Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Canada

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Serving GOVERNMENT, Serving CANADIANS.

SPECIFICATION

VAC BRANDON RETROFIT
Veterans Affairs Canada (VAC)

Project No. R.080396.009
Main Floor, 1039 Princess Avenue
Brandon, Manitoba

Solicitation No. ET

PART 1- GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises office fit-up for Veterans Affairs Canada, located at Main Floor, 1039 Princess Avenue, Brandon, Manitoba; and further identified as VAC Brandon Fit-up.

1.2 CONTRACTOR USE OF PREMISES

.1 The majority of the renovation work will be in vacant space until Substantial Performance.

.2 Some related work will be required in occupied areas as indicated outside of the main renovation area.

.3 Limit use of premises for Work, for storage and for access, to allow:
- .1 Partial owner occupancy.
- .2 Public usage.

.4 Co-ordinate use of premises under direction of Departmental Representative.

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

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

1.3 OWNER FURNISHED ITEMS

.1 Owner Responsibilities:
- .1 Arrange and pay for delivery to site in accordance with Progress Schedule.
- .2 Receive and unload products at site.
- .3 Inspect deliveries.
- .4 Arrange for replacement of damaged, defective or missing items.
- .5 Handle products at site, including uncrating and storage.
- .6 Assemble, install, connect, adjust, and finish products.

.2 Contractor Responsibilities:
- .1 Designate delivery date for each product in progress schedule.
- .2 Submit to Consultant notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
- .3 Protect products from damage, and from exposure to elements.
- .4 Be responsible for costs to repair or replace items damaged by Contractor or subcontractor on site (under his control).

.3 Schedule of Owner furnished items:
- .1 Furnishings.
  - .1 Reception: workstation and cabinets.
  - .2 Meeting Room: table and chairs.

.3 Interview Room: table and chairs.
.4 Waiting Room: table and chairs.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to building operations, occupants, public and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

1.5 EXISTING SERVICES

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

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative ten (10) working days' notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to tenant operations.

.3 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.

.4 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to Departmental Representative.

.5 Provide temporary services when directed by Departmental Representative to maintain critical building and tenant systems.

.6 Where unknown services are encountered, immediately advise departmental Representative and confirm findings in writing.

.7 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.8 Record locations of maintained, re-routed and abandoned service lines.

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

1.6 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:
.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed Shop Drawings.
.5 List of Outstanding Shop Drawings.
.6 Change Orders.
.7 Other Modifications to Contract.
.8 Copy of Approved Work Schedule.

.9 Health and Safety Plan and Other Safety Related Documents.
.10 Other documents as specified.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

PART 1 - GENERAL

1.1 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Maintain existing services to building and do not disrupt personnel and vehicle access.

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

.4 Departmental Representative will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.

.5 Closures: protect work temporarily until permanent enclosures are completed.

1.2 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to building operations, occupants, public and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

1.3 EXISTING SERVICES

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

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative ten (10) working days' notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions to a minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

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

1.4 SPECIAL REQUIREMENTS

.1 Requirement for Contractor to hire a Commissionaire:

.1 For all after-hours and week-end Work, the Contractor must be accompanied by a Commissionaire.

.1 Regular working hours are: 8:00 am to 4:30 pm.

.2 Carry out work in occupied areas, including painting, on Saturdays, Sundays and statutory holidays accompanied by a Commissionaire.

.3 Carry out noise generating and odour-producing Work Monday to Friday from 6:00 pm to 07:00 am and on Saturdays, Sundays and statutory holidays accompanied by a Commissionaire.

.2 It is the Contractor’s responsibility to arrange, schedule and pay for all required services of a Commissionaire.
.3 Submit schedule in accordance with Section 01 32 16 - Construction Progress Schedule - Bar (GANTT) Chart.

.2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.3 Keep within limits of work and avenues of ingress and egress.

.4 Ingress and egress of Contractor vehicles at site as directed by Departmental Representative.

.5 Deliver materials outside of office hours unless otherwise approved by Departmental Representative.

1.5 SECURITY

.1 Requirements for hiring a Commissionaire:
.1 It is the Contractor’s responsibility to schedule and pay for the services of a Commissionaire as follows:
.1 Where security has been reduced by Work of Contract.
.2 Where after-hours and week-end Work is required.

.2 Security clearances:
.1 Personnel employed on this project will not be subject to security check.

1.6 BUILDING SMOKING ENVIRONMENT

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

1.1 ADMINISTRATIVE

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

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

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

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

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

1.2 PRECONSTRUCTION MEETING

.1 Within seven (7) days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

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

.3 Establish time and location of meeting and notify parties concerned minimum five (5) days before meeting.

.4 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 – Construction Progress Schedule.

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

.4 Requirements for temporary facilities, in accordance with Section 01 52 00 - Construction Facilities.

.5 Delivery schedule requirements for Departmental Representative provided products in accordance with Section 01 11 00 – Summary of Work.

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

.7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime,

administrative requirements.
.8 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
.9 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
.10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
.11 Monthly progress claims, administrative procedures, photographs, hold backs.
.12 Appointment of inspection and testing agencies or firms.
.13 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work, schedule progress meetings every two weeks.

.2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.

.3 Notify parties minimum five days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within two days after meeting.

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

PART 1 - GENERAL

1.1 DEFINITIONS

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

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

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

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

1.2 REQUIREMENTS

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

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately ten (10) working days, to allow for progress reporting.

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit to Departmental Representative within five (5) working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

.3 Submit Project Schedule to Departmental Representative within five (5) working days of receipt of acceptance of Master Plan.

1.4 PROJECT MILESTONES

.1 Indicate project milestones that form interim targets for Project Schedule.

.2 Indicate Commissioning.

.3 Indicate Interim Certificate (Substantial Completion).

1.5 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Departmental Representative will review and return revised schedules within five (5) working days.

.3 Revise impractical schedule and resubmit within three (3) working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

.1 Award.
.2 Shop Drawings, Samples.
.3 Permits.
.4 Mobilization.
.5 Interior Architecture (Walls, Floors and Ceiling).
.6 Lighting.
.7 Electrical.
.8 Piping.
.9 Controls.
.10 HVAC
.11 Millwork.
.12 Fire Systems.
.13 Testing and Commissioning.
.14 Long delivery items.

1.7 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.8 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

PART 1 - GENERAL

1.1 ADMINISTRATIVE

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

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

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

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

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

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

.7 Verify field measurements and affected adjacent Work are co-ordinated.

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

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

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

1.2 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 Canada where required.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or

equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow ten (10) days for Departmental Representative's review of each submission.

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

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

.7 Accompany submissions with transmittal letter, containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

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

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

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

.11 Submit electronic copies of product data sheets or brochures for

requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
- .2 Testing must have been within three (3) years of date of contract award for project.

.13 Submit [6] [electronic] copies of certificates for requirements requested in specification Sections and as requested by [Departmental Representative] [DCC Representative] [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.

.14 Submit electronic copies of manufacturer’s instructions for requirements requested in specification Sections and as requested by Departmental Representative.
- .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

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

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

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

.18 Delete information not applicable to project.

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

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

.21 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.

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

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

1.3 SAMPLES

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

.2 Deliver samples prepaid to address as directed by Departmental Representative.

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

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

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

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

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

1.4 MOCK-UPS

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 REFERENCES

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

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 and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit electronic copies of WHMIS MSDS.

.3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.

.4 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

.5 Address topics at level of detail commensurate with environmental issue and required construction task.

.6 Include in Environmental Protection Plan:
.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
.2 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
.3 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
.4 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

1.3 FIRES

.1 Fires and burning of rubbish are not permitted.

1.4 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection Plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
.1 Take action only after receipt of written approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Ensure sanitary sewers remain free of waste and volatile materials disposal.

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

PART 1 - GENERAL

1.1 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:
.1 Contract documents.
.2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

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

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

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

1.3 BUILDING SMOKING ENVIRONMENT

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

PART 1 - GENERAL

1.1 INSPECTION

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

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

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

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

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 Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

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 Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

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

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

1.5 REPORTS

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

.2 Provide copies to subcontractor of work being inspected or tested.

1.6 EQUIPMENT AND SYSTEMS

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

.2 Refer to related Sections for definitive requirements.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

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 Departmental Representative will provide supply of potable water for construction use.

1.3 TEMPORARY POWER AND LIGHT

.1 Departmental Representative will provide temporary power during construction for temporary lighting and operating of power tools.

.2 Arrange for connection. Pay costs for installation, maintenance and removal.

.3 Provide and maintain temporary lighting throughout project.

1.4 TEMPORARY HEATING, VENTILATION AND AIR CONDITIONING

.1 Provide ventilation in enclosed areas as required to:

.1 Provide adequate ventilation to meet health regulations for safe working environment.

.2 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 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

1.5 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary telephone, fax, data, e-mail, internet access hook up, lines, equipment necessary for own use.

1.6 FIRE PROTECTION

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

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

PART 1 - GENERAL

1.1 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.2 LADDERS

.1 Provide and maintain ladders.

1.3 SITE STORAGE/LOADING

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

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

1.4 CONSTRUCTION PARKING

.1 Parking will not be permitted on site.

.2 Maintain adequate access to project site.

1.5 OFFICES

.1 An office trailer is not required.

.2 Maintain an office area within the construction space for viewing and neatly storing construction documents. Provide marked and fully stocked first-aid case in a readily available location.

1.6 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

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

.3 There is no space on the parking lot for storage of tools and materials.

1.7 SANITARY FACILITIES

.1 Sanitary facilities within the facility may be used by for work force.

.2 Use facilities as indicated by Departmental Representative.

.3 Maintain facilities in clean, sanitary condition.

1.8 CONSTRUCTION SIGNAGE

.1 No signs or advertisements, other than warning 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 Departmental Representative.

1.9 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.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

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 DUST TIGHT SCREENS

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

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

1.3 FIRE ROUTES

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

1.4 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

.2 Be responsible for damage incurred.

1.5 PROTECTION OF BUILDING FINISHES

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

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Departmental Representative locations and installation schedule ten (10) days prior to installation.

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

1.6 WASTE MANAGEMENT AND DISPOSAL

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

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 REFERENCES

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

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

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

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

1.2 QUALITY

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

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

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

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

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

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

1.3 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 on flat, solid supports and keep clear of ground.

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

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

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

1.4 TRANSPORTATION

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

.2 Transportation cost of products supplied by Owner will be paid for by Departmental Representative.

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 Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.

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

1.6 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 Departmental Representative if required

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

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

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

1.7 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 conduit, pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

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

1.9 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 Departmental Representative 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 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.

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

.5 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 Departmental Representative.

1.14 EXISTING UTILITIES

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

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

PART 1 - GENERAL

1.1 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 PREPARATION

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

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

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

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

1.3 EXECUTION

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

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

.3 Uncover Work to install ill-timed Work.

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

.5 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 Employ original installer to perform cutting and patching for sight-exposed surfaces.

.8 Pneumatic or impact tools are not allowed without prior approval.

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

.10 Seal and fit Work weather tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

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

1.4 WASTE MANAGEMENT AND DISPOSAL

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

1.5 EXCESS MATERIAL

.1 Remove all excess other material to off-site.

PART 1 - GENERAL

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

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

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

.5 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.6 Dispose of waste materials and debris off site.

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

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

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

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

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

1.2 FINAL CLEANING

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

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

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

.4 Remove waste products and debris.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

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

.7 Clean and polish glass, hardware, stainless steel, chrome, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, walls, floors and ceilings.

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

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

.11 Prepare floor finishes, as recommended by manufacturer.

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

1.3 WASTE MANAGEMENT AND DISPOSAL

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

PART 1 - GENERAL

1.1 WASTE MANAGEMENT GOALS

.1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be project generated.

.2 PWGSC's waste management goal: to divert a minimum 75 percent of total Project Waste from landfill sites. Prior to project completion provide Departmental Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced. The overall waste diversion goal for this project is 75%.

.3 Specific material target percentages for reuse and/or recycling:
.1 Ceilings and walls: 75%.
.2 Metals: 75%.
.3 Doors and windows: 75%.
.4 Electrical - lighting: 80%.
.5 Packaging: 75%.

.4 Target percentage goals are achievable for waste diversion. Contractor to review and confirm Departmental Representative's Waste Audit acceptable values.

.5 Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.

.6 Protect environment and prevent environmental pollution damage.

1.2 REFERENCES

.1 Definitions:
.1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the Departmental Representative.
.2 Class III: non-hazardous waste - construction renovation and demolition waste.
.3 Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities
.4 Inert Fill: inert waste - exclusively asphalt and concrete.
.5 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.
.6 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

.7 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.8 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.9 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.10 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.11 Separate Condition: refers to waste sorted into individual types.

.12 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.

.13 Waste Audit (WA): detailed inventory of estimated quantities of waste materials that will be generated during construction, demolition, deconstruction and/or renovation. Involves quantifying by volume/weight amounts of materials and wastes that will be reused, recycled or landfilled. Refer to Schedule A.

.14 Waste Diversion Report: detailed report of final results, quantifying cumulative weights and percentages of waste materials reused, recycled and landfilled over course of project. Measures success against Waste Reduction Workplan (WRW) goals and identifies lessons learned.

.15 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating required submittal and reporting requirements.

.16 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials generated by project. Specifies diversion goals, implementation and reporting procedures, anticipated results and responsibilities. Waste Reduction Workplan (Schedule B) information acquired from Waste Audit.

.2 Reference Standards:

.1 Public Works and Government Services Canada (PWGSC)

.1 2002 National Construction, Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.

.2 CRD Waste Management Market Research Report (available from PWGSC's Environmental Services).

.3 Sustainable Development Strategy 2007-2009: Target 2.1 Environmentally Sustainable Use of Natural Resources.

.1 Real Property projects over $1 million and in communities where industrial recycling is supported, implementation of CRD waste

management practices will be completed, with waste materials being reused or recycled.
.2 Contractually ensure resources used in construction or maintenance are consumed and recovered in a sustainable manner.

1.3 DOCUMENTS

.1 Post and maintain in visible and accessible area at job site, one copy of following documents:
.1 Waste Audit (Schedule A).
.2 Waste Reduction Workplan (Schedule B).
.3 Waste Source Separation Program.
.4 Schedules A and B completed for project.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Prepare and submit following prior to project start-up:
.1 1 electronic copy of completed Waste Audit (WA): Schedule A.
.2 1 electronic copy of completed Waste Reduction Workplan (WRW): Schedule B.
.3 1 electronic copy of Waste Source Separation Program (WSSP).

.3 Prepare and submit, throughout project or at intervals agreed to by Departmental Representative the following:
.1 Receipts, scale tickets, waybills, and/or waste disposal receipts that show quantities and types of materials reused, recycled, or disposed of.
.2 Updated Waste Materials Tracking form (Schedule D).
.3 Written monthly summary report detailing cumulative amounts of waste materials reused, recycled and landfilled, and brief status of ongoing waste management activities.

.4 Submit prior to final payment the following:
.1 Waste Diversion Report, indicating final quantities by material types salvaged for reuse, recycling or disposal in landfill and recycling centres, re-use depots, landfills and other waste processors that received waste materials (See Schedule C).
.2 Provide receipts, scale tickets, waybills, waste disposal receipts that confirm quantities and types of materials reused, recycled or disposed of and destination.

1.5 WASTE AUDIT (WA)

.1 WA provides detailed inventory, estimated quantities and types of waste materials that will be generated as well as their potential to be reused and/or recycled and project's waste diversion goals and objectives.

.2 After award of contract, contractor to review WA and confirm that anticipated quantities of waste generated are accurate and goals achievable.

.3 If after review, contractor determines that indicated quantities or opportunities in WA are not accurate or achievable, contractor to provide written details of discrepancies and revised quantities for areas of concern. Contractor to meet with Departmental Representative to review and justify revisions.

.4 Post on-site WA where contractor and sub-contractors are able to review content.

1.6 WASTE REDUCTION WORKPLAN (WRW)

.1 Prepare and submit WRW (Schedule B) at least 10 days prior to project start-up.

.2 WRW identifies strategies to optimize diversion through reduction, reuse, and recycling of materials and comply with applicable regulations, based on information acquired from WA.

.3 WRW should include but not limited to:
.1 Applicable regulations.
.2 Specific goals for waste reduction, identify existing barriers and develop strategies to overcome them.
.3 Destination of materials identified.
.4 Deconstruction/disassembly techniques and schedules.
.5 Methods to collect, separate, and reduce generated wastes.
.6 Location of waste bins on-site.
.7 Security of on-site stock piles and waste bins.
.8 Protection of personnel, sub-contractors.
.9 Clear labelling of storage areas.
.10 Training plan for contractor and sub-contractors.
.11 Methods to track and report results reliably (Schedule D).
.12 Details on materials handling and removal procedures.
.13 Recycler and reclaimer requirements.
.14 Quantities of materials to be salvaged for reuse or recycled and materials sent to landfill.
.15 Requirements for monitoring on-site wastes management activities.

.4 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.

.5 Post WRW or summary where workers at site are able to review content.

.6 Monitor and report on waste reduction by documenting total volume and cost of actual waste removed from project (Schedule D).

1.7 WASTE SOURCE SEPARATION PROGRAM (WSSP)

.1 As part of Waste Reduction Workplan, prepare WSSP prior to project start-up.

.2 WSSP will detail methodology and planned on-site activities for separation of reusable and recyclable materials from waste intended for landfill.

.3 Provide list and drawings of locations that will be made available for sorting, collection, handling and storage of anticipated quantities of reusable and recyclable materials.

.4 Provide sufficient on-site facilities and containers for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

.5 Locate containers to facilitate deposit of materials without hindering daily operations.

.6 Provide training for contractor sub-contractors and workers in handling and separation of materials for reuse and/or recycling.

.7 Locate separated materials in areas which minimizes material damage.

.8 Clearly and securely label containers to identify types/conditions of materials accepted and assist contractor sub-contractors and workers in separating materials accordingly.

.9 Monitor on-site waste management activities by conducting periodic site inspections to verify: state of signage, contamination levels, bin locations and condition, personnel participation, use of waste tracking forms and collection of waybills, receipts and invoices.

.10 On-site sale of salvaged materials is not permitted.

1.8 USE OF SITE AND FACILITIES

.1 Execute Work with minimal interference and disturbance to normal use of premises.

.2 Maintain security measures established by facility provide temporary security measures approved by Departmental Representative.

1.9 WASTE PROCESSING SITES

.1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of material for recycling.

1.10 QUALITY ASSURANCE

.1 After award of Contract, a mandatory site examination will be held for this Project for Contractor responsible for construction, renovation demolition/deconstruction waste management.

.1 Date, time and location will be arranged by Departmental Representative.

.2 Waste Management Meeting: Waste Management Co-ordinator is to provide an update on status of waste diversion and management activities at each meeting. Written monthly Waste Diversion Report summary to be provided by Waste Management Coordinator.

1.11 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.4 Protect structural components not removed and salvaged materials from movement or damage.

.5 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.

.6 Protect mechanical and electrical from damage.

.7 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.

.8 Separate and store materials produced during project in designated areas.

.9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
.1 On-site source separation is recommended.
.2 Remove co-mingled materials to off-site processing facility for separation.
.3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.
.4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

1.12 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste, volatile materials, mineral spirits, oil, paint thinner into waterways, storm, or sanitary sewers.

.3 Keep records of construction waste including:
.1 Number and size of bins.
.2 Waste type of each bin.
.3 Total tonnage generated.
.4 Tonnage reused or recycled.
.5 Reused or recycled waste destination.

.4 Remove materials on-site as Work progresses.

.5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in the waste audit.

1.13 SCHEDULING

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Do Work in compliance with WRW and WSSP.

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

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
.2 Source separate materials to be reused/recycled into specified sort areas.

3.3 DIVERSION OF MATERIALS

.1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative, and consistent with applicable fire regulations.
.1 Mark containers or stockpile areas.
.2 Provide instruction on disposal practices.

.2 On-site sale of salvaged, recovered, reusable, recyclable materials is not permitted.

3.4 WASTE DIVERSION

.1 At completion of Project, prepare written Waste Diversion Report

REPORT

indicating quantities of materials reused, recycled or disposed of as well as the following:

.1 Identify final diversion results and measure success against goals from Waste Reduction Workplan.

.2 Compare final quantities/percentages diverted with initial projections in Waste Audit and Waste Reduction Workplan and explain variances.

.1 Supporting documentation.

.2 Waybills and tracking forms.

.3 Description of issues, resolutions and lessons learned.

3.5 WASTE AUDIT (WA)

.1 Schedule A - Waste Audit (WA):

.2 Column-1 refers to the category of waste, and a physical description of the material (e.g. off-cuts, clean drywall). Column-2 refers to the total quantity of materials received by the Contractor. Measurement units must be specified. Column-3 refers to the estimated percentage of material that is waste. Column-4 refers to the total quantity of waste (column-2 x column-3). Column-5 refers to the areas(s) in which the waste was generated. Column-6 refers to the total percentage of recycled material from the specified total quantity of waste (column-4). Column-7 refers to the total percentage of reused material from the specified total quantity of waste (column-4).

3.6 WASTE REDUCTION WORKPLAN (WRW)

.1 Schedule B - Waste Reduction Workplan (WRW):

.2 Column-1 refers to the category and type of waste materials. Column-2 refers to the persons responsible for completing the WRW. Column-3 refers to Column-4 of Schedule A. Column-4 refers to the amount of reused waste predicted and realized. Column-5 refers to the amount of recycled waste predicted and realized. Column-6 refers to the approved recycling facility

3.7 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Government Chief Responsibility for the Environment:

.1 Manitoba:

.1 Manitoba Environment Building 2, 139 Tuxedo Avenue, Winnipeg, MB R3N 0H6.

.1 Telephone: 204-945-7100

.2 The Clean Environment Commission, 284 Reimer Avenue, Box 21420, Steinbach, MB R0A 2T3.

.1 Telephone: 204-326-2395.

PART 1 - GENERAL

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:
- .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
  - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
  - .2 Request Departmental Representative inspection.
- .2 Departmental Representative Inspection:
  - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
  - .2 Contractor to correct Work as directed.
- .3 Completion Tasks: submit written certificate that tasks have been performed as follows:
  - .1 Work: completed and inspected for compliance with Contract Documents.
  - .2 Defects: corrected and deficiencies completed.
  - .3 Equipment and systems: tested, adjusted and balanced and fully operational.
  - .4 Operation of systems: demonstrated to Owner's personnel.
  - .5 Commissioning of mechanical and electrical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements and copies of final Commissioning Report submitted to Departmental Representative.
  - .6 Work: complete and ready for final inspection.
- .4 Final Inspection:
  - .1 When completion tasks are done, request final inspection of Work by Departmental Representative.
  - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

1.2 FINAL CLEANING

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

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

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1- GENERAL

1.1 ADMINISTRATIVE REQUIREMENTS

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative for review, four final copies of operating and maintenance manuals in English and one copy on CD in PDF version.

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

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

1.3 FORMAT

.1 Organize data as instructional manual.

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

.3 When multiple binders are used correlate data into related consistent groupings.
.1 Identify contents of each binder on spine.

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

.5 Arrange content by systems, under Section numbers and sequence of

Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab.
.1 Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in DWG and PDF format on CD.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;
.1 Date of submission; names.
.2 Addresses, and telephone numbers of Consultants, Contractor and sub-contractors with name of responsible parties.
.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:
.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

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

.5 Typewritten Text: as required to supplement product data.
.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control

1.5 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Change Orders and other modifications to Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.
.1 Provide files and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

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

.4 Maintain record documents in clean, dry and legible condition.
.1 Do not use record documents for construction purposes.

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

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of black line opaque drawings and in copy of Project Manual.

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

.3 Record information concurrently with construction progress.
.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
.1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
.2 Field changes of dimension and detail.
.3 Changes made by change orders.
.4 Details not on original Contract Drawings.
.5 References to related shop drawings and modifications.

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

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

.7 Provide digital photos, if requested, for site records.

1.7 EQUIPMENT AND SYSTEMS

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

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

.3 Include installed colour coded wiring diagrams.

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

operating instructions and sequences.
.1 Include regulation, control, stopping, shut-down, and emergency instructions.
.2 Include summer, winter, and any special operating instructions.

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

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

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

.8 Include sequence of operation by controls manufacturer.

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

.10 Provide installed control diagrams by controls manufacturer.

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

.12 Include test and balancing reports as specified in Section 01 45 00 - Quality Control, 01 91 13 - General Commissioning (Cx) Requirements and 23 05 93 – Testing, Adjusting and Balancing for HVAC.

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

1.8 MATERIALS AND FINISHES

.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
.1 Provide information for re-ordering custom manufactured products.

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

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

1.9 MAINTENANCE MATERIALS

.1 Spare Parts:
.1 Provide spare parts, in quantities specified in individual specification sections.
.2 Provide items of same manufacture and quality as items in Work.
.3 Deliver to site boxed and labelled, place and store in location as directed.

.4 Receive and catalogue items.
.1 Submit inventory listing to Departmental Representative.
.2 Include approved listings in Maintenance Manual.
.5 Obtain receipt for delivered products and submit prior to final payment.

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

.3 Special Tools:
.1 Provide special tools, in quantities specified in individual specification section.
.2 Provide items with tags identifying their associated function and equipment.
.3 Deliver to site boxed and labelled, place and store in location as directed..
.4 Receive and catalogue items.
.1 Submit inventory listing to Departmental Representative.
.2 Include approved listings in Maintenance Manual.

1.10 DELIVERY, STORAGE AND HANDLING

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

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

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

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

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

1.11 WARRANTIES AND BONDS

.1 Assemble approved warranty information in binder, submit upon acceptance of work and organize binder as follows:
.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within [ten] days after completion of applicable item of work.
.4 Verify that documents are in proper form, contain full information, and are notarized.
.5 Co-execute submittals when required.
.6 Retain warranties and bonds until time specified for submittal.

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

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

.4 Include information contained in warranty management plan as follows:
.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
.2 Provide list for each warranted equipment, item, feature of construction or system indicating:
.1 Name of item.
.2 Model and serial numbers.
.3 Location where installed.
.4 Name and phone numbers of manufacturers or suppliers.
.5 Names, addresses and telephone numbers of sources of spare parts.
.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
.7 Cross-reference to warranty certificates as applicable.
.8 Starting point and duration of warranty period.
.9 Summary of maintenance procedures required to continue warranty in force.
.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
.11 Organization, names and phone numbers of persons to call for warranty service.
.12 Typical response time and repair time expected for various warranted equipment.
.3 Contractor's plans for attendance at 9 month post-construction warranty inspections.
.4 Procedure and status of tagging of equipment covered by extended warranties.
.5 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

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

.6 Written verification to follow oral instructions.
.1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.12 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Departmental Representative.

.2 Attach tags with copper wire and spray with waterproof silicone coating.

.3 Leave date of acceptance until project is accepted for occupancy.

.4 Indicate following information on tag:
.1 Type of product/material.
.2 Model number.
.3 Serial number.
.4 Contract number.
.5 Warranty period.
.6 Inspector's signature.
.7 Construction Contractor.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

PART 1- GENERAL

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Demonstrate operation and maintenance of equipment and systems to personnel minimum one week prior to date of substantial performance.

.2 Departmental Representative: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.

.3 Preparation:
.1 Verify conditions for demonstration and instructions comply with requirements.
.2 Verify designated personnel are present.
.3 Ensure equipment has been inspected and put into operation in accordance with related forms in Section 01 91 33 – Commissioning Forms.
.4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational.

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

.5 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment or system as follows:
.1 Section 08 71 13 – Power Door Operators: One half hour of instruction.
.2 Section 23 36 00 – Air Terminal Units: One half hour of instruction.
.3 Section 27 51 10 – Sound Masking System: One hour of instruction.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.

.3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
.1 Give time and date of each demonstration, with list of persons present.

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

1.3 QUALITY ASSURANCE

.1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
.1 Instruct Owner's personnel.
.2 Provide written report that demonstration and instructions have been completed.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

PART 1- GENERAL

1.1 ACRONYMS

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

1.2 GENERAL

.1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:
- .1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
- .2 Ensure appropriate documentation is compiled into the BMM.
- .3 Effectively train O&M staff.

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

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

1.3 COMMISSIONING OVERVIEW

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

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

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

.4 Departmental Representative will issue Interim Acceptance Certificate when:
.1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
.2 Equipment, components and systems have been commissioned.
.3 O&M training has been completed.

1.4 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

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

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

1.5 PRE-CX REVIEW

.1 Before Construction:
.1 Review contract documents, confirm by writing to Departmental Representative.
.1 Adequacy of provisions for Cx.
.2 Aspects of design and installation pertinent to success of Cx.

.2 During Construction:
.1 Co-ordinate provision, location and installation of provisions for Cx.

.3 Before start of Cx:
.1 Have completed Cx listing.
.2 Ensure installation of related components, equipment, and systems is complete.
.3 Fully understand Cx requirements and procedures.
.4 Have Cx documentation shelf-ready.
.5 Understand completely design criteria and intent and special features.
.6 Submit complete documentation to Departmental Representative.
.7 Ensure systems have been cleaned thoroughly.
.8 Complete TAB procedures on systems. Submit TAB reports to Departmental Representative for review and approval.
.9 Ensure "As-Built" system schematics are available.

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

1.6 CONFLICTS

.1 Report conflicts between requirements of this section and other

sections to Departmental Representative before start-up and obtain clarification.

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

1.7 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
.1 Submit:
.1 Name of Contractor's Cx personnel.
.2 Draft Cx documentation.
.3 Preliminary Cx schedule.
.2 Request in writing to Departmental Representative for changes to submittals and obtain written approval prior to start of Cx.
.3 Provide additional documentation relating to Cx process required by Departmental Representative.

1.8 COMMISSIONING DOCUMENTATION

.1 Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms for requirements and instructions for use.
.1 Departmental Representative to review and approve Cx documentation.
.2 Provide completed and approved Cx documentation to Departmental Representative.

1.9 COMMISSIONING SCHEDULE

.1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

.2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
.1 Approval of Cx reports.
.2 Verification of reported results.
.3 Repairs, retesting, re-commissioning, re-verification.
.4 Training.

1.10 STARTING AND TESTING

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

1.11 WITNESSING OF STARTING AND TESTING

.1 Provide 14 days' notice prior to commencement.

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

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

1.12 MANUFACTURER'S INVOLVEMENT

.1 Factory testing: manufacturer to:
.1 Arrange for Departmental Representative to witness tests.

.2 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Departmental Representative.
.1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
.2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.

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

.4 Qualifications of manufacturer's personnel:
.1 Experienced in design, installation and operation of equipment and systems.
.2 Ability to interpret test results accurately.
.3 To report results in clear, concise, logical manner.

1.13 PROCEDURES

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

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

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

.4 Document required tests on approved PV forms.

1.14 TEST RESULTS

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

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

1.15 START OF COMMISSIONING

.1 Notify Departmental Representative at least 10 days prior to start of Cx.

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

1.16 INSTRUMENTS / EQUIPMENT

.1 Provide the following equipment as required:
.1 Ladders.
.2 Equipment as required to complete work.

1.17 COMMISSIONING PERFORMANCE VERIFICATION

.1 Carry out Cx:
.1 Under actual / accepted simulated operating conditions, over entire operating range, in all modes.

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

.3 Follow equipment manufacturer's operating instructions.

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

1.18 WITNESSING COMMISSIONING

.1 Departmental Representative to witness activities and verify results.

1.19 AUTHORITIES HAVING JURISDICTION

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

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

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

1.20 COMMISSIONING CONSTRAINTS

.1 Since access into areas will be very difficult after occupancy, it is necessary to complete Cx in these areas before issuance of the Interim Certificate.

1.21 REPEAT VERIFICATIONS

.1 Assume costs incurred by Departmental Representative for third and subsequent verifications where:
.1 Verification of reported results fail to receive Departmental Representative's approval.
.2 Repetition of second verification again fails to receive approval.
.3 Departmental Representative deems Contractor's request for second verification was premature.

1.22 DEFICIENCIES, FAULTS, DEFECTS

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

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

1.23 COMPLETION OF COMMISSIONING

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

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

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

1.24 ACTIVITIES UPON COMPLETION OF COMMISSIONING

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

1.25 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

1.26 OCCUPANCY

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 INSTALLATION/, START-UP CHECK LISTS

.1 Commissioning forms to be completed for equipment, system and integrated system.

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

.3 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Departmental Representative supplemental additional data lists will be required for specific project conditions.

.4 Use check lists for equipment installation. Document check list verifying checks have been made. Indicate deficiencies and corrective action taken.

.5 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Departmental Representative. Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project.

.6 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

1.2 PRODUCT INFORMATION (PI) REPORT FORMS

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

.2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Departmental Representative's approval.

1.3 PERFORMANCE VERIFICATION (PV) FORMS

.1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.

.2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.

.3 Prior to PV of integrated system, complete PV forms of related systems and obtain Departmental Representative's approval.

1.4 SAMPLES OF COMMISSIONING FORMS

.1 Departmental Representative will provide to Contractor required project-specific Commissioning forms in electronic format. specification data.

.2 Revise items on Commissioning forms to suit project requirements.

.3 Samples of Commissioning forms produced to date are attached to this Section.

1.5 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS

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

1.6 COMMISSIONING FORMS

.1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.

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

1.7 LANGUAGE .1 To suit the language profile of the awarded contract.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

COMMISSIONING REPORT
DOOR OPERATIONS: PERFORMANCE TESTING
SCHEDULE OF SYSTEMS AND OPERATIONS FOR COMMISSIONING

DATE OF TEST:

VETERANS AFFAIRS CANADA FIT-UP
MAIN FLOOR - 810 PRINCESS STREET, BRANDON, MANITOBA

TEST PERFORMED BY:

		DESCRIPTION OF FUNCTIONS	Operator No.2 Door Designation D1	Operator No.1 Door Designation E1
1		**Power Door Operator Function: Manual**		
	1.1	Manually pushing door:		
	1.1a	- Activates opening cycle		
	1.1b	- Door closes after time delay expires (30% less than after pushplate activation)		
	1.1c	- Automatic operator delivers even consistent open force across entire transistion		
2		**Power Door Operator Function: Automatic**		
	2.1	**Opening force requirements:**		
	2.1a	- In event of power failure to the operator, door shall open with manual force max. 133N (30lbf)		
	2.2	**Opening speed requirements:**		
	2.2a	- Opening speed between 4.5 and 6 seconds		
	2.2a	- Closing speed between 4.5 and 6 seconds		
	2.3	**Time Delay:**		
	2.3a	- Adjustable from 5 seconds minimum (ANSI A156.19) to 30 seconds		
	2.4	**Safety feature:**		
	2.4a	- Prevents closing of door if obstruction in path, within doorway, within range indicated		
	2.4b	- Door reverses immediately if an object stops the door		
	2.5	**Closing time:**		
	2.5a	- Doors shall close from 90 degrees to 10 degrees in 3 seconds or longer		
	2.5b	- Doors shall close from 10 degrees to fully closed in not less than 1.5 seconds		
3		**Power Door Operator Function: Switching and Interface**		
	3.1	**Switching:**		
	3.1a	- Positive operation of 3-position toggle swith on operator (AUTOMATIC, OFF, HOLD-OPEN)		
	3.1b	- Positive operation push plate activating device(s)		
	3.2	**Interface:**		
	3.2a	- When door is in locked position, power to door operator is disengaged		
	3.2b	- When push plate is activated, electric strike is disengaged		
4		**Other:**		
	4.1	Is all required signage in place?		
	4.2	Are all safety systems operational?		
	4.3	Are AAADM Labels applied?		

VAV BOX
Static Verification

REVISION #: _____

NAME:	Greg Chan	CUSTOMER:	PWGSC
COMPANY:	Epp Siepman Engineering	PROJECT:	VAC-Brandon Fit-up
ADDRESS:	400-136 Market Avenue	FILE NUMBER:	16087
	Winnipeg, MB - Manitoba R3B 0P4	DATE:	

NAMEPLATE			
MANUFACTURER		EQUIPMENT NO.	
SERVICE		LOCATION	

VARIABLE AIR VOLUME BOX						
MANUFACTURER, MODEL & TYPE						**VAV**
LOCATION						
SIZE						
FLOW (L/S) (DESIGN/ACTUAL)						
INLET DUCT LENGTH (MIN. 4 X DUCT I)						
SILENCER/ACOUSTIC DUCT INSTALLED						
VAV BOX UNDAMAGED						
VAV BOX SUPPORTED CORRECTLY						
IDENTIFICATION TAGS VISIBLE						
CONTROLS ACCESSIBLE						

REHEAT COILS						**VAV**
PIPING CORRECT						
PIPING IDENTIFIED						
PIPING INSULATED						
DRAIN INSTALLED						
AIR VENT INSTALLED						
SHUT OFF VALVE INSTALLED						
ACCESS DOORS INSTALLED						

REHEAT COILS						**VAV**
CONTROL VALVE OPERATION						
CONTROLS VERIFIED						
ENTERING AIR TEMPERATURE AT MAXIMUM AIR FLOW						
EXITING AIR TEMPERATURE AT MAXIMUM AIR FLOW						

GENERAL COMMENTS:

VAV BOX
Static Verification

REVISION #: _____

NAME:	Greg Chan	CUSTOMER:	PWGSC
COMPANY:	Epp Siepman Engineering	PROJECT:	VAC-Brandon Fit-up
ADDRESS:	400-136 Market Avenue	FILE NUMBER:	16087
	Winnipeg, MB - Manitoba R3B 0P4	DATE:	

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		

LIGHTING and CONTROL
Funcational Performance Testing

REVISION #: __________

NAME:	Jose Aquino	CUSTOMER:	PWGSC
COMPANY:	Epp Siepman Engineering	PROJECT:	VAC-Brandon Fit-up
ADDRESS:	400-136 Market Avenue	FILE NUMBER:	16087
	Winnipeg, MB - Manitoba R3B OP4	DATE:	1/9/2016

Room No.	Controlled by	Lighting Levels [lx]		
		Average	**Maximum**	**Minimum**
Test instrument make and model No.				

GENERAL COMMENTS:
Test notes

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Contractors/Subcontractor		

EMERGENCY LIGHTING
Verification Form

REVISION #: _____

NAME:	Jose Aquino	CUSTOMER:	PWGSC
COMPANY:	Epp Siepman Engineering	PROJECT:	VAC-Brandon Fit-up
ADDRESS:	400-136 Market Avenue	FILE NUMBER:	16087
	Winnipeg, MB - Manitoba R3B OP4	DATE:	1/9/2016

Location			Battery Bank				Remote Heads		Exit Lights	
Room No.	Room Name	Min. Lighting Level [fc]	Watts	Test Switch	Pilot Light	Lamp Heads	Type	Qty	Type	Qty

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Contractors/Subcontractor		

EXIT SIGNS
Verification Form

REVISION #: _____

NAME:	Jose Aquino	CUSTOMER:	PWGSC
COMPANY:	Epp Siepman Engineering	PROJECT:	VAC-Brandon Fit-up
ADDRESS:	400-136 Market Avenue	FILE NUMBER:	16087
	Winnipeg, MB - Manitoba R3B OP4	DATE:	1/9/2016

Location:		**Equipment No.**	

Exit Sign	Specified	Shop Drawings	Installed
Manufacturer			
Style			
Type/Model No.			
Voltage			
Lamp Type			
Finish			

Exit Sign	Status	Comments
Normal Operation		
Emergency Operation		

GENERAL COMMENTS:

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Contractors/Subcontractor		

SOUND MASKING SYSTEM

Funcational Performance Testing

REVISION #: _____

NAME:	Jose Aquino	CUSTOMER:	PWGSC
COMPANY:	Epp Siepman Engineering	PROJECT:	VAC-Brandon Fit-up
ADDRESS:	400-136 Market Avenue	FILE NUMBER:	16087
	Winnipeg, MB - Manitoba R3B OP4	DATE:	1/9/2016

System Manufacturer: Equipment Location:

Installer: Floor:

VP Complete Yes ☐ No ☐ Building:

Room No.	Room Name (Location)	Sound Pressure Level (dB)	Comments

POSITION/TITLE	SIGNATURE	DATE
Building Owner/Representative		
Contractors/Subcontractor		

Brookfield Global Integrated Solutions - Equipment Data Collection Form (DCF) - Ver 1.2

ONLY EQUIPMENT THAT BROOK FIELD GIS IS RESPONSIBLE TO PERFORM PLANNED MAINTENANCE SHOULD BE RECORDED

GENERAL INFORMATION

Subm Date (Sep 22, 2010): _____ Project #: _____

CBG (ex: TD, CIBC, etc) **: _____ Requester Name **: _____

Client Building # **: _____ Requesters Phone #: _____

Building # **: _____ Building Address: _____

All O&M Binders should be submitted to the FM. Pdf versions can be submitted with this form to be stored on the Brookfield GIS Portal

** denotes mandatory field

EQUIPMENT INFORMATION

☐ Add Equipment ☐ Replace Old Equipment ☐ Update Equipment ☐ Inactivate Equipment (info retained)

Current Building Item ID# (if known): _____ Criticality (1-Critical, 2-Minimal Impact, 3-Non-Critical): _____

Building Item (Equip) Description **: _____

Belongs to Equipment ID: _____

Specific Location of Equip **: _____

What does this equipment service? (ex: Air Conditioning Unit serving LAN Room) _____

System Type (2 digits): _____

Building Item Type (3 digits): _____

Client ID#: _____

Manufacturer Name: _____

Model: _____

Serial #: _____

Note: These fields are mandatory for all HVAC products containing refrigerant *

Tonnage: _____

Ref Capacity (kg): _____

Refrigerant Type: _____

ODP Tag #: _____

ODP Tag Date: _____

WARRANTY INFORMATION

Warrantor Name: _____ Install Date: _____

Warranty/Terms: _____ Warranty Expiry Date: _____

Estimate Service Life (Years): _____

SPECIFIC EQUIPMENT INFORMATION

Volts: _____ Phase: _____ FLA: _____

Filter Size (hxwxthk): _____ Belt Size: _____ HP/Watt: _____

Filter Quantity: _____ Belt Quantity: _____ BTU/Watt: _____

Energy Source: ☐ NATURAL GAS ☐ OIL ☐ PROPANE ☐ ELECTRIC

REQUESTER COMMENTS

_____

_____

_____

PM SCHEDULING INFORMATION (Optional)

Please fill in date Annual should be performed in as well as any service provider if known

Service Provider 1: _____ First Date: _____ Frequency: _____ ***

Service Provider 2: _____ First Date: _____ Frequency: _____ ***

Service Provider 3: _____ First Date: _____ Frequency: _____ ***

*** **Available: Daily, Weekly, Bi-Weekly (every 2 wks), Monthly, Bi-Monthly (every 2 mos), Quarterly, Semi-Annual, Annual, 2 Year, 3 Year, 5 Year, 6 Year, 10 Year, 12 Year, 15 Year**

Return all completed forms to GOC.CMMS@Brookfieldgis.com, enter the region in the subject line of the email

PART 1 - GENERAL

1.1 REFERENCES

.1 CSA International
- .1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
- .2 CSA O121-08, Douglas Fir Plywood.
- .3 CSA O141-05(R2009), Softwood Lumber.

.2 National Lumber Grades Authority (NLGA)
- .1 Standard Grading Rules for Canadian Lumber [2010].

1.2 QUALITY ASSURANCE

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

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

.3 Plywood, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA standards.

1.3 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 LUMBER MATERIAL

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:
- .1 CSA O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.
- .3 CAN/CSA-Z809 or FSC or SFI certified.

.2 Furring, blocking, nailing strips, rough bucks.
- .1 S2S is acceptable.
- .2 Board sizes: "standard" or better grade.
- .3 Dimension sizes: "standard" light framing or better grade.

2.2 PANEL MATERIALS

.1 Douglas fir plywood: to CSA O121, Good-One-Side.
- .1 Urea-formaldehyde free.

2.3 ACCESSORIES

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

.2 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

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

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Comply with requirements of NBC, supplemented by the following paragraphs.

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

.3 Align and plumb faces of furring and blocking to tolerance of 1:600.

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

.5 Install nailers and other wood supports as required and secure using steel fasteners.

3.2 ERECTION

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

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

3.3 SCHEDULES

.1 Provide electrical equipment backboards for mounting electrical equipment as indicated. Use 19 mm thick plywood on 19 x 38 mm furring around spacing, perimeter and at maximum 300 mm intermediate.

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International
.1 ASTM C 423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
.2 ASTM C 553-13, Standard Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
.3 ASTM C 1320-10, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.

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 blanket insulation and fasteners. Include product characteristics, performance criteria, physical size, finish and limitations.

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

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

1.3 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, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect specified materials.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

PART 2 - PRODUCTS

2.1 INSULATION

.1 Batt and blanket mineral fibre: to ASTM C 553, ASTM C 665 and CAN/ULC-S702.
- .1 Type: 1.
- .2 Density: 45 kgs/m3.
- .3 Flame spread index: 0.
- .4 Smoke developed index: 0.
- .5 Acoustical performance:
  - .1 Sound absorption coefficients: to ASTM C423.
  - .2 Airborne sound transmission loss: to ASTM E90.
  - .3 Rating sound insulation: to ASTM E413.
- .6 Thickness: as indicated.

2.2 ACCESSORIES

.1 Source quality control: insulation components and accessories to be supplied or approved in writing by single manufacturer.

.2 Mechanical fastener: in accordance with insulation manufacturer's written recommendations.

.3 Acoustical sealant: in accordance with Section 07 92 00 – Acoustical Joint Sealants.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for blanket insulation application in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSULATION INSTALLATION

.1 Install in accordance with manufacturer's written recommendations.

.2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.3 Do not compress insulation to fit into spaces.

.4 Keep insulation minimum 75 mm from heat emitting devices such as

recessed light fixtures.

.5 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

.6 Seal joints with acoustical sealant in accordance with Section 07 92 00 – Joint Sealants.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

PART 1- GENERAL

1.1 REFERENCES

.1 ASTM International
.1 ASTM C 919-08, Standard Practice for Use of Sealants in Acoustical Applications.
.2 ASTM C 834, Standard Specification for latex-Based Sealing Compounds.

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

.3 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

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 acoustical sealant, putty and backer rod. Include product characteristics, performance criteria, physical size, finish and limitations.
.2 Manufacturer's product to describe:
.1 Caulking compound.
.2 Primers.
.3 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 43 - Environmental Procedures.

.3 Manufacturer's Installation Instructions:
.1 Submit manufacturer’s installation instructions for each product used.

1.3 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for 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 indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect sealants.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.5 SITE CONDITIONS

.1 Ambient Conditions:
.1 Proceed with installation of acoustical sealants only when:
.1 Joint substrates are dry.
.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.2 Joint-Width Conditions:
.1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:
.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

.1 Do not use product that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

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

2.2 SEALANT MATERIAL

.1 Acoustical sealant:
.1 Acrylic latex-based sound caulk, non-hardening, non-staining,

DESIGNATIONS

to ASTM C 834, Standard Specification for latex-Based Sealing Compounds, tested in accordance with ASTM: C 731,C 732, C 733, C 734, C736, D 217, D 3302, D 2203, D2377, E 90.

2.3 JOINT CLEANER

.1 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 Visually inspect substrate.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 SURFACE PREPARATION

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

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

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

.4 Ensure joint surfaces are dry.

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

3.3 PRIMING

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

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

3.4 MIXING

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

3.5 APPLICATION

.1 Accoustical Sealant:
.1 Apply acoustical sealant in accordance with ASTM C 919 and manufacturer's written instructions.
.2 Mask as required to provide neat application.
.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.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.
.2 Clean adjacent surfaces immediately.
.3 Remove excess and droppings, using recommended cleaners as work progresses.
.4 Remove masking tape after initial set of sealant.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

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

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

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM A 653/A 653M-[06a], Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)
.1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.4 Canadian Steel Door Manufacturers' Association (CSDMA)
.1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.

.5 South Coast Air Quality Management District (SCAQMD), California State
.1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Provide product data: in accordance with Section 01 33 00 - Submittal Procedures.

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

1.3 DELIVERY, STORAGE AND HANDLING

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

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

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Hot dipped galvanized steel sheet: to ASTM A 653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.

2.2 PRIMER

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

2.3 PAINT

.1 Field paint steel frames in accordance with Section 09 91 23 - Interior Painting. Protect door hardware from paint. Provide final finish free of scratches or other blemishes.

2.4 ACCESSORIES

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

.2 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.

.3 Glazing: safety glass, tempered in accordance with Section 08 80 50 – Glazing.

.4 Make provisions for glazing as indicated and provide necessary glazing stops.
.1 Provide removable stainless steel glazing beads for use with glazing tapes and compounds and secured with countersunk stainless steel screws.

2.5 FRAMES FABRICATION GENERAL

.1 Fabricate frames in accordance with CSDMA specifications.

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

.3 Interior frames: 1.6 mm welded type construction.

.4 Blank, reinforce, drill and tap frames for mortised, templated hardware, and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.

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

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

.7 Conceal fastenings except where exposed fastenings are indicated.

.8 Provide factory-applied touch up primer at areas where zinc coating

has been removed during fabrication.

2.6 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.

2.7 FRAMES: WELDED TYPE

.1 Welding in accordance with CSA W59.

.2 Full profile welded: Accurately saw-mitre frame product and continuously weld on inside of profile.
.1 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.
.2 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

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

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

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION GENERAL

.1 Install and frames to CSDMA Installation Guide.

3.3 FRAME INSTALLATION

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

.2 Secure anchorages and connections to adjacent construction.

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

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

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

3.4 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

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

3.5 GLAZING

.1 Install glazing for frames in accordance with Section 08 80 50 - Glazing.

PART 1- GENERAL

1.1 REFERENCES

.1 Architectural Woodwork Manufacturers Association of Canada (AWMAC).
- .1 Quality Standards for Architectural Woodwork 1998.

.2 Canadian General Standards Board (CGSB).
- .1 CAN/CGSB-71.19-M88, Adhesive, Contact, Sprayable.
- .2 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.

.3 Canadian Standards Association (CSA International).
- .1 CAN/CSA O132.2 Series-90(R1998), Wood Flush Doors.

.4 Environmental Choice Program (ECP).
- .1 CCD-045-92, Sealants and Caulking Compounds.
- .2 CCD-046-92, Adhesives.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures for doors, metal vision panel frame and glass, perimeter gasketing components and door bottoms.
- .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
  - .1 For door materials and adhesives.

.2 Shop Drawings:
- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate door types and cutouts for lights, sizes, core construction and general construction.
  - .1 Indicate sound transmission class and accessories: gasketing and door bottom.

.3 Manufacturer's Instructions:
- .1 Submit manufacturer's installation instructions for all components including accessory door gaskets and door bottom.

1.3 QUALITY ASSURANCE

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

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Protection:
- .1 Protect doors from dampness. Arrange for delivery after work causing abnormal humidity has been completed.
- .2 Store doors in well ventilated room, off floor, in accordance

with manufacturer's recommendations.

.3 Protect doors from scratches, handling marks and other damage. Store doors away from direct sunlight.

1.5 WASTE MANAGEMENT AND DISPOSAL

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

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

.3 Unused or damaged glazing materials are not recyclable and must not be diverted to municipal recycling programs.

.4 Divert unused adhesive material from landfill to official hazardous material collections site.

.5 Do not dispose of unused paint materials into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 - PRODUCTS

2.1 ACOUSTIC-RATED WOOD DOORS

.1 Wood doors: tested in accordance with ASTM E-90-04 and 09 to achieve rating as scheduled.

.1 Doors and gaskets: to sound transmission class 46.

2.2 WOOD FLUSH DOORS

.1 Solid core: to CAN/CSA-O132.2.1.

.1 Construction: 5-ply.

.1 Core: particleboard, to ANSI A208.1 LD1.

.2 Stiles: strand composite lumber.

.3 Rails: hardwood.

.4 Stiles and rails securely bonded to core. Assembly sanded prior to application of faces.

.5 Blocking: as required to suit hardware.

.2 Face Panels:

.1 Hardwood; veneer grades: paint grade, birch species.

.3 Adhesive: Type 1 (waterproof).

.4 Finish: field paint wood doors in accordance with Section 09 91 23 - Interior Painting. Protect door hardware from paint. Provide final finish free of scratches or other blemishes.

2.3 WOOD FLUSH DOORS ACOUSTIC- RATED

.1 Acoustical composite core.

.1 Acoustical rating: STC 46 ASTM E90-04 and 09 – Operable.

.2 Construction: 5-ply.

.1 Core: acoustical material.

.2 Stiles: strand composite lumber.
.3 Rails: hardwood.
.4 Stiles and rails securely bonded to core. Assembly sanded prior to application of faces.
.5 Blocking: as required to suit hardware.
.3 Face Panels:
.1 Hardwood; veneer grades: paint grade, birch species.
.4 Adhesive: Type 1 (waterproof).
.5 Finish: field paint wood doors in accordance with Section 09 91 23 - Interior Painting. Protect door hardware from paint. Provide final finish free of scratches or other blemishes.

2.4 VISION PANEL (LITE)

.1 Vision frame:
.1 Material: 1.21 mm (18 gauge) cold rolled steel.
.2 Welded stiffener.
.3 Corners: mitred, no sharp edges.
.4 Fastening holes pre-drilled.
.5 Fasteners: supplied by manufacturer.
.6 Finish: factory prime painted
.1 Finish coat: field paint frame in accordance with Section 09 91 23 - Interior Painting.

.2 Glass:
.1 Safety glass: to CAN/CGSB-12.1, transparent, clear.
.1 Type 2-tempered.
.2 Class B-float.
.3 Category 11.
.4 Thicknesses: 6 mm.

2.5 ACCESSORIES FOR WOOD FLUSH DOORS ACOUSTIC- RATED

.1 Accessories:
.1 Perimeter gasketing: head, jamb, stop, to ANSI ROE154.
.1 Adhesive gasketing: self-adhesive perimeter seal.
.2 Colour: black.
.3 Width: 12.7 mm.
.4 Height: 9.5 mm.
.2 Acoustic corner pad.
.1 Polypropylene pile, adhesive backed, installed in conjunction with door bottom.
.2 Colour:black.
.3 Width: 31.8 mm.
.4 Height: 50.8 mm.
.3 Door bottom: automatic, non-handed, reversible, suitable for carpet floor finish.
.1 Case: clear anodized aluminium.
.2 Insert: black sponge neoprene and nylon brushes.
.3 Slotted holes for adjustment.
.4 Width: 24.6 mm.
.5 Height: 54 mm.
.6 Mounting: semi-mortised.
.7 Operation: moveable drop bar seal is actuated by plunger which contacts the jamb as the door is closing forcing

the drop bar seal down against the floor.

2.6 FABRICATION

.1 Vertical edge strips to match face veneer.

.2 Doors with lites:
- .1 Prepare door for glazing.
- .2 Provide door complete with vision panel frame and glass.

.3 Bevel vertical edges of single acting doors 3 mm in 50 mm on lock side and 1.5 mm in 50 mm on hinge side.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Unwrap and protect doors in accordance with CAN/CSA-O132.2 Series, Appendix A.

.2 Install doors and hardware in accordance with manufacturer's printed instructions and CAN/CSA-O132.2 Series, Appendix A.

.3 Adjust hardware for correct function.

3.3 ADJUSTMENT

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

3.4 CLEANING

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

.2 Remove traces of primer, caulking; clean doors and frames.

.3 Clean glass and glazing materials with approved non-abrasive cleaner.

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

PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
.1 ANSI/BHMA A156.1-2000, American National Standard for Butts and Hinges.
.2 ANSI/BHMA A156.2-2003, Bored and Preassembled Locks and Latches.
.3 ANSI/BHMA A156.3-2001, Exit Devices.
.4 ANSI/BHMA A156.4-2000, Door Controls - Closers.
.5 ANSI/BHMA A156.5-2001, Auxiliary Locks and Associated Products.
.6 ANSI/BHMA A156.6-2005, Architectural Door Trim.
.7 ANSI/BHMA A156.16-2002, Auxiliary Hardware.
.8 ANSI/BHMA A156.18-2006, Materials and Finishes.

.2 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
.1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

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 door hardware and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Hardware List:
.1 Submit contract hardware list.
.2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

.4 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.5 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.3 CLOSEOUT SUBMITTALS

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

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

1.4 MAINTENANCE MATERIALS SUBMITTALS

.1 Extra Stock Materials:
.1 Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
.2 Tools:

.1 Supply 2 sets of wrenches for door closers, locksets and fire exit hardware.

1.5 QUALITY ASSURANCE

.1 Regulatory Requirements:
.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

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

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

.4 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 door hardware from nicks, scratches, and blemishes.
.3 Protect prefinished surfaces with strippable coating.
.4 Replace defective or damaged materials with new.

.5 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 HARDWARE ITEMS

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

2.2 DOOR HARDWARE

.1 Locks and latches:
.1 Bored and preassembled locks and latches: to ANSI/BHMA A156.2, series 4000 bored lock, grade 1, designed for function as stated in Hardware Schedule.

.2 ADA compliant.
.3 Lever handles: plain, with return at door.
.4 Roses: round.
.5 Normal strikes: box type, lip projection not beyond jamb.
.6 Cylinders: 6-pin security cylinders, construction cores. The building has a master key system with Primus security cylinders. New cylinders must be compatible.
.7 Backset: 95 mm.
.8 Finish: satin chromium plated.

.2 Butts and hinges:
.1 Butts and hinges: to ANSI/BHMA A156.1, designated by A 5112, size and finish, listed in Hardware Schedule, two permanently lubricated non-detachable ball bearings, stainless steel pins, hole in bottom for easy pin removal, full-mortise.
.2 Electric hinge: concealed wires for exit device monitor switch, full mortise, five knuckle exposed ball bearing, stainless steel, satin finish.

.3 Exit devices: to ANSI/BHMA A156.3, grade 1.
.1 Type rim exit device, function lever – night latch ANSI-09, no dogging, key retracts latch bolt, rim cylinder: 6-pin security cylinder with construction core, conventional stile design, finished to satin stainless steel, smooth mechanism case.
.2 Type rim exit device, dummy trim lever with style standard to match other lever sets, function ANSI-02 pull when dogged, cylinder dogging: 6-pin security cylinder with construction core, latch bolt monitor switch de-activating power door operator, escutcheon plate, non-handed, finished to satin stainless steel, smooth mechanism case.

.4 Door Closers and Accessories:
.1 Door controls (closers): to ANSI/BHMA A156.4, grade 1, size in accordance with ANSI/BHMA A156.4, table A1, finish: powder coated aluminium.

.5 Power Door Operators:
.1 Power assist and low energy power operated doors: refer to Section 08 71 13 – Power Door Operators.

.6 Auxiliary locks and associated products: to ANSI/BHMA A156.5, grade 1:
.1 Electric strike: for use with rim exit device on single door, hollow metal frame application, stainless steel construction, fail-secure, 12Volt DC, finish: stainless steel satin.
.2 Electric strike: for cylindrical lock on single door, hollow metal frame application, stainless steel construction, fail-secure, 12Volt DC, finish: stainless steel satin.

.7 Architectural door trim: to ANSI/BHMA A156.6.
.1 Door protection plates: kick plate, type solid, 1.57 mm thick stainless steel, radius corners, size: 300 mm high, material: solid stainless steel.

.8 Auxiliary hardware: to ANSI/BHMA A156.16.
.1 Stop floor-mounted: type solid one-piece casting heavy duty dome stop with 12.7 mm high matching riser, stainless steel.
.2 Door silencer: type rubber.

.9 Door bottom seal: adjustable automatic retract mechanism when door is open, refer to Section 08 14 16 – Flush Wood Doors.

.10 Weatherstripping/Perimeter Gasket Sound Seal:
.1 Head and jamb seal:
.1 Refer to Section 08 14 16 – Flush Wood Doors.

2.3 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

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

.3 Exposed fastening devices to match finish of hardware.

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

2.4 KEYING

.1 Supply construction cores.

PART 3 - EXECUTION

3.1 INSTALLATION

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

.2 Supply door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Supply manufacturers' instructions for proper installation of each hardware component.

.4 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

3.2 ADJUSTING

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

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

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

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.
.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
.3 Remove protective material from hardware items where present.
.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

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

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

3.5 HARDWARE SCHEDULE

.1 Hardware Schedule on drawings

PART 1 - GENERAL

1.1 REFERENCES

.1 Aluminum Association (AA)
.1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
.1 ANSI/BHMA A156.19-2013, American National Standard for Power Assist and Low Energy Power Operated Doors.

.3 American National Standards Institute (ANSI)
.1 ANSI A 117.1-2009, Accessible and Usable Buildings and Facilities.

.4 ASTM International
.1 ASTM B 209M-07, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
.2 ASTM B 221M-07, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

.5 National Research Council of Canada (NRC)
.1 MNECB-97, Model National Energy Code of Canada for Buildings.

.6 Underwriters' Laboratories (UL)
.1 UL C325, Electrical Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation:
.1 Convene pre-installation meeting minimum 1 week prior to beginning work of this Section and on-site installation, with Contractor's Representative to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building sub-trades.
.4 Review manufacturer's written installation instructions and warranty requirements.

.2 Ensure key personnel, site supervisor and subcontractor representatives attend.

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 power door operator and accessories and include

product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Verify actual dimensions by field measurements before preparation of shop drawings.
.2 Submit shop drawings indicating layout, dimensions, elevations, detail sections, special conditions, materials, finishes, accessories, including mounting heights, anchors and reinforcements, details of other pertinent components of the work, and adjacent construction to which work of this section is attached.
.3 Identify installation tolerances required, assembly conditions, routing of service lines, locations of operating components, controls and boxes.
.4 Indicate signage: materials, mounting, wording.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit project specific operation and maintenance data for power door operator system for incorporation into manual.

.3 Warranty: submit warranty documentation.

.4 Parts List: submit manufacturer's parts lists; include servicing frequencies, instructions for adjustment and operation applicable to each type of component or hardware, and name, address and telephone number of nearest authorized service representative.

1.5 MAINTENANCE MATERIAL SUBMITTALS

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

.2 Supply wrenches and tools required for maintenance of equipment.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements:
.1 Conform to applicable code requirements.

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

1.7 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect power door operators from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

PART 2 - PRODUCTS

2.1 SYSTEMS

.1 Design Requirements:
.1 Design power assist and low energy power operated doors to applicable requirements of ANSI/BHMA A156.19.
.2 Manually pushing door activates the automatic opening cycle: door closes after time delay expires.

.2 Performance Requirements:
.1 Automatic door equipment to accommodate medium frequency pedestrian traffic.
.2 Operator Equipment: CSA approved.
.3 Include fully adjustable operators for opening and closing speeds, checking speeds and hold open time.
.4 Operation requirements:
.1 Power Door Operator No.1:
.1 General notes:
.1 This is not an egress; it is provided as convenience for general circulation and more direct access to Washrooms located off the Rear Corridor.
.2 Automatic operator to function in one direction only.
.2 When door is operated from VAC Tenant Space to Rear Corridor:
.1 Barrier–free operation: Pushing activating device (pushbutton plate) disengages the electric strike and engages the automatic operator in one single operation.
.2 Regular operation: Pushing on lever disengages the latch and permits door to be opened manually. No activation of automatic operator function.
.3 When door is operated from Rear Corridor to VAC Tenant Space:
.1 For both barrier-free and regular operation: no automatic operator function. Activating card control device disengages the electric strike and allows manual access by

pulling on lever.

.2 Power Door Operator No.2:
.1 General notes:
.1 Automatic operator to function in both directions.
.2 Both sides of door:
.1 Barrier–free operation: Pushing activating device (pushbutton plate) engages the automatic operator when exit device is dogged open. When exit device is latched (after-hours), latching device is sending signal to door operator to turn off the power.

2.2 MATERIALS

.1 Aluminum Extrusions: alloy and temper recommended by producer or finisher for type of use and finish indicated, and to ASTM B 221 for Aluminum Association designation 6063-T5, minimum thickness 3 mm.

.2 Fasteners: aluminum, non-magnetic stainless steel, cadmium plated steel, or other non-corrosive metal fasteners compatible with aluminum components and adjacent materials/finishes, hardware, anchors and other items being fastened.

.3 Isolation Coating: zinc chromate primer to CGSB 1.132M.

2.3 DOOR HARDWARE

.1 As indicated on Door Schedule and Section 08 71 00 - Door Hardware for supply of finish hardware.

2.4 AUTOMATIC OPERATORS

.1 Visibly mounted, overhead operator for accommodating door action, push side mount.

.2 Header case: side access extruded aluminium clear anodized, standard size 102 mm wide x 152 mm high

.3 Fully adjustable without removal of doors. Supply adjustable speed control for checking opening and closing and length of time door remains open.

.4 On-Off-Hold Open: toggle switch at inside head of swinging doors.

.5 Emergency Stop: equip operators with safety device which shall cause the door to stop immediately with reversal of door motion should the door encounter an obstruction.

.6 Supply connections for power and control wiring to suit operations indicated.

.7 Supply for manual operation to suit operations indicated.

.8 Equip operators with current characteristics to suit building's electrical service.

.9 Controller protection:
- .1 Automatic reset on power-up.
- .2 Main fuse protection.
- .3 Electronic surge protection.
- .4 Internal power supply protection
- .5 Resettable sensor supply fuse protection.

2.5 OPERATOR POWER UNITS

.1 Electric operating mechanism, maximum current draw 3.15 amps.

.2 Opening action: 1/15 HP D.C. permanent magnetic motor working through reduction gears to an output shaft.

.3 Field adjustable closing action: field replaceable spring.

2.6 RELATED EQUIPMENT

.1 Activating Device:

.1 Push Switch: 159 mm diameter brushed stainless steel push plate.

.1 Recess wall mount on VAC tenant space side of opening, for wired connection to operator.

.1 Power Door Operator No.1: one only required, locate on VAC tenant space side of opening.

.2 Power Door Operator No.2: two required.

.2 With engraved blue coloured international symbol for accessibility.

.3 Refer to PART 2 – SYSTEMS – OPERATION REQUIREMENTS for interface requirements with electric strike.

.2 Electrical Interfaces:

.1 Supply devices which prevent activation of operator when door is locked, latched or bolted.

.2 Supply devices to suit operations indicated in PART 2 – SYSTEMS – OPERATION REQUIREMENTS.

2.7 ACCESSORIES

.1 Door Sign: Provide in accordance with requirement of ANSI/BHMA A156.10.

.1 Sign Material: self-adhesive type for mounting on door.

.2 Wording in French and English to suit operations. Submit wording to Departmental Representative for review and approval.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates are acceptable for power door operator installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate.
.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 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Install power door operators in accordance with shop drawings and manufacturer's instructions.

.3 Co-ordinate installation of components with related and adjacent work.

.4 Set work plumb, square, level, free from warp, twist and superimposed loads.

.5 Securely anchor work in required position.

.6 Apply isolation coating to separate aluminum and primed or galvanized steel surfaces at points of contact with cementitious materials.

.7 Install door operator system in accordance with manufacturer's instructions, including controls, control wiring.

3.3 ADJUSTING

.1 After repeated operation of completed installation equivalent to three days of use by normal traffic (100 to 300 cycles), readjust door operators and controls for optimum, smooth operating condition and safety. Lubricate hardware, operating equipment and other moving parts.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.
.2 Clean doors and frames.
.3 Clean aluminum surfaces promptly after installation. Exercise care to avoid damage to coatings.
.4 Remove protective material from prefinished aluminum surfaces.

.5 Wash exposed surfaces with mild solution of detergent and warm water, using soft, clean wiping cloths. Remove dirt from corners. Wipe surfaces clean.

.6 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 COMMISSIONING

.1 Commissioning of the power door operators is required in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and Section 01 91 33 – Commissioning Forms and Power Door Operator Commissioning Form sample attached.

.2 Commissioning shall be performed by the power operator manufacturer's representative in the presence of the General Contractor and the Departmental Representative.

.3 Commission power door operators with power door operator and all door hardware fully installed in accordance with related Commissioning Form sample.

3.6 DEMONSTRATION AND TRAINING

.1 Demonstrate operation, operating components, adjustment features, and lubrication requirements to Owner in accordance with Section 01 79 00 – Demonstration and Training.

3.7 PROTECTION

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

.2 Repair damage to adjacent materials caused by aluminum door and frame installation.

PART 1- GENERAL

1.1 REFERENCES

.1 ASTM International
.1 ASTM F 1233-08, Standard Test Method for Security Glazing Materials and Systems.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
.2 CAN/CGSB-12.8-97, Insulating Glass Units.
.3 CAN/CGSB-12.8-97 (Amendment), Insulating Glass Units.

.3 Environmental Choice Program (ECP)
.1 CCD-045-95(R2005), Sealants and Caulking Compounds.

.4 Glass Association of North American (GANA)
.1 GANA Glazing Manual - 2008.

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation:
.1 One week prior to work of this Section Contractor's Representative to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building sub-trades.
.4 Review manufacturer's written installation instructions and warranty requirements.

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 glass and glazing accessories. Include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing 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 off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect glazing from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Design Criteria:
.1 Limit glass deflection to flexural limit of glass with full recovery of glazing materials.
.2 Safety glass: to CAN/CGSB-12.1, transparent, clear.
.1 Type 2-tempered.
.2 Class B-float.
.3 Category 11.
.4 Thicknesses: 6 mm and 9 mm.

.2 Insulating Glass Units:
.1 Insulating glass units: to CAN/CGSB-12.8, double unit, 34 mm overall thickness.
.1 Glass: to CAN/CGSB-12.1.
.2 Glass thickness: 6 mm inner light and 9 mm outer light.
.3 Inter-cavity space thickness: 19 mm between inner and outer lights with spacers.

2.2 ACCESSORIES

.1 Setting blocks: EPDM.

.2 Spacer shims.

.3 Glazing tape:
.1 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides.

.4 Glazing clips: manufacturer's standard type.

.5 Lock-strip gaskets: to ASTM C 542.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.
.1 Verify that openings for glazing are correctly sized and within tolerance.
.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.2 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

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

.1 Perform work in accordance with GANA Glazing Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.

.3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.

.5 Place glazing tape on free perimeter of glazing in same manner described.

.6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

.7 Knife trim protruding tape.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.
.1 Remove glazing materials from finish surfaces.
.2 Remove labels.
.3 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.
.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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

Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

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

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

.3 Repair damage to adjacent materials caused by glazing installation.

PART 1 - GENERAL

1.1 REFERENCES

.1 Aluminum Association (AA)
.1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 ASTM International
.1 ASTM C 475-02(2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
.2 ASTM C 840-08, Standard Specification for Application and Finishing of Gypsum Board.
.3 ASTM C 954-07, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
.4 ASTM C 1047-09, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
.5 ASTM C 1280-99, Standard Specification for Application of Gypsum Sheathing.
.6 ASTM C1396/C1396M-09a, Standard Specification for Gypsum Wallboard.

.3 Association of the Wall and Ceilings Industries International (AWCI)
.1 AWCI Levels of Gypsum Board Finish-97.

.4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

.5 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S102-07, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

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 gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Moisture resistant board: moisture resistant gypsum core with coated fiberglass mats.
.1 Submit manufacturer's instructions handling and cutting instructions, installation instructions and finishing instructions.
.3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.

.3 Submit detailed materials and installation instructions for STC-Rated

Assembly, Sound Test Reference.

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 gypsum board assembly materials level, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect gypsum board from nicks, scratches, and blemishes.
.3 Protect from weather, elements and damage from construction operations.
.4 Handle gypsum boards to prevent damage to edges, ends or surfaces.
.5 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.4 AMBIENT CONDITIONS

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

.2 Apply board and joint treatment to dry surfaces.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

.1 STC-Rated Assemblies:
.1 For STC-rated assemblies, provide materials and construction matching those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent inspection agency with exceptions only as indicated.

2.2 MATERIALS

.1 Standard board: to ASTM C1396/C1396M regular, 16 mm thick, Type X, 1200 mm wide x maximum practical length, edges tapered.

.2 Moisture resistant board: to ASTM C1396/C1396M, moisture resistant gypsum core with coated fiberglass mats, 16 mm thick, 1200 mm wide x maximum practical length, edges tapered.
.1 To meet STC-Rated Assembly indicated in Performance Requirements.
.2 Greenguard Gold certified.
.3 Non-combustible in accordance with ASTM E 136 and CAN/ULC S114.
.4 Mold resistant to ASTM D 3273.

.3 Metal furring runners, hangers, tie wires, inserts and anchors.

.4 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.

.5 Steel drill screws: Type S drywall screws to ASTM C 1002.

.6 Casing beads, corner beads and edge trim: to ASTM C 1047, zinc-coated by hot-dip process, 0.5 mm base thickness, perforated flanges, one piece length per location.

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

.8 Joint compound: to ASTM C 475, asbestos-free.

2.3 FINISHES

.1 Texture finish: asbestos-free standard white texture coating and primer-sealer, recommended by gypsum board manufacturer.
.1 Primer: VOC limit 50 g/L maximum to SCAQMD Rule 1113.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates are acceptable for gypsum board assembly installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 ERECTION

.1 Do application and finishing of gypsum board to ASTM C 840 except where specified otherwise.

.2 Install work level to tolerance of 1:1200.

.3 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

.4 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

.5 Furr above suspended ceilings for security stops as indicated.

.6 Install wall furring for gypsum board wall finishes to ASTM C 840, except where specified otherwise.

.7 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.8 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

3.3 APPLICATION

.1 Apply gypsum board after anchors, blocking, sound attenuation, electrical and mechanical work has been approved.

.2 Apply, as indicated, single or double layer gypsum board, of type indicated, to metal furring or framing using as indicated using 25 mm Type S drywall screws for first layer and using 41 mm Type S drywall screws for second layer.

.1 Single-Layer Application:

.1 Apply gypsum board at ceilings prior to application of walls to ASTM C 840.

.2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.

.3 At sound rated partitions, stagger joints 600 mm each side of steel studs.

.4 Maximum spacing of screws: 203 mm on centre at vertical joints and 305 mm on centre at wall perimeter and intermediate studs.

.2 Double-Layer Application:

.1 Apply second layer of gypsum board, of type indicated, vertically or horizontally to one side where indicated, providing sheet lengths that will minimize end joints.

.2 Apply face layer joints offset at least 600 mm with base layer joints.

.3 Maximum spacing of screws: 305 mm on centre.

.3 STC-Rated Assembly:

.1 Apply, in accordance with manufacturer’s instructions, acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components.

.4 Install gypsum board on walls vertically to avoid end-butt joints.

.5 Install gypsum board with face side out.

.6 Do not install damaged or damp boards.

.7 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4 INSTALLATION

.1 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated.

.2 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.3 Gypsum Board Finish: finish gypsum board walls and bulkheads to following levels in accordance with AWCI Levels of Gypsum Board Finish:

.1 Level of finish:

.1 Level 5: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.

.4 Finish corner beads and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.5 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

.6 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.7 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

.8 Mix joint compound slightly thinner than for joint taping.

.9 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.

.10 Allow skim coat to dry completely.

.11 Remove ridges by light sanding or wiping with damp cloth.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

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

.2 Repair damage to adjacent materials caused by gypsum board assembly installations.

3.7 SCHEDULES

.1 STC-Rated Assemblies:

.1 Construct sound-rated assembly where indicated.

.1 Sound test reference: NRCC 817-NV with exception of steel stud spacing which is to be revised from 600 mm on centre to 400 mm on centre. All other requirements to remain.

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International
.1 ASTM C 645-11a, Standard Specification for Nonstructural Steel Framing Members.
.2 ASTM C 754-11, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.2 Environmental Choice Program (ECP)
.1 CCD-047-98(R2005), Architectural Surface Coatings.
.2 CCD-048-95(R2006), Surface Coatings - Recycled Water-Borne.

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

.4 The Master Painters Institute (MPI)
.1 Architectural Painting Specification Manual - current edition.
.1 MPI #26, Primer, Galvanized Metal, Cementitious.

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.2 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: 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 metal framing from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

.1 STC-Rated Assemblies:
.1 For STC-rated assemblies, provide materials and construction matching those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent inspection agency with exceptions only as indicated.

2.2 MATERIALS

.1 Non-load bearing channel stud framing: to ASTM C 645, 92 mm stud size, roll formed from 0.53 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board.
.1 Jambs: Use 0.91 mm thick steel sheet for single studs at jambs.
.2 Knock-out service holes at 460 mm centres.

.2 Floor and ceiling tracks: to ASTM C 645, in widths to suit stud sizes, 32 mm flange height.

.3 Metal channel stiffener: size as required, 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.

.4 Acoustical sealant: in accordance with Section 07 92 00 - Joint Sealants.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for non-structural metal framing application in accordance with manufacturer's written instructions.
.1 Visually inspect substrate.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 ERECTION

.1 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.

.2 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.
.1 Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's

instructions.

.3 Erect metal studding to tolerance of 1:1000.

.4 Attach studs to bottom ceiling track using Type S pan head screws.

.5 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.6 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.7 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified.
.1 Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.8 Install heavy gauge single jamb studs at openings.

.9 Erect track at head of door/window/sidelight openings and sills of window openings to accommodate intermediate studs.
.1 Secure track to studs at each end, in accordance with manufacturer's instructions.
.2 Install intermediate studs above and below openings in same manner and spacing as wall studs.

.10 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures attached to steel stud partitions.

.11 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.12 Extend partitions to ceiling height except where noted otherwise on drawings.

.13 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.
.1 Use double track slip joint.

.14 Install two continuous beads of acoustical sealant under studs and tracks around perimeter of sound control partitions.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by non-structural metal framing application.

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM C 423-02a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
.2 ASTM E 1264-98, Standard Classification for Acoustical Ceiling Products.
.3 ASTM E 1477-98a(2003), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

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

.3 Underwriter's Laboratories of Canada (ULC)
.1 CAN/ULC-S102-2003, Surface Burning Characteristics of Building Materials and Assemblies.

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 acoustic ceiling panels. Include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets.

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 Store extra materials required for maintenance, where directed by Departmental Representative.

.3 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction /Demolition Waste Management and Disposal.
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

1.4 ENVIRONMENTAL REQUIREMENTS

.1 Permit wet work to dry before beginning to install.

.2 Maintain uniform minimum temperature of 15 degrees C and humidity

of 20-40% before and during installation.

.3 Store materials in work area 48 hours prior to installation.

1.5 EXTRA MATERIALS

.1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide acoustical units amounting to 10% of gross ceiling area for each pattern and type required for project.

.3 Ensure extra materials are from same production run as installed materials.

.4 Clearly identify each type of acoustic unit, including colour and texture.

.5 Package, label and deliver to site upon completion of the work of this Section. Locate as directed by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Acoustic units for suspended ceiling system: to ASTM E 1264.
.1 Mineral fibre, wet formed.
.2 Surface finish: acoustically transparent membrane with Shop-applied latex paint.
.3 Type IV, Form 2, Pattern E.
.4 Class A.
.5 Texture: smooth.
.6 Flame spread rating:25 or less in accordance with CAN/ULC-S102 and ASTM E 84.
.7 Smoke developed: 50 or less in accordance with CAN/ULC-S102 and ASTM E 84.
.8 Noise Reduction Coefficient (NRC) designation of 0.85 to ASTM C 423.
.9 Ceiling Attenuation Class (CAC) rating 35, in accordance with ASTM C 1414
.10 Articulation Class (AC): 170, to ASTM E 1111.
.11 Light Reflectance (LR) range of 0.86 to ASTM E 1477.
.12 Edge type: square tegular 23.81 mm.
.13 Colour: white.
.14 Size: 600 mm x 1200 mm x 25 mm thick.
.15 Shape; flat.
.16 Sabin: not applicable.
.17 Recycled content: greater than 50% total recycled content.
.18 Low VOC emmissions.

PART 3 - EXECUTION

3.1 EXAMINATION	.1	Do not install acoustical panels and tiles until work above ceiling has been inspected by Departmental Representative.
3.2 INSTALLATION	.1	Install acoustical panels and tiles in ceiling suspension system.
3.3 APPLICATION	.1	Install acoustical units in accordance with reflected ceiling plan.
3.4 INTERFACE WITH OTHER WORK	.1	Co-ordinate with Section 09 53 00.01 - Acoustical Suspension.
	.2	Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, sprinkler heads, to be built into acoustical ceiling components.

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International
.1 ASTM A 653/A 653M, Standard Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.2 ASTM C 635/C 635M-07, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
.3 ASTM C 636/C 636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

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

1.2 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 acoustical suspension and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for acoustical suspension 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 indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect acoustical ceiling tiles and tracks from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section and in accordance with

Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Design Requirements: maximum deflection: 1/360th of span to ASTM C 635/ASTM C635M deflection test.

2.2 MATERIALS

.1 Intermediate/heavy duty system to ASTM C 635/ASTM C 635M.

.2 Basic materials for suspension system: commercial quality hot dipped galvanized steel to ASTM A 653. All surfaces chemically cleansed.

.3 Suspension system: non fire rated, made up as follows:
- .1 2 directional exposed tee bar grid.
- .2 Profile: exposed tee.
- .3 Cross tee main tee interface: override.
- .4 End detail, cross tee and main tee: stacked on clip

.4 Exposed tee bar grid components:
- .1 Surface finish: shop painted, powder-coat blizzard white colour.
- .2 Components die cut.
- .3 Main tee with double web, rectangular top bulb and 24 mm rolled cap on exposed face.
- .4 Cross tee double web with rectangular top bulb and 24 mm flange; web extended to form positive interlock with main tee webs.
- .5 Lower flange extended and offset to provide flush intersection.

.5 Attachment devices; size for five times design load in accordance with ASTM C 635.

.6 Hanger wire: Class 1 zinc coating, galvanized soft annealed steel wire, to ASTM A 641.
- .1 Yield stress load of minimum three times the design load, but not less than 12 gauge.

.7 Hanger inserts: purpose made.

.8 Accessories: splices, clips, wire ties, retainers, trims and wall moulding reveal, to complement suspension system components, as recommended by system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for acoustical ceiling tile and track installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate.
.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 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Installation: to ASTM C 636/C 636M except where specified otherwise.

.3 Install suspension system to manufacturer's instructions.

.4 Do not erect ceiling suspension system until work above ceiling has been inspected and approved by Departmental Representative.

.5 Secure hangers to overhead structure using attachment methods acceptable to Departmental Representative.

.6 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.

.7 Lay out system according to reflected ceiling plan].

.8 Ensure suspension system is co-ordinated with location of related components.

.9 Install wall moulding to provide correct ceiling height.

.10 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers and grilles.

.11 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.12 Interlock cross member to main runner to provide rigid assembly.

.13 Finished ceiling system to be square with adjoining walls and level within 1:1000.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
.1 Touch up scratches, abrasions, voids and other defects in painted surfaces.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by acoustical suspension installation.

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 printed product literature and data sheets for resilient sheet flooring and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit manufacturer's installation instructions.
.3 Submit electronic copies of WHMIS MSDS for all materials in accordance with 01 35 43 - Environmental Procedures.

.3 Samples:
.1 Submit duplicate samples:
.1 Resilient sheet flooring, 300 x 300 mm.
.2 Welding rod.
.3 Rubber base, 50 mm long.
.4 Metal edge transition strips.

.4 Asbestos Test Reports:
.1 Refer to requirements in Part 1 of this Section.

1.2 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:
.1 Provide extra stock materials of resilient sheet flooring, base and adhesives in accordance with Section 01 78 00 - Closeout Submittals.
.1 Provide minimum 10% exta stock in full roll width (2 meters wide) of colour, pattern and type resilient sheet flooring material.
.2 Provide 10% extra stock of rubber base.
.3 Provide one container of each type of adhesive.
.2 Extra materials from same production run as installed materials.
.3 Box and label materials. Identify contents, project name and installed location.
.4 Deliver to Departmental Representative upon completion of the work of this Section.
.5 Store where directed by Departmental Representative.

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 where ambient temperatures maintained within range recommended by manufacturer, but not less than 13 degrees C or more than 29 degrees C.
.3 Store and protect specified materials from nicks, scratches, and blemishes.
.4 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.4 SITE CONDITIONS AND ENVIRONMENTAL REQUIREMENTS

.1 Ambient Conditions:
.1 Maintain air temperature and structural base temperature at flooring installation area not less than 18 degrees C or more than 29 degrees C for 48 hours before, during and 48 hours after installation.
.2 Maintain the ambient relative humidity between 40% and 60% during installation
.3 Maintain ambient temperatures within range recommended by manufacturer, but not less than 13 degrees C or more than 29 degrees C.

.2 Ventilation:
.1 Departmental Representative will co-ordinate operation of ventilation system during installation of flooring. Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.
.2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities. Provide fans with HEPA filters.
.3 Provide continuous ventilation during and after flooring installation. Run ventilation system 24 hours per day during installation; provide continuous ventilation for 7 days after completion flooring installation.

.3 Safety:
.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials.

.4 Testing for Asbestos:
.1 Test existing adhesive and floor leveling compound for presence of asbestos contamination.
.2 Testing to be performed by an independent inspection agency specializing in this type of testing.
.3 Submit test reports to Departmental Representative.
.4 Notify Departmental Representative for additional instructions where asbestos is discovered.

.5 Install flooring after wet-work in space is completed and nominally dry, work above ceilings is complete.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Homogenous sheet vinyl flooring with no backing: to ASTM F 1913 - Standard Specification for Vinyl Sheet Floor Covering Without Backing, exceeds requirements Class - 1, Type – A.
- .1 Polyurethane reinforced.
- .2 Grade: commercial.
- .3 No backing.
- .4 Wear layer thickness: 2.0 mm.
- .5 Total thickness: 2.0 mm.
- .6 Sheet roll width: 2.0 meters.
- .7 Properties:
  - .1 Static load limit: to ASTM F 970.
    - .1 Passes.
  - .2 Slip resistance: to ASTM D 2047.
    - .1 SCOF ≥ 0.6.
  - .3 Flame resistance: to ASTM E 648.
    - .1 Class 1.
  - .4 Smoke density: to ASTM E 662.
    - .1 < 450.
  - .5 Chemical resistance: to ASTM F 925.
    - .1 Good.
  - .6 Resistance to heat: to ASTM F 1514.
    - .1 $\Delta\Sigma \leq 8.0$
- .8 Colour: as selected by Departmental Representative from full standard range.

.2 Resilient base:
- .1 Type: rubber.
- .2 Style: cove.
- .3 Thickness: 3.17 mm.
- .4 Height: 101.6 mm.
- .5 Lengths: cut lengths minimum 2400 mm.
- .6 Colour: as selected by Departmental Representative from full standard range.

.3 Primers and adhesives for resilient sheet flooring:
- .1 Waterproof, of type recommended by resilient flooring manufacturer for specific material on applicable substrate.

.4 Adhesives for resilient rubber cove base:
- .1 Contact cement.

.5 Sub-floor filler and leveller: as recommended by flooring manufacturer for use with their product.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate are acceptable for resilient sheet flooring installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 SITE VERIFICATION OF CONDITIONS

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

3.3 PREPARATION

.1 Remove existing resilient flooring and rubber base.

.2 Remove old adhesives to prevent residual adhesives from bleeding through to new flooring and/or interfering with the bonding of new adhesives.

.3 Remove substrate paint, coatings and other substances that are incompatible with adhesives, or contain soap, wax, oil, solvents or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

.4 Mechanically remove contamination on substrates that may cause damage to new flooring and base.

.5 Prepare substrates in accordance with ASTM F 710 including the following:
.1 Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
.1 Perform anhydrous calcium chloride test, ASTM F 1869. Results must not exceed 5 lbs. Moisture Vapor Emission Rate per 1,000 sq. ft. in 24 hours.
.2 Perform relative humidity test using in situ probes, ASTM F 2170. Must not exceed 80%.
.2 pH Testing for Alkalinity: Results should range between 7 and 9. If the test results are not within the acceptable range of 7 to 9, the installation must not proceed until the problem has been corrected.
.3 Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.

.6 Clean floor.

.7 Fill low spots, cracks, joints, holes and other defects with sub-floor filler to produce a uniform, smooth substrate.

.8 Do not install resilient products until they are same temperature as the space where they are to be installed. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

.9 Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.4 APPLICATION: FLOORING

.1 Provide high ventilation rate, with maximum outside air, during installation, and for 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system.

.2 Apply adhesive uniformly using recommended trowel. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.3 Lay flooring with seams parallel to building lines to produce a minimum number of seams. Border widths minimum 1/3 width of full material.

.4 Double cut sheet joints and continuously heat weld according to manufacturer's printed instructions.

.5 Heat weld seams of resilient sheet flooring in accordance with manufacturer's printed instructions.

.6 As installation progresses, roll flooring in both directions with minimum 45 kg three-section roller to ensure full adhesion.

.7 Cut flooring around fixed objects.

.8 Terminate flooring at centre-line of door in openings where adjacent floor finish is dissimilar.

.9 Install metal edge transition strips at unprotected or exposed edges where flooring terminates.

3.5 APPLICATION: RUBBER BASE

.1 Lay out coved type base to keep number of joints at minimum.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions.

.7 Cope internal corners. Use formed straight base material for external corners of other angles.

3.6 CLEANING

.1 Comply with manufacturer's written instructions for cleaning.

.2 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.3 Perform the following operations immediately following installation:
.1 Remove adhesive and other blemishes from exposed surfaces.
.2 Sweep and vacuum surfaces thoroughly.
.3 Damp-mop surfaces to remove marks and soil.

.4 Final Cleaning: upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
.1 Wait 72 hours after installation before performing cleaning.
.2 Clean flooring and base surfaces to flooring manufacturer's printed instructions.

.5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

.1 Protect new floors from time of final set of adhesive to final inspection.

.2 Prohibit traffic on floor for 48 hours after installation. No heavy traffic or furniture placement for 72 hours.

PART 1 - GENERAL

1.1 REFERENCES

.1 American Association of Textile Chemists and Colorists (AATCC)
.1 AATCC Test Method 16-2004, Colorfastness to Light.
.2 AATCC Test Method 23-2005, Colorfastness to Burn Gas Fumes.
.3 AATCC Test Method 129-2005, Colourfastness to Ozone in the Atmosphere Under High Humidities.
.4 AATCC Test Method 134-2006, Electrostatic Propensity of Carpets.
.5 AATCC Test Method 165-2013, Colourfastness to Crocking.
.6 AATCC Test Method 171-2005, Carpets: Cleaning of; Hot Water Extraction Method.
.7 AATCC Test Method 175-2008, Stain Resistance: Pile Floor Coverings.
.8 AATCC Test Method 189-2007, Fluorine Content of Carpet Fibers.

.2 ASTM International
.1 ASTM D1055, Specification for Flexible Cellular Materials - Latex Foam.
.2 ASTM D 1335-05, Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings.
.3 ASTM D 1667-05, Standard Specification for Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).
.4 ASTM D 3936-05, Standard Test Method for Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering.
.5 ASTM D 5252, Standard Practice for the Operation of the Hexapod Drum Tester.
.6 ASTM E 648, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
.7 ASTM E 662, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

.3 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-4.2 No. 18.8, Colourfastness of Light.
.2 CAN/CGSB-4.2 No.27.6M-2004, Textile Test Methods - Flame Resistance - Methemine Tablet Test for Textile Floor Coverings.
.3 CAN/CGSB-4.2 No.77.1-94/ISO 4919:2000, Textile Test Methods - Carpets - Determination of Tuft Withdrawal Force.
.4 CAN/CGSB-4.129-93(R1997), Carpets for Commercial Use.
.5 CAN/CGSB-25.20, Surface Sealer Floors.

.4 Carpet and Rug Institute (CRI)
.1 CRI Carpet Installation Standard 2009.
.2 IAQ Carpet Testing Program.

.5 National Floor Covering Association (NFCA)
.1 National Floor Covering Specification Manual 2007.

.6 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102-07, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.2 CAN/ULC-S102.2-07, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Requirements:
.1 Testing for Asbestos:
.1 Test existing floor leveling compound and adhesives for presence of asbestos contamination and submit report to Departmental Representative in accordance with Section 01 33 00 - Submittal Procedures.
.2 Perform a pre-installation review one (1) week prior to beginning on-site installation to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other construction sub-trades.
.4 Review manufacturer's written installation instructions and warranty requirements.

.2 Sequencing: sequence with other work. Comply with manufacturer's written recommendations for sequencing construction operations.

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 carpet tile, adhesive including peel and stick type, carpet protection, subfloor patching compound and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 43 - Environmental Procedures for adhesives.

.3 Samples:
.1 Submit duplicate architectural product folders of carpet tile goods in range specified showing full range of patterns and colours for preliminary selection by Departmental Representative.
.1 Submit duplicate full size carpet tiles (maximum four) for review and final selection by Departmental Representative.
.2 Samples will not be returned for inclusion into work.
.2 Submit duplicate samples of resilient base, 150 mm length binder bars, 50 mm length resilient base.

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

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

.6 Asbestos Test Reports:
.1 Refer to requirements in Part 1 of this Section.

.7 Manufacturer's Instructions: submit complete manufacturer's installation instructions including special procedures at perimeter conditions requiring special attention.

1.4 CLOSEOUT SUBMITTALS

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

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

.3 Include maintenance procedures, recommendations for maintenance materials and equipment, and suggested schedule for cleaning.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:
.1 Provide extra materials of carpet tile, base and adhesives in accordance with Section 01 78 00 - Closeout Submittals.
.1 Provide 10% extra stock of carpet tiles.
.2 Provide 10% extra stock of rubber base.
.3 Provide one container of each type of adhesive.
.2 Extra materials from same production run as installed materials.
.3 Box and label materials. Identify contents, project name and installed locations.
.4 Deliver to Departmental Representative upon completion of the work of this Section.
.5 Store where directed by Departmental Representative.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements:
.1 Prequalification: compliance with Health Canada regulations under "Hazardous Products Act", Part II of Schedule 1, to CAN/CGSB-4.2 No. 27.6.

.2 Qualifications:
.1 Flooring Installer:
.1 Experienced in performing work of this Section who has specialized in installation of work similar to that required for this project.
.2 Certified by carpet manufacturer for carpet tile installation.
.3 Must not sub-contract labour without written approval of Departmental Representative.
.4 Responsible for proper product installation, including floor testing and preparation as specified and in accordance with carpet manufacturer's written instructions.

1.7 DELIVERY, STORAGE AND HANDLING

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

.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 materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

.3 Store and protect carpet tile, base and adhesives in original containers or wrapping with manufacturer's seals and labels intact.

.4 Store and protect carpet tile and accessories in location as directed by Departmental Representative.

.5 Store carpet and adhesive at minimum temperature of 18 degrees C and relative humidity of maximum 65% for minimum of 48 hours before installation.

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

.7 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

.8 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.8 SITE CONDITIONS AND ENVIRONMENTAL REQUIREMENTS

.1 Ambient Conditions:

.1 Moisture: ensure substrate is within moisture limits and alkalinity limits recommended by manufacturer.

.2 Temperature: maintain ambient temperature of not less than 18 degrees C from 48 hours before installation to at least 48 hours after completion of work.

.3 Relative humidity: maintain between 10% and 65% for 48 hours before, during and 48 hours after installation.

.4 Ventilation:

.1 Departmental Representative will co-ordinate operation of ventilation system during installation of carpet and base. Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities. Provide fans with HEPA filters.

.3 Provide continuous ventilation during and after carpet and base application. Run ventilation system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of carpet installation.

.5 Safety:

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials.

.6 Testing for Asbestos:

.1 Test existing floor leveling compound and adhesives for presence of asbestos contamination.

.2 Testing to be performed by an independent inspection agency specializing in this type of testing.

.3 Submit test reports to Departmental Representative.

.4 Notify Departmental Representative for additional instructions where asbestos is discovered.

.7 Install carpet after wet-work in space is completed and nominally dry, work above ceilings is complete.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Manufacturers:

.1 Certification: to Carpet and Rug Institute and Canadian Carpet Institute requirements.

.2 Sustainability:

.1 Materials must be eligible for recycling by the supplying mill or fibre producer within an existing in-place program.

.2 Submit to Departmental Representative, recycling program details and parameters on request.

.3 Description: Carpet and Accessories:

.1 Green Label Plus certified.

2.2 PERFORMANCE

.1 Flooring radiant panel: Class 1 to ASTM E 648.

.2 Flammability: passes Methenamine Pill Test DOC-FF1-70.

.3 Flame Spread: maximum flame spread rating 300, maximum smoke developed classification 500, when tested to CAN/ULC-S102.2.

.4 Smoke Development: 450 or less per ASTM E 662.

.5 Fibre modification ratio: not greater than 2.0.

.6 Edge Ravel: none for 15 years.

.7 Static Resistance: permanent static control to AATCC 134, 3000 V maximum at 20% RH and 22 degrees C.

.8 Colourfastness to light: to AATCC 16 - E, greater than or equal to 4.0 at 60 AFUs.

.9 Dimensional stability: to AACHEN Din 54318 less than 10%.

.10 Traffic classification: moderate.

.11 Antimicrobial:
.1 AATCC Parts 2 and 3 99%, reduction/no mold 7 days.
.2 ASTM E-2471, complete inhibition.

.12 Environmental:
.1 Total recycled content: minimum 50%.
.2 Indoor Air Quality Certification: certified to CRI Green Label Plus IAQ requirements.
.3 End of life: carpet to carpet recycling program.

2.3 FABRICATION

.1 Type:
.1 One product.
.2 Size 500 mm x 500 mm
.3 Colour, pattern texture to be selected by Departmental Representative from manufacturer's full range.

.2 Face construction: tufted.

.3 Pile Surface Appearance: cut pile.

.4 Pile fibre: to CAN/CGSB-4.129.
.1 Nylon: type Nylon 6.6.

.5 Dyeing method: 100% solution dyed.

.6 Dye lot: non-mergeable.

.7 Soil and stain protection.

.8 Preservative protection.

.9 Stitches: 34.3 ends/10 cm.

.10 Machine Gauge: 50.4 ends/10cm.

.11 Pile Density: 339.1 g/m^2.

.12 Pile thickness: 1.4 mm.

.13 Pile density: 339.1 g/m^2.

.14 Pile height: minimum 2.5 mm average.

.15 Tufted yarn weight: minimum 474 g/m^2.

.16 Tufted Carpet Backing: to CAN/CGSB-4.129.
.1 Primary backing: non-woven.
.2 Fiberglass reinforced vinyl composite.
.3 Backing thickness: 12.7 mm.
.4 Performance:
.1 Radiant panel: to ASTM E 648, Class 1.
.2 Smoke Density: to ASTM E 662, less than or equal to 450.
.3 Dimensional stability: AACHEN Din 54318 less than

0.1%.

2.4 ACCESSORIES

.1 Transition strips: aluminum.

.2 Adhesive:
.1 Pressure Sensitive Type: releasable, of type recommended by carpet tile manufacturer for direct glue down installation to suit substrate conditions.

.3 Carpet protection: non-staining heavy duty kraft paper.

.4 Concrete floor sealer:
.1 Type as recommended by carpet tile manufacturer to isolate any existing adhesive residue (remaining following removal process) and/or patching compound that would affect bond of new adhesive over concrete substrate.

.5 Subfloor patching compound: Portland cement base filler as recommended by carpet tile manufacturer.

2.5 RESILIENT BASE

.1 Resilient base:
.1 Type: rubber.
.2 Style: cove.
.3 Thickness: 3.17 mm.
.4 Height: 101.6 mm.
.5 Lengths: cut lengths minimum 2400 mm.
.6 Colour: as selected by Departmental Representative from full standard range.

.2 Adhesive for resilient resilient cove base:
.1 Contact cement.

PART 3 - EXECUTION

3.1 INSTALLERS

.1 Use experienced and qualified technicians to carry out assembly and installation of tile carpet.

3.2 EXAMINATION

.1 Examine conditions, substrates and work to receive work of this Section.

.2 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for carpet tile installation in accordance with manufacturer's written instructions.
.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.2 Proceed with installation only after unacceptable conditions

have been remedied.

3.3 PREPARATION

.1 Demolition / Removal:
.1 Remove existing carpet for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Vacuum used carpet before removal.
.2 Remove existing rubber base.
.3 Remove existing carpet and rubber base adhesives.

.2 Concrete floor sealer:
.1 Apply sealer in accordance with manufacturer's written recommendation to isolate any existing adhesive residue (remaining following removal process) and/or subfloor patching compound that would affect bond of new adhesive over concrete substrate.

.3 Subfloor Preparation:
.1 Inspect substrate and determine special care required to make it suitable for carpet installation.
.2 Fill and level cracks 3 mm wide or protrusions over 0.8 mm with appropriate and compatible patching compound.
.3 Comply with manufacturer's written recommendations for maximum patch thickness.
.4 Prime large patch areas with compatible primer.
.5 Ensure concrete substrates are clean and dry.
.6 Ensure substrates are free of paint, dirt, grease, oil, curing or parting agents, and other contaminates, including sealers, that interfere with the bonding of adhesive.
.7 Where powdery or porous substrate surface is encountered, apply primer compatible with adhesive to provide a suitable surface for glue-down installation in accordance with carpet manufacturer's written instructions.

.4 Surface Preparation:
.1 Prepare surface in accordance with manufacturer's written recommendations.
.2 Prepare floor surfaces in accordance with CRI Carpet Installation Standard.

.5 Tile Carpeting Preparation:
.1 Pre-condition carpeting, adhesive and related products: following manufacturer's written instructions.

3.4 INSTALLATION

.1 Install carpet tiles in accordance with manufacturer's written instructions, and CRI Carpet Installation Standard and co-ordinate with Section 01 73 00 - Execution.

.2 Co-ordinate tile carpeting work with work of other trades, for proper time and sequence to avoid construction delays.

.3 Install carpet tile after finishing work is completed.

.4 Installation pattern: Brick.

.5 Snugly join carpet tiles in completed installation.
.1 Measure distance covered by 11 carpet tiles (10 joints) and ensure distance is in compliance with manufacturer specifications.
.2 Do not trap yarn between carpet tiles.

.6 Apply thin film of pressure-sensitive adhesive according to manufacturer's recommendations.

.7 Ensure finished installation presents smooth wearing surface free from conspicuous seams, burring and other faults.

.8 Use material from same dye lot.
.1 Ensure colour, pattern and texture match within visual areas.
.2 Maintain constant pile direction.

.9 Fit around architectural, mechanical, electrical elements, around perimeter of rooms into recesses, and around projections.

.10 Extend carpet tiles into toe spaces, door reveals, alcoves, and similar openings.

.11 Install carpet tiles smooth and free from bubbles, puckers, and other defects.

.12 Protect exposed carpet tile edges at transition to other flooring materials with suitable transition strips.

3.5 APPLICATION: RUBBER BASE

.1 Lay out base to keep number of joints at minimum.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions.

.7 Cope internal corners. Use formed straight base material for external corners of other angles.

.8 Use toeless type base where floor finish will be carpet, coved type elsewhere.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.
.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
.3 Vacuum carpets clean immediately after completion of

installation.

.2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

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

.2 Prohibit traffic on carpet for period of 24 hours minimum after installation and until adhesive is cured.

.3 Install carpet protection to satisfaction of Departmental Representative.

.4 Repair damage to adjacent materials caused by tile carpeting installation.

PART 1 - GENERAL

1.1 REFERENCES

.1 Department of Justice Canada (Jus)
.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33

.2 Environmental Protection Agency (EPA)
.1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).

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

.4 Master Painters Institute (MPI)
.1 MPI Architectural Painting Specifications Manual, 2004.

.5 National Fire Code of Canada - 1995

.6 Society for Protective Coatings (SSPC)
.1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

.7 Transport Canada (TC)
.1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.2 QUALITY ASSURANCE

.1 Pre-Installation:
.1 Convene pre-installation review one week prior to beginning work of this Section and on-site installations.
.2 Verify project requirements.
.3 Review installation and substrate conditions.
.4 Coordination with other building sub-trades.
.5 Review manufacturer's installation instructions.

1.3 SCHEDULING

.1 Submit work schedule for various stages of painting to Departmental Representative for review. Submit schedule minimum of 7 days in advance of proposed operations in occupied areas.
.1 Obtain written authorization from Departmental Representative for changes in work schedule for work in occupied areas.

.2 Schedule painting operations to prevent disruption of occupants.
.1 Work in occupied areas must be undertaken after-hours. Refer to Section 01 14 00 – Work Restrictions for requirements.

1.4 ACTION AND INFORMATIONAL

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

SUBMITTALS

.2 Product Data:
.1 Submit product data and instructions for each paint and coating product to be used.
.2 Submit product data for the use and application of paint thinner.
.3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOCs during application.

.3 Samples:
.1 Submit full range colour sample chips.
.2 Submit triplicate 50 mm x 200 mm samples of each paint with specified paint in colours, gloss/sheen required to MPI Architectural Painting Specification Manual.
.3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
.4 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
.1 Lead, cadmium and chromium: presence of and amounts.
.2 Mercury: presence of and amounts.
.3 Organochlorines and PCBs: presence of and amounts.
.5 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.6 Manufacturer's Instructions:
.1 Submit manufacturer's installation and application instructions.
.7 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:
.1 Product name, type and use.
.2 Manufacturer's product number.
.3 Colour numbers.
.4 MPI Environmentally Friendly classification system rating.

1.5 MAINTENANCE

.1 Extra Materials:
.1 Deliver to extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.
.2 Quantity: provide one - four litre can of each type and colour of finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
.3 Delivery, storage and protection: comply with Departmental Representative requirements for delivery and storage of extra materials.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:
.1 Pack, ship, handle and unload materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.

.2 Acceptance at Site:
.1 Identify products and materials with labels indicating:
.1 Manufacturer's name and address.
.2 Type of paint or coating.
.3 Compliance with applicable standard.
.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Storage and Protection:
.1 Provide and maintain dry, temperature controlled, secure storage.
.2 Store materials and supplies away from heat generating devices.
.3 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.

.5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.

.7 Remove paint materials from storage only in quantities required for same day use.

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

.9 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
.3 Place materials defined as hazardous or toxic in designated containers.
.4 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.
.5 Ensure emptied containers are sealed and stored safely.
.6 Unused paint coating materials must be disposed of at official hazardous material collections site as approved by Departmental

Representative.

.7 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.

.8 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

.9 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.10 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:

.1 Retain cleaning water for water-based materials to allow sediments to be filtered out.

.2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.

.3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.

.4 Dispose of contaminants in approved legal manner in accordance with hazardous waste regulations.

.5 Empty paint cans are to be dry prior to disposal or recycling (where available).

.11 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

1.7 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:

.1 Ventilate enclosed spaces in accordance with Section 01 51 00 – Temporary Utilities.

.2 Maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.

.3 Provide continuous ventilation for seven days after completion of application of paint.

.4 Coordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.

.5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

.6 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless pre-approved written approval by product manufacturer, perform no painting when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.

.4 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can it's self with-stand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:

.1 15% for wood.

.2 12% for plaster and gypsum board.

.3 Test for moisture using calibrated electronic Moisture Meter.

.3 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Additional interior application requirements:

.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

.2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected. Refer to Section 01 14 00 – Work Restrictions for detailed requirements.

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 E2 E3 "Environmentally Friendly" rating are acceptable for use on this project.

.4 Conform to latest MPI requirements for interior painting work including preparation and priming.

.5 Materials (primers, paints, coatings, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.

.6 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as

required.

.7 Provide paint products meeting MPI "Environmentally Friendly" E2 E3 ratings based on VOC (EPA Method 24) content levels.

.8 Use MPI listed materials having minimum E2 E3 rating where indoor air quality (odour) requirements exist.

.9 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:
.1 Water-based.
.2 Non-flammable.
.3 Manufactured without compounds which contribute to ozone depletion in the upper atmosphere.
.4 Manufactured without compounds which contribute to smog in the lower atmosphere.
.5 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.

.10 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

.11 Flash point: 61.0 degrees C or greater for water-borne surface coatings and recycled water-borne surface coatings.

.12 Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings does not release:
.1 Matter in undiluted production plant effluent generating 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to natural watercourse or sewage treatment facility lacking secondary treatment.
.2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to natural watercourse or a sewage treatment facility lacking secondary treatment.

2.2 COLOURS

.1 Departmental Representative will provide Colour Schedule after Contract award.

.2 Colour schedule will be based upon selection of maximum three base colours and three accent colours. No more than six colours will be selected for entire project and no more than three colours will be selected in each area.

.3 Selection of colours from manufacturer’s full range of colours.

.4 Where specific products are available in restricted range of colours, selection based on limited range.

.5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site.

.2 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 Mix and thin paint 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 is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - Velvet-Like Finish	Max.10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	Min. 35
Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as noted on Finish Schedule.

2.5 INTERIOR PAINTING SYSTEMS

.1 Galvanized metal: frames.
.1 INT 5.3N - Institutional low odour/low VOC, Gloss level 5, semi-gloss finish over 100% acrylic primer.

.2 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material":
.1 INT 9.2M - Institutional low odour/low VOC, Gloss level 3, eggshell finish over 100% acrylic primer.
.2 INT 9.2M - Institutional low odour/low VOC, Gloss level 5,

semi-gloss finish over 100% acrylic primer.

.3 Dressed lumber: including doors, casings, mouldings:
.1 INT 6.3V - Institutional low odour/low VOC, Gloss level 5, semi-gloss finish over 100% acrylic primer..

2.6 SOURCE QUALITY CONTROL

.1 Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility which has been accredited by Standards Council of Canada.
.1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
.2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
.3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:

.1 Gypsum board: 12%.
.2 Wood: 15%.

3.4 PREPARATION

.1 Protection:
.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
.2 Protect items that are permanently attached such as Fire Labels on doors and frames.
.3 Protect factory finished products and equipment.
.4 Protect building occupants and general public in and about the building.

.2 Surface Preparation:
.1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
.2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
.3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.

.3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
.1 Remove dust, dirt, and other surface debris by vacuuming and wiping with dry, clean cloths.
.2 Wash surfaces with a biodegradable detergent and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
.4 Allow surfaces to drain completely and allow to dry thoroughly.
.5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
.6 Use trigger operated spray nozzles for water hoses.
.7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.5 New wood surfaces:
.1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.

.2 Apply wood filler to nail holes and cracks.
.3 Tint filler to match stains for stained woodwork.

.6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes or vacuum cleaning.

.8 Touch up of shop primers with primer as specified.

.9 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

3.5 APPLICATION

.1 Method of application to be as approved by Departmental Representative. Apply paint by brush and roller. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:
.1 Apply paint in uniform layer using brush and/or roller type suitable for application.
.2 Work paint into cracks, crevices and corners.
.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
.5 Remove runs, sags and brush marks from finished work and repaint.

.3 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.4 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.5 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.6 Sand and dust between coats to remove visible defects.

.7 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.8 Finish alcoves as specified for adjoining rooms.

.9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ ELECTRICAL EQUIPMENT

.1 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.2 Do not paint over nameplates.

.3 Keep sprinkler heads free of paint.

.4 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.5 Paint fire protection piping red.

.6 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.7 Paint natural gas piping yellow.

.8 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

3.7 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.8 RESTORATION

.1 Clean and re-install hardware items removed before undertaking painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

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 cubicle compartment curtains, track components, carriers anchors, tube spacer, furring channel, fastenings and accessories. Include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings.
.1 Show layout, size of curtains, number of carriers and conditions requiring accessories.
.2 Show suspension details including furring channel suspended from structure above, tube spacer through acoustic ceiling tile panels and fasteners.

.4 Installation Instructions:
.1 Submit manufacturer’s complete installation instructions.

.5 Samples:
.1 Curtain fabric: submit duplicate 300mm x 300 mm samples of curtain fabric options, pattern and colour, from manufacturer’s standard mid-range.
.2 Mesh top: .Submit duplicate 100 mm x 100 mm samples.
.3 Curtain track: Submit duplicate samples not less than 100 mm long.
.4 Curtain carrier: Submit duplicate full size units.
.5 Tube spacer and related fastener.

1.2 QUALITY ASSURANCE SUBMITTALS

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

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

1.3 CLOSE-OUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Close-out Submittals.

.2 Operation and Maintenance Data.
.1 Submit operation and maintenance data for tracks and curtains for inclusion in operation and maintenance manuals.
.2 Include procedures and schedules for cleaning and changing curtains and maintaining cubicles.

1.4 MAINTENANCE MATERIAL SUBMISSIONS

.1 Extra Materials:
.1 Provide extra materials in accordance with Section 01 78 00 - Closeout Submittals.
.1 Provide ten (10) roller carriers, breakaway type complete with hooks.
.2 Provide six (6) tube spacers and related fasteners.
.2 Box and label materials. Identify contents, project name and installed location.
.3 Deliver to Departmental Representative upon completion of the work of this Section.
.4 Store where directed by Departmental Representative.

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 indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect components from damage.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

.1 Curtain fabrics launderable to a temperature of 71 degrees C.

.2 Curtain fabrics flame resistant meeting or exceeding NFPA 701 certification for vertical flammability.

2.2 PROJECT CONDITIONS

.1 Environmental Limitations: Do not install cubicle until wet work in space is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels when occupied for its intended use

.2 Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

2.3 MATERIALS

.1 Cubicle tracks.

.1 Heavy duty extruded 6063-T5 aluminium, 34.9 mm x 19 mm, 90 degree L-shaped curved 300 mm radius track, finish: clear satin anodized.

.2 Track accessories:

.1 Roller carriers:

.1 Breakaway type, to breakaway at 9.07 kg, nylon wheels, body and hook, three carriers per 300 mm length of track.

.2 End stops with filler cap at both ends:

.1 Plastic, screw-down type.

.3 Connectors:

.1 Clear satin anodized aluminium.

.4 Wall bracket assembly at both ends.

.1 Clear satin anodized aluminium.

.5 Track mounting accessories:

.1 Tube spacers and related fasteners for penetration through acoustic tile panels to continuous suspended furring channels above.

.6 Other accessories as required.

.2 Curtains.

.1 Curtain fabric:

.1 NFPA 701 compliant.

.2 Fibre content: 100% polyester.

.3 Stain resistant.

.4 Washable to 71 degrees C.

.5 Commercial and non-commercial launderable.

.6 Dispersion dyed.

.7 No heavy metals.

.8 Pattern: as selected from manufacturer's full mid-range.

.9 Colour: as selected from manufacturer's full range of available colours.

.2 Mesh top:

.1 Openness: 12 mm on the horizontal, vertical or diagonal (70% openness).

.2 Height: 510 mm.

.3 Curtain grommets:

.1 Two-piece, rolled edge, rust proof aluminium spaces at maximum 150 mm on centre, machined into top hem.

2.4 CURTAIN FABRICATIONS

.1 Fabricate curtains to comply with the following requirements:

.1 Width: equal to track length from which curtain is hung plus 20% added fullness.

.2 Length: equal to floor-to-ceiling height, with minimum 510 mm mesh top and minus distance above finished floor 250 mm at bottom.

.3 Top hem: not less than 25 mm and not more than 38 mm inches wide, triple thickness, reinforced with integral web, and double lock stitched.

.4 Mesh top: Top hem not less than 25 mm and not more than 38 mm wide, triple thickness, reinforced with integral web, and double lock stitched. Double lock stitch bottom of mesh directly to 12 mm triple

thickness, top hem of curtain fabric.
.5 Bottom hem: 38 mm double thickness and single lock stitched.
.6 Side hems: 38 mm wide, with double turned edges, and single lock stitched
.7 Vertical seams: Not less than 12 mm wide, double turned and double stitched.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions:
.1 Verify that conditions are acceptable for cubicle curtain and track installation in accordance with manufacturer's written instructions.
.2 Visually inspect.
.3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.4 Proceed with installation only after unacceptable conditions have been remedied.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written installation instructions and data sheets.

3.3 PREPARATION

.1 Ensure supplementary anchorage, required, is in place.

.2 Continuous furring channels independently suspended from structure above are in place for surface mount cubicle track.

3.4 INSTALLATION

.1 Install tracks level and plumb, according to manufacturer's written instructions. Provide track fabricated from one continuous length up to 4875 mm.

.2 Surface Ceiling Mount:
.1 Install track surface mounted, mechanically fastened to continuous independently supported furring channel above ceiling, through tube spacers placed through acoustic ceiling tile panels.
.2 Secure ends of track to wall with flanged fittings or brackets.

.3 Track Accessories:
.1 Install end caps, wall brackets, connectors and other accessories as required for a secure and operational installation.

.4 Curtain Carriers:
.1 Provide curtain carriers adequate for 150 mm spacing along the full length of the curtain.

.5 Curtains:
.1 Hang curtains on curtain track.

3.5 ADJUSTING

.1 Adjust for optimum, smooth operating condition.

3.6 PROTECTION

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

.2 Repair damage to adjacent materials caused by installation.

.3 Protect installed recessed track openings with non-residue adhesive tape to prevent debris from ceiling finishing operations from impeding carrier operation

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials:
.1 ASTM E119-98 Standard Test for One-Hour Fire-Rating of Building Construction and Materials.
.2 ASTM F1233-98 Standard Test Method for Forced Entry Testing of Materials/Assemblies, Class IV.

.2 National Institute of Justice Ballistic Standards:
.1 NIJ Standard 0108.01 – Type III-A.

.3 Underwriters Laboratories:
.1 UL 752 Specifications and Ammunition, 11th Edition, Standard for Bullet Resisting Equipment published September 9, 2005, revised December 21, 2006, Level 3.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product data:
.1 Submit manufacturer's printed product literature and data sheets for bullet resistant fiberglass panels and include product characteristics, performance criteria, ammunition tested level, physical size, weight and thickness, and limitations.
.2 Submit electronic copies of WHMIS MSDS in accordance with 01 35 43 - Environmental Procedures.
.3 Certificates:
.1 Submit documentation indicating compliance with the following:
.1 UL LISTING Verification and UL752 Current Test Results as provided by Underwriters Laboratories.
.2 ASTM E119-98 One-Hour Fire Rating of Building Construction and Materials.
.3 ASTM F1233-98 Standard Test Method for Forced Entry Testing of Materials/Assemblies – Class IV.

.3 Shop drawings:
.1 Submit shop drawing showing panel sizes, layout, joints and joint detail.

.4 Installation Instructions:
.1 Submit manufacturer's printed installation instructions.

.5 Samples:
.1 Submit duplicate 150 mm x 150 mm samples of bullet resistant fiberglass panels matching the specification requirements.

1.3 QUALITY ASSURANCE

.1 Test reports:
.1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.

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

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements:
.1 Deliver materials to site in original factory packaging, with UL listed labels intact and legible, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in accordance with manufacturer's recommendation, indoors, off floor, under cover, stacked flat.
.2 Handle material with care to prevent damage.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

.1 Bullet resistant fiberglass panels shall be non-ricochet type to permit the encapture and retention of an attacking projectile lessening the potential of a random injury or lateral penetration.

.2 Panel rating: UL752 Level 3.

.3 Bullet resistance of joints: equal to that of the panel.

2.2 MATERIALS

.1 Panels fabricated of multiple layers of woven roving ballistic grade fiberglass cloth impregnated with a thermoset polyester resin and compressed into flat rigid sheets.
.1 Thickness: 23.44 mm nominal thickness.
.2 Nominal weight: 229.8 N/m^2.
.3 Panel sizes: panel size(s) selected to provide the least number of panel joints.
.4 Accessories:
.1 Batten joint strips matching panel material type, thickness and weight.

.2 Fasteners:
.1 Self-tapping drywall screws.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions previously installed under other Sections are acceptable for bullet resistant fiberglass panels installation in accordance with manufacturer's written instructions.
.1 Visually inspect.
.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 Manufacturer’s instructions:
.1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, and data sheets.
.2 Meet all requirements of manufacturer’s Health and Safety Precautions.

.2 Joints:
.1 Reinforce joints with a back-up layer of bullet resistive material. Minimum width of reinforcing layer at joint shall be 100 mm, centered on panel joints.
.2 Fasten directly to panels.

.3 Corners:
.1 Overlap panels at 90 degree corners.

.4 Secure armor panels using self-tapping drywall screw attachment.
.1 Minimize vulnerabilities by fitting tightly to adjacent surfaces including concrete floor slab and bullet resistive window frames.
.2 Erect with materials and components straight, tight and in alignment.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

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

3.4 PROTECTION

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

Part 1 General

1.1 REFERENCES

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.2 National Fire Protection Association (NFPA)

.1 NFPA 10-2006, 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.

.2 Submit two copies WHMIS MSDS - Material Safety Data Sheets.

.3 Provide shop drawings.

.4 Quality control submittals: submit following

.1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

.5 Closeout Submittals:

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

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 Cartridge operated type with hose and shut-off nozzle, ULC labelled for A, B and C class protection.

.1 Size 4.5kg.

2.2 CABINETS

.1 Semi-recessed, constructed of 1.6 mm thick steel, 180 degrees opening door of 2.5 mm thick steel with latching device.

.2 Cabinet to maintain fire resistive rating of construction in which they occur.

.3 Lockable cabinet door: with 5 mm full glass panel.

.4 Handle and break glass decal.

.5 Finish:

.1 Tub: prime coated.

.2 Door and frame: No.4 satin finish stainless steel.

2.3 IDENTIFICATION

.1 Identify extinguishers in accordance with recommendations of ANSI/NFPA 10 CAN/ULC-S508.

.2 Attach bilingual 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 in cabinet in accordance with NFPA 10.

END OF SECTION

PART 1 - GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's printed product literature and data sheets for horizontal louver blinds and include materials, finishes, product characteristics, performance criteria, physical size and limitations.
.2 Submit manufacturer’s installation instructions.

.3 Shop Drawings:
.1 Indicate on drawings dimensions in relation to window jambs, operator details, head anchorage details, hardware and accessories details.

.4 Samples:
.1 Submit duplicate samples of manufacturer's standard colours for selection by Departmental Representative.

1.2 CLOSEOUT SUBMITTALS

.1 Submit operation and maintenance submittals in accordance with Section 01 78 00 – Closeout Submittals.

.2 Submit cleaning instructions.

.3 Submit maintenance instructions, including instructions for replacing or repairing worn parts. Include inventory numbers for parts and procedures for ordering replacement parts.

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

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Design horizontal louvre blinds to following requirements:
.1 Mounting: outside mount application with extension brackets/spacers as required.
.2 Allow wear susceptible parts to be replaceable by either user or manufacturer.
.3 Guarantee of at least five-years of available replacement parts following discontinue of products manufacture.
.4 Include instructions for replacing or repairing worn parts, including inventory numbers for parts and procedures for ordering replacement parts.
.5 Allow for refurbishing or return of used louvre blinds.
.6 Permit effective disassembly of components for recycling of materials.
.7 Include stamps on major plastic components indicating composition code to facilitate recycling efforts.

2.2 MATERIALS AND FABRICATION

.1 Slats:
.1 25 mm wide x 0.2 mm nominal thickness, with rounded corners and rough edges removed.
.2 Aluminum alloy, corrosion resistant, heat-treated and spring-tempered.
.3 Recycled content: minimum 95% pre-consumer recycled content.
.4 Furnish with not less than nominal 16.5 slats per 300 mm, routed on back edge to ensure superior closure and light control.
.5 Colour and finish:as selected by Departmental Representative. Finsh to inhibit dust build-up.

.2 Slat support:
.1 Braided ladders of 100 % polyester yarn designed for full tilting action while retaining same level and position of each slat.
.2 Colour compatible with slats.
.3 Ladders spaced not more than 18 mm.

.3 Headrails:
.1 Profile: U-shaped with rolled edges.
.2 Size: 35 mm x 35 mm x 0.6 mm thick.
.3 Construction: corrosion resistant steel with beveled edge, valance-free, internally fit with components required for specified performance and designed for smooth, quiet, trouble-free operation.
.4 Finish: standard, to match slats.
.5 Ends fitted with 0.6 mm steel end lock with adjustable tab for centering blinds.

.4 Bottom rails:
.1 Construction: steel, with corrosion-resistant finish formed with double-lock seam into closed oval shape for beam and torsional strength.

.2 Color-coordinated engineered polymer tape buttons secure the ladder and cord.
.3 Finish: standard, color coordinated to slats.

.5 Bottom rail end caps:
.1 Soft moulded polymer fitted snugly over ends of rails.
.2 Colour to match slats.

.6 Lifting mechanism:
.1 Crashproof steel cordlocks with corrosion-resistant finish, two-ply polyester cord filler in braided polyester jacket lift cords, cord equalizers, cordlock adapter, and Cord Stop/Single Pull Cord.
.2 Locate on either side of individual blind unit as directed by Departmental Representative.

.7 Tilting mechanism:
.1 Permanently lubricated die-cast worm and gear type tilter gear mechanism in fully enclosed housing with clutch action to protect ladder tapes from over rotation of the solid steel, corrosion resistant tilt rod.

.8 Tilt control wand:
.1 Tubular shaped 406 mm diameter extruded clear plastic, ribbed for positive grip and detachable without tools.
.2 Locate on either side of individual blind unit as directed by Departmental Representative.

.9 Mounting hardware:
.1 Manufacturer’s standard 1.0 mm steel box brackets.
.2 Finish: to match headrail.
.3 Number of support brackets as recommended by manufacturer of blinds.

.10 Other brackets, spacer blocks and fasteners as required.

.11 Cord cleats.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive horizontal louvre blinds are acceptable for product installation in accordance with manufacturer's instructions prior to horizontal louvre blinds installation.
.1 Visually inspect substrate.
.2 Field measure for exact size.
.1 Adequate clearance to be provided for unencumbered operation of shade and hardware.
.3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.4 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install blinds where indicated.

.2 Install in accordance with manufacturer’s written installation instructions and reviewed shop drawings.

.3 Include centre brackets where necessary to prevent deflection of headrail.

.4 Adjust to provide for operation without binding.

.5 Use non corrosive metal fasteners for installation, concealed in final assembly.

3.3 ADJUSTING

.1 Adjust horizontal louvre blinds components for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by horizontal louvre blinds installation.

PART 1 - GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Provide manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit samples for finish options: upholstery and metal.

1.2 CLOSEOUT SUBMITTALS

.1 Provide maintenance data and cleaning instructions for exam table, for incorporation into operation and maintenance manual specified in Section 01 78 00 - Closeout Submittals.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements 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 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 Exam Table.
.1 Steel shell: 18 gauge steel shell, powder coated paint finish.
.2 Drawers: seamless polystyrene with ball-bearing drawer glides.
.3 Seat: steel reinforced.
.4 Stirrups: standard with table.
.5 Height: 842 mm.
.6 Patient weight capacity: 226.8 kg.

.7 Electrical receptacle:
.1 115 VAC 5 AMPS Max.
.2 Duplex hospital grade electrical receptacle on left side.
.8 Seamless upholstery top: 724 mm x 1511 mm.
.9 Paper roll holder: holds 533 mm x 89 mm paper roll.
.10 Length, with footrest extended: 1930 mm.
.11 Acceptable material: Midmark, Ritter 204 Manual Examination Table, finish colours to be selected by Departmental Representative from standard range.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install in location as indicated after all other construction and finishing work is complete.

3.2 ADJUSTING

.1 Adjust examination table components for correct function and operation in accordance with manufacturer's written instructions.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
.1 Clean all examination table surfaces in accordance with manufacturer’s instructions

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by examination table installation.

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials:
.1 ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes. ASTM C 509 - Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
.2 ASTM B 209/209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
.3 ASTM C 1172 - Standard Specification for Laminated Architectural Flat Glass, NIJ Standard 0108.01

.2 National Institute of Justice:
.1 NIJ Standard for Ballistic Resistant Protective Materials.

.3 Underwriters Laboratories:
.1 UL 752, Standard for Bullet-Resisting Equipment.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product data:
.1 Submit manufacturer's printed product literature and data sheets for framing and glass-clad polycarbonate materials. Include product characteristics, performance criteria, ammunition tested level, physical size, weight and thickness, and limitations.
.2 Test reports:
.1 Submit documentation in sufficient detail indicating compliance with the following:
.1 UL LISTING Verification and UL752 Current Test Results as provided by Underwriters Laboratories.

.3 Shop drawings:
.1 Submit shop drawing showing frame profiles, cuts, size, material, type and spacing of frame anchors, reinforcement size and locations, details of joints and connections.

.4 Installation and storage Instructions:
.1 Submit manufacturer's printed storage, preparation and installation instructions.

.5 Samples:
.1 Submit duplicate 150 mm x 150 mm samples of bullet resistant glass-clad polycarbonate material matching the specification requirements.
.2 Submit frame sample.

1.3 CLOSEOUT

.1 Submit operation and maintenance submittals in accordance with

SUBMITTALS

Section 01 78 00 – Closeout Submittals.
.1 Submit cleaning instructions.

1.4 WARRANTY

.1 All materials shall be warranted against defects for a period of one year from date of Substantial Performance.

.2 Certificates of manufacturer's standard limited warranty shall be provided at project completion.

1.5 QUALITY ASSURANCE

.1 Test reports:
.1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.

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

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:
.1 Deliver materials to site in original factory packaging, with UL listed labels intact and legible, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in accordance with manufacturer's recommendations, indoors, off floor, under cover, stacked flat.
.2 Handle material with care to prevent damage.
.3 Replace defective or damaged materials with new.

.4 Project Environmental Conditions:
.1 Ensure temperature, humidity, and ventilation is within the maximum limit recommendations set by manufacturer.
.2 Do not install products that are under conditions outside these limits.

PART 2 - PRODUCTS

2.1 PERFORMANCE

.1 Through the design, manufacturing techniques and material

CRITERIA

application, the Bullet Resistant Window Framing System shall be constructed of an extruded aluminum in 6061-T6 alloy/tempered with UL Standard 752 Level 4 protection rating.

.1 Frame to have no exposed fasteners.

.2 Corner joints shall consist of extruded and keyed aluminum spline.

.3 All joints and connections shall be tight, providing hairline joints and true alignment of adjacent members.

.4 Panels shall not be removable from threat side.

.2 Through the design, manufacturing techniques and material application, the Bullet Resistant Glass-Clad Polycarbonate shall be constructed of multiple layers of glass and polycarbonate sheets with UL Standard 752 Level 4 protection rating.

.1 Average thickness: 38 mm.

2.2 BULLET RESISTANT INTERIOR WINDOW FRAMING ASSEMBLY

.1 Bullet Resistant Fixed Sash System:

.1 Acceptable material: Total Security Solutions Bullet Resistant Aluminum Sash TSS-B5.5 Window Framing System.

.2 Head and sill: one piece extrusions with no integral weep system at the sill.

.3 Jambs: two piece extrusions with removable faces to allow for re-glazing.

.4 All joints and connections shall be tight, providing hairline joints and true alignment of adjacent members.

.5 Glazing must not be removable from the threat side of the sash.

.6 Provide to dimension heights and widths indicated on the Drawings.

.1 System shall be designed to defeat ballistic assaults in accordance with UL 752, Level 4.

.2 Aluminium frames:

.1 Head, Sill and Jamb Size: 44.5 mm by 140 mm.

.2 Bullet Resistant Glass-clad Polycarbonate Security Glazing:

.1 Acceptable material: Total Security Solutions Bullet Resistant Glass-clad Polycarbonate, TSS 004 L/S.

.2 Material to conform to UL752 of the following protection level:

.1 Level 4.

.2 Make-up: Glass/Polycarbonate seven layer composite.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions:

.1 Prior to installing the bullet resistive material, verify that all supports have been installed as required by the contract documents, manufacturer's instructions and reviewed shop drawings.
.2 Visually inspect, one week prior to installation in presence of Departmental Representative.
.3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.4 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Clean and prepare all surfaces in accordance with manufacturer's recommendations for achieving best results for the substrate under the project conditions.

3.3 INSTALLATION

.1 Do not begin installation until openings have been verified and surfaces properly prepared.

.2 Manufacturer's Instructions:
.1 Comply with manufacturer's written data, including product technical bulletins, installation instructions, anchoring and finishing details, data sheets and reviewed shop drawings.

.3 Install in accordance with UL 752.

.4 Install unit in provided opening, set plumb and anchor securely in place to supports.

.5 Separate alumimium from other metal surfaces with bituminous coatings.

.6 Install bullet resistant glass-clad polycarbonate in TSS – BL5.5 ballistic framing in accordance with manufacturer's instructions.

.7 Replace damaged products before Substantial Completion.

.8 Verify installation is complete and complies with manufacturer's requirements.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.
.2 During construction, clean glazing unit in accordance with manufacturer's instructions.

.2 Final Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.
.2 Clean product and accessories in accordance with manufacturer's instructions.
.3 Clean exposed surfaces of frames and glazing products

thoroughly in accordance with manufacturer's instructions. Remove mastic smears and other unsightly marks. Remove excess sealant, labels and protective covers.

3.5 PROTECTION

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

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials:
.1 ASTM E 119-98, Standard Test for One-Hour Fire-Rating of Building Construction and Materials.
.2 ASTM B 209/209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
.3 ASTM A 666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.

.2 National Institute of Justice:
.1 NIJ Standard for Ballistic Resistant Protective Materials.

.3 Underwriters Laboratories:
.1 UL 752 Specifications and Ammunition, 11th Edition, Standard for Bullet Resisting Equipment published September 9, 2005, revised December 21, 2006, Level 3.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product data:
.1 Submit manufacturer's printed product literature and data sheets for bullet resistant transaction window assembly including framing, glazing materials, counter and deal tray. Include product characteristics, performance criteria, ammunition tested level, physical size, weight and thickness, and limitations.
.2 Certificates:
.1 Submit documentation indicating compliance with the following:
.1 UL LISTING Verification and UL752 Current Test Results as provided by Underwriters Laboratories.
.2 ASTM F1233-98 Standard Test Method for Forced Entry Testing of Materials/Assemblies – Class IV.

.3 Shop drawings:
.1 Submit shop drawing showing transaction window size, materials and details. Show cuts, anchor spacing, reinforcement and location.

.4 Installation Instructions:
.1 Submit manufacturer's printed installation instructions including preparation and storage requirements.

.5 Samples:
.1 Submit duplicate 150 mm x 150 mm samples of bullet resistant glazing material matching the specification requirements.
.2 Submit sample frame extrusion, 150 mm long.

1.3 CLOSEOUT SUBMITTALS

.1 Submit operation and maintenance submittals in accordance with Section 01 78 00 – Closeout Submittals.
.1 Submit cleaning instructions.

1.4 QUALITY ASSURANCE

.1 Test reports:
.1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.

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

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements:
.1 Deliver materials to site in original factory packaging, with UL listed labels intact and legible, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in accordance with manufacturer's recommendations, indoors, off floor, under cover, stacked flat.
.2 Handle material with care to prevent damage.
.3 Replace defective or damaged materials with new.

.4 Project Environmental Conditions:
.1 Ensure temperature, humidity, and ventilation are within the maximum limit recommendations set by manufacturer.
.2 Do not install products that are under conditions outside these limits.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

.1 Through design, manufacturing techniques and material application the bullet resistant interior transaction window assembly shall be of the “non-ricochet” type.

.2 Design intent: to permit the encapture and retention of an attacking projectile lessening the potential of a random injury or lateral penetration.

.3 No field alterations to the construction of the units fabricated under the

acceptable standards shall be allowed unless approved by both the manufacturer and the Departmental Representative.

.4 Standard manufacturing tolerances shall be +/- 1.6 mm.

.5 Materials shall meet or exceed UL 752 requirements.

2.2 BULLET RESISTANT INTERIOR TRANSACTION WINDOW ASSEMBLY

.1 General:
.1 Manufacture in strict accordance with the specifications, design and details.
.2 Cut vision panels to size with all exposed edges polished.
.3 Pre-drill and tap in factory, all necessary holes where required.

.2 System:
.1 Custom prefabricated assembly, bullet resistant panels with secure air passage as required for voice transmission utilizing the “arched window” backer configuration in transaction glazing, aluminum frame, with a plastic laminate base and recessed deal tray. All accessories for installation included.
.2 Bullet Resistant Glazing Panels:
.1 Bullet resistant Level 3, LP 1250 Laminated, 31.75 mm thick.
.3 Frame:
.1 Ballistic aluminium clear anodized, manufactured in accordance with ASTM B209, extruded aluminum alloy 6063 T5.
.2 Tubular framing top and sides.
.3 Free of sharp edges or burrs when in place.
.4 Glazing Channel:
.1 Aluminium clear anodized U-Channel specifically designed for securing transparencies tightly in place at top, bottom and sides.
.5 Shelf/Counter:
.1 Full width of window x 457 mm deep x 50 mm thick, centered under glazing, with cut-out for accessory deal tray, rounded corners, finish: high pressure laminate, colour black.
.6 Deal Tray:
.1 Recess mount.
.2 Stainless steel 18 gauge, #4 finish.
.3 Size as indicated.
.7 Fasteners:
.1 Stainless steel assembly screws and acrylic spacers provided by the fabricator.
.8 Acceptable material: Total Security Solutions, Arched Voice Port Interior Transaction Window.

.3 Fasteners:
.1 Stainless Steel assembly screws and acrylic spacers provided by the fabricator.
.2 Anchor stainless steel countersunk screws shall be provided by the installer.

.4 Caulking:
.1 Paintable type.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions:
.1 Verify that conditions previously installed under other Sections are acceptable for bullet resistant interior transaction window assembly installation, in accordance with manufacturer's written instructions.
.2 Visually inspect, one week prior to installation, in presence of Departmental Representative.
.3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.4 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Clean and prepare all surfaces in accordance with manufacturer’s recommendations for achieving best results for the substrate under the project conditions.

3.3 INSTALLATION

.1 Manufacturer’s Instructions:
.1 Comply with manufacturer's written data, including product technical bulletins, installation instructions, anchoring and finishing details, data sheets and reviewed shop drawings.

.2 Install in accordance with UL 752.

.3 Assembly shall arrive on site as a completed unit. Unit shall be installed in provided opening and secured.

.4 Do not begin installation until openings have been verified and surfaces properly prepared.

.5 Install unit in provided opening, set plumb and anchor in place.

.6 Apply paintable caulking.

.7 Replace damaged products before Substantial Completion.

.8 Clean product and accessories, removing excess sealant, labels and protective covers.

.9 Verify installation is complete and complies with manufacturer’s requirements.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.
.2 During construction, clean glazing unit in accordance with manufacturer’s instructions.

.2 Final Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Clean glazing unit in accordance with manufacturer's instructions.

3.5 PROTECTION

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

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 and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop drawings:

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

.2 Drawings to show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances.

.3 Drawings and product data accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify current model production.

.5 Certification of compliance to applicable codes.

.4 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

1.2 CLOSEOUT SUBMITTALS

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

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

.1 Operation and maintenance manual approved by, and final copies deposited with Departmental Representative 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.

.7 Colour coding chart.

.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 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.6 Site records:

.1 Departmental Representative will provide 1 set 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, control systems and low voltage control wiring.

.2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.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 Departmental Representative 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.

1.3 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 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 Execution

2.1 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.

2.2 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 09 91 23 - Interior Painting.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

2.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Section 01 45 00 – Quality Control 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.

2.4 DEMONSTRATION

.1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.4 Instruction duration time requirements as specified in appropriate sections.

2.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

2.6 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 National Fire Prevention Association (NFPA)

.1 NFPA 13-2007, Standard for the Installation of Sprinkler Systems.

.2 NFPA 20-2007, Standard for the Installation of Stationary Pumps for Fire Protection.

.3 NFPA 24-2007, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

.4 NFPA 25-2008, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

.2 Underwriter's Laboratories of Canada (ULC)

.1 CAN4 S543-M984, Standard for Internal Lug Quick Connect Couplings for Fire Hose.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

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

.2 Indicate:

.1 Materials.

.2 Finishes.

.3 Method of anchorage

.4 Number of anchors.

.5 Supports.

.6 Reinforcement.

.7 Assembly details.

.8 Accessories.

.4 Samples:

.1 Submit samples of following:

.1 Each type of sprinkler head.

.2 Signs.

.5 Test reports:

.1 Submit certified test reports for wet pipe fire protection sprinkler systems from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.6 Certificates:

.1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.7 Manufacturers' Instructions:

.1 Provide manufacturer's installation instructions.

.8 Field Quality Control Submittals:

.1 Manufacturer's Field Reports: manufacturer's field reports specified.

1.3 CLOSEOUT SUBMITTALS

.1 Provide operation, maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals in accordance with ANSI/NFPA 20.

.2 Manufacturer's Catalog Data, including specific model, type, and size for:

.1 Pipe and fittings.
.2 Alarm valves.
.3 Valves, including gate, check, and globe.
.4 Sprinkler heads.
.5 Pipe hangers and supports.
.6 Pressure or flow switch.
.7 Mechanical couplings.

.3 Drawings:

.1 Sprinkler heads and piping system layout.

.1 Prepare 760 mm by 1050 mm detail working drawings of system layout in accordance with NFPA 13, "Working Drawings (Plans)".
.2 Show data essential for proper installation of each system.
.3 Show details, plan view, elevations, and sections of systems supply and piping.
.4 Show piping schematic of systems supply, devices, valves, pipe, and fittings. Show point to point electrical wiring diagrams.

.2 Electrical wiring diagrams.

.4 Design Data:

.1 Calculations of sprinkler system design.
.2 Indicate type and design of each system and certify that each system has performed satisfactorily in the manner intended for not less than 18 months.

.5 Field Test Reports:

.1 Preliminary tests on piping system.

.6 Records:

.1 As-built drawings of each system.

.1 After completion, but before final acceptance, submit complete set of as-built drawings of each system for record purposes.
.2 Submit 760 mm by 1050 mm drawings on reproducible Mylar film with title block similar to full size contract drawings.

.7 Operation and Maintenance Manuals:

.1 Provide detailed hydraulic calculations including summary sheet, and Contractors Material and Test Certificate for piping and other documentation for incorporation into manual in accordance with NFPA 13.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company or person specializing in wet sprinkler systems.

.2 Supply grooved joint couplings, fittings, valves, grooving tools and specialties from a single manufacturer. Use date stamped castings for coupling housings, fittings, valve bodies, for quality assurance and traceability.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals. Box and label.

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:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Storage and Protection:

.1 Store materials indoors.

.2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Design automatic wet pipe fire suppression sprinkler systems in accordance with required and advisory provisions of NFPA 13, by hydraulic calculations for uniform distribution of water over design area.

.2 Include with each system materials, accessories, and equipment inside and outside building to provide each system complete and ready for use.

.3 Design and provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with detailed shop drawings.

.4 Locate sprinkler heads in consistent pattern with ceiling grid, lights, and air supply diffusers.

.5 Devices and equipment for fire protection service: ULC approved for use in wet pipe sprinkler systems.

.6 Design systems for earthquake protection for buildings in seismic zones 3 and 4, and only essential and high risk buildings in seismic zone 2.

.7 Location of Sprinkler Heads:

.1 Locate heads in relation to ceiling and spacing of sprinkler heads not to exceed that permitted by NFPA 13 for ordinary hazard occupancy.

.2 Uniformly space sprinklers on branch.

.8 Water Distribution:

.1 Make distribution uniform throughout the area in which sprinkler heads will open.

.2 Discharge from individual heads in hydraulically most remote area to be 100% of specified density.

.9 Density of Application of Water:

.1 Size pipe to provide specified density when system is discharging specified total maximum required flow.

.10 Sprinkler Discharge Area:

.1 As defined in NFPA 13.

.11 Friction Losses:

.1 Calculate losses in piping in accordance with Hazen-Williams formula with 'C' value of 120 for steel piping, 150 for copper tubing, and 140 for cement-lined ductile-iron piping.

2.2 ABOVE GROUND PIPING SYSTEMS

.1 Provide fittings for changes in direction of piping and for connections.

.1 Make changes in piping sizes through tapered reducing pipe fittings, bushings will not be permitted.

.2 Perform welding in shop; field welding will not be permitted.

.3 Conceal piping in areas with suspended ceiling.

2.3 PIPE, FITTINGS AND VALVES

.1 Pipe:

.1 Ferrous: to NFPA 13.

.2 Copper tube: to NFPA 13.

.2 Fittings and joints to NFPA 13:

.1 Ferrous: screwed, welded, flanged or roll grooved.

.1 Grooved joints designed with two ductile iron housing segments, pressure responsive gasket, and zinc-electroplated steel bolts and nuts. Cast with offsetting angle-pattern bolt pads for rigidity and visual pad-to-pad offset contact.

.2 Copper tube: screwed, soldered, brazed, grooved.

.3 Provide threaded fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.

.4 Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into pipe when pressure is applied will not be permitted.

.5 Rubber gasketted grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32 mm and larger.

.6 Fittings: ULC approved for use in wet pipe sprinkler systems.

.7 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.

.8 Side outlet tees using rubber gasketted fittings are not permitted.

.9 Sprinkler pipe and fittings: metal.

.3 Valves:

.1 ULC listed for fire protection service.

.2 Gate valves: open by counterclockwise rotation.

.4 Pipe hangers:

.1 ULC listed for fire protection services in accordance with NFPA.

2.4 SPRINKLER HEADS

.1 General: to NFPA 13 and ULC listed for fire services.

.2 Sprinkler Head Type:

.1 Type C: pendant chrome glass bulb type.

.3 Provide nominal 1.2 cm orifice sprinkler heads.

.1 Release element of each head to be of intermediate temperature rating or higher as suitable for specific application.

.2 Provide polished stainless steel ceiling plates sprinklers below suspended ceilings.

.3 Provide corrosion-resistant sprinkler heads and sprinkler head guards in accordance with NFPA 13.

.4 Deflector: not more than 75 mm below suspended ceilings.

.5 Ceiling plates: not more than 25 mm deep.

.6 Ceiling cups: not permitted.

2.5 ALARM CHECK VALVE

.1 Alarm check valve to NFPA 13 and ULC listed for fire service.

.2 Provide variable pressure type alarm valve complete with retarding chamber, alarm test valve, alarm shutoff valve, drain valve, pressure gages, accessories, appurtenances for proper operation of system.

.3 Provide valve complete with internal components that are replaceable without removing the valve from the installed position.

2.6 SUPERVISORY SWITCHES

.1 General: to NFPA 13 and ULC listed for fire service.

.2 Valves:

.1 Mechanically attached to valve body, with normally open and normally closed contacts and supervisory capability.

.3 Pressure or flow switch type:

.1 With normally open and normally closed contacts and supervisory capability.

.2 Provide switch with circuit opener or closer for automatic transmittal of alarm over facility fire alarm system.

.3 Connect into building fire alarm system.

.4 Connection of switch: Section 28 31 00 - Fire Detection and Alarm.

.5 Alarm actuating device: mechanical diaphragm controlled retard device adjustable from 1 to 60 seconds and instantly recycle.

.4 Pressure alarm switch:

.1 With normally open and normally closed contacts and supervisory capability.

2.7 PIPE SLEEVES

.1 Provide pipe sleeves where piping passes through walls, floors, roofs.

.2 Secure sleeves in position and location during construction.

.3 Provide sleeves of sufficient length to pass through entire thickness of walls, floors, roofs.

.4 Provide 2.5 cm minimum clearance between exterior of piping and interior of sleeve or core-drilled hole.

.1 Firmly pack space with mineral wool insulation.

.2 Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement which will dry to firm but pliable mass.

.3 In fire walls and fire floors, seal both ends of pipe sleeves or core-drilled holes with ULC listed fill, void, or cavity material.

.5 Sleeves in Masonry and Concrete Walls, Floors, and Roofs:

.1 Provide cast-iron sleeves.

.2 Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in core-drilled hole are completely grouted smooth.

.6 Sleeves in Other Than Masonry and Concrete Walls, Floors, and Roofs:

.1 Provide 0.61 mm thick galvanized steel sheet.

2.8 ESCUTCHEON PLATES

.1 Provide split hinge type metal plates for piping passing through walls, floors, ceilings in exposed spaces.

.2 Provide polished stainless steel plates in finished spaces.

.3 Provide paint finish on metal plates in unfinished spaces.

2.9 INSPECTOR'S TEST CONNECTION

.1 Locate inspector's test connection at hydraulically most remote part of each system, provide test connections approximately 3 m above floor for each sprinkler system or portion of each sprinkler system equipped with alarm device.

.2 Provide test connection piping to location where discharge will be readily visible and where water may be discharged without property damage.

.3 Provide discharge orifice of same size as corresponding sprinkler orifice.

2.10 SIGNS

.1 Attach properly lettered Bilingual and approved metal signs to each valve and alarm device to NFPA 13.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install, inspect and test to acceptance in accordance with NFPA 13 and NFPA 25.

3.3 PIPE INSTALLATION

.1 Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings.

.2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.

.3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.

.4 Inspect piping before placing into position.

3.4 ELECTRICAL CONNECTIONS

.1 Provide electrical work associated with this section under Section 26 05 00 - Common Work Results for Electrical.

.2 Provide fire alarm system under Section 28 31 00 - Fire Detection and Alarm.

.3 Provide control and fire alarm wiring, including connections to fire alarm systems, in accordance with National Electrical Code.

.4 Provide wiring in rigid metal conduit or intermediate metal conduit.

3.5 DISINFECTION

.1 Disinfect new piping.

.2 Fill piping systems with solution containing minimum of 50 parts per million of chlorine and allow solution to stand for minimum of 24 hours.

.3 Flush solution from systems with clean water until maximum residual chlorine content is not greater than 0.2 part per million or residual chlorine content of domestic water supply.

.4 Obtain at least two consecutive satisfactory bacteriological samples from piping, analyzed by certified laboratory, and submit results prior to piping being placed into service.

3.6 CONNECTIONS TO EXISTING WATER SUPPLY SYSTEMS

.1 Notify Contracting Officer in writing at least 15 days prior to connection date.

.2 Use tapping valve and mechanical joint type sleeves for connections to be made under pressure.

.3 Bolt sleeves around main piping.

.4 Bolt valve to branch connection. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, without interruption of service.

.5 Furnish materials required to make connections into existing water supply systems, and perform excavating, backfilling, and other incidental labour as required.

3.7 FIELD PAINTING

.1 Clean, pretreat, prime, and paint new systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories.

.2 Apply coatings to clean, dry surfaces, using clean brushes.

.3 Clean surfaces to remove dust, dirt, rust, and loose mill scale.

.4 Immediately after cleaning, provide metal surfaces with 1 coat of pretreatment primer applied to minimum dry film thickness of 0.3 ml, and one coat of zinc chromate primer applied to minimum dry film thickness of 1.0 ml.

.5 Shield sprinkler heads with protective covering while painting is in progress.

.6 Upon completion of painting, remove protective covering from sprinkler heads.

.7 Remove sprinkler heads which have been painted and replace with new sprinkler heads.

.8 Provide primed surfaces with following:

.1 Piping in Finished Areas:

.1 Provide primed surfaces with 2 coats of paint to match adjacent surfaces.

.2 Provide valves and operating accessories with 1 coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil.

.3 Provide piping with self-adhering red plastic bands 50 mm wide red enamel bands spaced at maximum of 6 m intervals throughout piping systems.

.2 Piping in Unfinished Areas:

.1 Provide primed surfaces with one coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil spaces above suspended ceilings, spaces where walls or ceiling are not painted or not constructed of a prefinished material.

.2 Provide piping with self-adhering red plastic bands 50 mm wide red enamel bands spaced at maximum of 6 m intervals.

3.8 FIELD QUALITY CONTROL

.1 Site Test, Inspection:

.1 Perform test to determine compliance with specified requirements in presence of Departmental Representative.

.2 Test, inspect, and approve piping before covering or concealing.

.3 Preliminary Tests:

.1 Hydrostatically test each system at 200 psig for a 2 hour period with no leakage or reduction in pressure.

.2 Flush piping with potable water in accordance with NFPA 13.

.3 Piping above suspended ceilings: tested, inspected, and approved before installation of ceilings.

.4 Test alarms and other devices.

.5 Test water flow alarms by flowing water through inspector's test connection. When tests have been completed and corrections made, submit signed and dated certificate in accordance with NFPA 13.

.4 Formal Tests and Inspections:

.1 Do not submit request for formal test and inspection until preliminary test and corrections are completed and approved.

.2 Submit written request for formal inspection at least 15 days prior to inspection date.

.3 Repeat required tests as directed.

.4 Correct defects and make additional tests until systems comply with contract requirements.

.5 Departmental Representative will witness formal tests and approve systems before they are accepted.

.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 - 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 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

.3 CLEANING

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

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

3.9 TESTING AND COMMISSIONING

.1 Submit Verification and Inspection report.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Use of mechanical systems during construction.

1.2 USE OF SYSTEMS

.1 Use of existing permanent heating and ventilating systems for supplying temporary heat and ventilation is permitted only under following conditions:

.1 Areas to be heated/ventilated are clean and will not thereafter be subjected to dust-producing processes.

.2 There is no possibility of damage.

.3 Supply ventilation systems are protected by 60 % filters, inspected daily, changed every 2 weeks or more frequently as required.

.4 Return systems have approved filters over openings, inlets, outlets.

.5 Systems will be:

.1 Operated as per manufacturer's recommendations and instructions.

.2 Operated by Contractor.

.3 Monitored continuously by Contractor.

.6 Warranties and guarantees are not relaxed.

.7 Refurbish entire system before static completion; clean internally and externally, restore to "as- new" condition, replace filters in air systems.

.2 Filters specified in this Section are over and above those specified in other Sections of this project.

.3 Exhaust systems are not included in approvals for temporary heating ventilation.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.

.2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

1.2 QUALIFICATIONS OF TAB PERSONNEL

.1 Submit names of personnel to perform TAB to Departmental Representative within 90 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-1-2002.

.2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems-1998.

.3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing-2002.

.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.

1.3 PURPOSE OF TAB

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

.2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.

.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.4 EXCEPTIONS

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

1.5 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.6 PRE-TAB REVIEW

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

.2 Review specified standards and report to Departmental Representative in writing proposed procedures which vary from standard.

.3 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

1.7 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

.2 Follow special start-up procedures specified elsewhere in Division 23.

1.8 OPERATION OF SYSTEMS DURING TAB

.1 Operate systems for length of time required for TAB and as required by Departmental Representative for verification of TAB reports.

1.9 START OF TAB

.1 Notify Departmental Representative 7 days prior to start of TAB.

.2 Start TAB when building is essentially completed, including:

.3 Installation of ceilings, doors, windows, other construction affecting TAB.

.4 Application of weatherstripping, sealing, and caulking.

.5 Pressure, leakage, other tests specified elsewhere Division 23.

.6 Provisions for TAB installed and operational.

.7 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.

1.10 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:

.1 HVAC systems: plus 5 %, minus 5 %.

1.11 ACCURACY TOLERANCES

.1 Measured values accurate to within plus or minus 2 % of actual values.

1.12 INSTRUMENTS

.1 Prior to TAB, submit to Departmental Representative 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 Departmental Representative.

1.13 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit, prior to commencement of TAB:

.2 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.14 PRELIMINARY TAB REPORT

.1 Submit for checking and approval of Departmental Representative, 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.

1.15 TAB REPORT

.1 TAB report to show results in SI units and to include:

.1 Project record drawings.

.2 System schematics.

.2 Submit 4 copies of TAB Report to Departmental Representative for verification and approval in D-ring binders, complete with index tabs.

1.16 VERIFICATION

.1 Reported results subject to verification by Departmental Representative.

.2 Provide personnel and instrumentation to verify up to 30% of reported results.

.3 Number and location of verified results as directed by Departmental Representative.

.4 Pay costs to repeat TAB as required to satisfaction of Departmental Representative.

1.17 SETTINGS

.1 After TAB is completed to satisfaction of Departmental Representative, 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.

1.18 COMPLETION OF TAB

.1 TAB considered complete when final TAB Report received and approved by Departmental Representative.

1.19 AIR SYSTEMS

.1 Standard: TAB to most stringent of TAB standards of AABC.

.2 Qualifications: personnel performing TAB, current member in good standing of AABC, qualified to standards of AABC.

.3 Quality assurance: perform TAB under direction of supervisor qualified by standards of AABC.

.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, noise, vibration.

.5 Locations of equipment measurements: to include as appropriate:

.1 Inlet and outlet of dampers, filter, coil, humidifier, fan, other equipment causing changes in conditions.

.2 At controllers, controlled device.

.6 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

1.20 OTHER TAB REQUIREMENTS

.1 General requirements applicable to work specified this paragraph:

.1 Qualifications of TAB personnel: as for air systems specified this section.

.2 Quality assurance: as for air systems specified this section.

.2 Building pressure conditions:

.1 Adjust HVAC systems, equipment, controls to ensure specified pressure conditions at all times during winter and summer design conditions.

1.21 POST-OCCUPANCY TAB

.1 Measure DBT, WBT (or %RH), air velocity, air flow patterns, NC levels, in occupied zone of following areas: Phase 2 area of work.

.2 Emergency evacuation: participate in full scale emergency evacuation exercises.

.3 Participate in systems checks twice during Warranty Period - #1 approximately 3 months after acceptance and #2 within 1 month of termination of Warranty Period.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Definitions:

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - means "not concealed" as previously defined.

.3 Insulation systems - insulation material, fasteners, jackets, and other accessories.

.2 TIAC Codes:

.1 CRD: Code Round Ductwork,

.2 CRF: Code Rectangular Finish.

.2 Reference Standards:

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.2 ASTM International Inc.

.1 ASTM B209M-07, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

.2 ASTM C335-05ae1, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.3 ASTM C411-05, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.4 ASTM C449/C449M-00, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.5 ASTM C547-07e1, Standard Specification for Mineral Fiber Pipe Insulation.

.6 ASTM C553-02e1, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.7 ASTM C612-04e1, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

.8 ASTM C795-03, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

.9 ASTM C921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.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 Green Seal Environmental Standards (GSES)

.1 Standard GS-36-00, Commercial Adhesives.

.5 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

.6 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (2005).

.7 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102-03, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.2 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.

.3 Manufacturers' Instructions:

.1 Provide manufacture's written duct insulation jointing recommendations. and special handling criteria, installation sequence, cleaning procedures.

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

.2 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).

.3 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^2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.2 Lagging adhesive: compatible with insulation.

.1 Maximum VOC limit 50g/L to SCAQMD Rule 1168 GSES GS-36.

.3 Aluminum:

.1 To ASTM B209 with moisture barrier as scheduled in PART 3 of this section.

.2 Thickness: 0.50 mm sheet.

.3 Finish: Smooth.

.4 Jacket banding and mechanical seals: 12 mm wide, 0.5 mm thick stainless steel.

.1 Stainless steel:

.5 Type: 304.

.6 Thickness: 0.25mm sheet.

.7 Finish: Smooth

.8 Jacket banding and mechanical seals: 12mm wide, 0.5 mm thick stainless steel.

2.4 ACCESSORIES

.1 Vapour retarder lap adhesive:

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

.1 Maximum VOC limit 50 g/L to SCAQMD Rule 1168.

.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^2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.5 Tape: self-adhesive, aluminum, plain, 50 mm wide minimum.

.6 Contact adhesive: quick-setting

.1 Maximum VOC limit 50g/L to SCAQMD Rule 1168.

.7 Canvas adhesive: washable.

.1 Maximum VOC limit 50g/L to SCAQMD Rule 1168.

.8 Tie wire: 1.5 mm stainless steel.

.9 Banding: 12 mm wide, 0.5 mm thick stainless steel.

.10 Facing: 25 mm stainless steel hexagonal wire mesh stitched on one face of insulation with expanded metal lath on other face of insulation.

.11 Fasteners: 4 mm diameter pins with 35 mm 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 manufacturers 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 Hangers and supports in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

.1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

.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	Vapour Retarder	Thickness (mm)	
Rectangular warm air ducts	C-1	no	25
Round warm air ducts	C-1	no	25
Supply, return and exhaust ducts exposed in space being served	none		
Exhaust duct between dampers and louvres	C-1	no	25
Acoustically lined ducts	none		

.2 Exposed round ducts 600 mm and larger, smaller sizes where subject to abuse:

.1 Use TIAC code C-1 insulation, scored to suit diameter of duct.

.1 Finishes: conform to following table:

TIAC Code		
Rectangular	Round	
Indoor, concealed	none	none
Indoor, exposed elsewhere	CRF/2	CRD/3

3.5 CLEANING

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

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

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

END OF SECTION

Part 1 General

.1 Sheet Metal and Air Conditioning National Association (SMACNA)

.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.

1.3 CLOSEOUT SUBMITTALS

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

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

.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 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 as indicated 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.

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 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 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 Departmental Representative.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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-12, Standard for the Installation of Air-Conditioning and Ventilating Systems.

.2 NFPA 90B-12, Standard for Installation of Warm Air Heating and Air-Conditioning Systems.

.3 Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA)

.1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2005.

.2 SMACNA IAQ Guideline for Occupied Buildings under Construction,2005.

.4 Underwriters' Laboratories (UL)

.1 UL 181-2005, Standard for Factory-Made Air Ducts and Air Connectors.

.5 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S110-2007, Standard Methods of Tests for Air Ducts.

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 flexible ducts and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Indicate:

.1 Thermal properties.

.2 Friction loss.

.3 Acoustical loss.

.4 Leakage.

.5 Fire rating.

.3 Test and Evaluation Reports:

.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.

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 indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect flexible ducts from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 GENERAL

.1 Factory fabricated to CAN/ULC-S110.

.2 Pressure drop coefficients listed below are based on relative sheet metal duct pressure drop coefficient of 1.00.

.3 Flame spread rating not to exceed 25. Smoke developed rating not to exceed 50.

2.2 NON-METALLIC - UNINSULATED

.1 Non-collapsible, coated aluminum foil mylar type, mechanically bonded to, and helically supported by, external steel wire, as indicated.

.2 Performance:

.1 Factory tested to 2.5 kPa without leakage.

.2 Maximum relative pressure drop coefficient: 3.

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 flexible ducts 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 DUCT INSTALLATION

.1 Install in accordance with: SMACNA.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM C423-09a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

.2 ASTM C916-85(2007), Standard Specification for Adhesives for Duct Thermal Insulation.

.3 ASTM C1071-12, Standard specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).

.4 ASTM C1338-08, Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.

.5 ASTM G21-09, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

.2 National Fire Protection Association (NFPA)

.1 NFPA 90A-1, Standard for the Installation of Air Conditioning and Ventilating Systems.

.2 NFPA 90B-12, Standard for the Installation of Warm Air Heating and Air Conditioning Systems.

.3 North American Insulation Manufacturers Association (NAIMA)

.1 NAIMA AH116-2002, Fibrous Glass Duct Construction Standards.

.4 Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)

.1 SMACNA, HVAC Duct Construction Standards, Metal and Flexible-2005.

.2 SMACNA IAQ Guideline for Occupied Buildings Under Construction-2007.

.5 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

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 duct liners and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for duct liners 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.

.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 duct liners from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DUCT LINER

.1 General:

.1 Mineral Fibre duct liner: air surface coated mat facing.

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50 when tested in accordance with NFPA 90A

.3 Recycled Content: EcoLogo certified with minimum 35 by weight recycled content .

.4 Fungi resistance: to ASTM C1338.

.2 Rigid:

.1 Use on flat surfaces where indicated.

.2 25mm thick, to ASTM C1071 Type 2, fibrous glass rigid board duct liner.

.3 Density: 48 kg/m^3minimum.

.4 Thermal resistance to be minimum 0.76 (m^2. degrees C)/W for 25 mm thickness, 1.15 (m^2.degrees C)/W for 38 mm thickness, 1.53 (m^2.degrees C)/W for 50 mm thickness when tested in accordance with ASTM C177, at 24 degrees C mean temperature.

.5 Maximum velocity on faced air side: 20.3 m/s.

.6 Minimum NRC of 0.70 at 25 mm thickness based on Type A mounting to ASTM C423.

.7 Recycled Content: EcoLogo certified containing minimum 45 by weight recycled content .

.3 Flexible:

.1 Use on round surfaces .

.2 25 mm thick, to ASTM C1071 Type 1, fibrous glass blanket duct liner.

.3 Density: 24 kg/m^3 minimum.

.4 Thermal resistance to be minimum 0.37 (m^2.degrees C)/W for 12 mm thickness, 0.74 (m^2.degrees C)/W for 25 mm thickness, 1.11 (m^2.degrees C)/W for 38 mm thickness, 1.41 (m^2.degrees C)/W to 50 mm thickness when tested in accordance with ASTM C177, at 24 degrees C mean temperature.

.5 Maximum velocity on coated air side: 30.5 m/s.

.6 Minimum NRC of 0.65 at 25 mm thickness based on Type A mounting to ASTM C423.

2.2 ADHESIVE

.1 Adhesive: to NFPA 90A and NFPA 90B.

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50. Temperature range minus 29 degrees C to plus 93 degrees C.

.3 Water-based fire retardant type.

2.3 FASTENERS

.1 Weld pins 2.0 mm diameter, length to suit thickness of insulation. Nylon retaining clips, 32 mm square.

2.4 JOINT TAPE

.1 Poly-Vinyl treated open weave fiberglass membrane 50 mm wide.

2.5 SEALER

.1 Meet requirements of NFPA 90A, NFPA 90B.

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50. Temperature range minus 68 degrees C to plus 93 degrees C.

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 duct liner 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 GENERAL

.1 Do work in accordance with SMACNA HVAC Duct Construction Standard as indicated except as specified otherwise.

.2 Line inside of ducts where indicated.

.3 Duct dimensions, as indicated, are clear inside duct lining.

3.3 DUCT LINER

.1 Install in accordance with manufacturer's recommendations, and as follows:

.1 Fasten to interior sheet metal surface with 90% coverage of adhesive to ASTM C916.

.1 Exposed leading edges and transverse joints to be factory coated or coated with adhesive during fabrication.

.2 In addition to adhesive, install weld pins not less than 2 rows per surface and not more than 425 mm on centres to compress duct liner sufficiently to hold it firmly in place.

.1 Spacing of mechanical fasteners in accordance with SMAC HVAC Duct Construction Standard.

.2 In systems, where air velocities exceeds 20.3 m/s, install galvanized sheet metal noising to leading edges of duct liner.

3.4 JOINTS

.1 Seal butt joints, exposed edges, weld pin and clip penetrations and damaged areas of liner with joint tape and sealer. Install joint tape in accordance with manufacturer's written recommendations, and as follows:

.1 Bed tape in sealer.

.2 Apply 2 coats of sealer over tape.

.2 Replace damaged areas of liner at discretion of Departmental Representative.

.3 Protect leading and trailing edges of duct sections with sheet metal nosing having 15 mm overlap and fastened to duct.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute/Air Movement and Control Association (ANSI/AMCA)

.1 ANSI/AMCA Standard 210-2007/(ANSI/ASHRAE 51-07), Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

.2 International Organization of Standardization (ISO)

.1 ISO 3741-2010, Acoustics-Determination of Sound Power Levels of Noise Sources Using Sound Pressure - Precision Methods for Reverberation Rooms.

.3 National Fire Protection Association (NFPA)

.1 NFPA 90A-12, Standard for the Installation of Air Conditioning and Ventilating Systems.

.4 Underwriter's Laboratories (UL)

.1 UL 181-2005(R2008), Factory-Made Air Ducts and Air Connectors.

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 terminal units and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

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

.2 Indicate the following:

.1 Capacity.

.2 Pressure drop.

.3 Noise rating.

.4 Leakage.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Test and Evaluation Reports:

.1 Test data: to ANSI/AMCA Standard 210.

.1 Submit published test data on DIN (Direct Internal Noise), in accordance with ISO 3741 made by independent testing agency for 0, 2.5 and 6 m/s branch velocity or inlet velocity.

.2 Sound power level with minimum inlet pressure of 0.25kPa in accordance with ISO 3741 for 2nd through 7th octave band, also made by testing agency.

.3 Pressure loss through silencer shall not exceed 60% of inlet velocity pressure maximum.

1.3 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for air terminal units 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 and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect air terminal units from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.5 COMMISSIONING

.1 Commission requirements

.1 Section 01 91 13 – General Commissioning Requirements.

.2 Section 01 91 33 – Commission Forms.

.1 VAV Box Commission Form.

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 certified ADC (Air Diffusion Council) testing agency signifying adherence to codes and standards.

2.2 MANUFACTURED UNITS

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

2.3 ELECTRONIC VARIABLE AIR VOLUME BOXES

.1 Pressure independent, reset to air flow between zero and maximum air volume.

.2 At inlet velocity of 10 m/s, differential static pressure for unit with attenuator section not to exceed 25 Pa.

.3 Sound ratings of assembly not to exceed 30NC at 375Pa.

.4 Air velocity sensor as standard to manufacturer.

.5 Signals between temperature sensing device, velocity controller, velocity sensor and damper actuator digital as indicated. Shielded or twisted wire requirements is not acceptable.

.6 Electronic thermostat furnished by terminal unit manufacturer and have set points and velocity adjustments located in thermostat. Heating and cooling set point range 13 to 30 degrees C. Set points not overlapping. Thermostat to have 0.5 C proportional band at velocity settings.

.7 Electronic control package factory calibrated and set at factory. Features to accommodate field calibration and readjustment of air volume settings to include:

.1 Metre taps for balancing with digital DC voltmeter.

.2 Adjustable flow settings at thermostat.

.8 Factory installed 20 VA transformer, 115 V to 24 V. Power consumption of terminal not to exceed 15 VA.

.9 Terminal unit to be CSA certified.

.10 Casing: 0.75 mm thick galvanized steel, internally lined with 25 mm. 0.7 kg density fibrous glass, to UL 181 and NFPA 90A. Mount control components inside protective metal shroud.

.11 Damper: two layers of heavy gauge galvanized steel with peripheral gasket and self lubricating bearings. Air leakage past closed damper not to exceed 2% of nominal rating at 750 Pa inlet static pressure, in accordance with Air Diffusion Council test procedure.

.12 Sizes and capacity: 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 air terminal units 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 in accordance with manufacturers recommendations.

.2 Support independently of ductwork.

.3 Install with at least 1000 mm of flexible inlet ducting and minimum of four duct diameters of straight inlet duct, same size as inlet.

.4 Locate controls, dampers and access panels for easy access.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.4 DEMONSTRATION & TRAINING

.1 Upon completion, inform Departmental Representative of equipment in accordance with Section 01 79 00 – Demonstration & Training.

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 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 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 Plaster frames where set into plaster or gypsum board and as specified.

.3 Concealed fasteners.

.3 Concealed manual volume control damper operators.

.4 Colour: standard as directed by Departmental Representative.

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 General: with opposed blade dampers.

.2 Type RA: steel 19 mm border, various size egg crate type face bars.

2.5 DIFFUSERS

.1 General: volume control dampers with flow straightening devices and gaskets.

.2 Type DA: steel square cone type, 600x600mm, having fixed pattern, lay-in mounted.

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 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 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 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.

.2 Reference Standards:

.1 CSA Group

.1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2.

.3 CAN3-C235-83(R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop drawings:

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

.2 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.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 Submit (2) number of copies of 600 x 900 mm minimum size drawings to authority having jurisdiction.

.6 If changes are required, notify Departmental Representative of these changes before they are made.

.3 Certificates:

.1 Provide CSA certified equipment.

.2 Where CSA certified equipment is not available, submit such equipment to inspection authorities 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.

1.3 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for lighting, lighting controls, sound masking, and fire alarm for incorporation into manual.

.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 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

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 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 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from inspection authorities 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 Control wiring and conduit: in accordance with mechanical specifications and drawings.

2.4 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of authority having jurisdiction.

.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 and labels as follows:

.1 Nameplates: lamicoid 3 mm black face, white core, lettering accurately aligned and engraved into core mechanically attached with self tapping screws.

.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 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 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO." as directed by Departmental Representative.

.7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

2.7 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, numbered, 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 15 m intervals.

.3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

Prime	Auxiliary	
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

Part 3 Execution

3.1 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.

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 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 Do not install outlets back-to-back in wall; allow minimum 600 mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.4 Locate light switches on latch side of doors.

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: 1200 mm.
- .2 Wall receptacles:
  - .1 General: 400 mm.
  - .2 Above top of continuous baseboard heater: 200 mm.
  - .3 Above top of counters or counter splash backs: 175 mm.
  - .4 In mechanical rooms: 1400 mm.
- .3 Panelboards: as required by Code or as indicated.
- .4 Telephone and data outlets: 400 mm.
- .5 Fire alarm stations: 1200 mm.
- .6 Fire alarm bells: 2100 mm.
- .7 Television outlets: Coordinate, behind television location.
- .8 Wall mounted speakers: 2100 mm.

3.7 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.8 FIELD QUALITY CONTROL

.1 Load Balance:

- .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
- .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- .3 Provide upon completion of work, load balance report as directed in PART 1 - 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 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

.5 Systems: fire alarm, sound masking.

.6 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.

3.9 SYSTEM STARTUP

.1 Instruct operating personnel in operation, care and maintenance of systems, system equipment and components.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 REFERENCES

.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 and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

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 indoors 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 Clamps or connectors for aluminum sheathed cable and flexible conduit as required to: CAN/CSA-C22.2 No.18.

Part 3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 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.

.3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 NOT USED.

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 thermoplastic insulation type T90 Nylon rated at 600V.

2.2 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from galvanized steel strip.

.4 Connectors: anti short connectors.

2.3 CONTROL CABLES

.1 Type: LVT: 2 soft annealed copper conductors, sized as indicated:

.1 Insulation: thermoplastic.

.2 Sheath : thermoplastic jacket, and armour of closely wound aluminum wire.

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 tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.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.

3.4 WIRING METHODS

.1 Concealed Dry Interior Locations: Use only building wire in raceway. Armoured cabling may be used for individual drops to equipment and devices only.

.2 Exposed Dry Interior Locations: Use only building wire in raceway.

.3 Above Accessible Ceilings: Use only building wire in raceway. Armoured cabling may be used for individual drops to equipment and devices only.

3.5 INSTALLATION OF ARMOURED CABLES

.1 Armoured cable shall be used for connections from conduit systems to recessed luminaires in accessible ceilings. Cable shall be of sufficient length to allow the lighting fixture to be relocated to any location within an 1800mm (6') radius. Cable shall be clamped before entering the lighting fixture and shall be clipped before entering the conduit system junction box. (Minimum requirements).

.2 Armoured cable may be used for connections from conduit systems to wiring devices in steel stud partitions and for interconnection of wiring devices within steel stud partitions. Cables shall be clipped before entering junction or outlet boxes.

3.6 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduit.

.2 Ground control cable shield.

END OF SECTION

Part 1 General

1.1 WASTE MANAGEMENT AND DISPOSAL

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

.2 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.

.3 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted suspended.

Part 3 Execution

3.1 INSTALLATION

.1 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Fasten exposed conduit or cables to building construction or support system using straps.

- .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
- .2 Two-hole steel straps for conduits and cables larger than 50 mm.
- .3 Beam clamps to secure conduit to exposed steel work.

.7 Suspended support systems.

- .1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.
- .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

.8 For surface mounting of two or more conduits use channels at 900 mm on centre spacing.

.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.12 Group conduits on suspended channels.

.13 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.14 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative.

.15 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-15, Canadian Electrical Code, Part 1, 23rd Edition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

Part 2 Products

2.1 JUNCTION AND PULL BOXES

.1 Construction:welded steel enclosure.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted: screw-on flat covers.

.4 All covers for junction and pull boxes with a dimension larger than 250mm shall have hinged covers.

Part 3 Execution

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

.3 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1-15.

3.2 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.

.2 Identification Labels: size 2 indicating system name, voltage and phase or as indicated.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-15, Canadian Electrical Code, Part 1, 23rd Edition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 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.

.5 347 V outlet boxes for 347 V switching devices.

.6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 GALVANIZED STEEL OUTLET BOXES

.1 One-piece electro-galvanized construction.

.2 Single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

.3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

.4 102 mm square or octagonal outlet boxes for lighting fixture outlets.

.5 Extension and plaster rings for flush mounting devices in finished walls.

2.3 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 35mm and pull boxes for larger conduits.

.4 Provide watertight connectors and couplings for all new conduit fittings and connectors.

.1 Set-screws are not acceptable.

.5 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.

.2 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

Part 2 Products

2.1 CONDUITS

.1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

2.2 CONDUIT FASTENINGS

.1 One hole straps to secure surface conduits 50 mm and smaller.

.1 Two hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 900 mm on centre.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 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 25 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.

.1 Set-screws are not acceptable.

2.4 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 Conceal conduits except in mechanical and electrical service rooms.

.3 Use electrical metallic tubing (EMT).

.4 Minimum conduit size for lighting and power circuits:19 mm.

.5 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.6 Mechanically bend steel conduit over 19 mm diameter.

.7 Install fish cord in empty conduits.

.8 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.9 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 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for low voltage control system designed to provide remote switching of lighting loads by use of:

.1 Low voltage momentary contact switches.

.2 Manual switch control.

1.2 NOT USED.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.2 Shop Drawings:

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

.3 Closeout Submittals:

.1 Submit operation and maintenance data in accordance with Section 01 78 00 - Closeout Submittals.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

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

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

Part 2 Products

2.1 MATERIALS

.1 Control system: by one manufacturer and assembled from compatible components.

2.2 REMOTE CONTROL SWITCHES

.1 Single pole, double throw, momentary contact, heavy duty rated, 25 V, centre pivot rocker action.

2.3 LOW VOLTAGE RELAYS

.1 Electrically operated by momentary impulse, mechanically latched until activated.

.2 Two coil solenoid type with one coil to close relay contacts and one coil to open relay contacts.

.3 Operating voltage: 24 V, AC.

.4 Load contacts: 20 A, 120V, AC.

.5 Auxiliary contacts for pilot light.

.6 Coloured pre-stripped leads.

2.4 CONTROL TRANSFORMER

.1 Low voltage power Class 2, input 120V, AC, 60 Hz, output 35 VA at 24 V.

2.5 RECTIFIER

.1 Selenium type: 24 V, AC, 60 Hz input, 0.36 A continuous duty output.

.2 Silicon type: 24 V, AC, 60 Hz input, 7.5 A continuous duty output.

2.6 MANUAL CONTROL

.1 individual remote control switches as indicated.

.2 Eight circuit manual master selector switch mounted in 100 mm square box with:

.1 Master lock-out switch.

.2 Individual red jewelled pilot lights.

.3 Nine circuit manual dial-type master selector.

.4 Twelve circuit manual dial-type master selector.

2.7 MOTOR OPERATED MASTER CONTROL

.1 Motor-driven multiple contact momentary switching device.

.2 Radial contact arm to rotate through one revolution in 17 s.

.3 Contact made in succession between 25 points around circle.

.4 One master required for "ON" operation and one for "OFF" operation.

.5 Motor master units connected in cascade to control circuits.

.6 Interface equipment as required to convert maintained contact signals to momentary contact control pulses.

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.

3.3 CLEANING

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

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA International

.1 CSA C22.2 No.42-1], 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).

1.2 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 wiring devices 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.

.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 wiring devices from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SWITCHES

.1 15 A, 120 V, 347 V, single pole, double pole, three-way, four-way switches to: CSA C22.2 No.55.

.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 OCCUPANCY SENSORS

.1 15 A, 120 V, single pole

.2 Mount: Ceiling or wall as noted on drawings.

.3 Sensing technologies: Dual technology, equipped with both

.1 Passive infrared sensing

.2 Ultrasonic sensing

.4 Sensitivity: adjustable

.5 Automatic off: Adjustable from 5-30 minutes.

.6 Occupancy Sensors of one manufacturer throughout project.

2.3 RECEPTACLES

.1 Duplex receptacles with following features:

.1 Configuration: Type as specified and indicated.

.1 General: CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA C22.2 No.42

.2 20A: CSA type 5-20R, 125V, 20 A, U ground to CSA C22.2 No. 42.

.3 GFCI: Duplex receptacle with integral ground fault circuit interrupter to meet regulatory requirements complete with steady-on “Green-Power-On” and steady-on “Red-Power-Tripped Off” LED indicator lights.

.2 Specification grade.

.3 White urea moulded housing.

.4 Suitable for No. 10 AWG for back and side wiring.

.5 Break-off links for use as split receptacles.

.6 Eight back wired entrances, four side wiring screws.

.7 Triple wipe contacts and rivetted grounding contacts.

.2 Other receptacles with ampacity and voltage as indicated.

.3 Receptacles of one manufacturer throughout project.

2.4 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, 1 mm thick for wiring devices mounted in flush-mounted outlet box.

2.5 SOURCE QUALITY CONTROL

.1 Cover plates from one manufacturer throughout project.

Part 3 Execution

3.1 INSTALLATION

.1 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 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 Install GFI type receptacles as indicated.

.4 Do not install devices back-to-back in wall.

.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.

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.3 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 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI C82.1-04, Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast.

.2 ANSI C82.4-02(R2007), Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps Multi Supply Type.

.2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE C62.41-1991, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.

.3 ASTM International Inc.

.1 ASTM F1137-00(2006), Standard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.4 Canadian Standards Association (CSA International)

.5 Underwriters' Laboratories of Canada (ULC)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet 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.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Divert unused metal materials from landfill to metal recycling facility.

.4 Disposal and recycling of fluorescent lamps as per local regulations.

Part 2 Products

2.1 LAMPS AND BALLASTS

.1 Fluorescent lamps and ballasts to match existing.

2.2 BALLASTS

.1 Fluorescent ballast: CBM and CSA certified, energy efficient type, IC electronic

2.3 LED LUMINAIRES AND DRIVERS

.1 All Luminaires

.1 Comply with IES LM-79-08 Approved Method for measuring lumen maintenance of LED light sources.

.2 Comply with IES LM-80-08 Approved Method for electrical and photometric measurement of SSL product.

.3 LED's shall be Restriction of Hazardous Substances Directive (RoHS) compliant.

.4 LED arrays shall be sealed, high performance, long life type; minimum 70% rated output at 50,000 hours.

.5 LED luminaires shall deliver a minimum of 60 lumens per watt.

.1 LED's shall be "Bin No. 1" quality.

.6 Drivers shall be solid state and accept 120 through 277 VAC at 60 Hz input.

.7 The LED light source shall be fully dimmable with use of compatible dimmers switch designated for low voltage loads.

.8 LED color temperatures: CRI 85, 4000K as noted +/- 275K.

.9 Luminaires shall have internal thermal protection.

.10 Luminaires shall not draw power in the off state. Luminaires with integral occupancy, motion, photo-controls, or individually addressable luminaires with external control and intelligence are exempt from this requirement. The power draw for such luminaires shall not exceed 0.5 watts when in the off state.

.11 Color spatial uniformity shall be within .004 of CIE 1976 diagram.

.12 Color maintenance over rated life shall be within .007 of CIE 1976.

.13 Indoor luminaires shall have a minimum CRI of 85.

.14 Luminaire manufacturers shall adhere to device manufacturer guidelines, certification programs, and test procedures for thermal management

.15 LED package(s)/module(s)/array(s) used in qualified luminaires shall deliver a minimum 70% of initial lumens, when installed in-situ, for a minimum of 50,000 hours.

.16 Luminaires shall be fully accessible from below ceiling plane for changing drivers, power supplies and arrays.

.2 Power Supplies and Drivers

.1 MB Hydro Powersmart approved.

.2 Power Factor: 0.90 or higher

.3 Maximum driver case temperature not to exceed driver manufacturer recommended in-situ operation.

.4 Output operating frequency: 60Hz.

.5 Interference: EMI and RFI compliant with FCC 47 CFR Part 15.

.6 Total Harmonic Distortion Rating: 20% Maximum.

.7 Meet electrical and thermal conditions as described in LM-80 Section 5.0.

.8 Primary Current: Confirm primary current with Drawings.

.9 Secondary Current: Confirm secondary current specified by individual luminaire manufacturers.

.10 Compatibility: Certified by manufacturer for use with individually specified luminaire and individually specified control components.

.11 Solid-state control components to be integral or external per each specified luminaire. Remote control gear to be enclosed in Class 1, Class 2, or NEMA 3R enclosures as required.

.3 Controller and Control System

.1 System electronics driver / controller to use coordinated communication protocols: 0-10V, DALI, or proprietary as required.

.2 The Contractor to ensure that external control equipment is compatible with LED control requirements

.3 Provide connector types and wiring as appropriate for un-interrupted communication between devices, considering distance maximums, field obstructions, and accessibility. Ensure that connection points are optically isolated for system noise reduction.

.4 Compatibility: Certified by manufacturer for use with individually specified luminaire and individually specified power supplies and/or drivers

2.4 FINISHES

.1 Light fixture finish and construction to meet ULC listings and CSA certifications related to intended installation.

Part 3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated.

.2 Provide adequate support to suit ceiling system.

3.2 WIRING

.1 Connect luminaires to lighting circuits:

.1 Install flexible or rigid conduit for luminaires as indicated.

3.3 LUMINAIRE SUPPORTS

.1 For suspended ceiling installations, support luminaires from slab in accordance with local inspection requirements.

3.4 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.5 TESTING AND COMMISSIONING

.1 Commissioning requirements

.1 Section 01 91 13 – General Commissioning Requirements

.2 Section 01 91 33 – Commissioning Forms

.3 Commissioning form sample attached.

3.6 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA International

.1 CSA C22.2 No.141-10, Emergency Lighting Equipment.

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 emergency lighting 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.

.2 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 emergency lighting from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.4 WARRANTY

.1 For batteries in this Section 26 52 00 - Emergency Lighting, 12 months warranty period is extended to 120 months.

Part 2 Products

2.1 EQUIPMENT

.1 Emergency lighting equipment: to CSA C22.2 No.141.

.2 Supply voltage: 120 V, AC.

.3 Output voltage: 24 V DC.

.4 Operating time: 30 minutes.

.5 Battery: sealed, maintenance free.

.6 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01 V for plus or minus 10% input variations.

.7 Solid state transfer circuit.

.8 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

.9 Signal lights: solid state, for 'AC Power ON' and 'High Charge'.

.10 Lamp heads: integral on unit, remote, 345 degrees horizontal and 180 degrees vertical adjustment. Lamp type: LED, 6 W minimum, 340 lumen minimum output.

.11 Cabinet: suitable for direct or shelf mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.

.12 Auxiliary equipment:

.1 Ammeter.
.2 Voltmeter.
.3 Test switch.
.4 Time delay relay.
.5 Battery disconnect device.
.6 AC input and DC output terminal blocks inside cabinet.
.7 Bracket.
.8 Cord and single twist-lock plug connection for AC.
.9 RFI suppressors.

2.2 WIRING OF REMOTE HEADS

.1 Conduit: type in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.2 Conductors: type in accordance with Section 26 05 21 - Wires and Cables (0-1000 V), sized 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 emergency lighting 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.

.2 Install unit equipment and remote mounted fixtures.

.3 Direct heads.

.4 Connect exit lights to unit equipment.

3.2 TESTING & COMMISSIONING

.1 Commissioning requirements

.1 Section 01 91 13 – General Commissioning Requirements
.2 Section 01 91 33 – Commissioning Forms
.3 Commissioning sample form attached.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by emergency lighting installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.141-02, Unit Equipment for Emergency Lighting.

.2 CSA C860-01(December 2002), Performance of Internally-Lighted Exit Signs.

.2 National Fire Protection Association (NFPA)

.1 NFPA 101-2006, Life Safety Code.

1.2 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.

Part 2 Products

2.1 STANDARD UNITS

.1 Exit lights: to CSA C22.2 No.141 and CSA C860.

.2 Housing: extruded aluminum housing, brush aluminum finish.

.3 Face plates: extruded aluminum.

.4 Lamps: LED <5.5W 50,000 hours.

.5 Letters: 150 mm high x 19 mm, with 13 mm thick stroke, red on white glass, reading EXIT SORTIE.

.6 Face plate to remain captive for relamping.

.7 Supply voltage: Universal.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install exit lights to manufacturer's recommendations, listing requirements, NFPA standard and local regulatory requirements.

.2 Connect fixtures to exit light circuits.

.3 Connect emergency lamp sockets to emergency circuits.

.4 Ensure that exit light circuit breaker is locked in on position.

3.3 TESTING & COMMISSIONING

.1 Commissioning requirements

.1 Section 01 91 13 – General Commissioning Requirements

.2 Section 01 91 33 – Commissioning Forms

.3 Commissioning sample form attached.

3.4 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ICES-003 (Industry Canada): Interference-Causing Equipment Standard.

.2 IEC 60065: Standard for Audio, Video and Similar Electronic Apparatus – Safety Requirements.

.3 UL 1310: Standard for Class 2 Power Units.

.4 UL 2043: Standard for Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; 1996

.5 UL 6500: Standard for Audio/Video and Musical Instrument Apparatus for Household, Commercial and Similar General Use.

1.2 SUBMITTALS

.1 Product Data: Submit for each system component specified.

.1 Manufacturer Instructions: Provide manufacturer's manuals for installation, startup and commissioning.

.2 Shop Drawings: Provide the system design on an architectural floor plan showing the quantity, type and location of components, cabling and accessories.

.3 Compliance Statement: Provide a signed document from an executive officer of the supplier stating that the system *as proposed* meets the Design and Performance Requirements.

1.3 CLOSEOUT SUBMITTALS

.1 Warranty Documentation. Provide warranty documentation, with start date(s) and service contact(s).

.2 Record Documentation: Provide the as-built system design on an architectural floor plan showing the quantity, type and location of components, cabling and accessories.

.3 System Reports:

.1 Provide reports in electronic form.

.2 Report an inventory of electronic system components, including model number, serial number, and firmware version.

.3 Report the verified quantity of speakers installed per local control zone.

.4 Report all system settings.

.5 Report testing and commissioning data.

.1 System Settings Backup: Provide an electronic backup file of all system settings.

.4 Security Items:

.1 Provide one set of keys for each locked equipment enclosure.

.2 Provide passwords to access control functions for hardware and software user interfaces.

1.4 QUALITY ASSURANCE

.1 Obtain required permits.

.2 Follow applicable codes, including regulatory testing and certifications.

.3 Source all sound masking equipment from a single supplier.

.4 Have the system designed and commissioned by an authorized manufacturer representative.

.5 Ensure supplementary materials meet applicable standards.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Protect equipment from moisture during shipping, storage and handling.

.2 Deliver in manufacturer's original unopened and undamaged packages with manufacturer's labels legible and intact.

.3 Inspect manufacturer's packages upon receipt.

.4 Handle packages carefully.

1.6 WARRANTY

.1 Provide a written product warranty covering sound masking components for defects in parts or assembly for a 5-year period from date of system startup.

.2 Provide a written 1-year installation warranty.

Part 2 Products

2.1 REGULATORY TESTING AND CERTIFICATIONS

.1 Safety and Electrical: IEC 60065

.2 Electromagnetic Interference (EMI): ICES-003

.3 Low Voltage Power Supplies: UL 1310

2.2 DESIGN AND PERFORMANCE REQUIREMENTS

.1 System Architecture

.1 Provide a networked-decentralized system with addressable masking devices installed alongside the loudspeakers throughout the system area.

.2 System Design

.1 Design system in accordance with manufacturer's specifications.

.2 Design local control zones based on:

.1 Drawing plan E3 with all loudspeakers in one (1) zone.

.3 System Control

.1 Provide digital controls for all system settings.

.2 Provide a networked user interface for controlling and reviewing all system settings.

.4 Masking Sound Generation

.1 Provide a sound masking generator for each local control zone.

.2 Provide a random masking sound generator. Alternatively, provide a pseudo-random generator with a cycle exceeding 24 hours and no noticeable repetitive pattern.

.3 Sytem must be capable of providing Noise Criteria 30.

.4 Exam Room and Interview Room require speech privacy rating of 65 – 70.

.5 Sound Masking Control

.1 Provide each local control zone with independent control over the sound masking signal, including:

.1 An equalizer with at least 21 third-octave bands from 100 to 10,000 Hz.

.2 A volume control with 0.5 dBA increments over a range of 35 to 85 dBA, measured at a distance of one meter.

.6 System Diagnostics

.1 Include the capability of identifying masking devices that are not functioning.

.7 System Reporting

.1 Provide a user interface for reading and displaying all current system settings.

.2 Include the ability to generate detailed reports of all system settings.

.8 Physical and Electronic Security

.1 House below-ceiling electronic components in a locked metal enclosure.

.2 Password protect access to system control functions.

.3 Allow all settings to be backed up to an electronic storage medium.

Part 3 Execution

3.1 EXAMINATION

.1 Ensure that the site is at a stage suitable for the system installation.

.2 Ensure that the site is constructed according to plans including wall locations, ceiling types and plenum barriers.

.3 Ensure planned power sources have been provided.

.4 Ensure planned space is available for centrally located components.

.5 Ensure third-party components interfacing with the system have been provided.

3.2 INSTALLATION

.1 Follow manufacturer’s installation manual.

.2 Follow the system design for location of system components and wiring.

.3 Record any necessary changes to the system design on the plan.

3.3 SITE QUALITY CONTROL

.1 Ensure plenum height meets manufacturer’s minimum specifications.

.2 Ensure the distance between the top of the loudspeaker and the deck meets manufacturer's minimum specifications.

.3 Suspend loudspeakers in a level manner.

.4 Minimize obstructions to loudspeakers.

.5 Support cables properly in the ceiling.

.6 Securely terminate cables.

3.4 SYSTEM STARTUP AND COMMISSIONING

.1 Commissioning requirements

.1 The commissioning agent who is the manufacturer representative schedules functional tests through general contractor and subcontractor. Under the supervision of the commissioning agent, the installing subcontractor performs the hardware and/or software manipulations required for the testing. The consultant shall be present to witness, owner maintenance staff may also be present in order to assist in system observations.

.2 Section 01 91 13 – General Commissioning Requirements

.3 Section 01 91 33 – Commissioning Forms

.4 Commissioning form sample attached.

.2 Follow manufacturer's manuals for system startup.

.3 Follow manufacturer's manuals for configuration of system, according to Owner requirements, including timer, audio, occupant controls, diagnostic, and security functions.

.4 Commission the sound masking system with

.1 Ceilings fully installed,

.2 All furnishings in place,

.3 Mechanical systems operating at normal daytime levels,

.4 No occupant noise during measurements.

.5 Select a commissioning location within each local control zone.

.1 Mark the commissioning location precisely on the as-built system design.

.2 Assign the commissioning location an alphanumeric ID.

.6 Conduct third-octave sound level measurements:

.1 Use an ANSI Type 1 or 2 third-octave sound level analyzer.

.2 Set analyzer for A-weighted equivalent average level (Leq).

.3 Set analyzer for fast response.

.4 Hold the analyzer microphone oriented upwards at a height between 1.2 to 1.4 meters (4 to 4.7 feet) from the floor.

.5 Move the analyzer through a slow horizontal arc of at least 60 centimeters (2 feet) during the measurement period.

.6 Keep the analyzer at least 1 meter (3.3 feet) away from vertical or horizontal surfaces.

.7 Measure for at least 15 seconds.

.7 Conduct a third-octave sound level measurement with the sound masking deactivated to document existing conditions at each commissioning location.

.1 Identify any third-octave band in existing conditions that exceeds the target band level for that location.

.8 Adjust the sound masking at each commissioning location to conform to the sound masking curve and overall volume for that location, such that:

.1 The volume in each third-octave band from 100 Hz and 5000 Hz inclusive is within plus or minus two decibels (+/- 2 dB) of the target band level.

.1 Unless existing conditions exceed the maximum limit for the band.

.2 The overall volume is within plus or minus one half decibel (+/- 0.5 dBA) of the overall volume.

.1 Unless existing conditions cause overall volume to exceed tolerances.

.3 If the sound masking curve and overall volume requirements are not met at a commissioning location, modify the system design, installation or commissioning, at the supplier's expense, until conformance is achieved.

.1 Unless deviation can be shown to be due to existing conditions.

.9 Provide an electronic report of testing and commissioning data, including:

.1 As-built system design(s) showing all commissioning locations with ID references and local control zones.

.2 A table and graph of commissioned sound masking measurements for each commissioning location, including:

.1 Third-octave levels for bands within the sound masking curve.

.2 Overall volume level.

.3 The sound masking curve, overall volume and tolerances specified for that location.

.3 Explanation of any sound masking measurements which exceed tolerances for the sound masking curve or overall volume with a table and graph of existing conditions measurements for each such commissioning location, including:

.1 Third-octave levels for bands within the sound masking curve.

.2 Overall volume level.

3.5 CLEANING AND WASTE MANAGEMENT

.1 Remove empty packaging and other material waste.

.2 Clean system components where required.

3.6 CLOSEOUT ACTIVITIES

.1 Demonstrate operational system and train owner's representative in accordance with Section 01 79 00 – Demonstration & Training.

.2 Review closeout submittals with Owner representative.

.3 Review service and support contacts.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Government of Canada

.1 TB OSH Chapter 3-03, 1997-01-28, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-03, Standard for Fire protection Electronic Data Processing Equipment.

.2 TB OSH Chapter 3-04, 1994-12-22, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-04, Standard for Fire Alarm Systems.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S524-2001, Standard for the Installation of Fire Alarm Systems.

.2 CAN/ULC-S525-1999, Audible Signal Device for Fire Alarm Systems.

.3 CAN/ULC-S526-2002, Visual Signal Devices for Fire Alarm Systems.

.4 CAN/ULC-S527-1999, Control Units.

.5 CAN/ULC-S528-1991, Manual Pull Stations for Fire Alarm Systems.

.6 CAN/ULC-S536-S537-2004, Burglar and Fire Alarm Systems and Components.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

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

.2 Include:

.1 Layout of equipment.

.2 Complete wiring diagram, including schematics of modules.

.3 Closeout Submittals:

.1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals in accordance with ANSI/NFPA 20.

.2 Submit following:

.1 System wiring diagrams:

.1 Submit complete wiring diagrams of system showing points of connection and terminals used for electrical connections in the system.

.2 Design data: Power Calculations:

.1 Submit design calculations new work specified to substantiate that battery capacity exceeds supervisory and alarm power requirements.

.2 Show comparison of notification appliance circuit alarm power requirements with rated circuit power output.

.3 Test Reports:

.1 Preliminary testing:

.1 Final acceptance testing.

.2 Submit for inspections and tests specified under Field Quality Control.

1.3 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company or person specializing in fire alarm system installations approved by manufacturer with minimum 5 year experience.

.2 Provide services of representative or technician from manufacturer of system, experienced in installation and operation of type of system being provided, to supervise installation, adjustment, preliminary testing, and final testing of system and to provide instruction to project personnel.

.3 System:

.1 To TB OSH Chapter 3-04.

.2 Subject to Fire Commissioner of Canada (FC) approval.

.3 Subject to FC inspection for final acceptance.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

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

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

Part 2 Products

2.1 MATERIALS

.1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.

.2 Visual signal devices: to CAN/ULC-S526.

2.2 SYSTEM OPERATION

.1 Maintain and extend existing FA system to accommodate revised architectural layouts.

.2 Existing fire alarm control panel

2.3 VISUAL ALARM SIGNAL DEVICES

.1 Flush-mounted assembly of stroboscopic type suitable for use in electrically supervised circuit and powered from notification appliance circuits.

.2 Appliances: minimum of 15 candela measured as approved by ULC, but not less than effective intensity required by National Building Code of Canada for appliance spacing and location as shown.

.3 Protect lamps with thermoplastic lens and labelled "FIRE" in letters at least 12 mm high.

.4 Provide visible appliances as indicated.

.5 Visible appliances may be part of audio-visual assembly, where more than two appliances are located in same room or corridor.

2.4 CONDUIT

.1 Electrical Metallic Tubing (EMT):

2.5 WIRING

.1 Wire for 120 V circuits: No. 12 AWG minimum solid copper conductor.

.2 Wire for low voltage DC circuits: No. 14 AWG minimum solid copper conductor

.3 Wire to remote annunciators: No. 18 AWG minimum solid copper conductor.

.4 Wire for connection to base telegraphic alarm loop: No. 12 AWG minimum solid copper conductor.

.5 Insulation 90 degrees C minimum with nylon jacket.

.6 Colour code wiring.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install systems in accordance with CAN/ULC-S524 and TB OSH Chapter 3-04.

.2 Connect signalling circuits to main control panel.

3.3 FIELD QUALITY CONTROL

.1 Site Tests:

.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 each device and alarm circuit to ensure manual stations transmit alarm to control panel and actuate general alarm.

.2 Check annunciator panels to ensure zones are shown correctly.

.3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of system.

.4 Class A circuits.

.1 Test each conductor on circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near midmost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.2 Test each conductor on circuits for capability of providing alarm signal during ground-fault condition imposed near midmost point

of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.5 Class B circuits.

.1 Test each conductor on circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.2 Test each conductor on circuits for capability of providing alarm signal during ground-fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.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 Maintenance Manuals:

.1 All new equipment shall be added to building maintenance manuals including.

.1 Revised wiring schematics

.2 Equipment cutsheets

3.4 TESTING & COMMISSIONING

.1 Commissioning requirements

.1 Section 01 91 13 – General Commissioning Requirements

.2 The system shall be tested and verified in accordance with;

.1 CAN/ULC S536 – Inspection and Testing of Fire Alarm Systems

.2 CAN/ULC S537 – Standard for Verification of Fire Alarm Systems

.3 The system shall be tested in the presence of the Consultant, Owner's representative, and the local Inspection Authorities, on completion of the Verification. Tests shall demonstrate that the fire alarm system will function in an acceptable manner. The Electrical inspector shall be the final authority in determining the acceptable manner of operation.

3.5 VERIFICATION CERTIFICATE

.1 On completion of the testing, submit to the Consultant, a Test Report certified by both the manufacturer and Electrical Contractor including:

.1 A copy of the inspecting Technician's report showing location of each device and certifying the test results of each device.

.2 A Certificate of Verification confirming that the Inspection has been completed and showing the conditions upon which such Inspection and Certification have been rendered.

.3 Proof of Liability Insurance for the Inspection.

3.6 CLEANING

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

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION