



EXTERIOR SHELL REPAIR - BLOC A HEALTH CANADA OFFICES AND LABORATORIES

Architecture and Engineering General Requirements and Technical Specifications

VOLUME 1

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SEALS AND SIGNATURES PAGE

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END OF SECTION

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END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 08 71 00 – Door hardware

1.2 REFERENCES

- .1 Not used.

1.3 CONTINUATION OF OPERATIONS

- .1 Work must not interfere with continued operations of Health Canada offices and laboratories. Normal working hours are from 8AM to 5PM from Monday to Friday.
- .2 The work must be done in phases, each one further subdivided in sub phases, in order to spread equally over 3 fiscal years, the total construction cost. The detailed scope of work division over the 3 years shall be coordinate with the Departmental Representative prior to the start of construction. The following proposed work division generally meets the Departmental Representative's requirements:
 - .1 Phase 1: Masonry, air barrier and insulation work to be carried out from spring to summer 2018.
 - .2 Phase 2:
 - .1 North and West façade's curtain wall replacement to be carried out from spring to summer of 2019;
 - .2 South and East façade's curtain wall replacement to be carried out from spring to summer of 2020.

1.4 CODES, STANDARDS AND OTHER REFERENCE DOCUMENTS

- .1 Work must be carried in accordance with National Building Code (NBC) requirements, including amendments published until the deadline for receipt of tenders, and other provincial and local codes. Where there are differences in requirements, the most stringent requirement will apply.
- .2 Work must satisfy or exceed requirements of the following documents.
 - .1 Contract documents
 - .2 Standards, codes and other prescribed reference documents.

1.5 WORK BY OTHERS

- .1 Give site access to and work in collaboration with other contractors following Departmental Representative's instructions.
- .2 Coordinate work with other contractors. If execution or the result of any part of the work covered by this contract depends on work by other contractors, immediately report to the Departmental Representative in writing any anomaly or defect likely to interfere with proper execution of the work.

1.6 DEPARTMENTAL REPRESENTATIVE'S SERVICE PROVIDER

- .1 Departmental Representative works with some providers for supplying and installing any components.
- .2 Contractor must include in tender the cost of supplying, installing and preparing the shop drawings for these components.
- .3 Contractor is fully responsible for the service provider. Coordinate provider's activities to ensure signposting elements are integrated into the project in a timely manner according to work timetable.
- .4 Provider's list:
 - .1 Cylinders and keys: Refer to section 08 71 00 – Door hardware.
 - .2 Camera and access control system: Refer to section 28 05 01- Common Work Results – Security (Aitel).
 - .3 Control – Refer to section 23 05 93 - Testing, Adjusting and Balancing for HVAC (Procetech).
 - .4 Fire alarm – Refer to section 28 31 00 – Fire Alarm Systems (Tyco).

1.7 WORK SEQUENCE

- .1 Construct Work in stages to accommodate continued use of premises by the Departmental Representative during construction.
- .2 Co-ordinate Progress Schedule based on occupation of premises.
 - .1 Required stages:
 - .1 Refer to phasing plans.
 - .2 Refer section 01 14 00 Work Restrictions
- .3 Construct Work in stages to provide for continuous public usage. Maintain public access to premises until work progress allows for an alternative.

1.8 CONTRACTOR USE OF PREMISES

- .1 Limit use of premises for Work to allow:
 - .1 Owner occupancy.
 - .2 Work by other contractors.
- .2 Co-ordinate use of premises under direction of Departmental Representative.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .4 Remove or alter existing work to prevent damage to portions of existing work that remain.
- .5 Repair or replace portions of existing work that have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.
- .6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.9 OCCUPANCY OF PREMISES BY DEPARTMENTAL REPRESENTATIVE

- .1 Departmental Representative will occupy premises during some parts of the construction period and will continue normal operations during these times.
- .2 Co-operate with Departmental Representative in scheduling operations to avoid interfering with occupants' normal operations, to avoid conflict and to facilitate occupants' use of the premises.

1.10 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 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.
 - .11 Other documents as specified.

Part 2 Products**2.1 NOT USED**

- .1 Not used.

Part 3 Execution**3.1 NOT USED**

- .1 Not used.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Not used.

1.2 REFERENCES

- .1 Not used.

1.3 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.
- .2 Maintain in function existing public services and provide access to construction site for personnel and vehicles.
- .3 Protect works by temporary means until installation of permanent closures.

1.4 WORK CONSTRAINTS RELATED TO CONTINUED FIELD OPERATIONS

- .1 Works must be executed in phases in order to ensure continued operation at the Health Canada Offices and Laboratories.
- .2 Work must be spread out over 3 years that is 2018, 2019 and 2020 in order to spread equally over 3 fiscal years the total construction cost.
- .3 Refer to Scope of Work and Phasing Plans showing sequence of Works in compliance with operation requirements of Health Canada. However Contractor may submit for approval by Departmental Representative an alternative sequence of execution of equal or shorter duration, or resulting in a lower construction cost, in compliance with the following requirements:
 - .1 Work to be conducted in accordance with municipal regulations.
 - .2 Work to be conducted so as to ensure permanent sealing at end of each project phase or sub-phase. Details in plans show conditions at end of work on Phase 2. Contractor to perform sealing at junctions of curtain walls and masonry facing to provide a finished appearance at end of each phase and to facilitate seal fitting from one phase to another.
 - .3 No construction operation may have an impact on Health Canada operations.
 - .4 Maintain all traffic routes and vehicle accesses necessary for Health Canada operations at all times during each phase of work. These routes and accesses include but are not necessarily limited to:
 - .1 Parking entry and exit, as well as parking areas.
 - .2 Access to delivery ramp leading to basement of building.
 - .3 Access to main entrance and to parking spaces for delivery vehicles in front of this entrance.
 - .4 Access to liquid air tank and other mechanical/electrical equipment on building perimeter.
 - .5 Firefighter access areas on building perimeter.

WORK RESTRICTIONS

- .5 Keep outdoor pedestrian traffic routes safe at all times. These routes and accesses include but are not necessarily limited to:
 - .1 Access between parking areas and main entrance.
 - .2 Access between northeast entrance and temporary trailers.
 - .3 Access adjacent to delivery ramp.
- .6 Pedestrian traffic inside building to be maintained at all times between Block A and Annex (Block C).
- .7 Access ramp at northeast corner of building may be blocked for duration of work.
- .8 All indoor work to be conducted outside normal hours of operation.
- .9 A sufficient number of emergency exits to be maintained at all times during normal hours of operation. A minimum of two exits diagonally across from each other to be maintained at all times during normal hours of operation (northwest and southeast corners or northeast and southwest corners).
- .10 Laboratory equipment sensitive to vibrations is located along building's south façade. Demolition work and any construction work that may produce vibrations to be conducted on weekends, when this equipment is turned off, from 5 p.m. Friday until 8 a.m. Monday.
- .11 Curtain wall replacement work on north and south façades to be conducted outside hours of operation.
 - .1 Temporary protection to be installed to separate work areas from adjacent space.
 - .2 If work cannot be completed in a single shift, premises must be refit for use by Health Canada personnel at resumption of regular operations.
 - .3 Where necessary, temporary protection of work in progress necessary for ensuring safety of personnel must be properly installed, encroaching as little as possible on workspace.
- .12 Workstations and equipment immediately adjacent to curtain walls of east and west façades may be relocated temporarily, one façade at a time (maximum relocation capacity of 40 employees at a time). Relocations to be handled by Owner. Time needed for relocations to be confirmed on site.
- .13 Maintain access at all times to service closet at southeast corner of ground floor.
- .14 Number and duration of complete service interruptions to be kept to a minimum. Contractor must indicate any complete service interruption at least two weeks in advance.
- .15 Partial service interruptions to be scheduled outside normal hours of operation. Contractor must indicate any partial service interruptions at least 48 hours in advance.
- .16 Persons to be contacted for planning of service interruptions:
 - .1 Name of person to be contact will be confirmed on site.

1.5**WORK HOURS**

- .1 Set work schedule based on project implementation constraints, municipal regulations and the following.
- .2 Schedule for regular work:

- .1 Unless indicated otherwise, time slot for regular work on construction site is from 6 a.m. to 5 p.m., Monday to Friday.
- .3 Schedule for noisy work:
 - .1 Noisy work to be conducted outside hours of operation.
 - .2 Work requiring use of a percussion tool, sawing or drilling of a slab, etc., is considered to be noisy work.
- .4 Submit Worktime Schedule in compliance with 01 32 16.06 - Construction progress schedule – Critical path method (CPM).

1.6 SECURITY

- .1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.
- .2 Security escort:
 - .1 Contractors and workers may not have free access to building interior.
 - .2 Workers assigned to indoor work to be accompanied by a superintendent when performing duties inside building, whether or not covered by work.
 - .3 Submit any request for an escort to Departmental Representative at least five working days in advance, following prescribed procedures. For requests submitted within prescribed limits, cost of escort will be paid by Departmental Representative. For late requests, cost will be charged to Contractor.
 - .4 Any escort request may be cancelled without fees upon given notice at least forty eight (48) hours prior to time period foreseen. If cancelling notification is received late, escort fees will be Contractor's responsibility.
 - .5 In the case of late notification of cancellation cost calculation will be calculated on standard hour rate of a security agent for a period of four (4) hours.

1.7 EXISTING UTILITY SERVICES

- .1 Before interrupting utility services, inform Departmental Representative as well as concerned utility service trades, and obtain necessary authorizations.
- .2 If carry out of chipping or connections on existing utility pipe network is needed, notify Departmental Representative 48 hours prior to planned interruption of corresponding electrical or mechanical services. Keep interruptions the shortest possible. Carry out Work interfering as little as possible with maintenance of normal activities inside the time schedule established by relevant local authorities.
- .3 Before starting of Work, establish scope and location of utility pipe network in Work area and duly inform Departmental Representative.
- .4 Submit for approval to Departmental Representative a schedule related to disruptions or closeouts of active facilities or works, including service interruption of data or electrical power. Observe approved time schedule and inform all parties affected by these inconveniences.
- .5 Provide temporary utility services as directed by Departmental Representative in order to maintain active the critical systems of building and tenants.
- .6 Ensure traffic access to personnel and public; where needed establish alternate routes for personnel and public.

- .7 Install site walkway for crossing of trenches, in order to maintain normal pedestrian and vehicle traffic.
- .8 Upon discovery of undocumented utility pipes, notify immediately Departmental Representative and keep written record.
- .9 Protect, move or maintain in service active utility pipes. Upon discovery of inoperative utility pipes, seal them in a manner authorized by relevant local authorities.
- .10 Keep localisation record of maintained, moved, or abandoned utility pipping.
- .11 Install fences in compliance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.8 BUILDING SMOKING ENVIRONMENT

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Not used.

1.2 REFERENCES

- .1 Not used.

1.3 ADMINISTRATIVE

- .1 Plan on holding meetings throughout the progress of work.
- .2 Unless otherwise indicated, meeting minutes will be prepared and distributed by the Departmental Representative.
- .3 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.
- .4 Meeting will be held on site, in the contractor's installations.

1.4 PRECONSTRUCTION MEETING

- .1 Within five days after award of Contract, a meeting of the parties to the contract will be organized by the Departmental Representative to discuss administrative procedures and define the responsibilities of each. .
- .2 Departmental Representative, Contractor (project director, project manager and superintendent), field inspectors and supervisors will be in attendance.
- .3 Departmental Representative will establish time and location of meeting and notify parties concerned minimum three days before meeting.
- .4 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of Work: in accordance with 01 32 16.06 - Construction Progress Schedule – Critical path method.
 - .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
 - .5 Delivery schedule of specified equipment in accordance with Section 01 32 16.06 – Construction Progress Schedule – Critical path method.
 - .6 Site security in accordance with Section 01 52 00 – Construction Facilities.
 - .7 Proposed administrative requirements about projects changes.
 - .8 Departmental Representative provided products.
 - .9 Record drawings in accordance with Section 01 78 00 – Closeout Submittals.
 - .10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
 - .11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
 - .12 Monthly progress claims, administrative procedures, photographs, hold backs.

- .13 Appointment of inspection and testing agencies or firms in accordance with Section 01 45 00 – Quality Control.
- .14 Special project procedures, phasing and security.
- .5 Comply with Departmental Representative's instructions regarding site mobilization zones, site office and sheds, circulation access and parking.
- .6 Use communication procedures established by Departmental Representative during construction of work site installations and temporary utilities: submittals for approval, reports and files, schedules, coordination of plans, recommendations and resolution of conflicts and ambiguities.

1.5 PROGRESS MEETINGS

- .1 The Departmental Representative will organize a schedule of meetings to be held regularly every two weeks during the course of the work.
- .2 Contractor and Departmental Representative are to be in attendance.
- .3 Record minutes of meetings will be prepared by the Departmental Representative and sent to participants and stakeholders, within three (3) days of completion.
- .4 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Examination of work schedule (work completed in previous weeks and future work for the three following weeks).
 - .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 Maintenance of quality standards.
 - .9 Review proposed changes for effect on construction schedule and on completion date.
 - .10 Worksite health and safety.
 - .11 Other business.

1.6 COORDINATION MEETINGS

- .1 Schedule and administer coordination meetings, every two weeks throughout the progress of work or at the request of the Departmental Representative and the management thereof. The contractor and key subcontractors must attend to plan, organize and coordinate future activities, various trades on site.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting three 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, affected parties not in attendance and the Departmental Representative

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Not used.

1.2 REFERENCES

- .1 Definitions:
 - .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
 - .2 Bar Chart (Gantt chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars.
 - .3 Baseline: original approved plan (for Project, work package, or activity), plus or minus approved scope changes.
 - .4 Cash Flow: projection of progress payment requests based on cash loaded construction schedule.
 - .5 Completion Milestones: they are firstly Interim Certificate Substantial Completion and secondly Final Certificate.
 - .6 Constraint: applicable restriction or limitation, either internal or external to project, that will affect performance of Project. Factors that affect activities can be scheduled.
 - .7 Control: process of comparing actual performance with planned performance, analyzing variances, evaluating possible alternatives, and taking appropriate corrective action as needed.
 - .8 Critical Activity: any activity on a critical path.
 - .1 Most commonly determined by using critical path method.
 - .9 Critical Path: sequence of activities that determines duration of Project. Generally, it is the longest path through Project.
 - .1 Usually defined as those activities with float less than or equal to specified value, often zero.
 - .10 Critical Path Method (CPM): network analysis technique used to determine the amount of scheduling flexibility (amount of float) on various logical network paths in Project schedule network, and to determine the minimum total Project duration.
 - .11 Data Date: date through which project status and progress were last determined and reported for analyses, such as scheduling and performance measurements.
 - .12 Duration: total number of work periods (not including holidays or other non-working periods) required to complete activity or other Project element.
 - .1 Usually expressed as workdays or work weeks.
 - .13 Early Finish Date: in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can finish, based on network logic and schedule constraints.

- .1 Early finish dates can change as Project progresses and changes are made to Project plan.
- .14 Early Start Date: in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can start, based on network logic and schedule constraints.
 - .1 Early start dates can change as Project progresses and changes are made to Project Plan.
- .15 Finish Date: point in time associated with activity's completion.
 - .1 Usually qualified by one of following: actual, planned, estimated, scheduled, early, late, baseline, target, or current.
- .16 Float: amount of time that activity may be delayed from its early start without delaying Project finish date.
 - .1 This resource is available to both PWGSC and Contractor.
- .17 Impact Analysis: schedule analysis technique that adds a modeled delay to an accepted construction schedule to determined possible outcome of that delay on project completion.
- .18 Lag: modification of logical relationship that directs delay in successor activity.
- .19 Late Finish Date (LF): in critical path method, latest possible point in time that activity may be completed without delaying specified milestone (usually Project finish date).
- .20 Late Start Date (LS): in critical path method, latest possible point in time that activity may begin without delaying specified milestone (usually Project finish date).
- .21 Lead: modification of logical relationship that allows acceleration of successor task.
- .22 Logic Diagram: see Project network diagram.
- .23 Master Schedule: summary-level schedule that identifies major deliverable; work breakdowns structure and key milestones.
- .24 Milestone: significant point or event in Project, usually completion of major deliverable.
- .25 Monitoring: capture, analysis, and reporting of Project performance, usually as compared to plan.
- .26 Non-Critical Activities: activities which when delayed, do not affect specified Contract duration.
- .27 Project Control System: fully computerized system utilizing commercially available software packages.
- .28 Project Network Diagram: schematic display of logical relationships of Project activities.
 - .1 Always drawn from left to right to reflect Project chronology.
- .29 Project Plan: formal, approved document used to guide both Project execution and Project control.
 - .1 Primary uses of Project plan are to document planning assumptions and decisions, facilitate communication among stakeholders, and document approved scope, cost, and schedule baselines.
 - .2 Project plan may be summary or detailed.

- .30 Project Planning: development and maintenance of Project Plan.
- .31 Project Planning, Monitoring and Control System: overall system operated to enable monitoring of Project Work in relation to established milestones.
- .32 Project Schedule: planned dates for performing activities and planned dates for meeting milestones.
- .33 Quantified days duration: working days based on 5 day work week, discounting statutory holidays.
- .34 Risk: uncertain event or condition that, if it occurs, has positive or negative effect on Project's objectives.
- .35 Start Date: point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.
- .36 Work Breakdown Structure (WBS): deliverable-oriented hierarchical decomposition of Work to be executed by contractor to accomplish project objectives and create required deliverables. It organizes and defines total scope of Project. Each descending level represents an increasingly detailed definition of Project Work. WBS is decomposed into Work packages.
- .2 Reference Standards:
 - .1 Project Management Institute (PMI Standards)
 - .1 Project Management Body of Knowledge guide (PMBOK Guide) – 5th edition.
 - .2 Practice Standard for Scheduling - 2011.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Project Meeting:
 - .1 Meet with Departmental Representative within 5 working days of Award of Contract date, to establish Work requirements and approach to project construction operations.
 - .2 Participate in regular project progress meetings with Departmental Representative specifically intended to discuss update of detailed schedule and contract changes.
- .2 Scheduling:
 - .1 Planning: ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made.
 - .2 Ensure project schedule efficiencies through monitoring of Project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed.
 - .3 Monitor sufficiently often so that causes of delays can immediately be identified and removed.
- .3 Project monitoring and reporting:
 - .1 Keep team aware of changes to schedule, and possible consequences as project progresses.

- .2 Use narrative reports to provide advice on seriousness of difficulties and measures to overcome them.
- .3 Begin narrative reporting with statement on general status of Project followed by summarization of delays, potential problems, corrective measures and Project status criticality.
- .4 Critical Path Method (CPM) Requirements:
 - .1 Ensure Master Plan and Detail Schedule are practical and remain within specified Contract duration.
 - .2 Revise Master Schedule and Detail Schedule deemed impractical by Departmental Representative and resubmit for approval.
 - .3 Change to Contract Duration:
 - .1 Acceptance of Master Schedule and Detail Schedule showing scheduled Contract duration shorter than specified Contract duration does not constitute change to Contract.
 - .2 Duration of Contract may only be changed through bilateral Agreement.
 - .4 Consider Master Schedule and Detail Schedule deemed practical by Departmental Representative, showing Work completed in less than specified Contract duration, to have float.
 - .5 First Milestone on Master Schedule and Detail Schedule will identify start Milestone with an "ES" constraint date equal to Award of Contract date.
 - .6 Calculate dates for completion milestones from Plan and Schedule using specified time periods for Contract.
 - .7 Interim Certificate Substantial Completion with "LF" constraint equal to calculated date.
 - .8 Calculations on updates to be such that if early finish of Interim Certificate falls later than specified Contract duration then float calculation to reflect negative float.
 - .9 Delays to non-critical activities, those with float may not be basis for time extension.
 - .10 Do not use float suppression techniques such as software constraints, preferential sequencing, special lead/lag logic restraints, extended activity times imposed dates other than required by Contract.
 - .11 Allow for and show Master Plan and Detail Schedule adverse weather conditions normally anticipated.
 - .1 Specified Contract duration has been predicated assuming normal amount of adverse weather conditions.
 - .12 Provide necessary crews and manpower to meet schedule requirements for performing Work within specified Contract duration.
 - .1 Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.
 - .13 Arrange participation on and off site of subcontractors and suppliers, as required by Departmental Representative, for purpose of network planning, scheduling, updating and progress monitoring.

- .1 Approvals by Departmental Representative of original networks and revisions do not relieve Contractor from duties and responsibilities required by Contract.
- .14 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative the Project Control System for planning, scheduling, monitoring and reporting of project progress.
- .3 Submit Project Control System to Departmental Representative for approval.
 - .1 Failure to comply with each required submission, may result in progress payment being withheld in accordance with Federal Government's GC 5 Terms of Payment.
- .4 Submit letter ensuring that schedule has been prepared in co-ordination with major sub-contractors.
- .5 Refer to article "PROGRESS MONITORING AND REPORTING" of this specification Section for frequency of Project control system submittals.
- .6 Submit impact analysis of schedule for changes that result in extension of contract duration.
 - .1 Include draft schedule update and report as outlined in article "PROGRESS MONITORING AND REPORTING".
- .7 Submit Project planning, monitoring and control system data as part of initial schedule submission and monthly status reporting as required by Departmental Representative in following form.
 - .1 CD files in original scheduling software MA Project containing schedule and cash flow information, labelled with data date, specific update, and person responsible for update.
 - .2 Master Schedule Bar Chart.
 - .3 Construction Detail schedule Bar Chart.
 - .4 Listing of project activities including milestones and logical connectors, networks (sub-networks) from Project start to end. Sort activities by activity identification number and accompany with descriptions. List early and late start and finish dates together with durations, codes and float.
 - .5 Criticality report listing activities and milestones with negative zero up to 5 days total float used as first sort for ready identification of critical near critical paths through entire project. List early and late starts and finishes dates, together with durations, codes and float for critical activities.
 - .6 Progress report in early start sequence, listing for each trade, activities due to start, underway, or finished within 2 months from monthly update date. List activity identification number, description and duration. Provide columns for entry of actual start and finish dates, duration remaining and remarks concerning action required.

1.5 QUALITY ASSURANCE

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

1.6 WORK BREAKDOWN STRUCTURE (WBS)

- .1 Prepare construction Work Breakdown Structure (WBS) within 10 working days of Award of Contract date.
 - .1 Develop WBS through at least five levels: project, stage, element, sub-element and work package.

1.7 PROJECT MILESTONES

- .1 Mandatory and recommended project milestones form targets for both Master Schedule and Detail Schedule of CPM construction network system.
 - .1 Mandatory: completion date for each phase.
 - .2 Mandatory: date of work completion certificate for each phase.
 - .3 Compulsory benchmark: date on which Departmental Representative must relocate workstations temporarily for each phase.
 - .4 Compulsory benchmark: date on which Departmental Representative may return workstations relocated for each phase.
 - .5 Recommended: building closed-in and weatherproofed completed date.
 - .6 Recommended: outside work completed date.

1.8 MASTER SCHEDULE

- .1 Structure and base CPM construction networks system on WBS coding in order to ensure consistency throughout Project.
- .2 Prepare comprehensive construction Master Schedule (CPM logic diagram) and dependent Cash Flow Projection within 10 working days of finalizing Agreement to confirm validity or alternates of identified milestones.
 - .1 Master Schedule will be used as baseline.
 - .1 Revise baseline as conditions dictate and as required by Departmental Representative.
 - .2 Departmental Representative as Project progresses will review and return revised baseline within 10 work days.
- .3 Reconcile revisions to Master Schedule and Cash Flow Projections with previous baseline to provide continuous audit trail.
- .4 Initial and subsequent Master Schedule will include:
 - .1 CD containing schedule and cash flow information, clearly labelled with data date, specific update, and person responsible for update.
 - .2 Bar chart identifying coding, activity durations, early/late and start/finish dates, total float, completion as percentile, current status and budget amounts.
 - .3 Network diagram showing coding, activity sequencing (logic), total float, early/late dates, current status and durations.

- .4 Actual/projected monthly cash flow: expressed annually monthly and shown in both graphical and numerical form.

1.9**DETAIL SCHEDULE**

- .1 Provide detailed project schedule (CPM logic diagram) within ten (10) working days of Award of Contract date showing activity sequencing, interdependencies and duration estimates. Include listed activities as follows:
 - .1 Contract award.
 - .2 Shop drawings and samples.
 - .3 Mock up.
 - .4 Permit.
 - .5 Mobilisation.
 - .6 Excavation.
 - .7 Temporary protection.
 - .8 Roofing.
 - .9 Masonry.
 - .10 Curtain walls.
 - .11 Interior system (walls, floors, ceiling).
 - .12 Doors, frames and hardware.
 - .13 Lighting.
 - .14 Electricity.
 - .15 Access and security system control.
 - .16 Piping.
 - .17 Heating, ventilation and air conditioning.
 - .18 Fire protection.
 - .19 Materials provided with long delivery times.
 - .20 Land rehabilitation.
 - .21 Commissioning and acceptance.
- .2 Detail CPM schedule to cover in detail minimum period of 12 months beginning from Award of Contract date with each activity duration approximately 10 days.
 - .1 Show remaining activities for CPM construction network system up to Final Certificate and develop complete detail as project progresses.
 - .2 Detail activities completely and comprehensively throughout duration of project.
- .3 Relate Detail Schedule activities to basic activities and milestones developed and approved in Master Schedule.
- .4 Clearly show sequence and interdependence of construction activities and indicate:
 - .1 Start and completion of all items of Work, their major components, and interim milestone completion dates.
 - .2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:

- .1 Time for submittals, resubmittals and review.
- .2 Time for fabrication and delivery of manufactured products for Work.
- .3 Interdependence of procurement and construction activities.
- .3 Include sufficient detail to assure adequate planning and execution of Work. Activities should generally range in duration from 3 to 15 workdays each.
- .5 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow co-ordination and control of project activities. Show continuous flow from left to right.
- .6 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form "Critical Path". Increased number of critical activities is seen as indication of increased risk.
- .7 Insert Change Orders in appropriate and logical location of Detail Schedule. After analysis, clearly state and report to Departmental Representative for review effects created by insertion of new Change Order.

1.10 REVIEW OF THE CONSTRUCTION DETAIL SCHEDULE

- .1 Allow 10 work days for review by Departmental Representative of proposed construction Detail Schedule.
- .2 Upon receipt of reviewed Detail Schedule make necessary revisions and resubmit to Departmental Representative for review within 5 work days.
- .3 Promptly provide additional information to validate practicability of Detail Schedule as required by Departmental Representative.
- .4 Submittal of Detail Schedule indicates that it meets Contract requirements and will be executed generally in sequence.

1.11 COMPLIANCE WITH DETAIL SCHEDULE

- .1 Comply with reviewed Detail Schedule.
- .2 Proceed with significant changes and deviations from scheduled sequence of activities that cause delay, only after written receipt of approval by Departmental Representative.
- .3 Identify activities that are behind schedule and causing delay. Provide measures to regain slippage.
 - .1 Corrective measures may include:
 - .1 Increase of personnel on site for effected activities or work package.
 - .2 Increase in materials equipment.
 - .3 Overtime work Additional work shifts.
- .4 Submit to Departmental Representative, justification, project schedule data and supporting evidence for approval of extension to Contract completion date or interim milestone date when required. Include as part of supporting evidence:
 - .1 Written submission of proof of delay based on revised activity logic, duration and costs, showing time impact analysis illustrating influence of each change or delay relative to approved contract schedule.

- .2 Prepared schedule indicating how change will be incorporated into the overall logic diagram. Demonstrate perceived impact based on date of occurrence of change and include status of construction at that time.
- .3 Other supporting evidence requested by Departmental Representative.
- .4 Do not assume approval of Contract extension prior to receipt of written approval from Departmental Representative.
- .5 In event of Contract extension, display in Detail Schedule that scheduled float time available for work involved has been used in full without jeopardizing earned float.
 - .1 Departmental Representative will determine and advise Contractor number of allowable days for extension of Contract based on project schedule updates for period in question, and other factual information.
 - .2 Construction delays affecting project schedule will not constitute justification for extension of contract completion date.

1.12**PROGRESS MONITORING AND REPORTING**

- .1 On ongoing basis, Detail Schedule on job site must show "Progress to Date". Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating and progress monitoring. Inspect Work with Departmental Representative at least once monthly to establish progress on each current activity shown on applicable networks.
- .2 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.
- .3 Perform Detail Schedule update monthly with status dated (Data Date) on last working day of month. Update to reflect activities completed to date, activities in progress, logic and duration changes.
- .4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.
- .5 Submit to Departmental Representative copies of updated Detail Schedule.
- .6 Requirements for monthly progress monitoring and reporting are basis for progress payment request.
- .7 Submit monthly written report based on Detail Schedule, showing Work to date performed, comparing Work progress to planned, and presenting current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:
 - .1 Description of progress made.
 - .2 Pending items and status of: permits, shop drawings, change orders, possible time extensions,.
 - .3 Status of Contract completion date and milestones.
 - .4 Current and anticipated problem areas, potential delays and corrective measures.
 - .5 Review of progress and status of Critical Path activities.

Part 2 Products**2.1 NOT USED**

.1 Not used.

Part 3 Execution**3.1 NOT USED**

.1 Not used.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Not Used.

1.2 REFERENCES

- .1 Not Used.

1.3 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 This section specifies the requirements and general procedures for the submission of shop drawings, product descriptions and samples by the Contractor to the Departmental Representative, for verification. Other additional special requirements are described in the appropriate sections of divisions 02 to 33
- .3 Do not proceed with Work affected by submittal until review is complete.
- .4 Reproductions of drawings prepared by professionals working on the project and submitted as drawings will be refused.
- .5 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .6 The review of shop drawings by the Departmental Representative 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.
- .7 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's DCC Representative's Consultant's review of submittals.
- .8 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.
- .9 Verify field measurements and affected adjacent Work are co-ordinated.
- .10 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

- .11 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .12 Make changes Departmental Representative deems appropriate to contract documents and resubmit documents and samples as directed by Departmental Representative.
- .13 When resubmitting documents or samples, notify Departmental Representative in writing of revisions other than those requested.
- .14 Keep one reviewed copy of each submission on site.

1.4 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 original drawings prepared by Contractor, Subcontractor, Supplier or Distributor illustrating part of work concerned, manufacturing details, layout, installation details and assembly prescribed in associated sections, as well as related elements for the project.
- .3 Identify details using sheet numbers and contract drawing sketches.
- .4 Allow 10 days for Departmental Representative's DCC Representative's Consultant's review of each submission.
- .5 A copy will be returned to Contractor after verification. The Contractor must make 7 copies and distribute to parties (Owner, professionals, consultants, subcontractors, etc.) and pay for the cost. Distribution will be based on process established at first construction site meeting. Product data and shop drawings in "Letter" (21,59cm x 27,94cm) or "Legal" (21,59cm x 35,56cm) format will be submitted in digital format (PDF). Delete information that does not apply to the project.
- .6 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.
- .7 Reissue drawings within five (5) days when rejected or identified for resubmittal.
- .8 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

1.5 PRODUCT DESCRIPTION

- .1 The above documentation must meet the following requirements for approval:
 - .1 Products meets characteristics specified in contract documents;
 - .2 They must not contain information unrelated to the project;
 - .3 Basic information must be completed by additional project information;
 - .4 Must indicate required dimensions and clearances.

1.6 SAMPLES

- .1 Samples: materials, quality, finish and installation method.

- .2 Submit for review samples in duplicate triplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .3 Deliver samples prepaid to Departmental Representative's DCC Representative's Consultant's business address site office.
- .4 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .5 Where colour, pattern or texture is criterion, submit full range of samples.
- .6 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .7 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .8 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.7 **MOCK-UPS**

- .1 Samples: work carried out on site using the materials and installation method ouvrages réalisés sur place en employant les matériaux et le mode d'exécution prescrits.
- .2 Erect mock-ups in accordance with section 01 45 00 - Quality Control.
- .3 Produce mockups in areas deemed acceptable by Departmental Representative.
- .4 Notify Departmental Representative in writing when product mock-ups are submitted of discrepancies over contract requirements.
- .5 Submit entire range of sample when colour, pattern or texture is required.
- .6 Once verified and approved, mockups will serve as quality standard for the project.

1.8 **SUBMISSION REQUIREMENTS**

- .1 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.
- .2 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Contractor;
 - .2 Subcontractor;
 - .3 Supplier;
 - .4 Manufacturer;

- .5 Retailer, if applicable;
- .4 Identification of product or material;
- .5 Matching to adjacent work;
- .6 Dimensions measured on site, clearly identified;
- .7 Specification section number;
- .8 Applicable standards, and number;
- .9 Designation of each drawing, data sheet and test report;
- .10 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .11 Details of appropriate portions of Work as applicable:
 - .1 Materials and fabrication details;
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances;
 - .3 Setting or erection details;
 - .4 Characteristics such as power, speed or capacity;
 - .5 Performance characteristics;
 - .6 Standards;
 - .7 Operating weight;
 - .8 Wiring diagrams;
 - .9 Single line and schematic diagrams;
 - .10 Relationship to adjacent work.
- .3 Submit one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request. If no shop drawing is required due to use of standard manufactured product, submit one electronic copy of data sheets or of manufacturer's documentation as prescribed in technical sections of specification and required by Departmental Representative.
- .4 Submit one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .5 Submit one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .6 Submit one electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.

- .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .7 Submit one electronic copy of inspection reports conducted on site by manufacturer, as prescribed in technical sections of specification and required by Departmental Representative.
- .8 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .9 Submit one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .10 Delete information not applicable to project.
- .11 Supplement standard information to provide details applicable to project.

1.9 CERTIFICATES AND TRANSCRIPTS

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Partie 1 General**1.1 RELATED REQUIREMENTS**

- .1 Sans objet.

1.2 REFERENCES

- .1 Province of Québec
 - .1 Loi sur la santé et la sécurité du travail L.R.Q., c. S-2.1 (Act respecting occupational health and safety).
 - .2 Code de sécurité pour les travaux de construction L.R.Q., c. S-2.1, r.4 (Safety code for the construction industry).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental representative, and the CNESST the site-specific prevention program, as outlined in the article "GENERAL REQUIREMENTS", at least 10 days prior to the start of work.
- .3 Departmental representative will review Contractor's site-specific prevention program and provide comments to Contractor within 10 days after receipt of the document. Revise plan as appropriate and resubmit to Departmental representative within 5 days after receipt of comments from Departmental representative. Departmental representative reserves the right not to authorize the start of work on the construction site as long as the content of the prevention program is not satisfactory. The Contractor shall then update his prevention program and resubmit it to the Departmental representative if the scope of work changes or if the working methods of the Contractor differ from his initial plans or for any other applicable new condition.
- .4 Departmental representative's review of Contractor's site-specific prevention program should not be construed as approval of the program and does not reduce the Contractor's overall responsibility for construction Health and Safety during the work.
- .5 Submit copies of Contractor's authorized representative's construction site health and safety inspection reports to Departmental representative, determine frequency, but at least once a week.
- .6 Submit to Departmental representative within 24 hours a copy of any inspection report, correction notice or recommendation issued by Federal, Provincial and Territorial health and safety inspectors.
- .7 Submit to Departmental representative within 24 hours an investigation report for any accident involving injury and any incident exposing a potential hazard.

The investigation report shall contain at least the following:

 - 1. date, time and place of accident;
 - 2. name of sub-contractor involved in the accident;
 - 3. number of persons involved and condition of wounded;

4. witness identification;
 5. detailed description of tasks performed at the time of the accident;
 6. equipment being used to accomplish the tasks performed at the time of the accident;
 7. corrective measures taken immediately after the accident;
 8. causes of the accident;
 9. preventive measures that have been put in place to prevent a similar accident.
- .8 Submit WHMIS material safety data sheets to Departmental Representative in accordance with Section 01 33 00 – Submittal Procedures and Section 02 81 01 – Hazardous Materials. Contractor must also keep a copy of these data sheets on site.
- .9 Medical Surveillance: where prescribed by legislation, regulation or prevention program, submit certification of medical surveillance for construction site personnel prior to commencement of Work, and submit additional certifications for any new construction site personnel to Departmental representative.
- .10 Submit to Departmental representative an on-site Emergency Response Plan at the same time as the prevention program. The Emergency Response plan must contain the elements listed in the article “GENERAL REQUIREMENTS” of this section.
- .11 Submit to Departmental representative copies of all training certificates required for the application of the prevention program, in particular (if applicable) for the following:
- .1 first aid in the workplace and cardiopulmonary resuscitation;
 - .2 work likely to release asbestos dust (mandatory for all work where asbestos is present);
 - .3 work in confined spaces (mandatory for all work in confined spaces);
 - .4 lockout-tagout procedures (mandatory for all work requiring lockout);
 - .5 safely operating forklift trucks (mandatory for all forklift usage);
 - .6 safely operating elevating work platforms (mandatory for the use of all elevating platforms);
 - .7 any other requirement of Regulations or the safety program.
- In addition, the certifications of the *Cours de santé et sécurité générale pour les chantiers de construction* (General Health and Safety Training for Construction Sites) shall be available on demand on the construction site.
- .12 Engineer’s plans and certificates of compliance: Contractor must submit to the Departmental representative and to the *Commission des normes, de l’équité, de la santé et de la sécurité du travail* (CNESST) a copy signed and sealed by engineer of all plans and certificates of compliance required pursuant to the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry) or by any other legislation or regulation or by any other clause in the specifications or in the contract. The Contractor must also submit a certificate of conformity signed by an engineer once the facility for which these plans were prepared has been completed and before a person uses the facility. A copy of these documents must be available on site at all times.

1.4 FILING OF NOTICE OF CONSTRUCTION SITE OPENING

- .1 Notice of construction site opening shall be submitted to the CNESST before work begins. A copy of such notice and acknowledgment of receipt from the CNESST shall be submitted to Departmental representative.
- .2 At the completion of all the work, a notice of construction site closing shall be submitted to the CNESST, with a copy to Departmental representative.
- .3 The Contractor shall assume the role of being the Principal Contractor in the limits of the construction site and elsewhere where he must execute work within the framework of this project. The Contractor shall recognize the responsibility of being the Principal Contractor of the project and identify himself as such in the notice of the construction site opening he provides to the CNESST.
- .4 The Contractor shall accept to divide and identify the construction site adequately in order to define time and space at all times throughout the course of the project.

1.5 HAZARD ASSESSMENT

- .1 The contractor must perform construction site specific safety hazard assessment related to project.

1.6 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Departmental representative prior to commencement of Work.
- .2 Contractor's representative with decision power must attend any meetings at which construction site safety and health issues are to be discussed.
- .3 If it is anticipated that there will be 25 workers or more on the construction site at any given time, the Contractor shall set up a worksite committee and hold meetings as required by the *Code de sécurité pour les travaux de construction* (S-2.1, r. 4) (Safety code for the construction industry). A copy of the minutes of the meetings of the committee shall be provided to the Departmental representative no later than 5 days after the committee meeting.

1.7 REGULATORY REQUIREMENTS

- .1 Comply with all legislation, regulations and standards applicable to the construction site and its related activities.
- .2 Comply with specified standards and regulations to ensure safe operations on a site containing hazardous or toxic materials.
- .3 Always use the most recent version of the standards specified in the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry), notwithstanding the date indicated in that *Code*.

1.8 COMPLIANCE REQUIREMENTS

- .1 Comply with the *Loi sur la santé et la sécurité du travail* (L.R.Q., c. S-2.1) (Act Respecting Occupational Health and Safety) and the *Code de sécurité pour les travaux de construction* (S-2.1, r. 4.) (Safety code for the construction industry) in addition to respecting all the requirements of this specification manual.

1.9 RESPONSIBILITIES

- .1 The Contractor must acknowledge and assume all the tasks and obligations which customarily devolve upon a principal Contractor under the terms of the *Loi sur la santé et la sécurité du travail* (L.R.Q., ch. S-2.1) (Act Respecting Occupational Health and Safety) and the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry).
- .2 The Contractor must be responsible for health and safety of persons on construction site, safety of property on construction site and for the protection of persons adjacent to construction site and the environment to the extent that they may be affected by conduct of the work.
- .3 No matter the size or location of the construction site, the Contractor must clearly define the limits of the construction site by physical means and respect all specific regulation requirements applicable in this regard. The means chosen to define the limits of the construction site must be submitted to the Departmental representative.
- .4 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific prevention Plan.

1.10 WORK PERFORMED BY EXTERNAL CONTRACTORS

- .1 On this construction site, it is anticipated that work will be performed by an external contractor that has not been hired by the Contractor:
 - .3 Maintenance staff;
 - .4 Snow removal on site (apart from work area).
- .2 The Contractor must take the necessary steps to protect the health and safety of external contractors that have no contractual link with the Contractor but have been mandated by the Departmental representative to perform certain work. In return, these external contractors are obligated to submit to the authority of the Contractor (Principal Contractor). A subordination agreement must be signed by the Contractor and by each external contractor to this effect and submitted to the Departmental representative prior to the start of the work of each contractor (see the wording in the article HEALTH AND SAFETY SUBORDINATION AGREEMENT)

1.11 GENERAL REQUIREMENTS

- .1 Before undertaking the work, prepare a site-specific prevention program based on the hazards identified according to the article “HAZARD ASSESSMENT” and the article “RISKS INHERENT TO THE WORKSITE” in this section. Apply this program in its totality from the start of the project until demobilization of all personnel from the construction site. The prevention program shall take into consideration the specific characteristics of the project and cover all the work to be executed on the construction site.

The safety program must include at least the following:

- .1 company safety and health policy;
- .2 description of the stages of the work;
- .3 total costs, schedule and projected workforce curves;
- .4 flow chart of safety and health responsibilities;

- .5 physical and material layout of the construction site;
- .6 risk assessment for each stage of the work, including preventive measures and the procedures for applying them;
- .7 identification of the preventive measures relative to the specific risks inherent to the worksite indicated in the article "RISKS INHERENT TO THE WORKSITE";
- .8 identification of preventive measures for health and safety of employees and / or public works site as indicated in the article "SPECIFIC REQUIREMENTS FOR THE HEALTH AND SAFETY OF OCCUPANTS AND PUBLIC";
- .9 training requirements;
- .10 procedures in case of accident/injury;
- .11 written commitment from all parties to comply with the safety program;
- .12 construction site inspection checklist based on the preventive measures;
- .13 emergency response plan which shall contain at least the following:
 - .1 construction site evacuation procedures;
 - .2 identification of resources (police, firefighters, ambulance services, etc.);
 - .3 identification of persons in charge of the construction site;
 - .4 identification of the first-aid attendants;
 - .5 communication organizational chart (including the person responsible for the site and the Departmental representative);
 - .6 training required for those responsible for applying the plan;
 - .7 any other information needed, in the light of the construction site's characteristics.

If available the Departmental representative will provide the evacuation procedures to the Contractor who shall then coordinate the construction site procedure with that of the site and submit it to the Departmental representative.

- .2 Departmental representative may respond in writing, where deficiencies or concerns are noted in the prevention program and may request resubmission with correction of deficiencies or concerns.
- .3 In addition to the prevention program, during the course of the work the Contractor shall elaborate and submit to the Departmental representative specific written procedures for any work having a high risk factor of accident (for example: demolition procedures, specific installation procedures, hoisting plan, procedures for entering a confined space, procedures for interrupting electric power, etc.) or at the request of the Departmental representative.
- .4 The Contractor shall plan and organize work so as to eliminate the danger at source or ensure collective protection, thereby minimizing the use of personal protective equipment.
- .5 Equipment, tools and protective gear which cannot be installed, fitted or used without compromising the health or safety of workers or the public shall be deemed inadequate for the work to be executed.
- .6 All mechanical equipment (for example, but not limited to: hoisting devices for persons or materials, excavators, concrete pumps, concrete saws) shall be inspected before delivery to the construction site. Before using any mechanical equipment, the Contractor

shall obtain a certificate of compliance signed by a qualified mechanic dated less than a week prior to the arrival of each piece of equipment on the construction site; the certificate shall remain on the construction site and transmitted to the Departmental representative on demand.

- .7 Ensure all inspections (daily, periodic, annual, etc.) for the hoisting devices for persons or materials required by the current standards are carried out and be able to provide a copy of the inspection certificates to the Departmental representative on demand.
- .8 The Departmental representative can at all times, if he suspects a malfunction or the risk of an accident, order the immediate stop of any piece of equipment and require an inspection by a specialist of his choice.
- .9 The Departmental representative must be consulted for the location of storing gas cylinders and tanks on the construction site.

1.12 RISKS INHERENT TO THE WORKSITE

- .1 In addition to the risks related to the tasks to be carried out, personnel responsible for the execution of the work on the construction site will be exposed to the following risks, inherent to the area where the work will be executed. Without limiting his prevention program to these, the Contractor shall also include these elements in his program.

At the worksite there is the presence of the following:

- .1 overhead power lines;
- .2 underground services (electric, gas, vapour, water system, etc.);

1.13 SPECIFIC REQUIREMENTS FOR THE HEALTH AND SAFETY OF OCCUPANTS AND PUBLIC

- .1 Site where work is to take place is occupied by employees and/or public throughout duration of work. Refer to Sections 01 11 01 – Summary of Work and 01 14 00 Work Restrictions for requirements to be met. These requirements must be included in Contractor's prevention program and in all other measures planned by Contractor to protect health and safety of employees and/or public on site.

1.14 UNFORESEEN HAZARDS

- .1 Whenever a source of danger not defined in the specifications or identified in the preliminary construction site inspection arises as a result of or in the course of the work, the Contractor must immediately suspend work, notify the person responsible for health and safety on the construction site, take appropriate temporary measures to protect the workers and the public and notify Departmental representative, both verbally and in writing. Then the Contractor must do the necessary modifications to the prevention program or apply the security measures required in order to resume work.

1.15 PERSON IN CHARGE OF HEALTH AND SAFETY

- .1 If the construction site meets the requirements of article 2.5.3 of the *Code de la sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the construction industry), the Contractor needs to hire a competent person authorized as a safety officer and appoint this person full time from the beginning of the work. This person's tasks shall solely be dedicated to the management of health and safety on the construction site. This safety officer must have the following qualifications:

- .1 have a safety officer certificate issued by the CNESST since at least 5 years;
- .2 have site-related working experience specific to the activities associated with the present project;
- .3 have working knowledge of occupational health and safety regulations in the workplace;
- .4 be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter the construction site to perform work;
- .5 be responsible for implementing, enforcing in detail and monitoring site-specific Contractor's Health and prevention program;
- .6 be on construction site at all times during execution of work;
- .7 inspect the work and ensure compliance with all regulatory requirements and those indicated in the contract documents or the site-specific prevention program.
- .8 Keep a daily log of actions taken and submitting a copy to Departmental representative each week.

The safety officer's certificate shall be submitted to the Departmental representative before the start of the work.

- .2 When the hiring of a safety officer is not required or if this person is hired by the Departmental representative, the Contractor shall designate a competent person to supervise and take responsibility for health and safety, no matter the size of the construction site or how many workers are present at the workplace. This person shall be on construction site at all times and be able to take all necessary measures to ensure the health and safety of persons and property at or in the immediate vicinity of the construction site and likely to be affected by any of the work. The Contractor shall submit the name of this person to the Departmental representative before the start of work.

1.16 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on construction site in accordance with Acts and Regulations of the Province, and in consultation with Departmental representative.
- .2 At a minimum, the following information and documents must be posted in a location readily accessible to all workers:
 - .1 notice of construction site opening;
 - .2 identification of principal Contractor;
 - .3 company OSH policy;
 - .4 site-specific prevention program;
 - .5 emergency plan;
 - .6 minutes of worksite committee meetings;
 - .7 names of worksite committee representatives;
 - .8 names of the first-aid attendants;
 - .9 action reports and correction notices issued by the CNESST.

1.17 INSPECTION OF THE CONSTRUCTION SITE AND CORRECTION OF NON-COMPLIANCES

- .1 Inspect the construction site and complete the construction site inspection checklist and submit it to the Departmental representative in accordance with the article “ACTION AND INFORMATIONAL SUBMITTALS” in this section.
- .2 Immediately take all necessary measures to correct any situations deemed non-compliant during the inspections mentioned in the previous paragraph or noticed by the authorities having jurisdiction or the Departmental representative or his agent.
- .3 Submit to Departmental representative written confirmation of all measures taken to correct the situation in case of non-compliance in matters pertaining to health and safety.
- .4 The Contractor shall give the safety officer or, where there is no safety officer, the person assigned to safety and health responsibilities, full authority to order cessation and resuming of work as and when deemed necessary or desirable in the interests of safety and health. This person should always act so that the safety and health of the public and construction site workers and environmental protection take precedence over cost and scheduling considerations.
- .5 The Departmental representative or his agent may order cessation of work if the Contractor does not make the corrections needed to conditions deemed non-compliant in matters pertaining to health and safety. Without limiting the scope of the preceding articles, the Departmental representative may order cessation of work if, in his view, there is any hazard or threat to the safety or health of construction site personnel or the public or to the environment.

1.18 PREVENTION OF VIOLENCE

- .1 Health and safety management of Public Works and Government Services Canada construction sites includes the implementation of measures designed to protect the psychological health of all persons who access the construction site where the work is taking place. Consequently, in addition to physical violence, verbal abuse, intimidation and harassment are not tolerated on the construction site. Any person who demonstrates such actions or behaviors will receive a warning and/or could be definitely expelled from the construction site by the Departmental representative.

1.19 POWDER ACTUATED DEVICE

- .1 Use powder actuated devices only after receipt of written permission from Departmental representative.
- .2 Any person using an explosive actuated tool shall hold a training certificate and meet all requirements of Section 7 of the *Code de sécurité pour les travaux de construction* (S- 2.1, r. 4). (Safety code for the construction industry)
- .3 Any other explosive-actuated device shall be used in accordance with the manufacturer's directions and applicable standards and regulations.

1.20 USE OF PUBLIC ROADS

- .1 Where it is necessary to encroach on a public road for operational reasons or to ensure the security of the workers, the occupants or the public (for example: the use of scaffolding,

cranes, excavation work, etc.), the Contractor shall obtain at his own expense any authorizations and permits required by the competent authority.

- .2 The Contractor shall install at his own expense any signage, barricades or other devices needed to ensure the safety and security of the public and the Contractor's own facilities.

1.21 LOCKOUT-TAGOUT

- .1 For all work on electrically or otherwise energized equipment, the Contractor shall draw up and implement a general lockout-tagout procedure and submit it to the Departmental representative.
- .2 Supervisors and all workers concerned by work requiring lockout-tagout must have received training on lockout-tagout procedures by a recognized organization; Contractor shall submit training certificates to the Departmental representative.
- .3 Before starting the lockout-tagout procedure of a piece of equipment on an occupied site, Contractor must coordinate his work with the representative of the site if the interruption of the power sources can have an impact on the operations of the site or on its occupants.
- .4 Contractor must designate a qualified person as responsible for the lockout-tagout and must make sure that that person prepares a lockout-tagout data sheet for each piece of equipment involved. The lockout-tagout data sheet must be submitted to the Departmental representative at least 48 hours before the beginning of the work. The Departmental representative will review the data sheet with the representative of the site if the work takes place in an existing building. The data sheets for lockout-tagout must contain at least the following information:
 - .1 description of work to carry out;
 - .2 identification, description and location of the circuit and/or ~~piece of~~ equipment to lockout-tagout;
 - .3 identification of energy sources that feeds the ~~piece of~~ equipment;
 - .4 identification of each cutout point;
 - .5 sequence of lockout-tagout and the release of residual energy as well as the sequence of unlocking;
 - .6 list of material needed for the lockout-tagout;
 - .7 method of verification of zero energy implementation;
 - .8 name and signature of the person who prepared the data sheet.

When required by the Departmental representative, Contractor must record all this information on the site's representative form.

- .5 At the time of lockout-tagout, the person responsible must date the data sheet and ensure that each worker involved in the work on the circuit/~~piece of~~ equipment to lockout-tagout puts his name on the data sheet and signs it.

1.22 ELECTRICAL WORK

- .1 Contractor shall ensure that all electrical work is executed by qualified employees in accordance with the provincial regulation respecting vocational training and qualification.

- .2 Contractor shall respect all requirements of standard CSA Z462 *Workplace Electrical Safety Standard*.
- .3 No repairs or alterations shall be carried out on any live equipment except where complete disconnection of the equipment is not feasible.
- .4 Contractor shall respect all requirements prescribed in paragraph “LOCKOUT-TAGOUT” in this section.
- .5 Contractor shall advise in writing the Departmental representative of all the work that cannot be done with de-energized equipment and obtain his authorization. Contractor shall demonstrate to the Departmental representative that it is impossible to do the work with de-energized equipment and provide all the information necessary to request and obtain an energized electrical work permit (indicate working procedures, arc flash hazard analysis, protective perimeter, protective equipment, etc.) before the beginning of the work, excluding for the exceptions indicated in standard CSA Z462 Workplace electrical safety.
- .6 The energized electrical work permit on must contain at least the following elements:
 1. description of the circuit and equipment and its location;
 2. justification for having to do the work in an energized condition;
 3. description of safe work practices to apply;
 4. results of the shock hazard analysis;
 5. limit of the protective perimeter against electric shocks;
 6. results of the arc flash hazard analysis;
 7. description of the arc flash protection boundary;
 8. description of the personal protective equipment required;
 9. description of the means to limit access to unqualified persons;
 10. proof that an information session has been carried out;
 11. approval signature of the energized electrical work (by a person in authority or by the owner).
- .7 If for the operational requirements of the occupants of the site the representative of the site requires that the Contractor performs work in an energized condition, the Contractor shall obtain all the information required to request and obtain obtain an energized electrical work permit (indicate working procedures, arc flash hazard analysis, protective perimeter, protective equipment, etc.) and have it signed by the representative of the site assigned by the Departmental representative before the beginning of the work.

1.23 EXPOSURE TO SILICA

- .1 For any interior or exterior work generating silica, the Contractor must respect the following requirements, in addition to those in the *Code de sécurité pour les travaux de construction* S-2.1, r.4 (Safety code for the construction industry).
 1. Work in wet environment or use tools with the inflow of water in order to reduce dustiness, if not, collect dust at the source and retain it with a high-efficiency filters not to propagate dust in the environment.
 2. Clean surfaces and tools with water, never with compressed air.

3. Sand and pickle surfaces by using an abrasive containing less than 1% of silica (also called amorphous silica).
4. Install shields or other containment device to prevent silica dust from migrating toward other workers or the public.
5. Wear individual respiratory and ocular protection equipment during all the operations that could generate silica dust in accordance with the requirements of the *Code de sécurité pour les travaux de construction, S-2.1, r.4* (Safety code for the construction industry).
6. Wear coveralls to prevent contamination outside the construction site.
7. Do not eat, drink, or smoke in a dusty environment.
8. Wash the hands and the face before drinking, eating or smoking.

1.24 SANDBLASTING

- .1 Prior to starting any sandblasting work, the Contractor must:
 1. Provide a written procedure of the work that meets the requirements of section 3.20. of the *Code de sécurité pour les travaux de construction, S-2.1, r.4* (Safety code for the Construction Industry).
 2. Demonstrate that he has all the material and equipment required on hand to respect the procedure and for safely conducting the work.
 3. All sanding and sandblasting work shall be done by using an abrasive containing less than 1% of silica.

1.25 RESPIRATORY PROTECTION

1. Contractor must ensure that all workers who must wear a respirator as part of their duties have received training for that purpose as well as fit testing of their respirator, in accordance with CSA standard Z94.4 *Selection, use and care of respirators*. Submit the certificates of the fit testings to the Departmental representative on demand.

1.26 FALL PROTECTION

1. Plan and organize work so as to eliminate the risk of fall at the source or ensure collective protection, thereby minimizing the use of personal protective equipment. When personal fall protection is required, workers must use a safety harness that complies with CSA standard CAN/CSA Z-259.10 M90. A safety belt must not be used as fall protection.
2. Every person using an elevating platform (scissors, telescopic mast, articulated mast, rotative mast, etc.) must have a training regarding this equipment.
3. The use of a safety harness is mandatory for all elevating platforms with telescopic, articulate or rotative mast.
4. Define the limits of the danger zone around each elevating platform.
5. All openings in a floor or roof must be surrounded by a guardrail or provided with a cover fixed to the floor able to withstand the loads to which it could be exposed, regardless of the size of the opening and the height of the fall it represents.

6. Everyone who works within two metres from a fall hazard of three metres or more must use a safety harness in accordance with the requirements of the regulation, unless there is a guardrail or another device offering an equivalent safety.
7. Despite the requirements of the regulation, the Departmental representative may require the installation of a guardrail or the use of a safety harness for specific situations presenting a risk of fall less than three metres.

1.27 SCAFFOLDINGS

- .1 In addition to the requirements of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry), the Contractor who uses scaffoldings must respect the following requirements:
 - .1 Foundation:
 1. Scaffoldings shall be installed on a solid foundation so that it does not slip or rock.
 2. Contractors wishing to install scaffoldings on a roof, overhang, canopy or awning shall submit their calculations and loads, as well as plans signed and sealed by an engineer to the Departmental representative and obtain his authorization before beginning installation.
 - .2 Assembly, bracing and mooring:
 1. All scaffoldings shall be assembled, braced and moored in accordance with the manufacturer's instructions and the provisions of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry).
 2. Where a situation requires the removal of part of the scaffoldings (e.g., crosspieces), the Contractor shall submit to the Departmental representative an assembly procedure signed and sealed by an engineer certifying that the scaffolding assembled in that manner will allow the work to be done safely given the loads to which it will be subject.
 3. For scaffoldings where the span between two supports is greater than three metres, the Contractor shall provide the Departmental representative an assembly plan signed and sealed by an engineer.
 - .3 Protection against falls during assembly:
 1. Workers exposed to the risk of falling more than three metres shall be protected against falls at all times during assembly.
 - .4 Platforms:
 1. Scaffolding platforms shall be designed and installed in accordance with the provisions of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry).
 2. If planks are used, they shall be approved and stamped in accordance with section 3.9.8 of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry)
 3. Scaffoldings of four sections (or six metres) high or more shall have a full platform covering the entire surface between the putlogs every three

metres high or fraction thereof, and the components of that platform shall not be moved at any time to create an intermediate landing.

.5 Guardrails:

1. A guardrail shall be installed on every landing.
2. Cross braces shall not be considered as guardrails.
3. If the platforms are not covering the entire surface between the putlogs, the guardrail must be installed just above the edge of the platform so that there is no empty horizontal space between the platform and the guardrail.
4. Where scaffoldings has four sections (or six metres) high or more and full platforms are required, the guardrails shall be installed on each landing at the start of work and shall remain in place until the work is completed.

.6 Access:

1. The Contractor shall ensure that access to the scaffoldings does not compromise worker safety.
2. Where the platforms of the scaffoldings are comprised of planks, ladders shall be installed in such a way that planks extending beyond the platform do not block the way up or down.
3. Notwithstanding the provisions of the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry), stairs shall be installed on all scaffoldings that have six or more rows of uprights or is six sections (or nine metres) high or higher.

.7 Protection of the public and occupants

1. When scaffoldings are installed in a zone accessible to the public, the Contractor shall take the necessary measures to prevent the public from having access to them and, if applicable, to the work or storage area located in the vicinity of these scaffolding.
2. Contractor must install covered walkways, nets or other similar devices to protect workers, the public and the occupants against falling objects. The means of protection must be approved by Departmental representative.

.8 Engineering plans

1. In addition to those required by the *Code de sécurité pour les travaux de construction* (Safety code for the construction industry), the Departmental representative reserves the right to require engineering plans for other types or configurations of scaffoldings.
2. A plan signed and sealed by an engineer is required for all scaffoldings that will be covered with a canvas, a tarpaulin or any other material that has wind resistance.
3. A certificate of conformity signed by an engineer is required in all cases where an engineering plan is required and this, before anybody uses the facility. A copy of these documents must be available on the construction site at all times.

1.28 LIFTING LOADS WITH CRANE OR BOOM TRUCK

1. Unless specified otherwise, the Contractor must prepare a hoisting plan and submit it to the Departmental representative for all lifting operations done with a crane or a boom truck at least 5 days before these lifting operations begin. The hoisting plan must contain at a minimum the information listed at the end of this article.
2. The hoisting plan must be signed and sealed by an engineer for the following lifting operations:
 1. lifting of concrete panels;
 2. lifting mechanical/electrical equipment on a roof or on the floor of a building;
 3. lifting of loads encroaching on the public road;
 4. lifting large dimensions or very heavy loads;
 5. all other lifting operation, in accordance with the requirements of the Departmental representative.
3. In addition to the above requirements, the Contractor must plan the hoisting operations in a way as to avoid that the loads pass over the occupied zones on the site. When there is no alternative, the hoisting plan must absolutely be signed and sealed by an engineer and must guarantee the security of the occupants in that zone; the plan must also be approved by the Departmental representative. The Departmental representative can, if he deems necessary, require that the work be done at night or on weekends.
4. Upon the beginning of the work on the construction site, the Contractor must submit the list of the hoisting plans anticipated for the whole project to the Departmental representative. That list shall be updated as needed if changes occur during the work.
5. In addition to the mechanical service inspection certificate, the annual inspection certificate and the crane logbook must be aboard all cranes and boom truck cabs.
6. The entire lifting area shall be marked off to prevent the entry of non-authorized persons.
7. The Contractor shall carefully inspect all of the slings and lifting accessories and make sure that those in poor condition are destroyed and scrapped.
8. Compressed-gas cylinders shall be lifted with a basket specially designed for this purpose.
9. Minimum content of hoisting plan
 1. Sketch indicating at a minimum, the location of the crane, the surrounding facilities, the zone covered by the hoisting operations, the pedestrian's pathways and vehicular routes, the security perimeter, etc.
 2. Weight of loads
 3. Dimensions of loads
 4. List of hoisting devices and weight of each
 5. Total weight lifted
 6. Maximum height of obstacles to clear
 7. Height of loads lifting relative to the surface of the roof (in the case of loads to be placed on roofs)
 8. Use of guide cables
 9. Type of crane used
 10. Crane capacity
 11. Boom length
 12. Boom angle
 13. Crane's radius of action
 14. Deployment of stabilizers
 15. Percentage usage of the crane's capacity
 16. Verification confirmation of hoisting equipment

17. Identification of the crane operator and the person responsible for the hoisting operations with date and signatures

1.29 HOT WORK

1. Hot work means any work where a flame is used or a source of ignition may be produced, i.e., riveting, welding, cutting, grinding, burning, heating, etc.
2. Before the beginning of each shift of work and for each sector, the Contractor must obtain a "Hot Work Permit" emitted by the person responsible for the site.
 1. Référent à la section 013529.06-A1.0 Santé et sécurité – Annexe 1 pour un exemplaire de ce permis.
3. A working portable fire extinguisher suitable to the fire risk shall be available and easily accessible within a 5 m radius from any flame, spark source or intense heat.
4. The Contractor must appoint an individual to do continuous monitoring of the fire risks for a period of one (1) hour after the end of the shift of hot work. This individual shall sign the section for this purpose on the permit and give it to the person in charge of the construction site after the one-hour period.
5. When the hot work is done in areas where there is combustible materials or where the walls, ceilings or floors are made of or covered with combustible materials, a final inspection of the work area must be scheduled four (4) hours after the work has finished. Unless specified otherwise by the Departmental representative, the Contractor must assign a person to carry out this monitoring.
6. Welding and cutting:
 1. In addition to the requirements prescribed in the preceding paragraphs, the Contractor must respect the following requirements:
 1. Welding and cutting work must be carried out in accordance with the requirements of the *Code de Sécurité pour les travaux de construction, S-2.1, r.4* (Safety code for the construction industry) and CSA standard W117.2, Safety in Cutting, Welding and Allied Processes.
 2. Air extraction system with filters must be used for all welding and cutting work performed inside.
 3. Stop all activities producing flammable or combustible gas, vapours or dust in the vicinity of the welding or cutting work.
 4. Store all compressed gas cylinder on a fireproof fabric and make sure that the room is well ventilated.
 5. Store all oxygen bottles at minimum distance of 6 metres from bottles of flammable gas (e.g., acetylene) or from a combustible material such as oil or grease, unless separated by a partition made of non-combustible materials as specified in Section 3.13.4 of Safety Code for Construction Industry, S-2.1, r.4.
 6. Store the cylinders far from all heat sources.
 7. Not to store the cylinders close to the staircases, exits, corridors and elevators.
 8. Do not put acetylene in contact with metals such as silver, mercury, copper and alloys of brass having more than 65% copper, to avoid the risk of an explosive reaction.
 9. Check that welding equipment with electric arc has the necessary tension and are grounded.

10. Ensure that the conducting wires of the electric welding equipment are not damaged.
11. Place the welding equipment on a flat ground away from the bad weather.
12. Install fireproof canvas when the welding work is done in a superposition and where there is the risk of falling sparks.
13. Move away or protect the combustible materials which are closer than 15 metres from the welding work.
14. Prohibition to weld or cut any closed container.
15. Do not perform any cutting, welding or work with a naked flame on a container, a tank, a pipe or other container containing a flammable or explosive substance unless:
 1. they have been cleaned and air samples indicating that work can be done without danger has been taken; and
 2. provisions to ensure the safety of the workers have been made.

1.30 ROOFING WORK

1. Protection against fall from heights:
 1. Installation of guardrails is mandatory at all times; however, the installation of a warning line is allowed to define the limits of the work zones provided that all the requirements of the articles 2.9.4.0 and 2.9.4.1 of the *Code de sécurité pour les travaux de construction* (Safety code for the Construction Industry) are respected.
 2. The guardrails must remain in place until the end of the project. The Departmental representative will authorize their dismantling when he can confirm that all the work, inspections and corrections have been made.
 3. Workers installing guardrails must wear safety harnesses.
 4. Workers installing and modifying guardrails or flashing shall wear safety harnesses in the event guardrails must be moved temporarily.
 5. Workers shall wear safety harnesses when receiving material and giving directions to the crane operator next to a drop.
 6. Safety harnesses shall be worn when carrying out work next to a drop where collective protection is not sufficiently safe.
 7. The Contractor shall provide a fastening method and safety cable system compliant with section 2.10.12 of the *Code de sécurité pour les travaux de construction (L.R.Q., S-2.1, r.4)* (Safety code for the Construction Industry) for each construction site or location.
2. Lifting of materials:
 1. For all winch installations, the Contractor shall provide the Departmental representative with the installation method recommended by the manufacturer. If unavailable, the Contractor shall then provide an installation procedure signed and sealed by an engineer. The installation procedure must take into account load-bearing capacity, the amount, weight and location of counterweight and any other detail that may affect the capacity and stability of the device.
 2. The Contractor shall carefully inspect all of the slings and lifting accessories and make sure that those in poor condition are destroyed or scrapped.
 3. Compressed-gas cylinders shall be lifted with a basket specially designed for this purpose.
 4. In all cases where a crane or boom truck is used, the Contractor must respect the requirements of the paragraph Lifting Loads With Crane or Boom Truck, in this section.

3. Protection against burns:
 1. Individuals assigned to the boilers shall wear long sleeves, safety glasses and a face shield when filling the boilers.
 2. Individuals working with asphalt or other hot liquids shall wear gloves, long sleeves and safety glasses.
4. Protection against fire
 1. The storage and use of propane cylinders shall comply with the standard CAN/CSA-B149.2, *Propane Storage and Handling Code*. The cylinders shall be stored outdoors, in a safe place, away from any unauthorized handling, in a storage cabinet specially designed for this purpose. The cylinders shall be securely kept upright and locked at all times in a place where no vehicles are allowed unless the cylinders are protected by barriers or similar protection.
 2. The number of propane cylinders on the roof shall not exceed the number of cylinders necessary for a day's work, and cylinders shall at all times be secured upright or held in a cart designed for this purpose.
 3. All hot work (burning, heating, riveting, welding, cutting, grinding, etc.) must be done in accordance with paragraph "Hot Work" in this section.
5. Material and waste management
 1. On the roof, light material and sheet material shall be kept in containers or be securely fastened. In the event this requirement is disregarded in the slightest way, the Departmental representative may disallow the storage of materials on the roof.
 2. Waste shall be discarded as produced using a waste chute or appropriate containers. The Contractor shall provide the means to prevent waste from being carried away by the wind.
 3. All waste must be removed from the roof at the end of shifts.
 4. Unless otherwise authorized by the Departmental representative, all waste bins must be placed at least 3 m from any structure or building.
6. Protection of occupants and the public
 1. Contractor must install covered passageways, nets or other devices above the entrances and the exits of the building to protect the workers, the public and the occupants against falling object. The means of protection must be approved by the Departmental representative.
 2. A safety perimeter on the ground must be placed under the work zone in order to protect the workers, the public and the occupants.
 3. The ground construction site, material handling area and boiler area shall be clearly sealed off to prevent occupants or the public from accessing the construction site and areas.
 4. Before installing any device that may emit gas or fumes, the Contractor shall receive authorization from the person in charge of the construction site, who shall make sure that there is no risk of gas or fumes infiltrating the building's ventilation system.

1.31**INTERIOR USE OF INTERNAL COMBUSTION ENGINES**

1. In addition to respecting article 3.10.17 of the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry), the Contractor must also respect the requirements described in the following paragraphs.
2. The use of a gas-powered equipment inside a building is prohibited even if the building is provided with openings.

3. The use of other equipment powered by an internal combustion engine inside a building must be submitted to the approval of the Departmental representative.
4. For the use of any piece of equipment powered by an internal combustion engine inside a building, even if the building is provided with openings, the Contractor must install a ventilation system able to maintain the concentrations of toxic gases below the regulatory values. The stale air shall be exhausted outside the building.
 1. Before using equipment powered by an internal combustion engine, the Contractor must plan and write the following:
 - .1 number of fans to install;
 - .2 power of the fans;
 - .3 location of the fans;
 - .4 dimensions of the openings that will be open during the work.
5. During the operation of equipment with internal combustion engine, the Contractor must measure the concentrations of carbon monoxide and nitrogen oxides in the work area and at the breathing area of the workers; the concentration levels measured must be recorded in a register every 30 minutes that must be available for consultation.
6. If work is in an occupied building, the Contractor must also measure the concentrations of carbon monoxide and nitrogen oxides in the rooms next to the work area and the concentration levels measured must be recorded in a register every 30 minutes.
7. If the carbon monoxide or nitrogen oxides detector alarm goes off during the work, the Contractor must stop the work and take the corrective measures required before resuming the work.
8. A portable fire extinguisher must be available at all times in the work area during the use of equipment with internal combustion engines.
9. The equipment must be maintained at a safe distance from all combustible material.
10. The storage of fuel for any equipment with internal combustion engine is prohibited inside a building.

1.32 TEMPORARY HEATING

1. In addition to respecting section 3.11 of the *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry), the Contractor must also respect the requirements described in the following paragraphs.
2. A portable fire extinguisher must be available at all times near the heating units, no matter what type of heating is used.
3. The heating units must always be used in accordance with the manufacturer's specifications.
4. If applicable, the canvas or tarpaulins used next to the heating units must be solidly fixed so as not to be projected on the heaters, on the pipes connected to the heaters or on any other heat source.
5. The gas cylinders must be installed in a way that they are protected from vehicle and other equipment traffic.
6. For the use of heating units other than electric, the Contractor must install a carbon monoxide detector in the work area, next to the heating units and/or the workers,

throughout the course of the heating period. The Contractor must immediately apply the corrective measures required to the heating units if the detector's alarm goes off.

7. The Contractor must ensure a minimum surveillance of the heating units outside the hours of work (nights and weekends). He must submit a surveillance plan to the Departmental representative before the use of the heating units.

1.33 WORK NEAR OVERHEAD POWER LINES

1. When there is an overhead power line in the work zone and that the Contractor chooses to apply paragraph b) of article 5.2.2 of the *Code de sécurité pour les travaux de construction* (2.1, r.4) (Safety code for the Construction Industry), a copy of the agreement with the electrical power company and a copy of the work process, required in the article 5.2.2 b), must be submitted to the Departmental representative before the beginning of the work in relation to these documents.

1.34 HEALTH AND SAFETY SUBORDINATION AGREEMENT

Project: _____ Address: _____

EXTERNAL CONTRACTOR

I hereby agree to submit to the authority of (name of the Principal Contractor's business) _____, which is the Principal Contractor for the project indicated above during the entire duration of our work on the construction site. Accordingly, I confirm that I have reviewed the Principal Contractor's prevention program, and I agree to:

- inform my employees of the content of the Principal Contractor's prevention program and ensure that its content are complied with at all times;
- apply the prevention program that is specific to the activities that we carry out under this project;
- inform the Principal Contractor of my actions or dealings on the construction site and obtain the Principal Contractor's agreement before the start of work; and
- follow the health and safety directives provided by the representative of the Principal Contractor on the construction site and, depending on requirements, attend training sessions and health and safety meetings organized by the representative of the Principal Contractor.

Name of representative: _____

Name of business: _____

Description of work to be done on the construction site: _____

Approximate dates of work (start-end): _____

Signature: _____ Date: _____

PRINCIPAL CONTRACTOR

I hereby agree to allow the business (name of external contractor) _____ to perform the work under this project indicated above and, as Principal Contractor, to take the necessary steps to protect the

health and safety of workers on the construction site. Should the Contractor repeatedly refuse or fail to comply with my directives, I agree to inform PWGSC's Departmental representative of this and to provide documentary evidence of my actions or dealings with the Contractor.

Name of representative: _____

Name of the Principal Contractor's business: _____

Signature: _____ Date: _____

Submit a completed and signed copy to PWGSC's Departmental representative

Section 01 35 29.06-A1

Annex 1

Hot work permit



HOT WORK PERMIT

BUILDING:

BEFORE INITIATING HOT WORK, ENSURE PRECAUTIONS ARE IN PLACE!
MAKE SURE AN APPROPRIATE FIRE EXTINGUISHER IS READILY AVAILABLE!

This Hot Work Permit is required for any operation involving open flames or producing heat and/or sparks. This includes, but is not limited to: welding, brazing, cutting, grinding, soldering.

1. Company doing Hot Work: Post the permit at the Hot Work Location. After Hot Work, indicate time completed and leave permit posted for Fire Watch.		Required Precautions Checklist	
2. Fire Watch: Prior to leaving area, do final inspection and sign the permit at the security office.		<input type="checkbox"/> Available sprinklers, hose streams and extinguishers are in service/operable.	
<input type="checkbox"/> Employee <input type="checkbox"/> Contractor		<input type="checkbox"/> Hot Work equipment in good repair (PWGSC equipment ONLY).	
Hot Work Done by (Company)		Requirement within 35 ft. (11M) of Work	
Date		<input type="checkbox"/> Flammable liquids, dust, lint and oily deposits removed.	
Job Number		<input type="checkbox"/> Explosive atmosphere in area eliminated.	
Location/Building and Floor		<input type="checkbox"/> Floors swept clean.	
Nature of Job		<input type="checkbox"/> Combustible floors wet down, covered with fire resistive sheets.	
Person in Charge		<input type="checkbox"/> Remove other combustibles where possible. Otherwise protect with fire resistive tarpaulins or metal shields.	
Signature		<input type="checkbox"/> All wall and floor openings covered.	
I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.		<input type="checkbox"/> Fire resistive tarpaulins suspended beneath work.	
PFM Authorization		Work on Walls or Ceilings	
Signature		<input type="checkbox"/> Construction is noncombustible and without combustible covering or insulation.	
Date Permit Issued		<input type="checkbox"/> Combustibles on other side of walls moved away.	
Time Permit Issued		Work on Equipment	
Date Permit Expires		<input type="checkbox"/> Enclosed equipment cleaned of all combustibles.	
Time Permit Expires		<input type="checkbox"/> Containers purged of flammable liquids/vapours.	
Fire Watch Signoff		<input type="checkbox"/> Pressurized vessels, piping and equipment removed from service, isolated and vented.	
Work area and all adjacent areas to which sparks and heat might have spread were inspected during the fire watch period and were found fire safe.		Fire Watch/Hot Work Area Monitoring	
Signed: _____		<input type="checkbox"/> Fire watch will be provided during and for 60 minutes after work, including any break activity.	
Fire Watch Signoff		<input type="checkbox"/> Fire watch is supplied with suitable extinguisher(s).	
Work area was monitored for 1 hour following Hot Work and found fire safe.		<input type="checkbox"/> Fire watch is trained in use of this equipment and in sounding alarm.	
Signed: _____		<input type="checkbox"/> Fire watch may be required for adjoining areas, above and below.	
NOTE:		<input type="checkbox"/> Monitor hot work area for an additional three (3) hours after the 60 minutes.	
All fire incidents are to be reported immediately by using one of the following methods:		Other Precautions Taken	
1. Activating the nearest fire alarm station.		<input type="checkbox"/> Confined space entry permit required.	
2. Calling the fire department (or 911 where applicable).		<input type="checkbox"/> Area is protected with heat detector.	
3. Notifying the immediate supervisor or the security.		<input type="checkbox"/> Ample ventilation to remove smoke/vapour from work area.	
		<input type="checkbox"/> Additional ventilation required.	
		<input type="checkbox"/> Welding screen required.	
		<input type="checkbox"/> Special Procedures required.	
		<input type="checkbox"/> Lockout/tagout required.	
		<input type="checkbox"/> Fire extinguisher required.	
		<input type="checkbox"/> Welding Procedure required.	
		<input type="checkbox"/> Welding Procedure attached.	
		<input type="checkbox"/> Level 1 Confined Space Entry Procedures	
		<input type="checkbox"/> Other (specify):	



HOT WORK PERMIT

BUILDING:

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2. Fire Watch: Prior to leaving area, do final inspection and sign the permit at the security office.		<input type="checkbox"/> Available sprinklers, hose streams and extinguishers are in service/operable.	
<input type="checkbox"/> Employee <input type="checkbox"/> Contractor		<input type="checkbox"/> Hot Work equipment in good repair (PWGSC equipment ONLY).	
Hot Work Done by (Company)		Requirement within 35 ft. (11M) of Work	
Date		<input type="checkbox"/> Flammable liquids, dust, lint and oily deposits removed.	
Job Number		<input type="checkbox"/> Explosive atmosphere in area eliminated.	
Location/Building and Floor		<input type="checkbox"/> Floors swept clean.	
Nature of Job		<input type="checkbox"/> Combustible floors wet down, covered with fire resistive sheets.	
Person in Charge		<input type="checkbox"/> Remove other combustibles where possible. Otherwise protect with fire resistive tarpaulins or metal shields.	
Signature		<input type="checkbox"/> All wall and floor openings covered.	
I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.		<input type="checkbox"/> Fire resistive tarpaulins suspended beneath work.	
PFM Authorization		Work on Walls or Ceilings	
Signature		<input type="checkbox"/> Construction is noncombustible and without combustible covering or insulation.	
Date Permit Issued		<input type="checkbox"/> Combustibles on other side of walls moved away.	
Time Permit Issued		Work on Equipment	
Date Permit Expires		<input type="checkbox"/> Enclosed equipment cleaned of all combustibles.	
Time Permit Expires		<input type="checkbox"/> Containers purged of flammable liquids/vapours.	
Fire Watch Signoff		<input type="checkbox"/> Pressurized vessels, piping and equipment removed from service, isolated and vented.	
Work area and all adjacent areas to which sparks and heat might have spread were inspected during the fire watch period and were found fire safe.		Fire Watch/Hot Work Area Monitoring	
Signed: _____		<input type="checkbox"/> Fire watch will be provided during and for 60 minutes after work, including any break activity.	
Fire Watch Signoff		<input type="checkbox"/> Fire watch is supplied with suitable extinguisher(s).	
Work area was monitored for 1 hour following Hot Work and found fire safe.		<input type="checkbox"/> Fire watch is trained in use of this equipment and in sounding alarm.	
Signed: _____		<input type="checkbox"/> Fire watch may be required for adjoining areas, above and below.	
NOTE:		<input type="checkbox"/> Monitor Hot Work Area for an additional three (3) hours after the 60 minutes.	
All fire incidents are to be reported immediately by using one of the following methods:		Other Precautions Taken	
1. Activating the nearest fire alarm station.		<input type="checkbox"/> Confined space entry permit required.	
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3. Notifying the immediate supervisor or the security.		<input type="checkbox"/> Ample ventilation to remove smoke/vapour from work area.	
		<input type="checkbox"/> Additional ventilation required.	
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		<input type="checkbox"/> Special Procedures required.	
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		<input type="checkbox"/> Fire extinguisher required.	
		<input type="checkbox"/> Welding Procedure required.	
		<input type="checkbox"/> Welding Procedure attached.	
		<input type="checkbox"/> Level 1 Confined Space Entry Procedures	
		<input type="checkbox"/> Other (specify):	



HOT WORK PERMIT

BUILDING:

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MAKE SURE AN APPROPRIATE FIRE EXTINGUISHER IS READILY AVAILABLE!

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2. Fire Watch: Prior to leaving area, do final inspection and sign the permit at the security office.		<input type="checkbox"/> Available sprinklers, hose streams and extinguishers are in service/operable.	
<input type="checkbox"/> Employee <input type="checkbox"/> Contractor		<input type="checkbox"/> Hot Work equipment in good repair (PWGSC equipment ONLY).	
Hot Work Done by (Company)		Requirement within 35 ft. (11M) of Work	
Date		<input type="checkbox"/> Flammable liquids, dust, lint and oily deposits removed.	
Job Number		<input type="checkbox"/> Explosive atmosphere in area eliminated.	
Location/Building and Floor		<input type="checkbox"/> Floors swept clean.	
Nature of Job		<input type="checkbox"/> Combustible floors wet down, covered with fire resistive sheets.	
Person in Charge		<input type="checkbox"/> Remove other combustibles where possible. Otherwise protect with fire resistive tarpaulins or metal shields.	
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I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.		<input type="checkbox"/> Fire resistive tarpaulins suspended beneath work.	
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Signature		<input type="checkbox"/> Construction is noncombustible and without combustible covering or insulation.	
Date Permit Issued		<input type="checkbox"/> Combustibles on other side of walls moved away.	
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Date Permit Expires		<input type="checkbox"/> Enclosed equipment cleaned of all combustibles.	
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Work area and all adjacent areas to which sparks and heat might have spread were inspected during the fire watch period and were found fire safe.		Fire Watch/Hot Work Area Monitoring	
Signed: _____		<input type="checkbox"/> Fire watch will be provided during and for 60 minutes after work, including any break activity.	
Fire Watch Signoff		<input type="checkbox"/> Fire watch is supplied with suitable extinguisher(s).	
Work area was monitored for 1 hour following Hot Work and found fire safe.		<input type="checkbox"/> Fire watch is trained in use of this equipment and in sounding alarm.	
Signed: _____		<input type="checkbox"/> Fire watch may be required for adjoining areas, above and below.	
NOTE:		<input type="checkbox"/> Monitor Hot Work Area for an additional three (3) hours after the 60 minutes.	
All fire incidents are to be reported immediately by using one of the following methods:		Other Precautions Taken	
1. Activating the nearest fire alarm station.		<input type="checkbox"/> Confined space entry permit required.	
2. Calling the fire department (or 911 where applicable).		<input type="checkbox"/> Area is protected with heat detector.	
3. Notifying the immediate supervisor or the security.		<input type="checkbox"/> Ample ventilation to remove smoke/vapour from work area.	
		<input type="checkbox"/> Additional ventilation required.	
		<input type="checkbox"/> Welding screen required.	
		<input type="checkbox"/> Special Procedures required.	
		<input type="checkbox"/> Lockout/tagout required.	
		<input type="checkbox"/> Fire extinguisher required.	
		<input type="checkbox"/> Welding Procedure required.	
		<input type="checkbox"/> Welding Procedure attached.	
		<input type="checkbox"/> Level 1 Confined Space Entry Procedures	
		<input type="checkbox"/> Other (specify):	

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Not used.

1.2 REFERENCES

- .1 Not used.

1.3 INSPECTION

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.4 INDEPENDENT INSPECTION AND TESTING AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
 - .1 Inspections and tests required by laws, ordinances, rules, regulations or instructions in matters of public order.
 - .2 Inspections and tests conducted exclusively for Contractor's purposes.
 - .3 Tests, tuning and balancing of handling systems as well as of networks and electrical and mechanical installations.
 - .4 Factory tests and certificates of compliance.
 - .5 Tests to be conducted by Contractor under supervision of Departmental Representative.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

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

1.5 ACCESS TO WORK

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

1.6 PROCEDURES

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

1.7 REJECTED WORK

- .1 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.

1.8 REPORTS

- .1 Submit one copy of inspection and test reports to Departmental Representative.
- .2 Provide copies to subcontractor of work being inspected or tested, and to manufacturer or fabricator of material being inspected or tested.

1.9 TESTS AND MIX DESIGNS

- .1 Furnish test results and mix designs as requested.

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

1.10 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Departmental Representative.
- .3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
- .6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.11 MILL TESTS

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

1.12 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems when specified in the technical specification sections.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Division 23 Heating, ventilating and air conditioning

1.2 REFERENCES

- .1 U.S. Environmental Protection Agency (EPA) / Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 INSTALLATION AND REMOVAL

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

1.5 WATER SUPPLY

- .1 Departmental Representative will provide continuous supply of potable water for construction use.
- .2 Take measures needed to connect utility network concerned to company network temporarily. Disconnect and evacuate worksite once work is completed.

1.6 TEMPORARY HEATING AND VENTILATION

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.
- .3 When propane or natural gas is used as heating fuel, Contractor shall conduct daily inspection of heating appliances, including statutory holidays, vacation days and weekends. These appliances must be equipped with a device to halt fuel feed automatically when burner stops.
- .4 Provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - .5 Provide adequate ventilation to meet health regulations for safe working environment.

- .5 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.
- .6 Ventilating:
 - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.
 - .5 Ventilate temporary sanitary facilities.
 - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .7 Permanent heating system of building, to be used when available and if approved in writing by the Departmental Representative. Be responsible for damage to heating system if use is permitted. Use of permanent heating system, prior to its substantial performance, will have no impact on the warranty requirements as noted in specifications.
- .8 Return in initial state any portion of heating system used during construction before date of Certificate of Substantial Performance as specified in Division 23. Replace all filters.
- .9 Ensure Date of Substantial Performance and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Departmental Representative.
- .10 Pay costs for maintaining temporary heat, when using permanent heating system. Departmental Representative will pay utility charges when temporary heat source is existing building equipment
- .11 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform with applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct-fired combustion units to outside.
- .12 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.7 POWER AND LIGHT

- .1 Contractor will pay for temporary power during construction for temporary lighting and operating of power tools. It is possible to connect to existing facilities (electrical panel : 400 A, 600 V, 3 phases). Set up a separate meter to identify the consumer for work
- .2 Departmental Representative is not responsible for temporary power outages.
- .3 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.

- .4 Do not use temporary power for welding. Use generator for welding work.
- .5 If the power supply provided by the Departmental Representative does not suffice, provide and pay for additional temporary power requirements during construction for temporary lighting and operating of power tools in accordance with regulations and codes in effect.
- .6 Provide central power panels to all subcontractors. Subcontractors will provide their own extension cords and adaptors.
- .7 Provide and be responsible for required switches, fuses, wiring and connections in accordance with Canadian Electrical Code.
- .8 Temporary power for electric cranes and other equipment requiring in excess of above is responsibility of Departmental Representative.
- .9 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lux. Provide additional lighting as required by specific specification sections to ensure quality control.
- .10 Provide adequate lighting at night and during dark days to ensure work and inspections are properly carried out.
- .11 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Departmental Representative provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps that have been used for more than 3 months prior to Substantial Acceptance of Work.
- .12 Contractor is responsible for work required to provide temporary power and lighting.
- .13 Réaliser les installations temporaires nécessaires à l'alimentation électrique des roulottes de chantier de l'entrepreneur et du Représentant du ministère (experts-conseils et commissaires).

1.8 COMMUNICATION FACILITIES

- .1 Provide and pay for temporary telephone, fax, data, hook up, lines and equipment necessary for own use and use of Departmental Representative. Ensure connection of these installations to main networks and assume costs of all these services.

1.9 FIRE PROTECTION

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution**3.1 NOT USED**

.1 Not Used.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Not used.

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1.189-2000, Exterior Alkyd Primer for Wood.
 - .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1-09/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete
 - .2 CSA-0121-08 (C2013), Douglas Fir Plywood.
 - .3 CAN/CSA-S269.2-87 (C2003), Access Scaffolding for Construction Purposes.
 - .4 CAN/CSA-Z321-F96 (C2006), Signs and Symbols for the Occupational Environment.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site signage panel structure specifications signed and sealed by a structural engineer member of the Ordre des ingénieurs du Québec.

1.4 INSTALLATION AND REMOVAL

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

1.5 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, temporary stairs.
- .3 Provide dust cover at scaffoldings during masonry work.

1.6 HOISTING

- .1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment.

- .2 Hoists and cranes to be operated by qualified operator.
- .3 Request Department Representative's approval at least 48 hours before hoists and cranes installation.
- .4 Hoist material to be installed where authorized by Departmental Representative.
- .5 Provide temporary roads and amenities required and foundations required for removal and installation of such equipment near surrounding buildings .
- .6 Provide foundations for hoisting equipment.
- .7 Comply with special security measures listed in Section 01 35 29.06 - Health and Safety Requirements.

1.7 ELEVATORS

- .1 Elevators not to be used by construction personnel nor transporting of materials.

1.8 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.

1.9 CONSTRUCTION PARKING

- .1 On site pay parking may be used (presently 5.75\$/day, cost increase without notice is possible), contractor shall respect parking sign.
- .2 Free parking will be allowed, if spaces are available and according to parking signs, for construction company vehicles, as long as it does not affect the construction work nor Health Canada operations.
- .3 Parking outside of identified zone is prohibited. Parking within the monthly permit zone are exclusively for Health Canada employees.

1.10 SECURITY

- .1 Site opening and closing to be controlled by Departmental Representative. Contractor is responsible at all times of the site and must ensure security monitoring and all related costs.

1.11 CONSTRUCTION TRAILER

- .1 Construction trailers to be located in a designated zone as per Departmental Representative.
- .2 The number of trailers must be kept to the bare minimum required for the installation of office spaces.

1.12 OFFICES

- .1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.

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

1.13 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

1.14 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.
- .3 When permanent water and drain connections are completed, provide temporary water closets and urinals complete with temporary enclosures, inside building. Permanent facilities may be used on approval of Departmental Representative DCC Representative Consultant.

1.15 CONSTRUCTION SIGNAGE

- .1 Provide and erect project sign, within three weeks of signing Contract, in a location designated by Departmental Representative.
- .2 Indicate on Construction sign, name of Owner, Consultants and Contractor, of design style established by Departmental Representative.
- .3 No other signs or advertisements, other than Construction sign and warning signs, are permitted on site..
- .4 Provide project identification site sign comprising foundation, framing, and one 1200 x 2400 mm signboard as detailed and as described below.
 - .1 Foundations: 15 MPa concrete to CSA-A23.1 minimum 200 mm x 900 mm deep.
 - .2 Framework and battens: SPF, pressure treated minimum 89 x 89 mm.
 - .3 Signboard: 19 mm Medium Density Overlaid Douglas Fir Plywood to CSA O121.
 - .4 Paint: alkyd enamel to CAN/CGSB-1.59 over exterior alkyd primer to CAN/CGSB 1.189.
 - .5 Fasteners: hot-dip galvanized steel nails and carriage bolts.
 - .6 Vinyl sign face: printed project identification, self adhesive, vinyl film overlay, supplied by Departmental Representative.
- .5 Locate project identification sign where indicated Departmental Representative and construct as follows:
 - .1 Build concrete foundation, erect framework, and attach signboard to framing.
 - .2 Paint surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.
 - .3 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.

- .6 Direct requests for approval to erect Consultant/Contractor signboard to Departmental Representative. For consideration general appearance of Consultant/Contractor signboard must conform to project identification site sign. Wording in both official languages
- .7 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .8 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed Departmental Representative.

1.16 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Protect travelling public from damage to person and property.
- .3 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .4 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .5 Construct access and haul roads necessary.
- .6 Dust control: adequate to ensure safe operation at all times.
- .7 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.17 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

- .1 Not used.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Not used.

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
 - .2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-O121-M1978(R2003), Douglas Fir Plywood.
- .3 National research council (NRC)
 - .1 National Fire Code – Canada 2010, part 5.6 Construction and demolition site.

1.3 INSTALLATION AND REMOVAL

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

1.4 HOARDING

- .1 Erect temporary site enclosure using :
 - .1 Jersey on compacted granular and leveled foundation;
 - .2 Wired fence 2.4 m high aboveground of exterior side of site.
 - .3 Exterior face of fence to be covered with a 16 mm plywood butt joint and flush free of fixing device on exterior side..
- .2 Paint both side of site enclosure in selected colours with one coat primer to CAN/CGSB 1.189 and one coat exterior paint to CGSB 1.59. Maintain public side of enclosure in clean condition
- .3 Provide lockable truck entrance gates and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.
- .4 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law. Construction specifications of protected walkway must be sealed and signed by a OIQ registered engineer.
- .5 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.5 WEATHER ENCLOSURES

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

- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3 Design enclosures to withstand wind pressure and snow loading.

1.6 DUST TIGHT SCREENS

- .1 Provide dust tight screens or insulated 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.

1.7 ACCESS TO SITE

- .1 Set up a safe zone in secured enclosure for trailers, bathrooms, parking, storage of materials and waste containers.
- .2 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
- .3 Submit a plan of the latter to Departmental Representative.
- .4 Once work over, restore Contractor's reserved area to match original condition, including avenues of ingress/egress.

1.8 PUBLIC TRAFFIC FLOW

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

1.9 FIRE ROUTES

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

1.10 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.

1.11 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 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

1.12 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse 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.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Not used.

1.2 REFERENCES

- .1 In each section of specifications, reference may be made to relevant norms.
- .2 Comply with last updated version of references standard, effective at submittal opening date, unless another version date has already been specifically noted.

1.3 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials in execution of 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.

1.4 ORIGIN OF MATERIALS

- .1 Where no specific requirement is prescribed in any relevant sections of specifications, favour regional material usage: Materials fabrication in a radius of 800 km from project location. By fabrication, we mean final assembly of components of the products to install.

1.5 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental

Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

- .3 Ten (10) days or less, after written notice from Departmental Representative, the following information related to materials and proposed equipment must be provided:
 - .1 Name and address of manufacturer,
 - .2 Brand, model and catalog number,
 - .3 Performance, description and tests data.
 - .4 Application instructions or installation notice from manufacturer,
 - .5 Proof of an agreement over delivery.

1.6 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, panels and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's DCC Representative's Consultant's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.7 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by Departmental Representative. Unload, handle and store such products.

1.8 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.

1.9 QUALITY OF WORK

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify 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.

1.10 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.

1.11 CONCEALMENT

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

1.12 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.

1.13 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.

1.14 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.

- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.15 FASTENINGS - EQUIPMENT

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use 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.

1.16 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.

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Not used.

1.2 REFERENCES

- .1 Not used.

1.3 QUALIFICATIONS OF SURVEYOR

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

1.4 SURVEY REFERENCE POINTS

- .1 Existing base horizontal and vertical control points are designated on drawings.
- .2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to Departmental Representative.
- .4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5 Require surveyor to replace control points in accordance with original survey control.

1.5 EXISTING SERVICES

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings. Contractor will have to plan a site check visit of the installations with building maintenance staff, at least 48 hours prior, on daytime between 7AM and 3PM.
- .2 Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.6 LOCATION OF EQUIPMENT AND FIXTURES

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

1.7 RECORDS

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 Prepare a record of locations of maintained, re-routed and abandoned service lines on completion of work.

1.8 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit name and address of Surveyor to Departmental Representative.
- .2 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

Part 2 Products**2.1 NOT USED**

- .1 Not Used.

Part 3 Execution**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Not used

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 PREPARATION

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

1.4 EXECUTION

- .1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.

- .5 Remove samples of Work for testing.
- .6 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .7 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .8 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .9 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .10 Restore work with new products in accordance with requirements of Contract Documents.
- .11 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .12 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material in accordance with Section 07 84 00 - Firestopping.
- .13 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
- .14 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.5 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Not used.

1.2 REFERENCES

- .1 Workplace Hazardous Materials Information System (WHMIS).

1.3 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including other than that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative DCC Representative Consultant. Do not burn waste materials on site, unless approved by Departmental Representative DCC Representative Consultant.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only remove from site.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/renovation/demolition waste management and disposal (CRD).
- .7 Dispose of waste materials and debris at designated dumping areas on Crown property off site.
- .8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .10 Tight seal all openings of ducts at their installation until authorization to unseal from the Departmental Representative
- .11 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .12 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .13 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
- .14 Following deliveries of equipment and materials, clean offsite access routes each day.

1.4 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 other than including that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .8 Remove dust, stains, marks and scratches detected on decorative surfaces, mechanical and electrical devices, furniture elements, 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 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .14 Remove dirt and other disfiguration from exterior surfaces.
- .15 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .16 Sweep and wash clean paved areas.
- .17 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .18 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .19 Remove snow and ice from access to building.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/renovation/demolition waste management and disposal (CRD).

Part 2 Products**2.1 NOT USED**

.1 Not Used.

Part 3 Execution**3.1 NOT USED**

.1 Not Used.

END OF SECTION

Part 1 General**1.1 WASTE MANAGEMENT GOALS**

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PWGSC's waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and/or Demolition (CRD) waste.
- .2 PWGSC's waste management goal: to divert a minimum 95 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 95%.
- .3 Specific material target percentages for reuse or recycling:
 - .1 Masonry and pavement: 100%.
 - .2 Ceilings, walls and partitions: 95%.
 - .3 Metals: 100%.
 - .4 Mechanical - HVAC: 20%.
 - .5 Mechanical - plumbing piping: 100%.
 - .6 Mechanical - fixtures: 20%
 - .7 Mechanical - other: 0%.
 - .8 Doors and windows: 50% (including frames).
 - .9 Wood: 100%.
 - .10 Finish carpentry and millwork: 100%.
 - .11 Flooring: 100 %.
 - .12 Electrical - wiring/conduits/boxes: 50%.
 - .13 Electrical - lighting: 0%.
 - .14 Electrical - other: 0%.
 - .15 Roofing: 50% (excluding hazardous or contaminated materials).
 - .16 Miscellaneous - furnishing/specialized equipment: 0%.
 - .17 Packaging: 100%.
- .4 All calculations to be made by weight, in metric tons.
- .5 Target percentage goals are achievable for waste diversion. Contractor to review confirm Departmental Representative Waste Audit acceptable values.
- .6 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.
- .7 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, nonhazardous waste materials generated during construction, demolition, or renovation activities.
- .4 Cost/Revenue Analysis Workplan (CRAW): based on information from Waste Reduction Workplan, and intended as financial tracking tool for determining economic status of waste management practices (Schedule E).
- .5 Inert Fill: inert waste - exclusively asphalt and concrete.
- .6 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into predefined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.
- .7 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .8 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .9 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.
- .10 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.
- .11 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .12 Separate Condition: refers to waste sorted into individual types.
- .13 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.
- .14 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.
- .15 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.
- .16 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating required submittal and reporting requirements.

- .17 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 Canadian Construction Association (CCA)
 - .1 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.
 - .2 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.

1.3 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 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare and submit following prior to project start-up.
 - .1 1 copy and 1 electronic copy of completed Waste Audit (WA): Schedule A.
 - .2 1 copy and 1 electronic copy of completed Waste Reduction Workplan (WRW): Schedule B.
 - .3 1 copy and 1 electronic copy of Cost/Revenue Analysis Workplan (CRAW): Schedule E.
 - .4 1 copy and 1 electronic copy of Waste Source Separation Program (WSSP).
- .3 Prepare and submit on monthly basis, 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 in tones 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 Departmental Representative will prepare WA prior to project start-up. WA will be provided with bid documentation (see Schedule A).
- .2 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.
- .3 After award of contract, contractor to review WA and confirm that anticipated quantities of waste generated are accurate and goals achievable.
- .4 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.
- .5 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 (in metric tons) and cost of actual waste removed from project (Schedule D).
- 1.7 COST/REVENUE ANALYSIS WORKPLAN (CRAW)**
 - .1 Prepare CRAW (see Schedule E) and include the following:
 - .1 Cost of current waste management practices.
 - .2 Implementation cost of waste diversion program.
 - .3 Savings and benefits resulting from waste diversion program.
- 1.8 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 the contractor in handling and separation of materials for reuse 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 the contractor 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.
- 1.9 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.

1.10 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 or authorized recycling facilities or to users of material for recycling.
- .2 Submit to the Departmental Representative the complete name and address of the leading waste managers for the Work according to their phases, for example, the demolisher, the land clearer, the waste manager during construction as well as those of their own facilities and those of each reclamation streams.

1.11 QUALITY ASSURANCE

- .1 After award of Contract, a mandatory site examination will be held for this contract for Contractor.
 - .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 (refer to the Waste Diversion Report form in Schedule C and Waste Materials Tracking form in Schedule D).

1.12 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 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver nonsalvageable items to licensed disposal facility.
- .5 Protect structural components not removed and salvaged materials from movement or damage.
- .6 Support affected structures. If safety of building is endangered, cease operations and immediately notify by Departmental Representative.
- .7 Protect surface drainage, mechanical and electrical from damage and blockage.
- .8 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
- .9 Separate and store materials produced during project (Work) in designated areas.
- .10 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 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.

1.13 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste volatile materials, mineral spirit, 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 a waste management summary to verify destination and quantities on a material-by-material basis as identified in the waste audit.

1.14 SCHEDULING

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

1.15 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.

1.16 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.

1.17 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.

1.18 WASTE DIVERSION REPORT

- .1 At completion of Project (Work), prepare written Waste Diversion 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.

Part 2 Products

2.1 NOT APPLICABLE

- .1 Not applicable.

Part 3 Execution

3.1 NOT APPLICABLE

- .1 Not applicable.

END OF SECTION

Section 01 74 21-A1

Annex 1

Schedules A, B and C

SCHEDULE A - WASTE AUDIT (WA)

1) Material Category	2) Material Quatity (unit)	3) Estimated Waste %	4) Total Quatity of Waste (unit)	5) Generation point	(6) % Recycled	7) % Reused
Wood and Plastics Material Description						
Off-cuts						
Warped Pallet Forms						
Plastic Packaging						
Cardboard Packaging						
Other						
Doors and Windows Material Description						
Painted Frames						
Glass						
Wood						
Metal						
Others						

SCHEDULE B - WASTE REDUCTION WORKPLAN (WRW)

1) Material Category	2) Person(s) Responsible	3) Total Quantity of Waste (unit)	4) Reused Amount (units) Projected	Actual	5) Recycled Amount (unit) Projected	Actual	6) Material (s) Destination
Wood and Plastics Material Description							
Off-cuts							
Warped Pallet Forms							
Plastic Packaging							
Cardboard Packaging							
Other							
Doors and Windows Material Description							
Painted Frames							
Glass							
Wood							
Metal							
Others							

SCHEDULE C - COST/REVENUE ANALYSIS WORKPLAN (CRAW)

1) Material Description	2) Total Quantity (unit)	3) Volume (cum)	4) Weight (cum)	5) Disposal Cost/Credit \$(±)	6) Category Sub-Total \$(±)
Wood					
Wood Stud					
Plywood					
Baseboard – Wood					
Door Trim – Wood					
Cabinet					
Doors and Windows					
Panel Regular					
Slab Regular					
Wood Laminate					
Byfold – Closet					
Glazing					
		7) Cost (-) / Revenue (+)			

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Not used.

1.2 REFERENCES

- .1 Not used.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Approval procedure of the work described below must apply to each project phase in order to allow occupation.
- .2 Acceptance of Work Procedures
 - .1 Contractor's Inspection: Contractor conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Departmental Representative's inspection.
 - .2 Departmental Representative's Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates in French that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, adjusted, balanced and fully operational.
 - .4 Operation of systems: demonstrated to Departmental Representative's personnel.
 - .5 Commissioning of mechanical 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 and Contractor.
 - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.
 - .3 Any additional final inspection will be at the contractor's expense.

1.4 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.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Not used.

1.2 REFERENCES

- .1 Not used.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-warranty Meeting:
 - .1 Convene meeting two weeks prior to contract completion with contractor's representative Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify Project requirements.
 - .2 Review warranty requirements and manufacturer's installation instructions.
 - .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.

1.4 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, two final copies of operating and maintenance manuals in English French English and French.
- .3 Submit duly filled "Construction, Renovation and Demolition WASTE DIVERSION FINAL REPORT" form.
- .4 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .5 Provide evidence, if requested, for type, source and quality of products supplied.

1.5 FORMAT

- .1 Organize data as instructional manual.
- .2 Use solid, three (3) D shaped rings, vinyl binders for loose leaf of 219 mm x 279 mm, with back and pockets. Each sample to be provided with DVD with digital (PDF) version and editable (DOC, XLS and DWG) version of all documents.

- .3 When more than one binder is needed, group data following a logical order. Clearly tag content on the back of each binder.
- .4 On the cover page of each binder document designation must be indicated, that is to say "Project File", typewritten or handwritten in block letters, project designation, and table of content.
- .5 Arrange content by systems under Section numbers and sequence of Table of Contents.
- .6 Each product and system to be separate by a tab divider which must contain typewritten project description and list of main pieces of equipment.
- .7 Text must consist of printed data provided by manufacturer or typewritten data.
- .8 Drawings to have rigid band edge with holes.
 - .1 Insert them into the binder and fold large drawings according to format of text pages.

1.6 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Consultant and Contractor Design-Builder 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.

1.7 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 Field instruction;
 - .6 Construction meeting minutes;
 - .7 Revised shop drawings, products data and samples;
 - .8 Health file and security;

- .9 Records of tests on site;
- .10 Inspection certificates;
- .11 Certificates issued by manufacturers.
- .2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

1.8 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- .1 Record information on set of blue line black line opaque drawings, and in copy of Project Manual, provided by Ministerial Representative.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
- .7 Provide digital photos, if requested, for site records.

1.9 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
 - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control 01 91 13 - General Commissioning (Cx) Requirements.
- .15 Additional requirements: as specified in individual specification sections.

1.10 MATERIALS AND FINISHES

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

- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

1.11 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 location as directed; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
 - .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 location as directed; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
 - .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 location as directed; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.

1.12 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.

1.13 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible 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.
- .7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by Departmental Representative.
- .9 Include information contained in warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
 - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, commissioned systems fire protection, alarm systems, sprinkler systems, lightning protection systems,.
 - .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of manufacturers or suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.

- .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
- .7 Cross-reference to warranty certificates as applicable.
- .8 Starting point and duration of warranty period.
- .9 Summary of maintenance procedures required to continue warranty in force.
- .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
- .11 Organization, names and phone numbers of persons to call for warranty service.
- .12 Typical response time and repair time expected for various warranted equipment.
- .4 Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.
- .5 Procedure and status of tagging of equipment covered by extended warranties.
- .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.
 - .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.14 WARRANTY TAGS

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution**3.1 NOT USED**

.1 Not Used.

END OF SECTION

PART 1 - GENERAL**1.1 DESCRIPTION**

- .1 Work covered by this section includes the provision of expertise, materials, labour, equipment and all that is required for the safe, partial or complete demolition of parts of the structure identified in the structural drawings.
- .2 The work includes removing all debris, transporting and disposing of them off site.
- .3 Unless otherwise specified by the Departmental Representative, the demolition materials become the Contractor's property upon authorization to start work. In this document, the word "remove" means to take the demolition materials away from the site in compliance with the relevant laws, at the Contractor's expense.

1.2 RELATED SECTIONS

- .1 The specialized Contractor is responsible for obtaining a copy of all the sections of these specifications even if they do not appear to pertain to his speciality. If he does not, it shall be understood that he agrees to the clauses and requirements of all sections in these specifications. The specialized Contractor must consult the table of contents of these specifications to have knowledge of the complete list of the specifications sections.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA)/CSA International
 - .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

1.4 DOCUMENTS TO BE SUBMITTED

- .1 If required by the Departmental Representative, submit for information purposes, drawings and schematics that provide clear, detailed indications regarding the order in which the structures are to be dismantled, or that indicate the support structures and the underpinning work. All documents shall be submitted in triplicate. A single (1) annotated copy shall be returned to the Contractor. The Contractor shall be responsible for making additional copies and distributing them.
- .2 Drawings of support structures must bear the signature and seal of a qualified Engineer who is a member in good standing of the Ordre des Ingénieurs du Québec.

1.5 SAFEGUARDS

- .1 Take all the necessary measures to prevent any movement or collapse of the various parts of the buildings and other structures to be retained, and to prevent them from sustaining any damage. Provide and install the parts required for reinforcement and support, perform the underpinning work as needed. Repair damaged structures and assume responsibility for injuries that could arise from the demolition work.

DEMOLITION OF STRUCTURAL MEMBERS

- .2 If any danger arises during the demolition work involving the parts of the structure to be demolished or the adjacent structures and services, stop the work and notify the Departmental Representative. Firmly support the structures and only resume work after having obtained the Departmental Representative's authorization.
- .3 If the Departmental Representative deems it necessary, install reinforcement and support materials, and perform the underpinning work required to prevent any movement or breakdown of the structures.
- .4 All parts of the structure under demolition must be solidly braced or supported to prevent any danger of collapse.
- .5 The private supply mains for water, gas and electricity and the other services shall be cut off at the place and in the way specified by the appropriate authorities. These service mains shall be relocated to avoid any damage and shall not constitute a hazard for workers and the public.
- .6 It is forbidden to work on top of any wall, pier or any structural part unless scaffolding is provided on every side at a distance not exceeding 10 feet (3.05 m) from the level at which the work is taking place.
- .7 It is forbidden to leave without taking the necessary protection measure, any wall or other structural part which might collapse under the effect of internal pressure differentials or vibrations.
- .8 The Contractor shall direct the operations while obstructing the streets, alleys and passages as little as possible and never obstructing the accesses. The Contractor shall comply with directives received in this connection from the Departmental Representative and the City.
- .9 Install, in compliance with laws, codes and by-laws, and the directives issued by the Departmental Representative, fences, safety shelters, guard rails, railings, lighting, adequate warning signs, etc., during the execution of the work to completely protect the public and the Departmental Representative against material losses or damage, loss of life or injuries attributable to the Contractor's negligence, carelessness or incompetence or that of his employees.
- .10 The Contractor shall take strict measures to ensure that no materials, products, debris or other objects cause any damage to the environment or to persons and shall keep and hold the City harmless in this regard from all legal proceedings, claims, losses or damage incidental to and resulting from his failure.
- .11 Ensure that the demolition work does not have any negative impact on wildlife, the water table and adjacent watercourses, and that it does not generate excessive levels of atmospheric or noise pollution.
- .12 Do not dump volatile waste or materials such as mineral spirits, oils, petroleum-based lubricants or toxic cleaning solutions, in watercourses, storm drains or sanitary sewers.
- .13 Ensure that appropriate methods are used to dispose of this type of waste for the duration of the project.
- .14 Do not dump, pump or otherwise dispose of any water containing suspended materials in watercourses, storm drains or sanitary sewers or on adjacent lots.
- .15 Ensure that the evacuation of water and confinement of surface runoff containing suspended materials or other harmful substances, in compliance with the requirements of the appropriate authorities.
- .16 Protect vegetation (trees, plants, shrubs and their foliage) located on the site and adjacent sites, according to indications.

DEMOLITION OF STRUCTURAL MEMBERS

- .17 During the execution of the demolition work, erect temporary protective enclosures to prevent foreign substance or materials from contaminating the air outside the worksite.
- .18 Cover dry materials and waste or dampen as a dust and debris abatement measure. Apply sweeping compound on all temporary access lanes.
- .19 The Contractor is responsible for ensuring worksite safety at all times, including outside working hours.
- .20 Demolition work shall be performed while taking the necessary precautions to prevent any damage to the parts of the structure to be retained.
- .21 Where required, the Contractor shall erect protective panels to preserve the existing facilities or equipment from flying debris.
- .22 If, due to lack of precaution, the frame to be retained is damaged and cannot be reused, the Contractor shall replace it adequately at his expense.

1.6 CONDITION OF THE STRUCTURES TO BE DEMOLISHED

- .1 Perform the demolition of the structures in the condition in which they will be on the day the contract is awarded, regardless of the condition in which they were when the site was inspected prior to submission of the tender.

PART 2 - PRODUCTS

DOES NOT APPLY

PART 3 - PERFORMANCE**3.1 DEMOLITION METHODS**

- .1 The Contractor is solely in charge of the means and methods of demolition and assumes sole responsibility for them. However, the Contractor shall provide the Departmental Representative and the proper authorities with demolition plans describing the methods the Contractor intends to use. These means and methods must be prepared by an Engineer who is a member in good standing of the Ordre des Ingénieurs du Québec and bear the Engineer's seal.
- .2 If, in the Departmental Representative's opinion or that of the representatives of the safety organizations, the demolition methods recommended by the Contractor might cause damage or inconveniences to persons, property or the environment, the Departmental Representative or the representatives of the safety organizations may require that these methods be modified or adapted at the Contractor's sole expense.
- .3 The Departmental Representative's involvement shall not release the Contractor from his responsibilities; conversely, the Departmental Representative's lack of involvement does not necessarily constitute approval of these means or methods.

DEMOLITION OF STRUCTURAL MEMBERS

- .4 The demolition methods used by the Contractor must be controllable. The steel members and framework shall be removed and lowered with care, using appropriate equipment with sufficient capacity. Reinforced concrete members shall be demolished progressively. The Contractor shall maintain complete control of all phases of demolition and be able to foresee the effect of his actions on the element under demolition and on the remaining parts. In particular, the Contractor shall avoid overloading parts of the structure with debris in order to prevent them from being damaged.
- .5 Demolish masonry and concrete walls, as well as slabs in small sections. Carefully remove and place on the ground frame structures and other heavy or sizable objects.
- .6 Selling or burning demolition materials on the site is prohibited.
- .7 Gather all contaminated or hazardous materials and remove them from the site while taking all necessary safety measures and complying with the requirements of the authorities involved.
- .8 Delineate the zone to be demolished using saw cuts in the concrete sections. Saw cuts shall not exceed the layer of concrete covering the rebar where the rebar needs to be retained.
- .9 In concrete areas to be demolished, if a saw cut crosses more than a third of the entire concrete section and if patching concrete or mortar needs to be poured against this section, the surface shall be bushhammered or coarse-grit sandblasted before applying a binding agent or pouring.
- .10 Ensure that the demolition does not obstruct the runoff water evacuation system, elevators or electrical and mechanical systems that must remain operational.
- .11 Do not cut the power to utility lines in service or under tension if they do not have to be relocated.

3.2 SEQUENCE OF DEMOLITION WORK

- .1 In choosing the order in which the various parts of the structure are to be demolished, the Contractor shall ensure that the sequence he has selected is such that the removal of a member does not affect the stability of a part still standing, in order to avoid a cascading collapse in this work area.
- .2 The demolition and clearing of part of the work shall be terminated before the supports are removed.
- .3 No beam, column or other member of the frame shall be cut or detached from the others without having been detached beforehand from all its supports.

3.3 ALLOWABLE FLOOR LOADS

- .1 Do not exceed the following floor loads: 4.8 kPa (100 lb/pi²)
- .2 Place solid supports at locations where shear legs, derricks and other lifting equipment, which are needed to perform demolition work, are installed.

3.4 DEMOLITION

- .1 Completely and partially demolish structures according to the indications and specifications contained in the structural drawings.

DEMOLITION OF STRUCTURAL MEMBERS

- .2 At the end of each work day, make sure that no structure can break down or collapse. Close off the parts of the structure not scheduled for demolition to protect them against any damage.
- .3 Perform the demolition so as to generate as little dust as possible and dampen dusty materials.
- .4 Perform the demolition work required to enable the indicated work.
- .5 Remove any equipment, supply lines and other elements that hinder the restoration or repair of existing surfaces, and reinstall them as work progresses.

3.5 BRACING

- .1 If required, install shoring during masonry and concrete demolition work. The Contractor is solely responsible for the building's structural integrity and the stability of masonry or concrete walls during the work.
- .2 If demolition of part of the structure results in the need to install temporary shoring or bracing in an adjacent part of the building scheduled for later demolition, the Contractor shall install this shoring or bracing at his expense.
- .3 Provide the bracing, scaffolding, ladders, chutes and means of transportation required for the work.
- .4 Construct and maintain these structures in compliance with the laws, codes, by-laws and directives of the appropriate authorities.

3.6 DRILLING HOLES IN STRUCTURAL MEMBERS

- .1 When sawing to delineate the opening to be drilled, the Contractor shall take every precaution required to avoid sawing the reinforcement outside the perimeter of the opening.
- .2 Overcuts are not allowed. As a result, delineation drill holes must not be used in the corners of the opening to be drilled in order to ensure saw cuts do not extend beyond the edges of the opening.

3.7 SITE CLEAN UP

- .1 The Contractor shall dispose of all demolition materials and waste in a safe, orderly manner while complying with the requirements of the authorities involved. Clean the site as the work progresses.
- .2 The Contractor shall remove from the site all temporary material and structures no longer required for performance of the contract, as soon as they are no longer needed.
- .3 Clean the adjacent areas to restore them to the condition that existed before the work began, to the Departmental Representative's satisfaction.
- .4 All temporary obstructions installed for the duration of the work shall be removed from sidewalks, streets or public thoroughfares and the latter shall be restored to their original condition.
- .5 The demolished construction site shall be cleaned and cleared of anything that may cause accidents, fires or harm public health.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 02 41 16 – Demolition of Structural Members.

1.2 REFERENCES

- .1 CSA International
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .2 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).
 - .2 National Fire Code of Canada 2015 (NFC).

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling:
 - .1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion. In event of unforeseen delay notify Departmental Representative in writing.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Sort and reuse wastes in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Submit for review and approval by Departmental Representative shoring and underpinning drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec in Canada, showing proposed method

1.5 QUALITY ASSURANCE

- .1 Qualifications: provide adequate workforce training through meetings and demonstrations. Have someone on site with deconstruction experience throughout project for consultation and supervision purposes.
- .2 Regulatory Requirements:
 - .1 Ensure Work is performed in compliance with applicable Provincial/Territorial regulations.
- .3 Site Meetings: conduct project meetings every week.
 - .1 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.
 - .2 Ensure key personnel attend.

1.6 ENVIRONMENTAL REQUIREMENTS

- .1 Ensure deconstruction work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air noise pollution.
- .2 Fires and burning of waste or materials is not permitted on site.
- .3 Do not dispose of waste or volatile materials into watercourses, storm or sanitary sewers.
 - .1 Ensure proper disposal procedures in accordance with applicable Provincial/Territorial regulations.
- .4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties in accordance with authorities having jurisdiction.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction.
- .6 Protect trees, plants and foliage on site and adjacent properties where indicated.
- .7 Prevent extraneous materials from contaminating air beyond deconstruction area, by providing temporary enclosures during Work.
- .8 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on temporary roads.
- .9 Employ reasonable means necessary to protect salvaged materials from vandalism, theft, adverse weather, or inadvertent damage by heavy machinery.
- .10 Use natural lighting to do Work where possible.
 - .1 Shut off lighting except those required for security purposes at end of each day.
- .11 Organize site and workers in manner which promotes efficient flow of materials through disassembly, processing, stockpiling, and removal.

1.7 SITE CONDITIONS

- .1 Check Hazardous Substances Report and take measures needed to preserve environment.
- .2 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Departmental Representative immediately.
 - .1 Proceed only after receipt of written instructions have been received from Departmental Representative.
- .3 Notify Departmental Representative before disrupting access or services.

1.8 GENERAL INDICATIONS - DEMOLITION

- .1 Scope of demolition work described on plans is for information only and should not be considered restrictive or limiting.
- .2 Examine carefully the drawings of all specialties involved in order to measure the exact scope of work.
- .3 Plans should serve as a guide to the Contractor, which has overall responsibility with specialized contractors, to establish the size and scope of the demolition work required to complement and complete the work of the plans

- .4 Proceed with caution so as not to damage the works to be preserved, to minimize the work of subsequent occasions and never leave unprotected building elements.

1.9 HANDLING AND MATERIAL PROTECTION

- .1 Protect existing structures to remain in place and those to be recovered. If they are damaged, replace or repair them immediately to the satisfaction of the Departmental Representative at no cost.

Part 2 Products

2.1 ÉQUIPEMENT

- .1 Leave equipment and machinery running only while in use, except where extreme temperatures prohibit shutting down.
- .2 Where possible use water efficient wetting equipment/trucks/attachments when minimizing dust.
- .3 Demonstrate that tools are being used in manner which allows for salvage of materials in best condition possible.

Part 3 Execution

3.1 EXAMINATION

- .1 Inspect building site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.
- .4 Disconnect, cap, plug or divert, as required, existing public utilities within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.
 - .1 Immediately notify Departmental Representative and utility company concerned in case of damage to any utility or service, designated to remain in place.
 - .2 Immediately notify the Departmental should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.
 - .3 Ensure the alarm system and other services are operational at all times following recommendations of Departmental Representative.

3.2 PREPARATION

- .1 Protection of In-Place Conditions:
 - .1 Prevent movement, settlement, or damage to adjacent structures, utilities, and landscaping features and parts of building to remain in place. Provide bracing and shoring required.

DEMOLITION - LARGE SCALE WORKS

- .2 Keep noise, dust, and inconvenience to occupants to minimum.
 - .1 Disconnect and cap ventilation ducts to prevent dust propagation throughout the interior system or other sectors of the building.
- .3 Protect building systems, services and equipment.
- .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
- .5 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements.

3.3 DEMOLITION WORK / REMOVAL

- .1 Removed materials are property of Departmental Representative.
- .2 Dismantle parts of the existing building where removal is necessary for new construction
- .3 Remove and store materials to be salvaged, in manner to prevent damage.
- .4 Trim edges of partially demolished building elements to tolerances.
- .5 Maintain structural integrity of structure.
- .6 Systematically remove finishes, furnishings, and mechanical and electrical equipment as indicated by Departmental Representative..
- .7 Wherever possible, transfer material assemblies from heights to ground level for easier disassembly. Take appropriate measures to ensure safety.
- .8 Source separate for recycling materials that cannot be salvaged for reuse.
- .9 Remove materials that cannot be salvaged for reuse or recycling and dispose of in accordance with applicable codes at licensed facilities.
- .10 Removal of windows and doors or openings in the exterior walls and roofs will be gradual, so as to be rebuilt on the same day, otherwise, the Contractor shall establish a perfect temporary weather tightness. The Contractor shall be responsible for damage due to inadequate protection. Do not undertake this work in rain, snow or cold weather.
- .11 It is prohibited to sell or burn down demolition materials on site.
- .12 Workers must utilize adequate fall protection and certified harness and belay systems where Departmental Representative considers it necessary.

3.4 HIDDEN OR UNKNOWN CONDITIONS

- .1 The Contractor shall perform all the required checks so as not to cut water supply pipes, gas, electricity, telephone or other similar services. This includes and should not be restrict or limit to consulting:
 - .1 Mechanical, electrical and telephony existing plans, but also the Departmental Representative's plans;
 - .2 Information from maintenance team that have a special knowledge of the area;
 - .3 Suppliers or companies and installations owners, if they are aware of exact location of supply conduits at work site.
 - .4 Should there be a lack of specific information, Contractor must track the conduits with a detector in the affected slabs or walls.

- .5 Should the Contractor neglect to perform all these verifications, he will be accountable for every service sectioning and will be bound to the fixing costs in case of damage, or additional degradation of the building.

3.5 CLEANING AND REPAIR

- .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 Refer to demolition drawings and specifications for items to be salvaged for reuse.
- .4 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- .5 Restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.

END OF SECTION

PART 1 - GENERAL**1.1 DESCRIPTION**

- .1 Work covered by this section includes the provision of all materials, equipment supplies and services, labour and transportation to fully carry out the following:
 - .1 Design, construct, provide, assemble, dismantle and maintain all formwork, scaffolding and falsework required for the construction of all structures specified or shown on the drawings.
 - .2 Install sleeves, anchor bolts, anchoring components, anchor plates, embedded components, grooves, sockets, angle irons, accessory parts, drains and all parts embedded in concrete shown on the plans of all disciplines or described in the invitation to tender document.

1.2 RELATED SECTIONS

- .1 The specialized Contractor is responsible for obtaining a copy of all the sections of these specifications even if they do not appear to pertain to his speciality. If he does not, it shall be understood that he agrees to the clauses and requirements of all sections in these specifications. The specialized Contractor must consult the table of contents of these specifications to have knowledge of the complete list of the specifications sections.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA-O86.1-01 (supplement CAN/CSA -08651-05), Engineering Design in Wood (Limit States Design).
 - .3 CSA O121-M1978, Douglas Fir Plywood.
 - .4 CSA O151, Canadian Softwood Plywood.
 - .5 CSA O153-M1980, Poplar Plywood.
 - .6 CSA 437.0-93, Standards on OSB and Waferboard.
 - .7 CSA S269.1-1975, Falsework for Construction Purposes.
 - .8 CAN/CSA-S269.3-M92, Concrete Formwork.
 - .9 CAN/CSA-S269.2-M87, Access Scaffolding for Construction Purposes.

- .2 Council of Forest Industries of British Columbia (COFI)
 - .1 COFI, Exterior Plywood for Concrete Formwork.
- .3 Quebec Official Publisher
 - .1 S-2.1, r.6; Safety Code for the construction industry.

1.4 CONTRACTOR'S RESPONSIBILITIES

- .1 Assume responsibility of concrete formwork and falsework. The Departmental Representative's review of the formwork and falsework shall not release the specialized Contractor from his responsibility regarding the provision of structures that fully comply with the drawings and specifications.
- .2 The Contractor shall be aware of all laws and regulations that apply to the design and construction of formwork and falsework and shall comply with these requirements. Comply with regulations including the Quebec Safety Code, S-2.1, r.6, regarding shoring of concrete formwork.
- .3 Before using the formwork and falsework, give the Departmental Representative a signed statement written by an Engineer who is a member in good standing of the Ordre des Ingénieurs du Québec, and which bears the Engineer's seal. The statement should certify that the formwork and falsework comply with the signed and sealed drawings, and that they may be used for their intended purposes.

1.5 ARCHITECTURAL CONCRETE

- .1 The concrete used to build the following components shall be considered architectural concrete.

COMPONENTS	DESCRIPTION
<ul style="list-style-type: none">▪ Staircase▪ Shear walls▪ Beams / columns	All surfaces of these components above the main floor level.

1.6 SHOP DRAWINGS

- .1 Produce shop drawings of formwork and falsework, which describe all the necessary components required to perform the work in compliance with the drawings and specifications.
- .2 Have an Engineer who is a member in good standing of the Ordre des Ingénieurs du Québec sign these shop drawings and affix his seal.
- .3 Before performing concrete formwork or falsework, submit these drawings to the Departmental Representative for review and comments. All documents shall be submitted in triplicate. A single (1) annotated copy shall be returned to the Contractor. The Contractor shall be responsible for making additional copies and distributing them.

- .4 The shop drawings shall indicate, show or include the construction method and work schedule, procedures relating to shoring, the removal of forms, and the reinstallation of supports, the materials, the specific architectural characteristics of visible surface finishes, the location of joints, fasteners, ties and interior coatings, and the location of embedded falsework components. Comply with CSA S269.1 falsework drawing requirements. Comply with CAN/CSA-S269.3 formwork drawing requirements.
- .5 Shop drawings shall indicate, show or include formwork data such as the allowable speed and temperature at which concrete may be placed into the forms.
- .6 In addition to the details requested in 1.6.4., indicate on the shop drawings, at each location where the falsework is connected or leaning on an existing structure or a structure under construction, or already completed, the intensity and direction of maximum loads exerted on the load-bearing structure, taking into account construction site loads.
- .7 Specify the order in which the concrete formwork and falsework are to be assembled and dismantled, according to the Departmental Representative's directives.

1.7 FORMWORK AND FALSEWORK DESIGN

- .1 Design the falsework according to trade practices making sure not to exert abnormal stress on the structure under construction.
- .2 Take construction sequences into account when designing the falsework. Describe on the shop drawings or in an explanatory note how and in what order to use the formworks, the position of specified construction joints and the falsework and formwork reuse principle. Submit the explanatory note and the relevant shop drawings to the Departmental Representative for review.
- .3 For vertical components, vertical construction joints shall be a maximum of 18 m apart. Submit the location of construction joints to the Departmental Representative.
- .4 The specialized Contractor is entirely responsible for engineering, locating and building the formworks.
- .5 The formworks are engineered to sustain the loads and lateral pressures described in Section 102 of the American publication "Recommended Practice for Concrete Formwork" (ACI 347). Wind loads are those recommended by the latest edition of the National Building Code.
- .6 Engineering considerations and the allowable loads shall comply with Section 103 of the above mentioned U.S. publication.
- .7 Every aspect of construction shall at all times comply with various government standards (municipal, provincial and federal standards) that govern the specialized Contractor's duties regarding worker safety on construction worksites.

1.8 CONFORMITY CERTIFICATE

- .1 When required by CNESST, the conformity certificate of the anchor bolts must be prepared by an engineer member of the "Ordre des ingénieurs du Québec" hired by the specialized contractor.

PART 2 - PRODUCTS**2.1 MATERIALS**

- .1 Submit all formwork material in direct contact with fresh concrete to the Departmental Representative for review.
- .2 Construction Lumber:
 - .1 in contact with concrete: form plywood.
 - .2 other: structural timber not warped and sawed straight
- .3 Formwork Materials
 - .1 To pour concrete with no particular architectural characteristics, use forms made of wood and wood products that comply with the CSA O121 CAN/CSA-O86 CSA 0437 CSA O153-M1980 standards.
- .4 In the case of exposed formwork surfaces (architectural concrete), use new formwork materials. The forms shall be made of 20 mm thick 1200 x 2400 plywood, sanded and covered with a coat of high quality form release oil. For lining only, use 7 mm thick three-ply plywood. Exposed formwork surfaces are those indicated in Section 1.5 of these specifications and those shown on the architectural drawings.
- .5 Interior formwork liners
 - .1 Plywood: Douglas fir in compliance with the CSA O121-M1978 standard.
 - .2 Waferboard: that complies with the CSA O437.0-93 standard.
- .6 Form release agent: non-toxic, biodegradable, and with low VOC content.
- .7 Form release oil: Colourless, non-toxic, biodegradable, low VOC content, mineral oil free from kerosene, whose viscosity is 15 to 24 mm²/s at 40°C and whose flashpoint in an open crucible is at least 150°C.
- .8 Falsework Materials: in compliance with the CSA S269-1-1975, Table 1 standard. Identify the materials using a quality index or provide certificates, trial data or other attestations of compliance.
- .9 Form release oil with chemical properties, containing compounds that react with the free lime in the concrete to form insoluble soaps in the water and prevent the concrete from adhering to the form.
- .10 Form ties can be:
 - .1 metal ties embedded in concrete, designed to be broken at least 25 mm under the surface of the hardened concrete after the forms have been removed;
 - .2 fixed or variable length metal ties whose ends are moveable bolts. The part of the tie embedded in the concrete is embedded at least 25 mm under the surface of the hardened concrete;

- .3 Spacety and Acrow-Richmond brand ties equipped with moulded water barriers at each end, for all the work. Both ends of these formwork ties shall be equipped with plastic cones at least 25 mm in diameter, which provide a minimum 25 mm of coverage on the broken end of the tie embedded in the concrete.
- .11 In the case of an exposed formed surface (architectural concrete), type 1) or 2) ties shall be equipped with plastic cones a maximum 38 mm in diameter, which provide a minimum 25 mm of coverage.
- .12 In the case of concrete that requires architectural features, use ties equipped with plastic cones and pale grey concrete plugs.
- .13 Sleeves, fasteners, anchors and other parts embedded in concrete meet the requirements of the drawings and specifications, and comply with Sections 6.2 and 6.7 of the CAN/CSA-A23.1-04/A23.2-04 standard. Sleeves embedded in concrete shall be equipped with a steel water barrier able to withstand a minimum of 60 kPa of hydrostatic pressure or the pressure in the line if it is greater.

PART 3 - PERFORMANCE

3.1 CONSTRUCTION AND ASSEMBLY

- .1 Unless otherwise specified, build and use the formwork in compliance with the CAN/CSA-A23.1/A23.2 standard.
- .2 Before using the forms, clean and treat the form surfaces with form release oil in compliance with Section 6.5.3.3 of the CAN/CSA-A23.1/A23.2 standard.
- .3 Before starting formwork and falsework construction, check the alignments, levels and centrelines, and make sure the dimensions match those indicated on the drawings.
- .4 Build and assemble the formwork in compliance with the CAN/CSA-S269.3-M92 standard to obtain finished concrete structures whose shape, dimensions and levels comply with the indications and are situated in the locations indicated on the drawings and specifications. Properly truss the forms and join them so as to keep the desired position and shape while the concrete is being poured and keep them trussed until the concrete has set.
- .5 Location tolerances and tolerances regarding the geometric configuration of components embedded in concrete after removal of the forms according to indications in the drawings shall comply with Section 6.4 of the CAN/CSA-A23.1/A23.2 standard.
- .6 Manufacture and build the falsework and assemble it in compliance with the CSA S269.1-1975 standard and the COFI "Exterior Plywood for Concrete Formwork" guide.
- .7 Obtain the Departmental Representative's written approval before pouring concrete directly on the ground or making openings in a form component, which are not indicated on the drawings, but which may be required for construction purposes.

CONCRETE FORMS, FALSEWORK

- .8 Align the formwork joints and seal them to prevent any loss of cement. The formwork shall contain as few joints as possible. Adequate reinforcements shall be installed behind the joints between the plywood panels to ensure that the plywood panels form a smooth, continuous surface capable of withstanding all phases of the pour without losing their shape or shifting.
- .9 Before pouring concrete directly on the ground, level the walls and the bottom of the excavated area, then remove the loose soil.
- .10 Refer to the architectural drawings regarding concrete components with visible architectural finishes.
- .11 The footings and supports installed on the ground shall not be assembled on a frozen surface.
- .12 Design lot drainage to prevent the ground from being washed away from under the footings and the supports installed at ground level.
- .13 Arrange all formwork joints and ties symmetrically on all concrete surfaces that will be visible (architectural concrete) after the forms are removed. Submit for inspection by the Departmental Representative.
- .14 Build the grooves, dovetail joints, mouldings, mortises and tenons, openings, drips, recesses, expansion and construction joints according to the indications of the drawings and specifications. See Section 03 25 00 for isolation or expansion joint requirements.
- .15 Place the formwork, trusses and supports so workers are able to remove them without causing any shocks or damage to the concrete.
- .16 Forms may be reused except in the case of exposed formed surfaces. They may be reused after sufficient cleaning, providing their surfaces are not cracked or rough; cracked or rough forms must be trimmed and patched to the Departmental Representative's satisfaction.
- .17 Install openings in the forms or other devices to enable workers to inspect and clean the forms, and to enable concrete placement and consolidation.
- .18 Unless otherwise indicated, provide and install in the forms the sleeves, fasteners, anchors and other embedded components required in the drawings and/or specifications of all disciplines, in compliance with Section 6.7 of the CAN/CSA-A23.1/A23.2 standard. Immediately before pouring the concrete, use surveyor's equipment to check the dimensions required in the drawings and specifications and make sure that these parts meet specified tolerances.
- .19 Before closing the forms, notify the Departmental Representative beforehand to allow him to perform the required inspections. The pouring of the concrete into the forms shall not take place before the Departmental Representative's written authorization has been received.
- .20 Use 25 mm bevelled moulding for exterior corners and/or 25 mm corner guards for the inside corners of beams, walls, slabs, joints and columns, unless otherwise indicated.
- .21 Slab and beam formwork shall have a camber of 6 mm per 3,000 mm of length, unless otherwise indicated. Keep the height of the beam and the thickness of the slab even throughout the length of the cambered surface.

- .22 Build forms for the architectural concrete components and install the ties according to the indications or directives provided. At times, the location of the joints may preclude the use of standard-sized panels or reduce the maximum allowable space between ties.

3.2 ANCHORS, SLEEVES AND EMBEDDED PARTS

- .1 Provide and install in the forms, the sleeves, fasteners, anchor plates and other embedded components required in the drawings and/or specifications, in compliance with Section 6.7 of the CAN/CSA-A23.1/A23.2 standard. The work shall comply with Section 03 25 00.
- .2 Provide and install in the forms, the anchor bolts for fasteners and machinery as shown and detailed in the drawings, in compliance with Section 6.7 of the CAN/CSA-A23.1/A23.2 standard.
- .3 Install in the forms, the sleeves, conduits and ducts provided by others at the levels and locations shown on the mechanical, electrical, procedural and architectural drawings.
- .4 In all cases, comply with the installation tolerances specified in Article 6.7.3 of the CAN/CSA A23.1/A23.2 standard.
- .5 In slabs, place conduits between the upper and lower rows of reinforcement.
- .6 Install sleeves, conduits and ducts in compliance with the following requirements:
 - .1 The exterior diameter of the sleeves, conduits or ducts shall not exceed one third of the thickness of the beams, slabs or walls in which they are embedded;
 - .2 The centreline between adjacent components must be greater than or equal to three diameters;
 - .3 These parts shall not be positioned in a manner that reduces the strength of the structure;
 - .4 These parts shall not be embedded in ground slabs exposed to the weather;
- .7 If the requirements of Article 3.2.6 cannot be met, notify the Departmental Representative and await his instructions on how to proceed.
- .8 Make sure aluminium sleeves, conduits or ducts embedded in concrete are covered or adequately coated to protect them against aluminum corrosion.
- .9 Submit a sleeve location plan for approval by the Structural Departmental Representative.
- .10 Coordinate with subcontractors responsible for their supply the delivery (to the construction site) and the installation in the formwork of accessory parts.
- .11 It is forbidden to place in the formwork any accessory parts which are not indicated in the drawings, or required in the specifications or the drawings referred to in Sub-article .2 above, unless the Departmental Representative so authorizes.

3.3 REMOVAL OF THE FORMS AND REINSTALLATION OF THE SUPPORTS

- .1 Remove the formwork and dismantle the falsework in compliance with Article 6.5.3.5 of the CAN/CSA-A23.1/A23.2 standard, unless otherwise indicated.
- .2 Do not disturb or remove the formwork or falsework as long as the concrete has not become strong enough to support its own weight and the load it supports.
- .3 Have the Departmental Representative authorize the removal of the formwork and falsework.
- .4 Leave the formwork in place after the concrete has been poured for the following lengths of time:
 - .1 Walls and sides of beams: 3 days;
 - .2 Slabs and beam soffits: 28 days or 3 days if all the supports removed to enable the removal of each of the form panels are immediately reinstalled within 30 minutes or less, and remain in place until expiry of the aforementioned 28-day period;
 - .3 Columns: 7 days;
 - .4 The periods of time specified above represent a cumulative number of hours, days or fractions of days, not necessarily consecutive, during which the ambient temperature is maintained above 10°C.
- .5 Reinstall all the supports required when frame components might be subject to additional loads during construction of the structure.
- .6 Notwithstanding the provisions of Sub-article .4 above, do not remove the forms unless the Departmental Representative authorizes their removal because he is satisfied with the measures taken to ensure the concrete cures properly and the concrete is protected against cold or heat and the weather.
- .7 However, the Departmental Representative may cancel the provisions of Sub-article .4 above if the non-destructive trials on the concrete placed in beam and slab forms indicate that the concrete has achieved 80% of the compression strength specified in Section 03 30 00 of these specifications. The non-destructive trials mentioned above shall have a recognized value and be approved by the Departmental Representative; he will determine beforehand the locations where they are to be performed. The costs of all these trials shall be borne by the specialized Contractor.
- .8 Even when the Departmental Representative has authorized him to remove the forms, the specialized Contractor remains solely responsible for all damage caused to concrete components if action is taken prematurely.
- .9 Depending on weather conditions, the placement of the concrete and curing conditions, the Departmental Representative may specify a minimum period of time that must elapse before the forms are removed from the various pours.
- .10 Reuse the formwork and falsework, notwithstanding the requirements of the CAN/CSA-A23.1/A23.2 standard.
- .11 The maximum spacing between the supports reinstalled at each of the main load inflection points is 2400 mm.

3.4 FILLING OF FORM TIE HOLES

- .1 Use Sikatop 122 mortar to fill all cone-shaped cavities left after removal of the plastic cones at the ends of the form ties. Moisten beforehand as required by the manufacturer. Carefully smooth the surface after applying the mortar so that it blends in with the adjacent concrete surfaces. Allow to cure.
- .2 In the case of exposed surfaces (architectural concrete), check with the Architect whether the cone-shaped cavities need to be filled. Have the Architect approve the filling products used. The products used shall be of the same texture and colour as the concrete utilized.

END OF SECTION

PART 1 - GENERAL**1.1 DESCRIPTION**

- .1 Provide all the expertise, labour, materials, products, equipment and services needed to supply, detail, manufacture and install all the reinforcement steel shear heads, dowels, metallic wires that must be incorporated in the concrete components indicated in the structural drawings.

1.2 RELATED SECTIONS

- .1 The specialized Contractor is responsible for obtaining a copy of all the sections of these specifications even if they do not appear to pertain to his speciality. If he does not, it shall be understood that he agrees to the clauses and requirements of all sections in these specifications. The specialized Contractor must consult the table of contents of these specifications to have knowledge of the complete list of the specifications sections.

1.3 REFERENCES

- .1 American Concrete Institute (ACI)
 - .1 ACI 315-99, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.
- .2 American National Standards Institute/American Concrete Institute (ANSI/ACI)
 - .1 ANSI/ACI 315-99, Details and Detailing of Concrete Reinforcement.
- .3 American Society for Testing and Materials (ASTM)
 - .1 ASTM A 775/A 775M-07b, Specification for Epoxy-Coated Reinforcing Steel Bars.
- .4 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction / Methods for Test and Standard Practices for Concrete.
 - .2 CSA-A23.3-04, Design of Concrete Structures for Buildings.
 - .3 CSA G30.3-M1983 (R1998), Cold-Drawn Steel Wire for Concrete Reinforcement.
 - .4 CSA G30.5-M1983 (R1998), Welded Steel Wire Fabric for Concrete Reinforcement.
 - .5 CSA G30.14-M1983 (R1998), Deformed Steel Wire for Concrete Reinforcement.
 - .6 CSA G30.15-M1983 (R1998), Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
 - .7 CAN/CSA-G30.18-M92 (R1998), Billet-Steel Bars for Concrete Reinforcement.
 - .8 CAN/CSA-G40.21-04, Structural Quality Steels.

- .9 CAN/CSA-G164-M92 (R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .10 CSA W186-M1990 (R1998), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .5 Institut d'acier d'armature du Québec
 - .1 Manuel des normes recommandées, most recent edition.
- .6 Quebec Construction Code - Chapter I, Building and National Building Code of Canada (amended)
 - .1 Code de Construction du Québec - Chapter I, Building, and National Building Code - Canada 2010 (amended) as well as the User's Guide - NBC 2010: Comments on the calculation of structures (Part 4 of Division B).

1.4 SAMPLING, TRIALS AND INSPECTION

- .1 Provide the Departmental Representative with free access to the plant and the construction site at all times to enable him to verify, examine and supervise the quality of materials and their manufacture, and if required, take samples for testing, trial and analytical purposes.
- .2 Pouring of the concrete is not authorized before the Departmental Representative has inspected and approved the reinforcement in place.
- .3 At his request, send the Departmental Representative one (1) copy of the certificates issued by the steel mill attesting to the chemical composition and physical properties of the steel used to manufacture the reinforcement.
- .4 Upon request, inform the Departmental Representative regarding the proposed source of supply for the materials to be provided.

1.5 SHOP DRAWINGS

- .1 Submit for review and comments by the Departmental Representative, all shop drawings for all steel reinforcement for the work in compliance with the following requirements.
- .2 The format of the reinforcement drawings shall be the same as that of the drawings upon which they are based. The full project title and the name Departmental Representative, Professionals and the specialized Contractors shall appear on each drawing.
- .3 The drawings submitted shall include three (3) copies of each reinforcement drawing. The drawings shall be accompanied by three (3) photocopies of each purchase order. One (1) corrected copy of the shop drawings shall be returned to the Contractor. The Contractor shall be responsible for making any additional copies he requires.
- .4 The reinforcement drawing shall clearly indicate:
 - .1 The number, nominal diameter, length, position, spacing and bending details of each type of bar shown on the drawings.

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- .2 The bar-supports, separators, additional bars and other accessories required to support and fasten the reinforcements while the concrete is being poured.
- .5 When not specified in the plans:
 - .1 Reinforcement overlap and sealing lengths shall comply with the requirements of Articles 7 and 12 of the CAN/CSA-A23.3 standard. Unless otherwise indicated on the drawings, all overlaps shall be Class B (1.3 Lc), in compliance with Table 17b: pre-stressed overlapping requirements for upper reinforcement in the Reinforcing Steel Institute of Canada's manual of standard practice.
 - .2 Overall dimensions of hangers, ties and coils shall comply with the minimum concrete cover thicknesses stipulated in Article 6.6.2 of the CSA-CSA A23.1/A23.2 standard.
- .6 Unless otherwise indicated in the drawings, the hooks required at the end of certain bars, including hangers, ties and spirals are all "standard hooks", which shall comply with the description provided in Articles 6.6.2 of the CSA A23.1/A23.2 standard.
- .7 The reinforcement shall be marked so that it is quick and easy to find on the purchase orders.
- .8 The Contractor shall provide shop drawings so the Departmental Representative has at least ten (10) working days to examine and comment on the shop drawings, which are submitted at each phase of the concrete work.
- .9 The reviewed shop drawings, which may or may not be annotated by the Departmental Representative, shall be returned to the specialized Contractor, who shall revise these drawings and resubmit them to the Departmental Representative for review and comment, if required. However, if the Departmental Representative finds that too many revisions are required, he shall return the drawings without annotating them; in addition, if the drawings need to be submitted more than twice, the Departmental Representative shall withhold funds from the specialized Contractor to pay for the cost of the Departmental Representative's additional reviews.
- .10 The specialized Contractor is solely responsible for the accuracy of his drawings; he cannot claim any supplement for delays caused by the discovery, on site, of errors or omissions on his own drawings, even if they have been reviewed by the Departmental Representative.
- .11 Unless otherwise indicated, use steel reinforcement details that comply with the most recent edition of the "Manuel des normes recommandées" published by the Institut d'acier d'armature du Québec.
- .12 Wait for final approval of the shop drawings before cutting and bending the rebar.
- .13 Submit the steel schedules that match the various shop drawings at the same time as the shop drawings.

PART 2 - PRODUCTS**2.1 MATERIALS**

Description	Standards
▪ High adherence billet-steel reinforcement bars, regular category (R).	CAN/CSA G30.18 Grade 400
▪ Weldable high adherence steel reinforcement bars made of low alloy weldable steel, weldable category (W).	CAN/CSA G30.18 Grade 400
▪ Tie wire, annealed cold-drawn steel wire	CSA G30.3
▪ High adherence steel wire for concrete reinforcement, 16 gauge	CSA G30.14
▪ Welded steel wire fabric provided in flat sheets only	CSA G30.5
▪ High adherence welded steel wire fabric in flat sheets only	CSA G30.15
▪ Non-prestressed galvanized reinforcement	CAN/CSA G164
▪ Chairs, bar chairs, bar supports, spacers (rustproof)	CSA A23.1/A23.2
▪ Metal coupling	Reinforcement steel, "recommended standards manual" subject to the Departmental Representative's approval
▪ Steel fibres	ASTM A820/A820M, C-1116 NOVOCON 1050 (FE) type of SI Concrete Systems

2.2 SUBSTITUTES

- .1 Obtain the Departmental Representative's written approval to substitute specified bars with bars of different dimensions, and to change spacing, overlapping or bending specified on the drawings.

2.3 FORMING

- .1 Form the bars at the factory, in compliance with requirements of the CAN/CSA-A23.1/A23.2 standard.
- .2 Unless otherwise indicated, forming tolerances are those indicated in Chapter 6 of the "Manuel des normes recommandées" published by the Institut d'acier d'armature du Québec. Bars that do not comply with these tolerances shall be rejected.

2.4 IDENTIFICATION

- .1 Clearly identify bar and wire fabric lots to conform to the shop drawings and steel schedules before shipping them to the construction site.

- .2 Use factory-labelled reinforcement bars. The label identifies the size, quality and manufacturer of the bar. All unlabelled bars shall be rejected.

PART 3 - PERFORMANCE

3.1 ON-SITE BENDING

- .1 Unless otherwise expressly indicated or authorized by the Departmental Representative, do not bend steel reinforcement bars on the construction site.
- .2 It is forbidden to bend rebar partially embedded in hardened concrete on site unless the Departmental Representative has authorized this procedure.

3.2 MANUFACTURE OF REINFORCEMENT

- .1 The manufacture of the reinforcement shall not start until the Departmental Representative has reviewed the drawings of this reinforcement.
- .2 Cut and bend the bar in strict compliance with the details shown on the drawings and in accordance with the requirements of the CAN/CSA-A23.1/A23.2 standard.
- .3 No substitution of the bars shown on the reinforcement drawing shall be allowed without the Departmental Representative's authorization.
- .4 Take every precaution to avoid deforming or dirtying the reinforcement during transportation, handling and storage.

3.3 REINFORCEMENT INSTALLATION

- .1 Assemble and install the rebar with care and tie them with black annealed drawn steel wire. Use a pattern and number of supports that comply with Section 6.6.8 of the CAN/CSA-A23.1/A23.2 standard.
- .2 Install the rebar and keep them in place during the pouring of the concrete in compliance with the tolerances stipulated in Section 6.6.8 of the CAN/CSA-A23.1/A23.2 standard.
- .3 Unless otherwise indicated on the drawings or in Section 3.6 of these specifications, the minimum concrete cover thickness around reinforcement bars is that stipulated for each of the various structural components in Article 6.6.6 of the CAN/CSA A23.1/A23.2 standard.
- .4 If required, before placing the rebar in the formwork, remove all excess rust, scale, mud, oil and any other dirt likely to reduce the concrete's adherence.
- .5 Use an adequate number of support bars of the height and rigidity required to ensure all concrete coverage of the rebar complies with the thicknesses stipulated on the drawings and in the standards.
- .6 Have the Departmental Representative approve the rebar and its installation, before pouring the concrete. The Departmental Representative shall have 48 hours to approve the steel reinforcement before the concrete is poured.

3.4 OVERLAPS

- .1 Overlap the reinforcement as indicated on the drawings and typical details.
- .2 Overlapping lengths and extension lengths of bars beyond critical points shall comply with the CSA-A23.3 standard. Unless otherwise indicated on the drawings, all overlaps shall be Class B (1.3 Lc), in compliance with Table 17b: tension overlapping requirements for upper reinforcement in the Reinforcing Steel Institute of Canada's manual of standard practice.
- .3 Obtain the Departmental Representative's approval for the locations of reinforcement overlaps other than those shown on the drawings.
- .4 Overlap at least 10% of the surface of the wire fabric sheets, but never less than one mesh width.

3.5 WELDING

- .1 Do not weld steel rebar unless authorized in writing by the Departmental Representative.
- .2 Where permitted by the Departmental Representative, perform the rebar welding work in compliance with Section 6.6.10. of the CAN/CSA-A23.1/A23.2 standard and the requirements of the CSA W186 standard. When welding is performed, the use of category W weldable bars is mandatory.
- .3 All welding work shall be assigned to a company accredited by the Canadian Welding Bureau and shall be performed in compliance with the requirements of the most recent version of the CSA W186 standard. Prior to starting any welding work, submit to the Departmental Representative for verification, all details regarding the welds to be performed. In this case, the steel reinforcement to be welded shall comply with the requirements of the most recent version of the CSA G30.16 standard. Pre-heat all steel reinforcement as required by these standards.

3.6 REINFORCEMENT COVERAGE

- .1 Unless otherwise indicated on the drawings, the reinforcement bars shall be installed at the following specific distances from the surface of the concrete:

	Coverage
A) Concrete poured directly on the ground	75 mm
B) Concrete exposed to the ground or the weather	
a) Bars larger than 15 M in walls and slabs or main bars in beams and columns	50 mm
b) Bars 15 M or smaller	
c) Ties, hangers and spiral reinforcement	40 mm 40 mm
C) Concrete not exposed to the weather Class N	
a) Slabs (other):	25 mm

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	Coverage
- top steel rebar	25 mm
- bottom steel rebar	50 mm
b) Curbs and coping	40 mm
c) Beams (main steel rebar)	50 mm
d) Columns (main steel rebar)	25 mm
e) Walls	30 mm
f) Ties, hangers and spiral reinforcement	
D) Concrete exposed to chlorine (exposure classes C-1, C-XL, C-3 and C-4)	<p>The reinforcement coverage shall not be less than any of the following values;</p> <ul style="list-style-type: none"> - 60 mm - twice the nominal diameter of the reinforcement - twice the maximum nominal diameter of aggregate

- .2 For conditions A-B-C of the preceding table, the ratio between coverage and the maximum size of the aggregate as well as the ratio between the coverage and the nominal diameter of the bars shall be at least 1.5 for concrete exposed to the ground and weather, and 1.0 for concrete not exposed to the ground and weather.

3.7 STORAGE AND DELIVERY

- .1 Deliver the reinforcement and wire fabric to the construction site in clearly identified lots.
- .2 Handle the reinforcement and wire fabric with care to avoid deforming them.
- .3 As soon as they are delivered on site, properly stack the steel reinforcement and wire fabric on wood skids to protect them against rust and keep them off the ground.
- .4 When there is snow, cover all stored steel with a woven tarp to protect it from the weather.
- .5 During transportation and handling, use a covering to protect the parts of the bars coated with epoxy and paint.

3.8 CLEANING

- .1 In order for the pouring of the concrete to take place, the condition of the reinforcement bars shall comply with Section 6.1.5 of the CAN/CSA A23.1/A23.2 standard.
- .2 If required, clean the reinforcement immediately before the concrete is poured.

3.9 REINFORCEMENT DOWELLING

- .1 The installation of reinforcement dowels in concrete that has already been poured shall be performed using a Hilti HIT, HY-150 epoxy-based system.
- .2 The sealing length of the dowels is that indicated in the sealing lengths table provided on the drawings.
- .3 Certain types of dowels shall have conical threads designed to work with "Terminator" type anchors by Lenton equipped with conical threads.

3.10 ON-SITE TOUCH-UPS

- .1 Using a compatible finishing product, touch up damaged or cut ends of galvanized or epoxy-coated reinforcement to provide a continuous coat.

END OF SECTION

PART 1 - GENERAL**1.1 DESCRIPTION**

- .1 Provide all the expertise, labour, materials, products, equipment and services needed to supply and deploy all the accessories specified and detailed on the drawings for all the disciplines, regardless of whether or not they are described in this section of the Specifications.

1.2 RELATED SECTIONS

- .1 The specialized Contractor is responsible for obtaining a copy of all the sections of these specifications even if they do not appear to pertain to his speciality. If he does not, it shall be understood that he agrees to the clauses and requirements of all sections in these specifications. The specialized Contractor must consult the table of contents of these specifications to have knowledge of the complete list of the specifications sections.
- .2 Comply with the general requirements and the requirements of all documents to which reference is made.

1.3 MANUFACTURED PRODUCTS

- .1 The brand of each of the manufactured products described in this section of the specifications shall be approved by the Departmental Representative. At the Departmental Representative's request, provide him with the technical description and/or samples of these products as well as certified copies of the results of analyses and trials conducted by independent laboratories attesting that these products comply with the manufacturing standards that apply to them. All documents shall be submitted in triplicate. A single (1) annotated copy shall be returned to the Contractor. The Contractor shall be responsible for making additional copies and distributing them.

1.4 FASTENERS

- .1 In all cases where fasteners not indicated on the drawings are required in concrete components to provide vertical and/or lateral support for architectural elements, pre-fabricated concrete components, parts for mechanical, electrical or other equipment, the structural design and engineering of these fasteners are the full and sole responsibility of the manufacturer who shall provide them, and shall in no way confer liability on the Departmental Representative or his representatives.
- .2 The fasteners to which Sub-article .1 above refers to includes plates, angle irons and all other hardware in direct contact with the concrete of components identified on the drawings, including rods, bolts, dowels and various anchoring devices wholly or partially embedded in this concrete.
- .3 The specialized Contractor shall nevertheless provide the Departmental Representative with a reproducible copy and a copy of the shop drawings, for information purposes, clearly indicating the location of all fasteners required as well as the intensity and direction of the stresses that each of the fasteners exert on the concrete components. These drawings shall have been approved for construction beforehand by an Engineer in good standing with the Ordre des Ingénieurs du Québec.

PART 2 - PRODUCTS

Note to the specification writer: the reader must verify the concordance between the plans and this section and if the products are suitable for the project.

2.1 MATERIALS

- .1 **Pre-moulded joint fillers:** pre-moulded resilient bitumen impregnated fibreboards in compliance with the ASTM D1751 standard. The dimensions required match the joints to be put in place on the drawings.
- .2 **Vapour barrier membrane under slabs-on-grade:** 0.15 mm thick polyethylene sheets in compliance with the CAN/CGSB-51.33 standard.
- .3 **Auxiliary backer rod for joints:** closed cell polyethylene foam, diameters required based on the dimensions shown on the drawings.
- .4 **Sealant for horizontal joints:** two-component, polyurethane-based product with a chemical cure, in compliance with the CAN/CGSB-19.24 standard, such as the “Sikaflex 2C SL” sealer. Distributed by Sika Canada or an equivalent approved by the Departmental Representative
- .5 **Sealant for vertical joints:** two-component, polyurethane-based product with a chemical cure, in compliance with the CAN/CGSB-19.24 standard, such as the “Sikaflex 2C NFEZ” sealer. Distributed by Sika Canada or an equivalent approved by the Departmental Representative.
- .6 **Primer for use with joint sealer:** “Sikaflex Primer 202” distributed by Sika Canada or an equivalent approved by the Departmental Representative. The primer and sealer must be compatible.
- .7 **Reinforcing steel:** according to Section 03 20 00.
- .8 **Embedded steel components:** in compliance with the requirements of the CSA-G40.21 standard, 300 MPa grade.
- .9 **Bonding agent:** three-component cement based and water-based modified epoxy product in compliance with the CAN/CSA-A23.1/A23.2 standard such as “SikaTop Armatec 110 EpoCem” from Sika Canada or an equivalent approved by the Departmental Representative.
- .10 **Rustproof coating:** three-component cement based and water-based modified epoxy product in compliance with the CAN/CSA A23.1/A23.2 standard such as “SikaTop Armatec 110 EpoCem” from Sika Canada or an equivalent approved by the Departmental Representative.
- .11 **Sealant for pressure injection of cracks:** two-component (2) epoxy resin, 100% solid, moisture tolerant. Use “Flexocrete Gel” from KRYTEX or “Sikadur 31 Hi-Mod Gel” distributed by Sika Canada or an equivalent approved by the Departmental Representative.
- .12 **Epoxy for pressure injection of cracks:** two-component (2) structural epoxy resin, 100% solids, moisture tolerant, low viscosity. Use “EPOXY-SCEL-80” from KRYTEX or “Sikadur 52” from Sika Canada or an equivalent approved by the Departmental Representative.

- .13 **Chemical anchoring system:** high-performance two-component (2) structural epoxy adhesive. Use an adhesive such as “HIT HY 150” from HILTI or “Sika Anchor Fix-3ca” from Sika Canada or an equivalent approved by the Departmental Representative.
- .14 **Mechanical rebar splicing system:** Lenton type mechanical splicing system or approved equivalent. Mechanical splices must develop 120% of the steel rebar’s tension.
- .15 **Textile form liner:** Use one of the following products or an equivalent approved by the Departmental Representative at the locations indicated on the plans:
- Drainaform R from SolmaxTexel
 - Hydroform 2000 from Hydro
 - Zemdrain from Dupont
- .16 **Waterstop:**
- .1 Ribbed extruded polyvinyl chloride PVC waterstops with the following properties:
 - .1 Minimal tensile strength: 11.4 MPa
 - .2 Elongation to failure: 275%
 - .3 Minimum tear resistance: 50 kN/m (ASTM D624-00 standard, Die “B” Method).
 - .2 The waterstops shall be of the width and thickness specified on the drawings. If no other dimension is provided, the waterstops shall be at least 150 mm wide and 10 mm thick.
 - .3 At T, L or X intersections use factory pre-cut and pre-assembled components.
- .17 **Sealer for concrete surfaces:** Silane based sealer such as “Sikagard SN40” from Sika Canada or approved equivalent.
- .18 **Beam support pad:** made of 50 duro neoprene measured with a durometer according to the ASTM D2240-05 standard and with a tensile strength of at least 15.5 MPa according to the ASTM D412-06a standard; the pads shall be moulded to the appropriate dimensions or cut out of moulded sheets.
- .19 **Repair grout:** Non-shrink cementitious grout such as Sika Grout 212 from Sika mixed with 1.1 litres of Sikacem 810 and 3.5 litres of water per bag of grout, or an equivalent approved by the Departmental Representative.
- .20 **Caulking mortar:** Once the injection is completed, caulk the cracks with an epoxy mortar such as “Sikadur 31 Hi-Mod Gel” from Sika or an equivalent approved by the Departmental Representative.
- .21 **Epoxy repair grout:** Three-component (3) epoxy resin such as “Sikadur 42 Grout Pak Multi-Flo” from Sika Canada at a 6:1 ratio or an equivalent approved by the Departmental Representative.

PART 3 - PERFORMANCE**3.1 JOINT FILLER:**

- .1 Locate and form isolation and / or expansion joints according to the indications provided. Install the joint filler.
- .2 Unless otherwise indicated on the drawings, use a 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces, and a 25 mm joint filler to separate slabs-on-grade from one another at the required locations.

3.2 VAPOUR BARRIER MEMBRANE

- .1 Install a vapour barrier membrane under concrete slabs-on-grade located inside buildings.
- .2 At locations where there are joints, overlap the sides of the polyethylene sheets by at least 150 mm.
- .3 Repair any perforations in the vapour barrier membrane before pouring the concrete. Use pieces that extend at least 150 mm beyond all the edges of the perforations.

3.3 JOINT CAULKING:

- .1 Remove dust, loose mortar and other foreign material and dry the surfaces of the joint.
- .2 Prepare the surfaces in compliance with the caulking manufacturer's instructions.
- .3 Clear the joint to the required depth to install a backer rod. This will allow the application of a layer of caulking that complies with the manufacturer's recommendations for the width of the joint involved.
- .4 Apply the primer on the contact surfaces, and then apply the caulking following the manufacturer's recommendations. Clean adjacent surfaces immediately after application.

3.4 WATERPROOFING THE JOINTS

- .1 Refer to the drawings to determine which construction joints need to be sealed with waterstops. Even if there are no indications on the drawings, all joints below the grade shall be sealed with waterstops.
- .2 Take care not to deform or damage the waterstops when fastening them to the form. Avoid moving adjacent reinforcements and ensure the waterstops cannot shift or bend during the pour.
- .3 Butt weld the waterstops together, following the manufacturer's recommendations. Each weld shall be perfectly watertight. Butting waterstops together on the construction site is only permitted in the case of waterstop segments that are an extension of one another.

3.5 EMBEDDED COMPONENTS

- .1 All embedded component manufacturing work shall be performed in compliance with the requirements of the CAN/CSA-S16-01 standard.

3.6 IMPLEMENTATION – CHEMICAL ANCHORING SYSTEM:

- .1 Drill a hole 4 mm wider than the bar to be anchored.
- .2 Make sure the drill hole is clean, dry, free of clay, debris and cement dust. The holes shall be drilled with a hammer drill and cleaned with compressed air.
- .3 Prepare and apply epoxy resin according to the recommendations provided on the manufacturer's data sheet.
- .4 Where possible, partially fill the hole with epoxy and insert the bar. If not, introduce the rod and inject epoxy resin.
- .5 Anchor the rod in the concrete to a depth at least 15 times the diameter of the bar unless otherwise indicated.

3.7 IMPLEMENTATION – RUSTPROOF COATING

- .1 Dry or wet sandblast the rebar to clean it and remove all grease, oil or rust. It may be necessary to clean the steel rebar using a mechanical steel brush to remove the rust.
- .2 Following the manufacturer's recommendations, use a stiff brush or a roller to apply a 0.5 to 1 mm thick coat on the steel rebar.
- .3 Allow to dry for 2 to 3 hours before applying a second coat of the same thickness.
- .4 Allow to dry for 2 to 3 hours before placing the repair concrete.

3.8 IMPLEMENTATION – BINDING AGENT

- .1 Dry or wet sandblast the surfaces to clean them and remove all traces of grease, oil or rust, as well as loose aggregate.
- .2 Moisten the surface of the concrete to obtain a saturated, superficially dry substrate.
- .3 Following the manufacturer's recommendations, use a stiff brush or a roller to apply a 0.5 mm coat over the entire area to be bound.
- .4 Place the repair concrete within the maximum time limits prescribed by the manufacturer.

3.9 INJECTING THE CRACKS

- .1 Roughen the cracks and clean the surfaces with compressed air jet.

- .2 Install injection points and seal them and the surfaces of the cracks to be injected to prevent resin loss. The distance between injection points shall not exceed the thickness of the part to be injected.
- .3 When the sealer has hardened, inject epoxy at the injection points. Inject the filler until the filler begins to come out of the next injection point.
- .4 Then plug the first injection point before going on to the next one.
- .5 When the epoxy resin has hardened, grind the top of the concrete surfaces at the sealing location to remove the sealer and the excess epoxy from the surface. The repaired crack surfaces shall have a quality finish.

END OF SECTION

PART 1 - GENERAL**1.1 DESCRIPTION**

- .1 This section specifies the requirements regarding the providing, placement, finishing, protection and curing of the cast-in-place concrete.

1.2 RELATED SECTIONS

- .1 The specialized Contractor is responsible for obtaining a copy of all the sections of these specifications even if they do not appear to pertain to his speciality. If he does not, it shall be understood that he agrees to the clauses and requirements of all sections in these specifications. The specialized Contractor must consult the table of contents of these specifications to have knowledge of the complete list of the specifications sections.

1.3 REFERENCES

- .1 The following standards and publications are mentioned in this section of the specifications. They form an integral part of the specifications and their provisions apply, but are not limited by the other provisions of this section.
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM C109/C109M-02, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).
 - .2 ASTM C260-01, Specification for Air-Entraining Admixtures for Concrete.
 - .3 ASTM C309-03, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .4 ASTM C332-87 (1991), Specification for Lightweight Aggregates for Insulating Concrete.
 - .5 ASTM C494/C494M-04, Specification for Chemical Admixtures for Concrete.
 - .6 ASTM C827-95a, Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
 - .7 ASTM C939-97, Test Method for Flow of Grout for Preplaced-Aggregate Concrete.
 - .8 ASTM D412-92, Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
 - .9 ASTM D624-91, Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
 - .10 ASTM D1751-83 (1991), Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

- .11 ASTM D1752-84 (1992), Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
 - .2 CAN/CGSB-51.34-M86 Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - .3 CGSB 81-GP-1M-77, Flooring, Conductive and Spark Resistant.
- .4 Canadian Standards Association (CSA)
 - .1 CAN/SA-A3000-03, Cementitious Materials Compendium:
 - A3001-03
Cementitious Materials for use in Concrete
 - A3004-03
Test Methods and Standard Practices for Cementitious Materials
 - A3005-03
Test Equipment and Materials for Cementitious Materials for use in Concrete and Masonry
 - .2 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete.
 - .3 CSA-A23.3-04, Design of Concrete Structures.
 - .4 CSA-A23.5-03, Supplementary Cementing Materials.
- .5 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2010, Volumes 1 and 2, as well as the user's guide – NBC 2010: Structural Commentaries (Part 4 of Division B)

1.4 SAMPLES

- .1 At least four (4) weeks before beginning the work, advise the Departmental Representative regarding the proposed source of supply for the aggregates, and allow him to access the source for sampling purposes.

1.5 CERTIFICATES

- .1 At least 4 weeks prior to starting concrete work, provide the Departmental Representative with copies of the manufacturer's trial reports, as well as a certificate issued by a qualified independent testing and inspection laboratory attesting that the materials listed hereinafter will comply with the specified requirements.

CAST-IN-PLACE CONCRETE

- .1 Portland Cement
 - .2 Blended Hydraulic Cement
 - .3 Supplementary Cementing Materials
 - .4 Grout
 - .5 Admixtures
 - .6 Aggregates
 - .7 Water
 - .8 Waterstops
 - .9 Waterstop Joints
 - .10 Joint Filler
-
- .2 Provide the mix formulas for approval by the Departmental Representative and a certificate attesting that the selected mix will produce concrete of the required quality, strength and performance, and that it complies with the requirements of the CSA-A23.1-00 standard.
 - .3 Provide a certificate attesting that the batching plant, equipment and materials that will be used to produce the concrete comply with the requirements of the CSA-A23.1-00 standard.
 - .4 The Departmental Representative's acceptance of the cement mix or mixes shall in no way release the specialized Contractor from his responsibility to provide concrete whose properties, in both its elastic and hardened states, meet the requirements of these specifications.
 - .5 All documents shall be submitted in triplicate. A single (1) annotated copy shall be returned to the Contractor. The Contractor shall be responsible for making additional copies and distributing them.

1.6 QUALITY ASSURANCE

- .1 At least four (4) weeks prior to starting concrete work, submit proposed quality control methods for approval by the Departmental Representative, regarding the following items:
 - .1 Hot weather concreting
 - .2 Cold weather concreting
 - .3 Curing
 - .4 Finishes
 - .5 Joints

PART 2 - PRODUCTS**2.1 MATERIALS**

- .1 Cement: Type GU and/or Gub-SF Portland cement that complies with the CSA-A23.5-03 or the CSA-A5/A8/A362-03 standard. Only use one recognized brand of cement per type of concrete for the entire contract.
- .2 Fine aggregate: of normal density, complying with Article 4.2.3 of the CSA-A23.1 standard. The aggregate may be natural sand or manufactured sand containing at least 20% natural sand.
- .3 Coarse aggregate: of normal density, complying with Article 4.2.3 of the CSA-A23.1 standard. The particles shall be clean, durable and free from dust and harmful material and shall contain less than 10% flat or elongated particles. Loss shall be less than 12% after 5 cycles of the magnesium sulphate soundness test. The Los Angeles abrasion test loss shall be less than 50%. The aggregates shall not contain fine-grained limestone and crystalline limestone. The maximum aggregate size shall be 20 mm, unless otherwise indicated. Subject to the Departmental Representative's approval, a 13 mm maximum aggregate size may be used in certain areas where concrete flow is restricted.
- .4 Mixing water: complies with Section 4.2.2 of the CSA-A23.1 standard.
- .5 Air-entraining admixture: complies with the ASTM C260 standard.
- .6 Chemical and pozzolanic mineral admixtures: comply respectively with the requirements of the ASTM C494/C494M and ASTM C1017/C1017M standards. The use of calcium chloride or admixtures that contain calcium chloride is not allowed. The Departmental Representative must approve accelerators or retarders during hot and cold weather concrete work.
- .7 Non-shrink mortar for concrete repairs: pre-mixed Portland cement-based product containing a non-metal aggregate and a plasticizer, capable of achieving at least 35 MPa of compression strength at seven (7) days.
- .8 Superplasticizer: complies with requirements of the ASTM C494/C949M standard.
- .9 Supplementary Cementing Materials: comply with the CSA-A23.5 standard.
- .10 Cementitious hydraulic slag: complies with the CAN/CSA-A362 standard.
- .11 Set retarders: comply with the ASTM C494/C494M [water-based], [low VOC content], [solvent-free] standard. The set retarder film shall never be exposed to humidity.

2.2 MIX DESIGN

- .1 Assume responsibility for the mix of each type of concrete required, while taking into account the requirements described in Section 2.1 of these specifications and the following criteria in compliance with possibility No. 1 presented in Table 5 of the CSA-A23.1 standard.
 - a) Concrete for sidewalks, curbs, slabs and exterior footings and enclosures
 - tested compression strength: 35 MPa at 28 days

CAST-IN-PLACE CONCRETE

- cement type: GU
 - exposure category (Table No. 1, CSA-A23.1/A23.2): C2
 - maximum nominal size of coarse aggregate: 20 mm
 - air content: 5 to 8%
 - maximum water/cement mass ratio: 0.45
 - desired on-site slump: 80 mm (± 30 mm)
 - Chemical admixtures: type air-entrainers that comply with the ASTM C494/C494M standard.
 - normal density concrete
- b) Lean concrete blinding slab:
- minimum tested compression strength at 28 days: 15 Mpa
 - cement type : GU
 - exposure category (Table No. 11, CSA-A23.1/A23.2): F-2
 - air content: 4 to 7%
 - maximum water/cement mass ratio: 0.55
 - desired on-site slump: 80 mm (± 20 mm)
 - normal density concrete
- .2 Obtain the Departmental Representative's approval for all admixtures used in concrete mixes (superplasticizers and required air-entrainers or other admixtures needed for any specific purpose, designated by the specialized Contractor). The use of calcium chloride is prohibited.
- .3 Provide a sample of the admixture(s) used, at the Engineer's request.
- .4 Follow the manufacturer's instructions when using admixtures.
- .5 The specialized Contractor is responsible for ensuring the admixtures are compatible with one another and with the materials included in the mix.
- .6 Enter the type and quantity of the admixture(s) used on the concrete shipping slip.
- .7 The use of an admixture shall never reduce the soundness of the concrete or its ability to withstand freezing and thawing.

2.3 CONCRETE CONTROL

- .1 Concrete quality control performed in compliance with the CSA-A23.2 standard by a designated laboratory at the Main Contractor's expense.
- .2 Submit to the laboratory for approval, proposed formulas for batching the mixes for each class of concrete; specify the type and brand of all admixtures used.
- .3 Provide the laboratory with samples of the fine and coarse aggregates that will be incorporated into the concrete blends and identify the quarry they come from.

Unless otherwise directed in writing by the Departmental Representative, also provide the laboratory with a document signed by a recognized petrographer certifying that none of the harmful alkali-aggregate and cement-aggregate reactions described in Appendix B of the CSA-A23.1/A23.2 standard are likely to occur in the concrete after it has been poured.
- .4 Notify the laboratory at least 24 hours before each concrete pour, whatever the volume involved.
- .5 Cooperate with sampling and facilitate testing. Provide free access to the structures. Provide the required concrete at no cost. If applicable, protect and provide a storage area for the samples taken.
- .6 The concrete's compression strength shall be checked during construction by taking 3 core samples per 75 m³ poured or at least 3 core samples per pour. The Departmental Representative may ask the laboratory to produce a fourth core sample and let it cure on the construction site as a control sample. A sample shall be crushed on the 7th day; the two other samples shall be crushed on the 28th day.
- .7 The cylinders shall be numbered consecutively and the laboratory report shall indicate the exact location of the concrete they represent in the framework, as well as the number of the truck that delivered the concrete.
- .8 The laboratory shall measure the concrete slump and air content every time it samples the concrete for strength tests and as often as necessary depending on the type of structure to be built.
- .9 Provide a sheltered location on site where the concrete core samples can be stored at an ambient temperature ranging from a minimum of 10°C to a maximum of 25°C before they are shipped to the trial laboratory.
- .10 If the core sample test results do not comply with Article 4.4.6.7 of the CSA A23.1 standard, the Departmental Representative may require that Section 4.4.6.8 of the standard be applied.
- .11 The specialized Contractor is solely responsible for the all concrete work required to complete the structures as indicated on the drawings or stipulated in the Specifications. All work that does not meet the requirements of the Specifications, for any reason whatsoever (quality of materials, batching, placement, strength, impermeability, etc.), shall be modified in compliance with the Departmental Representative's requirements, or it shall be completely demolished and rebuilt in compliance with the provisions of the Specifications and drawings, at the specialized Contractor's expense.

PART 3 - PERFORMANCE**3.1 PREPARATION**

- .1 Ensure that the forms are erected and that they are clean and free of ice, snow and water, and that form reinforcement and hardware are installed in compliance with the requirements of Sections 03 10 00, 03 20 00 and 03 25 00 of the specifications.
- .2 Before starting the work, obtain the Departmental Representative's approval of the concrete placement methods, which shall comply with Section 7.2 of the CAN/CSA-A23.1-04/A23.2-04 standard.
- .3 Obtain the Departmental Representative's written authorization before performing the concrete work and notify him 24 hours before beginning the work. To notify the Departmental Representative, the "Avis de bétonnage" form from Dessau must be used and duly completed by the Contractor.
- .4 Pumping concrete is [forbidden] [shall only be permitted once the equipment and the mix are approved].
- .5 Ensure that the reinforcement and embedded components are not moved while the concrete is being poured.
- .6 Before performing the concrete work, obtain the Departmental Representative's written authorization regarding the proposed method for protecting the concrete during the pour and the subsequent cure.
- .7 No concrete shall be poured without the Departmental Representative's written authorization.
- .8 Authorization to pour concrete shall only be provided once the Departmental Representative has completed his own inspection of the formwork and determined that the requirements of Article 3.1 appear to have been met.
- .9 It is forbidden to pour concrete when it is raining or snowing, unless the Departmental Representative provides the required authorization, being satisfied with the measures taken to shelter the concrete while it is being transported and placed.
- .10 The Departmental Representative's authorization to pour concrete when the outside temperature is below 5°C or above 25°C shall in no way release the specialized Contractor from his full responsibility regarding the strength and soundness of the concrete to be poured.
- .11 Keep a concrete placement log, which indicates the date and location of each placement, the concrete's characteristics, the truck numbers, the ambient temperature, samples taken and other relevant information.
- .12 Immediately before placing the concrete, carefully clean and remove all waste and debris of any kind from the space the concrete will occupy.
- .13 In areas where new concrete is bonded to an existing structure, drill holes in the existing concrete and install steel dowels made of high adherence steel rebar in it and thoroughly embed the dowels with non-shrink epoxy grout to anchor and maintain them in the positions indicated.
- .14 No load shall be exerted on the new concrete components until the Departmental Representative has provided the required authorization.

3.2 MANUFACTURE AND DELIVERY OF THE CONCRETE

- .1 Provide ready-to-use concrete manufactured in a concrete plant, transported and discharged at the site in compliance with Section 5.2 of the CAN/CSA-A23.1/A23.2 standard, or provide concrete manufactured on site, in compliance with all the requirements of that same section. If the second alternative is chosen, submit the entire procedure to the Departmental Representative for approval.
- .2 The manufacturer of the ready-to-use concrete is solely responsible for batching the concrete, and he shall personally, at his expense, take all necessary measures to ensure the quality and uniformity of his product.
- .3 Require that the concrete supplier provide a delivery slip for each load of concrete and provide the Departmental Representative with a copy of these slips. The slips shall contain the following information: name and address of the supplier's company, truck number, specialized Contractor's name, project name and location, class of concrete, cumulative quantity, start of discharge, end of discharge, maximum size of aggregate, slump and air-entrainment required, types of admixtures used, quantity and type of cement and quantity of water.
- .4 The addition of water to the mix after the initial batching shall only be carried out in strict adherence with Article 5.2.4.3.2 of the CAN/CSA-A23.1/A23.2 standard, but the maximum quantity used shall be 6 l/m³. Submit all anticipated additions to the Departmental Representative for approval and control. Indicate on the delivery slip the quantity of all water added at discharge.
- .5 Plan the manufacture of the concrete and schedule the deliveries to the site so that each pour can be performed without any interruptions. Each batch of concrete shall be completely discharged into the forms within two (2) hours of beginning of batching.
- .6 Never remix concrete or mortar that has started to set.
- .7 The temperature of the concrete at discharge shall be within the range presented in Table 1 of the CAN/CSA-A23.1/A23.2 standard and shall be controlled according to Article 5.2.4.4 of the same standard. Use all protective measures required for this purpose.
- .8 No aluminum component shall be used to batch, transport or place the concrete.

3.3 IMPLEMENTATION

- .1 Place the concrete in compliance with the requirements of the CAN/CSA-A23.1/A23.2 standard.
- .2 Carry out the consolidation of the concrete using models and sizes of mechanical vibrators approved by the Departmental Representative.
- .3 Select an appropriate type and number of vibrators and use them in accordance with Section 7.2.5 of the CAN/CSA-A23.1/A23.2 standard.
- .4 Bind the fresh concrete with rock or hardened concrete in accordance with Section 19.2 of the CSA-A23.1/A23.2 standard.
- .5 Saturate hardened concrete surfaces with water immediately before pouring concrete on these surfaces.

- .6 Lay the concrete without interruption or in layers thick enough that each new layer will bind with the underlying layers before they have hardened enough to form cold joints.
- .7 If difficulties arise during pouring, change the concrete formula following the laboratory's directives and use the admixture(s) prescribed by the laboratory, and assume all expenses for this procedure.
- .8 Adding a superplasticizer to the concrete before it has been poured into the forms is mandatory when pouring walls (including retaining walls) and columns.

3.4 CONCRETE CURING

- .1 The concrete shall be cured according to the requirements of section 7.4 of the CSA-A23.1/A23.2 standard. Walls and slabs 500 mm thick or thicker are considered mass concrete.
- .2 The use of curing compounds is prohibited.
- .3 The concrete of walls and other vertical elements shall be cured using two layers of jute kept moist at all times.
- .4 The concrete of slabs shall be cured using a using a cover kept moist at all times,
- .5 Slabs and other unformed surfaces shall be kept moist for a period of at least 7 days.
- .6 Walls, beams, columns and other formed surfaces shall undergo the following 7-day curing schedule:
 - .1 forms left in place: 3 days;
 - .2 moist curing after removal of the forms: 4 days.
- .7 When the outside temperature exceeds 20°C for mass concrete or otherwise 27°C, keep the forms moist before pouring the concrete and throughout the entire time they remain in place.
- .8 In cold weather, water curing ends 12 hours before the end of protection.
- .9 Throughout the entire cure, the concrete shall never be under any load and shall be adequately protected against violent shocks, excessive vibration, weather and other disturbances.
- .10 The provision, installation and maintenance of all falsework and devices required for the curing and protection of the concrete in hot or cold weather, as well powering the equipment, are part of the contract work, for which all costs are to be assumed.

3.5 CONCRETE PROTECTION

- .1 In hot weather, the concrete shall be protected according to Article 7.4.2.4 of the CSA-A23.1/A23.2 standard.
- .2 Concrete components containing silica fume shall be protected from drying according to Article 7.4.2.2 of the CSA-A23.1/A23.2 standard.

- .3 Other concrete components shall be protected from dryout based on Appendix D of the CSA-A23.1/A23.2 standard.
- .4 In cold weather, the concrete shall be protected according to Article 7.4.2.5 of the CSA-A23.1/A23.2 standard.
- .5 Methods for protecting concrete in cold weather are detailed in Chapter 15.4.3.13 of the “Cahier des charges et devis généraux (CCDG)”, 2003 edition. Payment methods described in this chapter of the CCDG shall not apply to this contract.

3.6 FINISHING OF FORMED SURFACES

- .1 Clean and finish the formed surfaces in compliance with Section 7.7.3 of the CSA-A23.1/A23.2 standard. Visible surfaces in completed buildings require smooth formed surfaces in accordance with Article 7.7.3.6 of the CSA-A23.1/A23.2 standard. All other surfaces require a rough formed surface in accordance with Article 7.7.3.5 of the CSA A23.1/A23.2 standard.
- .2 Fill the holes left by the form ties in compliance with Section 03 10 00 of these specifications.

3.7 CONCRETE PREPARATION

- .1 Remove and replace all damaged or defective concrete with concrete that meets the specifications and requirements of the drawings.
- .2 After the forms have been removed, the Departmental Representative shall examine all voids, honeycombs and other defects. If applicable, submit the methods for repairing the voids, honeycombs and other defects to the Departmental Representative for approval. Do not repair any of the surfaces before having received the Departmental Representative’s authorization.
- .3 Wherever possible, repair formed surfaces as soon as possible after the forms have been removed.
- .4 Cover the concrete surfaces with a cement-latex slurry or an epoxy-based glue before performing concrete or mortar repairs.
- .5 The product used shall comply with Section 2.1.7 of this section.

3.8 CUTS, DRILL HOLES AND CUT-OUTS IN HARDENED CONCRETE

- .1 Components that have already been poured shall never be cut, drilled or cut-out for any reason whatsoever, unless the Departmental Representative has authorized these procedures.
- .2 Any cut, drill hole or cut-out in hardened concrete authorized by the Departmental Representative shall be performed at the specific location, using the exact dimensions he has approved. Use rotary tools that prevent the concrete from shattering.

3.9 TOLERANCES

- .1 If the tolerances specified in Article 6.4 of the CSA-A23.1/A23.2 standard have not been met during the construction of any component of a structure shown on the drawings, the Departmental Representative may require that this component be demolished and rebuilt according to the tolerances of said article, at no additional expense to the Departmental Representative.

3.10 CONSTRUCTION JOINTS

- .1 Follow the indications of Section 7.3 of the CSA-A23.1/A23.2 standard for construction joints.
- .2 The Departmental Representative shall approve the location of the construction joints that demarcate each concrete pour. If the Departmental Representative deems it appropriate, he may require that these joints be brought closer together or relocated.
- .3 None of the construction joints already indicated on the drawings shall be moved or eliminated without prior authorization from the Departmental Representative.
- .4 Immediately before resuming pouring against a construction joint or above it, clean and score the surface of the hardened concrete to eliminate all loose fragments and any trace of bleeding, moisten the surface and allow to dry to obtain saturated, dry surface conditions.
- .5 Install 80 mm thick shear keys on construction joints along the entire length/height of the component, of a width equal to one-third the thickness of the component. Slightly bevel the sides of the shear keys.
- .6 For vertical components (walls, strip footings) construction joints shall be a maximum of 20 m apart. For structural raft foundation and slabs install construction joints with maximum 20 m x 20 m spacing. Submit the location of the construction joints to the Departmental Representative.
- .7 Allow a section to cure for a minimum of 7 days before pouring a new section next to it.

3.11 WATERSTOPS

- .1 Where indicated on the drawings, install waterstops to provide continuous watertightness. Do not bend or puncture the waterstops in order to avoid hindering their performance. Do not move the reinforcement when installing waterstops. Splice waterstops on site using equipment that complies with the manufacturer's requirements. Firmly secure the waterstops before the concrete is poured.
- .2 Joints butt-welded on site are only allowed between the points of intersection of the straight lengths. Weld the intersecting parts on site.

3.12 WATER STOPS FOR COLD JOINTS

- .1 Where indicated on the drawings, install weather-stripping and waterstops for cold joints to provide continuous watertightness. Strictly follow manufacturer recommendations regarding the installation, handling and materials required for each type to be used. Submit for the Departmental Representative's approval the installation method for each type used, in keeping with the manufacturer's recommendations.

3.13 ON-SITE QUALITY CONTROL

- .1 A testing laboratory designated by the Departmental Representative shall inspect and test the concrete and its constituents in accordance with the CSA-A23.1/A23.2 standard.
- .2 The owner shall assume all costs for the trials.
- .3 The Laboratory shall take additional core samples during cold weather concrete work. These core samples shall be cured on site, under the same conditions as the concrete pours they represent.
- .4 Non-destructive concrete trials shall be performed according to the methods described in the CSA-A23.1/A23.2 standard.
- .5 The inspection and trials performed by the Laboratory shall not replace or finalize the quality control performed by the Contractor, nor shall they release the Contractor from his contractual obligations in this respect.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 02 41 99 – Demolition for Minor Works
- .2 Section 03 30 00 - Cast-in-Place Concrete
- .3 Section 04 05 12 – Masonry mortar and grout.
- .4 Section 04 05 19 –Masonry anchorage and reinforcing.
- .5 Section 04 21 13 – Brick Masonry
- .6 Section 05 12 23 - Structural Steel For Buildings
- .7 Section 07 84 00 - Firestopping
- .8 Section 07 92 00 – Joint Sealing.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CSA-A165-14, CSA Standards on Concrete Masonry Units.
 - .2 CAN/CSA A179-14, Mortar and grout for unit masonry.
 - .3 CAN/CSA A371-14, Masonry Construction for Buildings.
 - .4 CSA S304.1-(F10), Design of Masonry Structures.
- .1 Institut de Maçonnerie du Québec (IMQ) documents:
 - .1 Technical bulletin " Maçonnerie-Info " (M-I), nos. 1 à 30, including revisions.
- .2 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)
 - .1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation meetings: Comply with Section 01 31 19 – Project Meetings. Conduct pre-installation meeting one week prior to commencing on-site installations to:
 - .1 Verify project requirements, including mock-up requirements.
 - .2 Verify substrate conditions.
 - .3 Co-ordinate products, installation methods and techniques.
 - .4 Sequence work of related sections.
 - .5 Co-ordinate with other building subtrades.
 - .6 Review manufacturer's installation instructions.
 - .7 Review masonry cutting operations, methods and tools and determine worker safety and protection from dust during cutting operations.
 - .8 Review warranty requirements.
- .2 Sequencing: sequence with other work in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM). Comply with manufacturer's written recommendations for sequencing construction operations.

COMMON WORK RESULTS FOR MASONRY

- .3 Availability of products and materials: Once contract is signed, contractor is required to check availability of specified masonry products in sufficient quantity and to place orders. Contractor shall notify Departmental Representative of any problem of availability of specified products and materials that may be likely to cause a delay and to suggest equivalent products for approval. Contractor will be held responsible for any delay resulting from a lag in ordering products and materials.

1.4 ACTION 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, limitations and colours.
 - .2 Provide one copy of Workplace Hazardous Materials Information System (WHMIS) - Material Safety Data Sheets (MSDS) in accordance with Section 01 35 29.06 - Health and Safety Requirements. Data sheets shall specify VOC levels of mortars, roughcast mortars, grouts, colouring agents and adjuvants, expressed in grams per litre (g/L).
- .3 Work samples: Refer to Article 1.7 – Quality Assurance.
- .4 Manufacturer's instructions
 - .1 Submit manufacturer's installation instructions.
- .5 Certificates: Submit documents provided by manufacturer certifying that products, materials and equipment meet prescribed requirements.
- .6 Test reports and assessment reports
 - .1 Submit certified test reports.
 - .2 Test reports must certify that masonry items and mortar ingredients meet prescribed physical characteristics and performance criteria.
 - .3 In addition to referenced CSA and ASTM standards, submit data on masonry's initial rate of water absorption (suction).
- .7 Manufacturer's instructions: Submit manufacturer's instructions on implementation, including storage and handling of materials and equipment, safety and cleaning.
- .8 Manufacturer's reports: Provide written reports prepared by manufacturer's staff on site, in particular:
 - .1 Inspection reports on compliance of work with contract requirements.
 - .2 Reports from site visits with details of implementation and work completed.

1.5 CLOSEOUT SUBMITTALS

- .1 Provide manufacturer's instructions for care, cleaning and maintenance of prefaced masonry units for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.6 EXTRA MATERIALS

- .1 Provide manufacturer's instructions in accordance with Section 01 78 00 - Closeout Submittals covering maintenance requirements and parts catalogue, with cuts and identifying numbers.

1.7 QUALITY ASSURANCE

- .1 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Mock-up used:
 - .1 To judge workmanship, substrate preparation, operation of equipment and material application.
 - .2 For testing to determine compliance with performance requirements. Perform following tests.
 - .1 For clay units, in addition to requirements set out in referenced CSA and ASTM Standards include data indicating initial rate of absorption.
 - .3 Construct mock-up where directed by Departmental Representative.
 - .4 Allow 48 hours for inspection of mock-up by Departmental Representative before proceeding with work.
 - .5 When accepted by Departmental Representative, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.
 - .6 Start work only upon receipt of written approval Departmental Representative.

1.8 DELIVERY, STORAGE, AND HANDLING

- .1 Delivering, storing and handling mortar and masonry grout and constituent materials in accordance with requirements of Section 01 61 00 – Common Product Requirements, and with those indicated below.
 - .1 Deliver pre-mixed dry materials for mortar to workplace in bags with inner plastic lining each bearing manufacturer's name and address, production code and batch number, as well as colour and formula numbers.
 - .2 Keep mortar, grout and pre-packaged materials dry and in a clean place, protecting them from dampness, frost and traffic and from contamination by foreign matter.
- .2 Management of packaging waste: recover packaging waste for recycling and for reuse of pallets, crates and other packaging materials by their manufacturer, in accordance with Section 01 74 21 – Construction/renovation/demolition waste management and disposal (CRD).
- .3 Store mortar bags for immediate use in heated enclosures, and allow these materials to reach a temperature of at least 10 degrees Celsius.

1.9 SITE CONDITIONS

- .1 Lay masonry on a dry surface and use only dry units. Unless indicated otherwise in specifications or prescribed by manufacturer, never dampen masonry units.
- .2 Application in cold weather:

COMMON WORK RESULTS FOR MASONRY

- .1 Meet requirements below as well as those set out in subsection 6.7.2 of standard CSA-A371 and CSA-A179.
 - .1 Maintain mortar at a temperature between 5 degrees and 35 degrees Celsius until use or stabilization of batch.
 - .2 Protect masonry units and completed masonry work against wind chill throughout work, 24 hours a day.
 - .3 Once work is completed and for at least 72 hours, keep it away uninterrupted from frost and wind chill at an ambient temperature above 5 degrees Celsius.
- .3 Hot weather requirements:
 - .1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
 - .2 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.
- .4 Protection of work – general:
 - .1 Protect masonry and adjacent work against scratches or other damage. Protect completed work against spattering of mortar.
- .5 Protection of structures – General:
 - .1 Secure masonry with non-stain waterproof fibreglass-reinforced plastic sheeting.
 - .2 This sheeting must cover masonry structures and extend far enough on each side to protect it from wind-driven rain and from cold penetration and heat loss (maintain required ambient temperature) unless work is completed or protected by flashing or other permanent structure for time set out in sub-paragraph 1.6.2.3.
 - .3 Protect masonry and adjacent structures from scratches or other damage. Protect completed structures from spattering of mortar.
 - .4 Shore up masonry temporarily until permanent lateral support structures are installed.
- .6 Ambient conditions: keep materials and surroundings at temperatures shown below.
 - .1 At least 5 degrees Celsius before and during work as well as for a 48-hour period following completion.
 - .2 At most 32 degrees Celsius before and during work as well as for a 48-hour period following completion.

1.10 WARRANTY

- .1 For work in this Section 04 05 00 Common Work Results for Masonry, the 12-month warranty period prescribed in the general conditions is extended to 60 months.
- .2 Provide a written document jointly prepared and signed by the manufacturer and the installer and issued in the name of Canada, ensuring the work against defects in materials, workmanship and installation for the period specified above.

Part 2 Products**2.1 MATERIALS**

- .1 Materials of the same brand and granulates from same source of supply must be used for all work.
- .2 Water: clean and potable.
- .3 As indicated in section 04 21 13 – Brick Masonry

2.2 COLOURING AGENTS

- .1 Use colouring agents incorporated in mortar during factory production.

2.3 MORTARS

- .1 Mortars in accordance with Section 04 05 12 – Masonry Mortar and Grout.

Part 3 Execution**3.1 INSTALLERS**

- .1 Experienced and qualified masons to carry out erection, assembly and installation of masonry work.

3.2 EXAMINATION

- .1 Examine conditions, substrates and work to receive work of this Section.
 - .1 Co-ordinate with Section 01 71 00 - Examination and Preparation.
- .2 Examine openings to receive masonry units. Verify opening size, location, and that opening is square and plumb, and ready to receive work of this Section.
 - .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation after unacceptable conditions have been remedied and after receipt of written approval from Departmental Representative.
- .3 Verification of Conditions:
 - .1 Verify that:
 - .1 Substrate conditions which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation.
 - .2 Field conditions are acceptable and are ready to receive work.
 - .3 Built-in items are in proper location, and ready for roughing into masonry work.
 - .2 Commencing installation means acceptance of existing substrates.

3.3 PREPARATION

- .1 Shore up masonry temporarily to support it during and after work until a permanent lateral support structure is in place.
- .2 Establish and protect lines, levels, and coursing.
- .3 Protect adjacent materials from damage and disfiguration.

3.4 INSTALLATION

- .1 Do masonry work in accordance with CSA-A371 except where specified otherwise.
- .2 Conduct masonry work straight, level and aligned, making well aligned vertical joints.
- .3 Arrange masonry rows according to prescribed bond to obtain courses of proper height and to maintain continuity of bond above and below bays, cutting a minimum number of units.

3.5 CONSTRUCTION

- .1 Exposed masonry:
 - .1 Remove chipped, cracked, and otherwise damaged units, in exposed masonry and replace with undamaged.
- .2 Jointing:
 - .1 When concave joints (semi-round or throated) are prescribed, let mortar harden enough to eliminate excess water, but no more, then push back with a round jointer to make smooth joints that are aligned, tightly packed and uniformly concave.
 - .2 Make flush joints (brought to the base) for all hidden wall joints or joints to be covered with plaster, tiling, insulation or any similar material, with the exception of paint or thin-film finished product of similar type.
- .3 Cutting:
 - .1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.
 - .2 Make cuts straight, clean, and free from uneven edges.
- .4 Building-In:
 - .1 Build in units required to be built into masonry.
 - .2 Prevent displacement of built-in units during construction. Check plumb, location and alignment frequently, as work progresses.
 - .3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.
- .5 Support of loads:
 - .1 Use 25 MPa concrete to Section 03 30 00 - Cast-in-Place Concrete, where concrete fill is used in lieu of solid units, as well as places to be filled for safety purposes.
 - .2 Use grout to CSA A179 where grout is used in lieu of solid units.
 - .3 Install building paper below voids to be filled with concrete; keep paper 25 mm back from faces of units.

- .6 Loose steel lintels:
 - .1 Install loose lintels above bays wherever girders are not planned; centre them in relation to width of bays and support them at edges of masonry over a length of 200 mm.
- .7 Structural steel lintels: Refer to Section 05 12 23 – Structural Steel for Buildings.
- .8 Joints allowing relative movement of parts or building elements:
 - .1 Coordinate with drawings the spacing needed between different parts of the building and the frame, subject to vertical movements of elastic deformation and/or creep, under live or dead loads.
 - .2 Horizontal structural joints for vertical movements:
 - .1 Between masonry and any part of the frame that may bend under dead or live loads or following concrete creep, leave a space of 20 mm, in accordance with Departmental Representative's calculations.
 - .2 Where applicable, between top of masonry and underside of C or L bearing sections that support masonry located above, leave a minimum space of 20 mm, in accordance with Departmental Representative's calculations.
 - .3 Dividing (break) joints in cladding, wall or partition surfaces to prevent fractures:
 - .1 Make vertical joints in keeping with maximum distances below:
 - .1 Clay brick: 12 metres either side.
 - .2 Concrete blocks: 8 metres either side.
 - .3 For all parapets (clay and concrete masonry): 6 metres either side.
 - .2 Location: in changes in plans forming a concave angle except when approved by Departmental Representative.
 - .4 Filling of movement joints:
 - .1 Joint sealing: material set out in Section 04 05 19- Masonry anchorage and reinforcing; application procedure set out in Section 07 92 00 – Joint Sealants.
 - .2 Fire protection in movement joints in an assembly with a degree of fire resistance: see Section 07 84 00 – Fire Stopping.
 - .3

3.6 SITE TOLERANCES

- .1 Tolerances in notes to CSA-A371 apply.

3.7 FIELD QUALITY CONTROL

- .1 Site Tests, Inspection:
 - .1 Perform field inspection and testing in accordance with Section 01 45 00 - Quality Control.
 - .2 Notify inspection agency minimum of 24 hours in advance of requirement for tests.
- .2 Manufacturer's Services:

COMMON WORK RESULTS FOR MASONRY

- .1 Have manufacturer of products supplied under this Section review work involved in handling, installation/application, and protection of its products, and submit written reports in acceptable format to verify compliance of work with Contract.
- .2 Manufacturer's field services: provide manufacturer's field services, consisting of product use recommendations and periodic site visits for inspection of product installation, in accordance with manufacturer's instructions.
- .3 Schedule site visits to review work as installation is about to begin.
- .4 Schedule site visits to review work at stages listed:
 - .1 After delivery and storage of products, and when preparatory work on which work of this Section depends is complete, but before installation begins.
 - .2 Twice during progress of work at 25% and 60% complete.
 - .3 Upon completion of work, after cleaning is carried out.
- .5 Obtain reports within [three] days of review and submit immediately to Departmental Representative.

3.8 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Final Cleaning:
 - .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
 - .2 Upon completion of installation and verification of performance of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.9 PROTECTION OF FINISHED WORK

- .1 Temporary Bracing:
 - .1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.
 - .2 Bracing approved by Departmental Representative.
 - .3 Brace masonry walls as necessary to resist wind pressure and lateral forces during construction.
- .2 Moisture Protection:
 - .1 Keep masonry dry using waterproof, nonstaining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until completed and protected by flashing or other permanent construction.
 - .2 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.
 - .3 Air Temperature Protection: protect completed masonry as recommended in 1.9 SITE CONDITIONS.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 00 – Common work results for masonry
- .2 Section 04 05 19 – Masonry anchorage and reinforcing
- .3 Section 04 05 23 – Masonry Accessories
- .4 Section 04 22 00 – Concrete unit masonry

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CAN/CSA-A23.1-14/A23.2-14, Concrete materials and methods of concrete construction / Test methods and standard practices for concrete.
 - .2 CAN/CSA-A82-14, Fired masonry brick made from clay or shale
 - .3 CAN/CSA A179-14, Mortar and grout for unit masonry.
 - .4 CSA A371-(F14), Masonry Construction for Buildings.
 - .5 CAN/CSA-A3000-F13, Cementitious materials compendium.
- .2 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C207-06 (2011), Hydrated Lime for Masonry Purposes.
- .3 International Masonry Industry All-Weather Council (IMIAC)
 - .1 Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
- .4 South Coast Air Quality Management District (SCAQMD)
 - .1 SCAQMD Rule 1168-05, Adhesive and Sealant Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Provide manufacturer's printed product literature, specifications and datasheets. Include product characteristics, performance criteria, and limitations.
 - .3 Provide one copy of Workplace Hazardous Materials Information System (WHMIS) - Material Safety Data Sheets (MSDS) in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures. Indicate VOC's mortar, grout, parging, colour additives and admixtures. Expressed as grams per litre (g/L).
- .2 Samples:
 - .1 Samples: provide unit samples in accordance with Section 04 05 00 - Common Work Results for Masonry, supplemented as follows:
 - .1 Provide two (2) samples of each type of mortar.
- .3 Provide manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver prepackaged, dry-blended mortar mix to project site in labelled plastic-lined bags each bearing name and address of manufacturer, production codes or batch numbers, and colour or formula numbers.
- .3 Storage and Handling Requirements:
 - .1 Deliver premixed dry materials for mortar to worksite in lined plastic bags, each bearing manufacturer's name and address, production code and batch number as well as colour and formula numbers.
 - .2 Maintain mortar, grout and packaged materials clean, dry, and protected against dampness, freezing, traffic and contamination by foreign materials.
 - .3 Deliver colouring products in original sealed container, clearly identifying product, manufacturer and colouring recipe.
 - .4 Store water-based colouring products away from frost and from any source of flames or sparks, ideally indoors.
 - .5 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

- .1 See requirements in Section 04 05 00 - Common Work Results for Masonry.

Part 2 Products**2.1 MATERIALS**

- .1 Use same brands of materials and source of aggregate for entire project.
- .2 Cement
 - .1 Mortar Cement: to CAN/CSA-A3002 and CAN/CSA-A179, Type N.
 - .1 Use low VOC products in compliance with SCAQMD Rule 1168.
 - .2 Packaged Dry Combined Materials for mortar: to CAN/CSA-A179, Type N, using white or grey cement, to manufacturer's recommendations to obtain colour being sought.
- .3 Aggregate: supplied by one supplier.
 - .1 Aggregate: to CAN/CSA-A179
 - .2 Granulometric limits to CSA A82.56

- .4 Water: clean and potable.
- .5 Lime:
 - .1 Quick Lime: to CAN/CSA-A179, Type N et S.
 - .2 Hydrated Lime: to CAN/CSA-A179, Type S.

2.2 ADMIXTURES

- .1 Use of adjuvants to be avoided.

2.3 MORTAR MIXES

- .1 Mortar for exterior masonry above grade:
 - .1 Non-Load Bearing: type N, prepared according to specifications based on properties set out in Table 6 of CSA A179-04.
- .2 Mortar for interior masonry:
 - .1 Non-Load Bearing: type N, prepared according to specifications based on properties set out in Table 6 of CSA A179-04.

2.4 MORTAR MIXING

- .1 Use pre-blended, pre-coloured mortar prepackaged under controlled factory conditions. Ingredients batching limitations to be within 1% accuracy.
- .2 Mix mortar ingredients in accordance with CAN/CSA-A179 in quantities needed for immediate use.
- .3 Maintain sand uniformly damp immediately before mixing process.
- .4 Add admixtures and mortar colour in accordance with manufacturer's instructions. Provide uniformity of mix and colouration.
- .5 Do not use anti-freeze compounds including calcium chloride or chloride based compounds.
- .6 Do not add air entraining admixture to mortar mix.
- .7 Use a batch type mixer in accordance with CAN/CSA-A179.

2.5 GROUT MIXES

- .1 Lintels: grout mix 10 to 12.5 MPa strength at 28 days; 200-250 mm slump; premixed type in accordance with CSA A23.1/A23.2, mixed in accordance with CAN/CSA-A179.
- .2 Grout: Minimum compressive strength of 12.5 MPa at 28 days. Maximum aggregate size and grout slump: CAN/CSA-A179.

2.6 GROUT MIXING

- .1 Mix batched and delivered grout in accordance with CSA A23.1/A23.2 transit mixed.
- .2 Mix grout ingredients in quantities needed for immediate use in accordance with CAN/CSA-A179.
- .3 Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- .4 Do not use calcium chloride or chloride based admixtures.

2.7 MIX TESTS**.1 Testing Mortar Mix:**

- .1 Test mortar to requirements of Section 01 45 00 - Quality Control, and in accordance with CAN/CSA-A179, for proportion specification and mortar based on property specification. Test during construction by laboratories independent of suppliers during construction for:
 - .1 Adhesion.
 - .2 Compressive strength.
 - .3 Consistency.
 - .4 Mortar aggregate ratio.
 - .5 Sand/cement ratio.
 - .6 Water content and water/cement ratio.
 - .7 Air content.
 - .8 Splitting tensile strength.

.2 Testing Grout Mix:

- .1 Test grout prepared according to specifications based on properties and dosage in accordance with Section 01 45 00 – Quality Control and with CAN/CSA-A179. Tests shall be conducted during construction work, to cover the following.
- .2 Test grout to requirements of Section 01 45 00 - Quality Control, and in accordance with CAN/CSA-A179, for grout based on property specification and proportion specification. Test during construction for:
 - .1 Compressive strength.
 - .2 Sand/cement ratio.
 - .3 Water content and water/cement ratio.
 - .4 Slump.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for masonry installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied[and after receipt of written approval to proceed from Departmental Representative.

3.2 MORTAR PLACEMENT

- .1 Install mortar premix mortar to manufacturer's instructions.
- .2 Unless otherwise indicated, apply mortar and grout in accordance with CAN/CSA A179-14.

- .3 Maintain temperature of work between 10 and 25 degrees C throughout work.
- .4 Remove excess mortar from grout spaces.

3.3 GROUT PLACEMENT

- .1 Install grout in accordance with manufacturer's instructions.
- .2 Install grout in accordance with CAN/CSA-A179.
- .3 Work grout into masonry cores and cavities to eliminate voids.
- .4 Do not install grout in lifts greater than 400 mm, without consolidating grout by rodding.
- .5 Do not displace reinforcement while placing grout.

3.4 MIXING

- .1 All pointing mortar can be mixed using a regular paddle mixer conforming to CAN/CSA A179. Only electric motor mixers are permissible. Mixers run on hydrocarbons are not permitted, due to fumes,
- .2 Total duration of mixing should be no less than 3 minutes and no more than 5 minutes.
- .3 Clean the mixing boards and the mixer between each mixing batch.
- .4 Assign same person to mix mortar throughout work. If someone else needs to be called upon during work, cease all mixing until new worker is trained and mixture is tested.
- .5 Use factory premixed and pre-packaged mortar under controlled conditions. Precision of assay should be in order of 1 to 100.
- .6 Do not use frost-preventing compounds, notably calcium chloride or other chloride-based compounds.
- .7 Do not use air-entraining agent in mixture.
- .8 Time limit for applying mortar:
 - .1 Discard any mortar not used within 1.5 hours if temperature is higher than 25 degrees C or 2.5 hours if temperature is lower.
 - .2 Remixing: within times specified above, mortar stiffened by evaporation can be remixed with as much water as needed to regain workability.
- .9 Remix mortar only two (2) hours after mixing in case of water loss through evaporation.
- .10 Use mortar within two (2) hours after mixing when temperature is 32 degrees C, or within 2.5 hours if temperature is below 5 degrees C.

3.5 FIELD QUALITY CONTROL

- .1 Site Tests, Inspection: in accordance with Section 04 05 00 - Common Work Results for Masonry supplemented as follows:
 - .1 Test and evaluate mortar during construction in accordance with CAN/CSA-A179.
 - .2 Test and evaluate grout during construction to CAN/CSA-A179; test in conjunction with masonry unit sections specified.
- .2 Manufacturer's Field Services: in accordance with Section 04 05 00 - Common Work Results for Masonry.

3.6 CLEANING

- .1 Nettoyage de la maçonnerie en cours et à la fin des travaux et à la fin: référer à la section 01 74 11 Nettoyage.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.
- .3 Remove droppings and splashings using clean sponge and water.
- .4 Clean masonry with low pressure clean water and soft natural bristle brush.

3.7 PROTECTION OF COMPLETED WORK

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

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 00 – Common work results for masonry.
- .2 Section 04 05 12 – Masonry mortar and grout.
- .3 Section 04 05 23 – Masonry Accessories
- .4 Section 04 21 13 – Brick Masonry

1.2 REFERENCES

- .1 ASTM International Inc.
 - .1 ASTM A167-99 (2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - .3 ASTM A580/A580M-15, Standard Specification for Stainless Steel Wire.
 - .4 ASTM A641/A641M-09a (2014), Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - .5 ASTM-A666-15, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - .6 ASTM D2240-15, Standard Test Method for Rubber Property - Durometer Hardness.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2-14, Concrete materials and methods of concrete construction / Test methods and standard practices for concrete.
 - .2 CSA-A165-14, CSA Standards on Concrete Masonry Units.
 - .3 CAN/CSA A179-14, Mortar and grout for unit masonry.
 - .4 CAN/CSA-A370-14, Connectors for masonry.
 - .5 CAN/CSA-A371-14, Masonry construction for buildings.
 - .6 CSA-S304.1-14, Design of Masonry Structures.
 - .7 CSA-G30.18-09 (R2014), Carbon steel bars for concrete reinforcement.
 - .8 CSA-W186-FM1990(R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .3 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).
- .4 Reinforcing Steel Institute of Canada (RSIC)
 - .1 Reinforcing Steel Manual of Standard Practice, 2004.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Data sheets
 - .1 Submit required data sheets as well as manufacturer's product specifications and documents in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Submit a copy of Material Safety Data Sheets (MSDS) required under Workplace Hazardous Materials Information System (WHMIS).
- .2 Shop drawings
 - .1 Submitted shop drawings shall bear seal and signature of a qualified engineer recognized or licensed to practise in the province of Quebec, Canada.
 - .2 Submitted drawings shall include details of rebar folding as well as details of anchorages, nomenclatures and layout drawings.
 - .3 Layout drawings shall indicate required number of reinforcing elements and connectors as well as dimensions, spacing and location of these items.
- .3 Submit instructions for installation or use from manufacturer of each product.

1.4 QUALITY ASSURANCE

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section 04 05 00 - Common Work Results for Masonry.

1.5 FIELD MEASUREMENTS

- .1 Make site measurements necessary to ensure proper fit of members.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Transport, store and handle masonry anchorage, reinforcing and accessories in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
 - .1 Deliver reinforcements, connectors and anchorages identified on shop drawings and installation drawings.

Part 2 Products**2.1 MATERIALS**

- .1 Connectors: to CAN/CSA-A370 and CSA S304.1.
- .2 Corrosion protection: to CSA-S304.1, galvanized to CSA-S304.1 and CAN/CSA A370.
- .3 Fasteners: installed post-construction:

- .1 Screw Shields and Plugs: plastic fibre rubber nylon lead, vibration-resistant chemical-resistant water-resistant install in mortar joints placed directly into solid masonry units.
- .2 Adhesives: epoxies, mastics and contact cements for fastening applications, use in accordance with manufacturers' recommendations.
- .4 Anchors: in accordance with CAN/CSA A370.
 - .1 Adjustable Unit Ties: to CAN/CSA-A370: proprietary type ties, type, style and size to suit application in accordance with manufacturer's recommendations.
 - .2 Joint Reinforcement Ties: to CAN/CSA-A370:
 - .1 Single Wythe Joint Reinforcement: ladder type :
 - .1 3,7 mm welded steel wire, hot dip galvanized: to ASTM A641, after fabrication.
 - .2 Multiple Wythe Joint Reinforcement: ladder type, without moisture drip adjustable.
 - .1 Steel wire, hot dip galvanized: to ASTM A641 after fabrication.
- .5 Conventional Bolts:
 - .1 Bolts: to ASTM A36, bar stock shop threaded, straight bolts with square or hex-headed nuts bent bar anchors, J L shaped.
 - .2 Plate anchors: steel to ASTM A36, weld square of circular steel plate perpendicular to axis of steel bar threaded on opposite end.
 - .3 Through bolt rods: to ASTM A307 threaded rod or threaded ASTM A36 bar stock.
- .6 Adhesive Anchors: proprietary systems, pre-mixed, self-contained system with double glass vial system to contain epoxy, consisting of resin, hardener and aggregate measure and mix system where epoxy materials are hand-measured and mixed in accordance with manufacturers' written instructions.
- .7 Sealants: in accordance with Section 07 92 00 – Joint Sealing.

2.2

FABRICATION

- .1 Fabricate reinforcing in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Fabricate connectors in accordance with CAN/CSA-A370.
- .3 Obtain Departmental Representative's approval for locations of reinforcement splices other than shown on placing drawings.
- .4 Obtain Departmental Representative's approval for locations of reinforcement splices other than shown on placing drawings.
- .5 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

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

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

3.2 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for anchorage and reinforcing materials 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.

3.3 PREPARATION

- .1 Direct and coordinate placement of metal anchors for masonry supplied to other Sections.

3.4 INSTALLATION

- .1 Supply and install masonry connectors and reinforcement in accordance with CAN/CSA-A370-04, CAN/CSA-A371, CAN/CSA A23.1 and CSA S304.1 unless indicated otherwise.
- .2 Prior to placing mortar, obtain Departmental Representative's approval of placement of reinforcement and connectors.
- .3 Supply and install additional reinforcement to masonry as indicated.

3.5 BONDING AND TYING

- .1 Bond walls of two or more wythes using metal connectors in accordance with CSA-S304, CAN/CSA A371 and as indicated.
- .2 Tie masonry veneer to backing in accordance with NBC, CSA-S304.1, CAN/CSA A371 and as indicated.
- .3 Install unit, adjustable, single wythe and multiple wythe joint reinforcement where indicated and in accordance with CAN/CSA A370 and CAN/CSA A371 manufacturer's instructions.
 - .1 Install horizontal joint reinforcement 400 mm on centre.
 - .2 Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 400 mm each side of opening.
 - .3 Place joint reinforcement continuous in first and second joint below top of walls.
 - .4 Lap joint reinforcement ends minimum 150 mm.
 - .5 Bond corners and intersections of checkerboard elements using anchor tabs spaced at 400 mm on each side vertically and 600 mm on each side horizontally.

3.6 ANCHORS

- .1 Supply and install metal anchors in accordance with CAN/CSA A370 and CAN/CSA A371 as indicated.

3.7 LATERAL SUPPORT AND ANCHORAGE

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

3.8 MOVEMENT JOINTS

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

3.9 FIELD BENDING

- .1 Do not field bend reinforcement and connectors except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
- .3 Replace bars and connectors which develop cracks or splits.

3.10 FIELD QUALITY CONTROL

- .1 Site inspections in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Obtain Ministerial Representative approval of placement of reinforcement and connectors, prior to placing mortar grout.

3.11 FIELD TOUCH-UP

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.
- .2 Brick colouring: wait a minimum of 12 hours before returning to areas judged unacceptable by Departmental Representative.

3.12 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 RELATED REQUIREMENTS**

- .1 Section 04 05 00 – Common Work Results for Masonry
- .2 Section 04 05 12 – Masonry Mortar and Grout
- .3 Section 04 05 19 – Masonry Anchorage and Reinforcing
- .4 Section 04 21 13 – Brick Masonry
- .5 Section 07 62 00 – Sheet Metal Flashing and Trim

1.2 REFERENCES

- .1 ASTM International Inc.
 - .1 ASTM D2240-15, Standard Test Method for Rubber Property - Durometer Hardness.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN/CSA A371-14, Masonry Construction for Buildings.
- .3 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)
 - .1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheets. Include product characteristics, performance criteria, and limitations.
 - .1 Material including :
 - .1 Movement joint filler.
 - .2 Lap adhesive.
 - .3 Mechanical fasteners.
 - .4 Reglets.
 - .5 Brick vents.
 - .2 Moisture control material samples, illustrating colour and colour range, size, and shape. Include:
 - .1 Weep hole vents.
 - .2 Mortar diverters.
 - .3 Grout screens.
 - .3 Flashing material samples, illustrating colour and colour range, size, shape, and profile. Include as specified:
 - .1 Sheet metal flashings.

- .3 Shop Drawings:
 - .1 Provide drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.
 - .2 Drawings to indicate the following :
 - .1 Shop drawings consist of flashing and installation details. Indicate sizes, spacing, location and quantities of fasteners.

1.4 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Manufacturer's Instructions: submit the following:
 - .1 Submit installation instructions for fillers, adhesives, reglets, brick vents, weeps, vents, diverters, screens, flashings.

1.5 FIELD MEASUREMENTS

- .1 Make field measurements necessary to ensure proper fit of members.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle masonry accessories in accordance with, Section 01 61 00 - Common Product Requirements supplemented as follows:
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements
 - .1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect[specified materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

- .1 Movement joint filler: purpose-made elastomer, durometer hardness to ASTM D2240 of size and shape indicated.
 - .1 Use low VOC products in compliance with the SCAQMD Rule 1168.
 - .2 Material type: fibre board expanded polyethylene rubber cork self-expanding cork closed cell neoprene.
- .2 Lap adhesive: recommended by masonry flashing manufacturer. Use low VOC products in compliance with the SCAQMD Rule 1168.

- .3 Weep hole vents: purpose-made PVC galvanized steel polypropylene fibre filter, colour grey.
- .4 Mechanical fasteners: recommended by flashing manufacturer to suit project requirements.
- .5 Brick vents:
 - .1 Material: aluminum, 38 mm deep frame.
 - .2 Blades: aluminum, overlapping, 45 degree angle opposed blade damper with maximum free area 39%.
 - .3 Sizes : as required
 - .4 Provide 458 x 356 mm mesh aluminum insect screen.
 - .5 Finish frame blades: 204-R1 clear anodize.

2.2 MOISTURE CONTROL

- .1 Cell vents: polypropylene plastic, honeycomb design.
- .2 Colour: clear.
- .3 Mortar diverters: shaped and sized to suit cavity spaces.
 - .1 Cavity space sizes: indicated on plans
 - .2 Manufactures from recycled material.
- .4 Grout Screens: 6 mm square monofilament screen is fabricated from high-strength, non-corrosive polypropylene polymers to isolate flow of grout in designated areas.

2.3 FLASHING

- .1 Refer to section 07 62 00 – Sheet Metal Flashing and Trim.

Part 3 Execution

3.1 INSPECTION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for masonry accessories 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: MATERIALS

- .1 Install continuous movement joint fillers in movement joints at locations indicated on drawings.
- .2 Lap adhesive: apply adhesive to flashing lap joints.

- .3 Mechanical fasteners: install fasteners to suit application and in accordance with manufacturer's written installation instructions.
- .4 Reglets: install reglets at locations indicated on drawings.
- .5 Brick vents: install brick vents at locations indicated on drawings.

3.3 INSTALLATION: MOISTURE CONTROL

- .1 Install weep hole vents in vertical joints immediately over flashings, in exterior wythes of cavity wall and masonry veneer wall construction, at maximum horizontal spacing of 600 mm on centre.
- .2 Mortar diverters: install purpose made diverters in cavities where indicated and as directed, size and shape to suit purpose and function.
- .3 Grout screens: install purpose made diverters in wall cavities, at the foundation, at intermediate lintels, at door heads, etc., and as directed, size and shape to suit purpose and function.

3.4 INSTALLATION: FLASHINGS

- .1 Build in flashings in masonry in accordance with CAN/CSA A371.
 - .1 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings, and at base of cavity wall and where cavity is interrupted by horizontal members or supports and as shown on drawings. Install flashings under weep hole courses and as indicated.
 - .2 In cavity walls and veneered walls, carry flashings from front edge of exterior masonry, under outer wythe, then up backing not less than 150 mm, and as follows:
 - .1 For masonry backing embed or bond flashing 25 mm in joint.
 - .2 For concrete backing, insert or bond flashing into reglets.
 - .3 Lap joints 150 mm and seal with adhesive.
- .2 Form flashing (end dams) at lintels, sills and wall ends to prevent water from travelling horizontally past flashing ends.
- .3 Install vertical flashing where outer veneer returns at window or door jambs, to prevent contact of veneer with inner wall.

3.5 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 RELATED REQUIREMENTS**

- .1 Section 04 05 00 – Common Work Results for Masonry
- .2 Section 04 05 12 – Masonry Mortar and Grout
- .3 Section 04 05 19 – Masonry Anchorage and Reinforcing
- .4 Section 04 05 23 – Masonry Accessories
- .5 Section 07 62 00 – Sheet Metal Flashing and Trim
- .6 Section 07 92 00 – Joint Sealing

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM C73-14, Standard Specification for Calcium Silicate Brick (Sand-Lime Brick)
 - .2 ASTM C216-16, Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)
 - .3 ASTM A123-15 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - .4 ASTM A153-16 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - .5 ASTM A580-16 – Standard Specification for Stainless Steel Wire
 - .6 ASTM A666-15 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
- .2 Brick Industry Association (BIA)
 - .1 Technical Note No. 20-2006, Cleaning Brick Work.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A82-14, Fired masonry brick made from clay or shale
 - .2 CAN/CSA-A165 SERIES-04 (R2014) - CSA Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3)
 - .3 CAN/CSA A371-14, Masonry Construction for Buildings
- .4 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)
 - .1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data
 - .1 Provide manufacturer's printed product literature for brick masonry. Specifications and datasheet to include product characteristics, performance criteria, dimensions and limitations.

- .3 Sample
 - .1 Submit one sample of each brick type.

1.4 QUALITY ASSURANCE SUBMITTALS

- .1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Certificates: provide manufacturer's product certificates certifying materials comply with specifications regarding physical characteristics and performance criteria.
- .3 Mock-ups
 - .1 Construct mock-ups in accordance with Sections 01 45 00 - Quality Control and 04 05 00 - Common Work Results for Masonry.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with requirements of Section 01 61 00 – Common Product Requirements, and manufacturer's written instructions.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements
 - .1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect[specified materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

- .1 Ambient Conditions: assemble and erect components only when temperature is above 5 degrees C.

1.7 ACCEPTABLE MATERIALS OR PRODUCTS

- .1 When materials or products are prescribed by brand name, consult Bidder Instructions to learn procedure for requesting approval of substitute materials or products.

Part 2 Products

2.1 MANUFACTURED UNITS

- .1 Facing brick
 - .1 Baked clay bricks, to CAN/CSA-A82.
 - .1 Type: S
 - .2 Category: EG
 - .3 Dimensions: metric modular, 90mm deep x 57mm high x 190mm long
 - .4 Colour: Shaded red colour

- .5 Texture: Perforation of less than 20% of net area, hammered
- .6 Solid / hollow items
- .7 Absorption rate:
 - .1 In cold water: 1.37% after 24 hours
 - .2 In warm water: 1.65% after 5 hours
- .8 Saturation coefficient: 0.80
- .9 Initial absorption rate: 2.4 g/min/194cm²
- .10 Compressive strength: 100.26 MPa
- .11 Frost and thaw resistance: No loss after 50 cycles
- .12 Efflorescence: None
- .13 Brick masonry items:
 - .1 Shaw Brick Brunswick Colonial 1064-M
 - .2 Belden Brick Indian Full Range
 - .3 Belden Brick Homestead Blend A
 - .4 Or a replacement product approved by addendum in accordance with instructions to bidders
- .2 Reinforcement:
 - .1 Reinforcement in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .3 Connectors:
 - .1 Connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .4 Flashings
 - .1 Refer to section 07 62 00 – Sheet Metal Flashing and Trim.
- .5 Mortar Mixes:
 - .1 Mortar and mortar mixes in accordance with Section 04 05 12 - Masonry Mortar and Grout.
- .6 Grout Mixes:
 - .1 Grout and grout mixes in accordance with Section 04 05 12 - Masonry Mortar and Grout.
- .7 Cleaning Compounds:
 - .1 Use low VOC products in compliance with SCAQMD Rule 1168.
 - .2 Compatible with substrate and acceptable to masonry manufacturer for use on products.
 - .3 Cleaning compounds compatible with brick masonry units and in accordance with manufacturer's written recommendations and instructions.

Part 3 Execution**3.1 INSPECTION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for masonry accessories 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 PREPARATORY WORK

- .1 Protect adjacent finished structures against damage that may result from execution of masonry work.

3.3 INSTALLATION

- .1 Construction to conform to CAN/CSA A371.
- .2 Bond: stretcher.
- .3 Coursing height: as indicated
- .4 Jointing: concave raked where exposed or where paint or similar thin finish coating is specified.
 - .1 Mixing and blending: mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.
 - .2 Clean unglazed clay masonry as work progresses.
 - .3 Reinforcement:
 - .1 Install reinforcing in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.
 - .4 Connectors:
 - .1 Install connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.
 - .5 Mortar Placement:
 - .1 Place mortar in accordance with Section 04 05 12 - Masonry Mortar and Grout.
 - .6 Repair/Restoration:
 - .1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.
 - .7 Field Quality Control:
 - .1 Site Tests, Inspection: in accordance with Section 04 05 00 - Common Work Results for Masonry supplemented as follows:
 - .2 Manufacturer's Field Services: in accordance with Section 04 05 00 - Common Work Results for Masonry.

- .8 Tolerances:
 - .1 To CAN/CSA A371 unless noted below.

3.4 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave area clean at end of each workday.
- .2 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .3 Clean unglazed clay masonry: 10 m2 area of wall designated by Departmental Representative DCC Representative Consultant mock up panel specified in Section 04 05 00 - Common Work Results for Masonry as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured, protect windows, sills, doors, trim and other work, and clean brick masonry as follows.
 - .1 Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.
 - .2 Scrub with solution of 25 mL trisodium phosphate and 25 mL household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.
 - .3 Repeat cleaning process as often as necessary to remove mortar and other stains.
 - .4 Use acid solution treatment for difficult to clean masonry as described in Technical Note No.20 by the Brick Industry Association.
- .4 Clean concrete brick masonry as work progresses.
 - .1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of brick and finally by brushing.
- .5 Final cleaning: Remove surplus material as well as garbage, tools and equipment from site in accordance with Section 01 74 11 – Cleaning.

3.5 PROTECTION

- .1 Brace and protect brick masonry in accordance with Section 04 05 00 - Common Work Results for Masonry.

END OF SECTION

PART 1 - GENERAL**1.1 DESCRIPTION**

- .1 The specialized Contractor shall provide all the materials, equipment and labour required to perform the detailing, joint design, manufacturing, fitting-up, factory painting, transportation, and installation of the steel framework.
- .2 The specialized Contractor shall also provide all parts to be embedded in concrete as well as the anchor bolts.

1.2 RELATED SECTIONS

The specialized Contractor is responsible for obtaining a copy of all the sections of these specifications even if they do not appear to pertain to his speciality. If he does not, it shall be understood that he agrees to the clauses and requirements of all sections in these specifications. The specialized Contractor must consult the table of contents of these specifications to have knowledge of the complete list of the specifications sections.

1.3 REFERENCES

- .1 The following standards and publications are mentioned in this section of the specifications. When reference is made to them, they must be consulted:
 - .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA-G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA-G164-M92 (C2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA-S16-01 CONSOLIDATION, Limit States Design of Steel Structures as well as CAN/CSA S16S1-05, Supplement no 1.
 - .4 CAN/CSA-S136-01 (C2007), North American Specification for the Design of Cold-Formed Steel Structural Members as well as CAN/CSA-S136S1-04, Supplement.
 - .5 CAN/CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.
 - .6 CAN/CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding.
 - .7 CAN/CSA W55.3-1965 (R2003), Certification of Companies for Resistance Welding of Steel and Aluminium.
 - .8 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
 - .2 American Society for Testing and Materials International, (ASTM)

STRUCTURAL STEEL FOR BUILDINGS

- .1 ASTM A36/A36M-00, Standard Specification for Carbon Structural Steel.
- .2 ASTM A193/A193M-08b, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications .
- .3 ASTM A307-04, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .4 ASTM A325-02, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- .5 ASTM A325M-00, Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric).
- .6 ASTM A490M-00, Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric).
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-85.10-99, Protective Coatings for Metals.
- .4 Canadian Institute of Steel Construction (CISC)/Canadian Paint and Coatings Association – CPCA (formerly the Canadian Paint Manufacturers Association - CPMA).
 - .1 CISC/CPMA 1-73A (1975), A Quick-drying One-coat Paint for Use on Structural Steel.
 - .2 CISC/CPMA 2-75, A Quick-drying Primer for Use on Structural Steel.
- .5 Master Painters Institute
 - .1 MPI-INT 5.1-04, Structural Steel and Metal Fabrications.
 - .2 MPI-EXT 5.1-04, Structural Steel and Metal Fabrications.
- .6 The Society for Protective Coatings (SSPC)
 - .1 SSPC-SP 3 (1995), Power Tool Cleaning.
- .7 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2010 and Supplement
- .8 Code de Construction du Québec - Chapter I, Building, and National Building Code - Canada 2010 (amended) as well as the User's Guide - NBC 2010: Comments on the calculation of structures (Part 4 of Division B).

- .2 Unless otherwise specified, perform structural steel work and welding work in compliance with the CAN/CSA-S16-01 and CAN/CSA S136S1-04 Standards.
- .3 The framework welding shall only be performed by a duly approved member of the Canadian Welding Bureau (CWB), in accordance with the requirements of the CAN/CSA W47.1 standard, Division 1 or Division 2.1. Check whether the subcontractor is a certified member of the CWB in the Division concerned, because the Departmental Representative will reject any specialized contractor that does not meet this requirement.

1.4 DESIGN CRITERIA

- .1 Structural and jointing details shall be designed in accordance with the requirements of the CAN/CSA-S16, CAN/CSA-S136 and CAN/CSA S136S1-04 standards, so that they can withstand the indicated forces, moments and shear stresses, and accommodate anticipated thermal movements.
- .2 Factory connections shall be welded.
- .3 Unless otherwise indicated on the drawings, the types of bolted joints are as follows:

Components	Types of Connections
Beams, columns	Bearing type
Bracing	Slip critical connections
Trusses	Slip critical connections

- .4 Unless otherwise indicated on the drawings, the stresses to be used in the design of connections are as follows:

Components	Stresses
Beams, columns	<p>The more stringent of two (2) criteria:</p> <ul style="list-style-type: none"> ▪ Reaction of the uniform load producing the section's ultimate resisting moment ▪ Or 50% of the beam's shear strength
Columns	<ul style="list-style-type: none"> ▪ The section's ultimate compressive strength and shear strength
Trusses	<ul style="list-style-type: none"> ▪ The section's ultimate tensile strength

- .5 Additional stresses induced on components to be connected:
 - .1 All joints shall be designed so that no additional stresses are induced on the components to be connected.

- .2 The Departmental Representative shall reject all details that create torque, bending moment or other stresses.
- .3 The Departmental Representative shall be the only one to decide whether the details submitted are accepted or rejected.
- .4 All modifications relating to changes required by the Departmental Representative shall be at the specialized Contractor's expense.
- .6 For non-standard joints, submit sketches and design notes bearing the seal and signature of a qualified Engineer recognized in the Province of Quebec, Canada.
- .7 Use at least two bolts per bolted joint (including those where anchors are used).
- .8 The depth of a beam joint shall never be less than 50% of the beam.

1.5 SHOP DRAWINGS

- .1 Submit the shop drawings to the Departmental Representative.
- .2 Each shop drawing must bear the seal and signature of an Engineer who is a member in good standing of the Ordre des Ingénieurs du Québec.
- .3 Clearly indicate on the shop drawings all forming and assembly details, including cuts, cut-outs, joints, drill holes, threaded anchors, bolts, shear connectors and welds. Use the symbols indicated in the CAN/CSA W59 Standard to represent welds.
- .4 Submit to the Departmental Representative the description of the work methods, the order in which the components are to be assembled, and the type of material intended for use. Even if this formality has been fulfilled and the document submitted, the specialized Contractor remains solely responsible regarding the use of the methods, equipment, delivery mode and safety measures.
- .5 Provide the Departmental Representative with three (3) copies of each complete and detailed shop and erection drawings of the steel framework to be built. The drawings shall be provided in metric units (SI).
- .6 The shop and erection drawings shall contain all the information mentioned in Articles 4.2 and 4.3 of the CAN/CSA-S16 Standard and bear the signature of the person who verified them before their submission to the Departmental Representative.
- .7 The project title as well as the names of the Owner, Architect, Departmental Representative, Expert framework consultant and of the Contractor shall appear on each shop and erection drawing.
- .8 The shop and erection drawings shall be sent soon enough to ensure that the Departmental Representative has at least ten (10) working days to examine them.
- .9 A copy of each drawing shall be returned to the specialized Contractor who, if required, shall revise the annotated drawing(s) and resubmit it (them). If the Departmental Representative determines that the revisions are too numerous or complex, he shall return the drawing(s) without annotating it (them). The Contractor shall be responsible for making any additional copies he requires.

- .10 The specialized Contractor shall only manufacture the framework components after the Departmental Representative has returned the shop and erection drawings.

1.6 ASSEMBLY VIDEO

- .1 The steel framework Contractor, in conjunction with the manufacturer of the pre-stressed concrete components, shall make an assembly video that shows in details the components installation sequences.
- .2 The sequences shall be ordered as to balance the various loads exerted on the main trusses to avoid any twisting.

1.7 VERIFICATION OF DIMENSIONS, MEASUREMENTS AND LEVELS

- .1 Before manufacturing the components of the framework, take and check all the dimensions, measurements and levels on site to compare them with the ones on the drawings or to complete the information shown on the drawings.
- .2 Notify the Departmental Representative of any errors on the construction site or of any incompatibility between the dimensions taken and the instructions provided on the drawings. Await the Departmental Representative's instructions on how to correct the errors and/or make the required adjustments.
- .3 If connecting to an existing framework, check all the dimensions, measurements and levels of the existing framework before producing shop drawings of the new frame that will be connected to it. Adjust the dimensions of the parts to be built to the situation and submit the modifications to the Departmental Representative.

1.8 QUALITY ASSURANCE

- .1 Submit 3 copies of shop trial reports 4 weeks prior to assembly of the structural steel work.
 - .1 The shop trial reports shall indicate the steel's chemical and physical properties, as well as other relevant details before it is used for this work,
 - .2 The trial reports shall be certified by qualified metallurgists authorized to work in the Province of Quebec, Canada.
- .2 Also provide an affidavit from the manufacturer of the structural steel work certifying that the products, equipment and materials used for this work comply with the relevant standards that apply to the required or indicated products, equipments and materials.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Use materials free of dirt, rust, scale, pinholes, leafing or any other defect. No used materials shall be accepted.

STRUCTURAL STEEL FOR BUILDINGS

- .2 General structural steel: in compliance with the CAN/CSA-G40.20/G40.21 Standard of grade 350W
- .3 Hollow Structural Sections (HSS): in compliance with the CAN/CSA-G40.21 and CAN/CSA-S16 Standards, of grade 350W, class H, as indicated on the drawings.
- .4 High-strength bolts, nuts and washers: in compliance with the ASTM A325M or A490M Standard.
- .5 Anchor bolts:
 - .1 Lower strength: in compliance with the CAN/CSA G40.21 Standard, grade 300W and the ASTM A307 Standard, grade A.
 - .2 High-strength: in compliance with the ASTM-A-449 standard with a minimum yield strength of 500 MPa.
- .6 Welding materials: in compliance with the CAN/CSA W59 Standard and the CAN/CSA W48 series Standards and approved by the Canadian Welding Bureau.
- .7 Shear connectors (if required on the drawings): in compliance with the CAN/CSA W59 Standard, Clause 5.5.6 and its Appendix H.
- .8 Non-shrink grout: non-metallic pre-mixed Portland cement-based product, of a consistence appropriate for pouring and capable of achieving at least 50 MPa compression strength at 28 days, subject to the Departmental Representative's approval.
- .9 Paint:
 - .1 1-73A CISC/CPMA: "Quick-drying one-coat paint for use on structural steel", grey colour.
 - .2 2-75 CISC/CPMA: "Quick-drying primer for use on structural steel", grey colour.
- .10 Mechanical anchor bolts (when specified on the drawings) approved by the Departmental Representative. The type required, the diameter and total length are specified on the drawings.
- .11 Hot dip galvanizing: apply a minimum 600 g/m² coat of zinc on the indicated areas, in compliance with the CAN/CSA-G164 Standard.
- .12 Touch up paint for galvanized steel: Complies with CAN / CGSB-1.181 with a metal zinc content higher than 87% (% in mass of the non-volatile part) such as the "ZRC Cold Galvanizing Compound" of ZRC Worldwide. Aerosol coatings are not permitted and the dry coating film must contain 95% zinc metal.

2.2 FACTORY PAINTING

- .1 Structural steel components shall be cleaned, prepared and coated with a layer of primer at the workshop in compliance with the CAN/CSA-S16 Standard, with the exception of components to be embedded in concrete.
- .2 The components shall be cleaned and freed of millscale, rust, oil, dust and all other foreign material. The surfaces shall be prepared according to the SSPC-SP 3 method.

- .3 A layer of primer shall be applied at the workshop so as to produce a dry film of at least 4 mils thick, on all steel surfaces, with the exception of the following surfaces:
 - .1 surfaces embedded in concrete;
 - .2 surfaces to which shear dowels will be fastened at the construction site;
 - .3 surfaces and edges that are to be welded on site;
 - .4 friction joint contact surfaces;
 - .5 surfaces located below grade and in direct contact with the ground.
- .4 In cases where frame components are not visible in the finished building (structural steel components covered by other construction materials), at the shop, apply on the structural steel a quick-drying one-coat paint for use on structural steel, in compliance with the 1-73A CISC/CPMA Standard. Follow the requirements of this standard regarding the methods to be used, atmospheric conditions to maintain and temperatures to respect when applying the paint.
- .5 In cases where frame components are visible in the finished building (exposed structural steel components later covered with one or two coats of finish paint on site, such as a gymnasium), at the shop, apply on the structural steel a quick-drying primer for use on structural steel, which complies with the 2-75 CISC/CPMA Standard. Follow the requirements of this standard regarding the methods to be used, atmospheric conditions to maintain and temperatures to respect when applying the paint.
- .6 Paint on nuts, bolts, straight edges and angles shall be removed before it is dry.

PART 3 - PERFORMANCE

3.1 FORMING

- .1 Form the steel components in compliance with the CAN/CSA-S16 Standard and according to the shop drawings submitted.
- .2 Structural members formed of welded sections shall be rejected if they are not shown as such on the shop drawings.
- .3 The use of members whose quality and/or dimensions differ from those shown is strictly forbidden without the Departmental Representative's written permission.
- .4 Drill or punch the bolt holes. All burning or cutting with a torch is forbidden.
- .5 The manufacturing and assembly tolerances are respectively those described in Sections 28.9 and 30.7 of the CAN/CSA-S16 Standard.
- .6 If required, reinforce the openings to maintain the design strength.

STRUCTURAL STEEL FOR BUILDINGS

- .7 Where indicated on the drawings, continuously seal all steel members with a continuous weld bead and grind the welds.
- .8 Reinforce the girder web with stiffening plates at each girder-column intersection and at each concentrated load location.
- .9 Grind visible welds where required.
- .10 Provide the qualified trades persons with the templates and the parts to be embedded in the concrete or masonry.
- .11 Once the assembly is completed, touch-up the rivets, on-site welds, and bolts as well as burned or scratched surfaces.
- .12 Apply a zinc primer on galvanized surfaces in areas burned as a result of on-site welding work.
- .13 The welding companies shall be certified under the terms of Division 1 of these specifications or Article 2.1 of the CAN/CSA W47.1 Standard regarding fusion welding of steel structures, and/or the CAN/CSA W55.3 Standard regarding resistance welding of structural members.

3.2 MARKING

- .1 Mark the materials in compliance with the CAN/CSA-G40.21 Standard. Do not use die-stamping. When the steel part must not be painted, stamp the mark in locations that will not be visible after assembly.
- .2 Joint markings: at the factory, mark load-bearing assemblies, assembly joints and adjustment joints.

3.3 ASSEMBLY

- .1 The proposed technique, as well as the equipment used to erect the frame are subject to the Departmental Representative's approval. However, this approval shall in no way release the specialized Contractor from his full responsibility regarding the choice of technique and the handling of the equipment that will enable him to perform his work quickly and in complete safety.
- .2 Assemble the steel components in compliance with the CAN/CSA-S16 Standard and according to the shop drawings.
- .3 Assemble the metal structures ensuring that they are square, plumb, aligned, accurately adjusted, and have tight joints and intersections.
- .4 Where indicated on the drawings, continuously seal all steel members with a continuous weld bead and grind the welds.
- .5 Obtain the Departmental Representative's written authorization before cutting or modifying structural steel members on site.
- .6 Once the assembly is completed, touch up the bolts, rivets, welds, and surfaces where the factory-applied galvanization is degraded.

STRUCTURAL STEEL FOR BUILDINGS

- .7 Deliver, handle and store all steel on site to avoid any damage. Damaged members and joints shall be rejected.
- .8 Take measures so as not to overload on-site structures which are already completed or under construction, beyond the allowable loads indicated on the drawings for these structures.
- .9 Where required on the drawings, weld shear connectors to the load-bearing components of the frame, using steel decking if required, following the manufacturer's instructions.
- .10 Notify the Departmental Representative as soon as possible regarding any defects detected in the assembly of factory-built components and abide by his decision regarding the corrections to be made.
- .11 Straighten slightly deformed components before assembling them on site and replace those that are damaged to the point where the Departmental Representative raises doubts regarding their effectiveness.
- .12 It is strictly forbidden to perform joint welds on site unless they are indicated on the shop drawings or the Departmental Representative has approved them beforehand.
- .13 It is strictly forbidden to drill, cut or modify in any way a component of the frame on site without having obtained the Departmental Representative's written authorization beforehand.
- .14 Galvanized steel framing should not be cut, drilled, or modified in any way on site. If structural modifications are made to the galvanized steel structural framing, they must be returned to the workshop to be re-galvanized.

3.4 ON-SITE QUALITY CONTROL

- .1 The Departmental Representative shall have access to the shop at all times to inspect the manufacturing and assembly work performed there.
- .2 The Departmental Representative may require that analytical trials, estimates and calculations be performed. Replace all work or materials found to be defective, at no expense and without any unnecessary project delays.
- .3 At the Departmental Representative's request, provide a factory certificate attesting that the quality of the steel meets the requirements of the contract documents.
- .4 At the Departmental Representative's request, provide him with certified copies of the steel factory inspection reports concerning the chemical and physical properties of the steels used.
- .5 A testing laboratory approved by the Departmental Representative shall inspect and test materials and craftsmanship.
- .6 The Departmental Representative may require that the Laboratory assess certain welds he considers important through visual inspection, or by performing penetrating liquid, magnetic particle, x-ray or ultrasound examinations. Cooperate fully on the performance of these tests and if required make the necessary repairs following these inspections.

- .7 The parts of welds that have been repaired shall be fully re-inspected following the same method used to perform the first inspection.
- .8 The Laboratory shall check the shear connectors using the following method: after welding, the specialized Contractor shall remove the ceramic ring around each connector and the Laboratory shall visually inspect the weld bead. Beads extending less than 360 degrees shall undergo more thorough inspection. These types of connectors shall be tested using a hammer to bend the connector 15 degrees from vertical toward the nearest side of the embedded plate or structural component. Welds that bend without breaking are acceptable. Bent connectors shall not break when straightened after the test. In addition, the Laboratory shall use the same method to conduct random testing on one percent of connectors where the weld bead is visually acceptable. The specialized Contractor shall replace defective connectors at his expense.
- .9 The Departmental Representative may ask the specialized Contractor to check whether the columns are plumb, in his presence. The Contractor shall provide the equipment required to perform this audit.
- .10 The Departmental Representative may ask the specialized Contractor to check the bolted joints, in his presence. High-strength joint shall comply with the CAN/CSA-S16 Standard, clauses 23.7 and/or 23.8.
- .11 The inspection and verification to ensure the framework is aligned, plumb and level shall comply with the CAN/CSA-S16 Standard, clause 29.7.

3.5 JOINTS

- .1 Unless otherwise indicated on the drawings, all factory-built joints shall be welded. If friction joints are specified, high-strength bolts shall be used.
- .2 High-strength bolts shall be used on all friction joints performed on site, in accordance with Section 23 of the CSA-S16-01 standard.

3.6 TEMPORARY BRACING

- .1 Assembly the steel framework, ensuring it is aligned and plumb to specified tolerances. Use temporary bracing for the assembly where necessary to offset any load to which the frame may be subjected, including wind, snow, equipment, and its use.

Leave these braces in place without disturbing them as long as they are required for safety, and until final installation of permanent braces.
- .2 The specialized Contractor shall be responsible for any negligence in adequately anticipating the stresses exerted during assembly of the framework.
- .3 Do not perform permanent bolting, welding or riveting as long as the braced framework has not been properly aligned.
- .4 The specialized Contractor is entirely responsible for the temporary stability of the steel frame.

3.7 GROUT APPLICATION

- .1 Where indicated on the drawings, after the framework has been erected and aligned, completely fill the space under column base plates or other supports with the specified non-shrink grout, following the manufacturer's written instructions.
- .2 Install the grout and wait until it has achieved 75% of its specified strength before pouring the concrete slabs on steel decking.

3.8 ON-SITE PAINTING

- .1 Unless otherwise indicated, all damaged surfaces and unpainted surfaces in the workshop must be retouched with a paint conforming to ICCA / PSAC 1-73A or ICCA / PSAC 2-75, depending on the case. Prepare surfaces to be retouched in accordance with SSPC SP-3. Retouch for galvanized steel.
- .2 Following approval by the Departmental Representative, galvanized steel framing with surfaces that have been damaged or scuffed during transport, handling or assembly shall be retouched with a zinc-rich paint on the surfaces in question.
- .3 Galvanized steel framing with a damaged surface or cumulative scratches for an element greater than 10 cm² shall be disassembled, returned to the workshop to be re-galvanized and re-installed.

3.9 SUBSTITUTION

- .1 Do not change the dimension and size of the members shown on the drawings without the Departmental Representative's written authorization. Substitution of members with units stronger than those specified may be accepted at no additional cost.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 21 13 – Brick Masonry
- .2 Section 09 21 16 – Gypsum Board Assemblies
- .3 Section 09 91 23 – Interior painting

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - .3 ASTM A194 / A194M-15a, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - .4 ASTM A307-14, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .5 ASTM A325-14, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric).
 - .6 ASTM A269/A269M-15a, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .7 ASTM F436M-11, Standard Specification for Hardened Steel Washers (Metric).
- .2 CSA International
 - .1 CAN/CSA G164-92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .2 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .3 CSA S16-14, Design of Steel Structures.
 - .4 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .5 CSA W59-13, Welded Steel Construction (Metal Arc Welding)(Metric).
- .3 The National Association of Architectural Metal Manufacturer:
 - .1 EMMA 557-99, Standards for Expanded Metal.
- .4 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
- .5 Steel structures painting council (SSPC)
 - .1 SSPC Painting manual.
 - .2
- .6 National Ornamental & Miscellaneous Metals Association (NOMMA)

METAL FABRICATIONS

- .1 Joint finish guideline – 1994.

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 sections plates pipe tubing bolts 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 Territory of QUEBEC, Canada.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
 - .3 Shop drawings shall illustrate following construction details: specialities, general arrangements, typical and special conditions of installations, materials, connections, accompanying items, anchors, location of fasteners and of exposed interfaces with adjacent materials.

1.4 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certifications: 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 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 Exposed surfaces of stainless steel items to be covered with thick self-adhesive paper or peelable plastic film before shipment of these items to site.
 - .3 Surfaces must not be cleared of protecting coating until final cleaning of building. Provide necessary instructions for removal of these protections.
 - .4 Replace defective or damaged materials with new.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/renovation/demolition waste management and disposal (CRD).
- .2 Remove all packaging materials from site and send to appropriate recycling facilities.

METAL FABRICATIONS

1.7 RECYCLED CONTENT

- .1 Materials and products described in this section shall contain overall minimum average by weight of 20% post-domestic consumption recycled materials OR 40% post-industrial consumption recycled materials.

Part 2 Products**2.1 MATERIALS**

- .1 Steel sections and plates: Grade 300W, to CSA G40.20/G40.21, thickness as indicated in drawings.
- .2 Steel pipes: to ASTM A53/A53M, standard series, galvanized finish.
- .3 Stainless steel tubes and plates: to ASTM A269, Grade 304, commercial grade, for welding, without longitudinal seam, AISI number 4 finish.
- .4 Welding materials: to CSA W59.
- .5 Welding electrodes: to CSA W48 Series.
- .6 Bolts and anchor bolts: to ASTM A325, Type 1 medium carbon steel bolts, galvanized finish; ASTM A194/194M, Grade 2H nuts, galvanized finish; ASTM F436M, Type 1 washers.
- .7 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Use self-tapping shake-proof flat round oval headed screws on items requiring assembly by screws or as indicated.
- .3 Where possible, fit and shop assemble work, ready for erection.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

- .1 Galvanization: hot dip with zinc coating, 600 g/m², ASTM A123/A123M. Typical for all exterior assemblies.
- .2 Primer applied in shop: in accordance with product MPI-EXT 5.1B and standard GS-11 for chemical composition and SCAQMD Rule 1168 for VOC level.
- .3 Zinc-rich primer: ready for use, in accordance with product MPI-INT 5.2C and standard GS-11, for chemical composition and SCAQMD Rule 1168 for VOC level.
- .4 Painting systems for non-galvanized interior metals: refer to Section 09 91 23 – Painting.

2.4 ISOLATION COATING

- .1 Isolate aluminum from following components, by means of bituminous paint:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

METAL FABRICATIONS

- .2 Concrete, mortar and masonry.
- .3 Wood.

2.5 SHOP PAINTING

- .1 Primer: VOC limit 250 g/L maximum to GS-11 CCD-047a CCD-048.
- .2 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .4 Surfaces to be welded on site must be cleaned and must not be coated with paint.
- .5 Surfaces must be cleaned according to instructions in Volume 2 of Steel Structures Painting Council manual.
- .6 All surfaces must be covered with one (1) coat of primer applied in shop, except interior surfaces of crib steps.
- .7 Surfaces inaccessible after assembly must be covered with two (2) coats of primer of a different colour.

2.6 ANGLE LINTELS

- .1 Steel angles: galvanized prime painted, sizes indicated for openings. Provide 150 mm minimum bearing at ends.
- .2 Weld or bolt back-to-back angles to profiles as indicated.
- .3 Finish: shop painted.
 - .1 Primer: VOC limit 250 g/L maximum to GS-11 when applied onsite.
- .4 Frames made of steel profiles, in dimensions indicated for profiles and apertures.
- .5 Profiles assembled by welding to form single-piece post-and-beam frame, in dimensions indicated.
- .6 Flat steel anchors, 38 mm x 38 mm x 6 mm thick, welded to post of frame in 600 mm centre-to-centre profiles.
- .7 Finish: Galvanized.

2.7 CHANNEL FRAMES

- .1 Fabricate frames from steel, sizes of channel and opening as indicated.
- .2 Weld channels together to form continuous frame for jambs and head of openings, sizes as indicated.
- .3 Weld 50 mm x 50 mm x 6 mm thick steel strap anchors to channel jamb frame at 600 mm on centre.
- .4 Finish: galvanised for exterior components, prime coat painted for interior components.

METAL FABRICATIONS

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Ministerial Representative.
 - .2 Inform Ministerial 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 Ministerial Representative.

3.2 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Ministerial Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CSA S16 Weld field connection.
- .7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .8 Once assembly is completed, use primer to touch up rivets, welds done on site, bolts and burned or scratched surfaces.
- .9 Using zinc-rich primer, touch up galvanized surfaces in places burned during on-site welding.
- .10 Hand over, to appropriate trades, templates and items to be immersed in concrete or embedded in masonry.

3.3 CHANNEL FRAMES

- .1 Install steel channel frames to openings as indicated.

3.4 CLEANING

- .1 Clean metalwork as soon as possible after installation to rid it of dust generated by construction work or by surroundings.
- .2 Removal all protective labels just before final acceptance, and clean products using cleaners recommended by manufacturer.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

METAL FABRICATIONS

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

3.5 PROTECTION

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

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 08 44 13 – Glazed Aluminum Curtain Walls
- .2 Section 08 71 10 - Door Hardware
- .3 Section 09 22 16 - Non-structural Metal Framing.
- .4 Section 12 21 19 – Roller Blinds

1.2 REFERENCES

- .1 American National Standards Institute/National Particleboard Association (ANSI/NPA)
 - .1 ANSI/NPA A208.1-2009, Particleboard.
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc (Hot-Dip Galvanized Coatings on Iron and Steel Products.
 - .3 ASTM D1761-12, Standard Test Methods for Mechanical Fasteners in Wood.
- .3 CSA International
 - .1 CSA-B111-1974 (R2003), Wire Nails, Spikes and Staples (Clous, fiches et cavaliers en fil d'acier).
 - .2 CSA-O112.9-10 (R2014) - Evaluation of adhesives for structural wood products (exterior exposure).
 - .3 CSA-O121-08 (R2013), Douglas fir plywood.
 - .4 CSA-O141-05 (R2014), Softwood lumber.
 - .5 CSA-O153-13, Poplar plywood.
 - .6 CSA-Z809-16, Sustainable forest management.
- .4 National Lumber Grade Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber, 2014.
- .5 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001 V5-0-2012, FSC Principle and Criteria for Forest Stewardship (Principes et critères de gestion forestière).
- .6 Sustainable Forestry Initiative (SFI)
 - .1 SFI 2015-2019, Standards and rules.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1. Submit product data and instructions and the manufacturer's documentation for wood products and accessories. The technical data must include product characteristics, performance criteria, physical size, finish and limitations.

1.4 QUALITY ASSURANCE

- .1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.

1.5 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, labeled with the name and address of the manufacturer.
- .3 Storage and Handling
 - .1 Store materials so they do not rest on the floor in a clean, dry, well ventilated, according to the manufacturer's recommendations.
 - .2 Store wood in order to protect against marks, scratches and scrapes.
 - .3 Replace materials and damaged or defective materials with new materials and equipment.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21, Management and disposal of construction / demolition waste.

Part 2 Products

2.1 LUMBER

- .1 Sawed lumber: softwood with S4S finish (bleached on all 4 sides).
 - .1 No more than 19% moisture.
 - .2 Complies to CSA O141.
 - .3 Complies with NLGA Standard Grading Rules for Canadian Lumber.
- .2 Anti-rot treatment, coloured pentachlorophenol base.
- .3 Hardware: nails, bolts, screws, nuts, screws, washers, lag screws and any other required item, to CSA B111 and ASTM D1761.
- .4 Furring, wedges, nailing strips, rough frames, battens and grounds, and sleepers:
 - .1 S4S finish.
 - .2 Boards of Standard or higher category.
 - .3 Dimensioned wood: light frame classification of Standard or higher category.
 - .4 Columns and square wood pieces: Standard or higher category.

- .5 Panels
 - .1 Outdoor use: immersion-treated Douglas fir plywood, water-resistant, marine-grade, to standards CSA-O121.
 - .2 Interior use: Douglas fir plywood, to standards CSA-O121, standard construction, appropriate thickness, humidity 8%, good both sides for carpentry and interior work. Plywood for indoor use must not contain any added urea-formaldehyde resin.
 - .3 Poplar plywood: to CSA-O153, fire retardant.
 - .1 Pressure treated to improve fire resistance.
 - .2 Labelled by certified test agency such as Underwriters Laboratories of Canada.
 - .4 Wood particle board for interior finishing: in accordance with standard NLGA.

2.2 ACCESSORIES

- .1 All-purpose glue: complies with CSA standards O112.9 series.
- .2 Nails, staples and horsemen conform to CSA-B111 and ASTM-D1761.
- .3 Bolts: with nuts and washers, with a diameter of 12.5 mm, unless otherwise stated.
- .4 Patented Attachments: toggle bolts, expandable pads with coach screws, screw with lead sleeves or inorganic fibers, explosive actuated devices recommended by the manufacturer.
- .5 H Staples for roof coverings: a thickness suitable for the panels, and approved by the Ministry Representative.
- .6 Finished fasteners
 - .1 Galvanized Metal: according to ASTM A123 / A123M and ASTM A653 for wood structures.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: before proceeding with product installation, ensure that the state of surfaces / materials previously implemented under other sections or contracts is acceptable and can perform the work in accordance with instructions written by manufacturer.
- .2 A visual inspection of surfaces / materials in the presence of Ministry Representative.
- .3 Immediately notify the Ministry Representative of unacceptable conditions detected.
- .4 Start the installation work only after correcting the unacceptable conditions and written approval of the Ministry Representative.

3.2 PREPARATION

- .1 Treat surfaces of material with wood preservative, before installation.
- .2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and one minute soak on plywood.

- .3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

3.3 INSTALLATION

- .1 Install members true to line, levels and elevations, square and plumb.
- .2 Construct continuous members from pieces of longest practical length.
- .3 Install spanning members with "crown-edge" up.
- .4 Select exposed framing for appearance. Install lumber materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.
- .5 Install roof sheathing in accordance with requirements of NBC.
- .6 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding [electrical equipment mounting boards], and other work as required.
- .7 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .8 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using [galvanized] [steel] fasteners.
- .9 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

3.4 ASSEMBLY

- .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.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

3.6 PROTECTION

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

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 00 - Common work results for masonry
- .2 Section 04 05 19 - Masonry anchorage and reinforcing
- .3 Section 04 05 23 - Masonry Accessories
- .4 Section 07 26 00 - Vapour Retarders and Air Barriers

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM D2842-12, Standard Test Method for Water Absorption of Rigid Cellular Plastics.
 - .2 ASTM E96/E96M-16, Standard Test Methods for Water Vapour Transmission of Materials.
- .2 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S604-M91, Type A Chimneys.
 - .2 CAN/ULC-S701-11, Standard for thermal insulation, polystyrene, boards and pipe covering.
 - .3 CAN/ULC-S702-14, Thermal Insulation, Mineral Fibre, for Buildings.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .2 CAN/CSA-B149.1-15, Natural Gas and Propane Installation Code.
 - .3 CAN/CSA-B149.2-15, Propane Storage and Handling Code.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.3 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.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's insulation products and adhesives.
- .2 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

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

- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse 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.

Part 2 Products

2.1 INSULATION

- .1 Rigid insulation – Extruded polystyrene panel: to CAN/ULC-S701. Closed cell rigid insulation, CFC free, with high-density continuous skin surface.
 - .1 Type : 4.
 - .2 RSI : 0,88 m²K/W / 25mm
 - .3 Compressive resistance: minimum 210 kPa.
 - .4 Water absorption (ASTM D2842): 0.7% by volume, maximum.
 - .5 Thickness: as indicated (ASTM E96) : maximum 50ng/Pa s m²
 - .6 Recycled content : 20% minimum.
 - .7 Thickness: as indicated
 - .8 Dimensions : 610 mm x 2440 mm.
 - .9 Edges : ship-lapped.

2.2 ACCESSORIES

- .1 Adhesive: in accordance with manufacturer's recommendations.
- .2 Galvanized steel sheet items: 1.2 mm minimum thickness, consisting of an assembly of sheet folded in an "L" shape to form a "Z" or "U" suiting thickness of insulation and containing a thermal break.
- .3 Anchors for insulation:
 - .1 Installation on a masonry or half-timber wall: high resistance to corrosion in lengths suited to insulation being installed, equipped with a galvanized metal washer 50 mm in diameter.
 - .2 Nail: galvanized steel, measuring 25 mm longer than the thickness of the insulation, to CSA B111 standard.
 - .3 Staples: legs of at least 12 mm in length.

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 WORKMANSHIP

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
- .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN4-S604 type A chimneys CAN/CGA-B149.1 and CAN/CGA-B149.2 type B and L vents.
- .5 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .6 Offset both vertical and horizontal joints in multiple layer applications.
- .7 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.3 EXAMINATION

- .1 Examine substrates and immediately inform Departmental Representative in writing of defects.
- .2 Prior to commencement of work ensure:
 - .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

3.4 RIGID INSULATION INSTALLATION

- .1 Exterior application:
 - .1 Fasten first row of insulation using adhesive.
 - .2 Apply a layer of adhesive on support and insulation panels, in accordance with manufacturer's recommendations.
 - .3 Lay panels against outer face of perimeter foundation walls, to indicated level.

3.5 CLEANING

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

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 06 10 00 - Rough Carpentry
- .2 Section 07 26 00 - Vapour Retarders and Air Barriers
- .3 Section 08 44 13 – Glazed Aluminum Curtain Walls
- .4 Section 09 21 16 - Gypsum Board Assemblies.
- .5 Section 09 22 16 - Non-structural Metal Framing

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C1320-10 (2016), Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .3 Laboratoires des assureurs du Canada (ULC)
 - .1 CAN/ULC-S702-14, Standard for Mineral Fibre Insulation.
 - .2 CAN/ULC-S702.2-15, Standard for Mineral Fibre Thermal Insulation for Buildings, Part 2: Installation Third Edition

1.3 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.

1.4 QUALITY ASSURANCE

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Health and safety: take necessary health and safety measures in construction in accordance with Section 01 35 29.06 – Health and Safety 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: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements

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

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse 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.

Part 2 Products

2.1 INSULATION

- .1 Blanket insulation
Batt and blanket mineral fibre.
 - .1 To CAN/ULC-S702, type 1.
 - .2 RSI : 0,62 m² °C/W / 25mm.
 - .3 Recycled content: 40% minimum.
 - .4 Thickness : as indicated.
- .2 Acoustical insulation
Acoustic insulation, fire-rated, mineral fibre: volcanic rock and slag.
 - .1 To CAN/ULC-S702, type 1.
 - .2 Density: 45 kg/m³.
 - .3 RSI: 0.76 m² °C/W / 25 mm.
 - .4 Flame propagation: 0
 - .5 Smoke developed: 0
 - .6 Recycled content: 40% minimum
 - .7 Thickness: as indicated.

2.2 ACCESSORIES

- .1 Insulation clips:
 - .1 Clips : Impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.
- .2 Nails: galvanized steel, length to suit insulation plus 25 mm, to CSA B111.
- .3 Staples: 12 mm minimum leg.
- .4 Tape: as recommended by manufacturer.

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

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

3.2 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 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.

3.3 INSULATION INSTALLATION

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces and to CAN/ULC S702.2 and ASTM C1320.
- .2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .3 Do not compress insulation to fit into spaces.
- .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures.
- .5 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 19 – Masonry anchorage and reinforcing
- .2 Section 07 26 00 - Vapour retarders.
- .3 Section 08 44 13 - Glazed aluminum curtain walls.
- .4 Section 09 21 16 - Gypsum Board Assemblies.
- .5 Section 09 22 16 - Non-structural Metal Framing

1.2 REFERENCES

- .1 Canadian Urethane Foam Contractors Association (CUFCA)
- .2 Green Seal (GS)
 - .1 GS-11, Standard for Paints and Coatings.
- .3 South Coast Air Quality Management District (SCAQMD)
 - .1 SCAQMD Rule 1113-13, Architectural Coatings.
- .4 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM C518-15, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - .2 ASTM C1338-14, Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
 - .3 ASTM D1621-10, Standard Test Method for Compressive Properties Of Rigid Cellular Plastics.
 - .4 ASTM D1622-14, Standard Test Method for Apparent Density of Rigid Cellular Plastics.
 - .5 ASTM D1623-09, Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
 - .6 ASTM D2126-15, Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
 - .7 ASTM D2842-97, Standard Test Method for Surface Strength of Paper (Wax Pick Method).
 - .8 ASTM D6226-15, Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
 - .9 ASTM E 96-15, Test Methods for Water Vapour Transmission of Materials.
- .5 Underwriters Laboratories of Canada (ULC).
 - .1 CAN/ULC-S101-14, Standard Methods of Fire Endurance Tests of Building Construction and Materials.
 - .2 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies.
 - .3 CAN/ULC-S705.1-15, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density.

- .4 CAN/ULC-S705.2-05, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density - Application.
- .5 CAN/ULC-S770-15, Standard test method for determination of long term thermal resistance of closed-cell thermal insulating foams.
- .6 CAN/ULC-S774-14, Standard Laboratory Guide for the Determination of Volatile Organic Compound Emissions from Polyurethane Foam.
- .6 Canadian Urethane Foam Contractors Association (CUFCA).
 - .1 Quality Assurance Program.
 - .2 Sprayed Polyurethane Foam – Certified Installer – Manual.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section [01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.
- .3 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Test reports: submit certified test reports for insulation from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 - .2 Submit test reports in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.
 - .3 Submit laboratory report on compatibility and adhesion between various products used: polyurethane, coatings, membranes, all other substrates.
- .4 Manufacturer's inspection reports
 - .1 Field inspection reports by manufacturer: Submit no later than three (3) days after inspections set out in FIELD QUALITY CONTROL in Part 3, with copies of manufacturer's written reports indicating that work complies with prescribed criteria.

1.4 QUALITY ASSURANCE

- .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .2 Installer doing work under this section must be trained and accredited by CUFCA.
- .3 Contractor conducting work under this section must hold a licence in good standing from certifying organization CUFCA (Canadian Urethane Foam Contractors Association).
 - .1 Provide to CUFCA a copy of insulation contractor's certification licence, names of polyurethane installers and a copy of their accreditations.
- .4 Mock-up:

- .1 Construct mock-up 10 m² minimum, of sprayed insulation including one inside corner, one outside corner, one openings and the overall typical project characteristics. Mock-up may be part of finished work.
- .5 Provide a copy of daily quality control reports as required under CAN/ULC-S705.2.
- .6 Role of manufacturer's representative:
 - .1 Verify substrate prior to commencement of work, during application and upon completion.
 - .2 Provide technical assistance to installer and assist with proper installation of insulation.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements
 - .1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS AND PROTECTION MEASURES

- .1 Ventilate area in accordance with Section 01 51 00 - Temporary Utilities.
- .2 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hour after application to maintain non-toxic, unpolluted, safe working conditions.
- .3 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.
- .4 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.
- .5 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
- .6 For spraying in inhabited buildings:
 - .1 Delineate and isolate work area.
 - .2 All ventilation conduit openings to be sealed prior to spraying.
 - .3 Install exhaust fan for air exfiltration outside building.
 - .4 Work area to be under negative pressure, at minimum exfiltration rate of 0.3 ACH (air change per hour).
 - .5 Work area to be kept under negative pressure for minimum of 24 hours.
- .7 Protect adjacent surfaces from damage that may be caused by projection.

Part 2 Products**2.1 INSULATION**

- .1 Sprayed on insulation: sprayed polyurethane foam closed-cell, to CAN/ULC S705.1, TYPE 2.
 - .1 Density: ASTM D1622 minimum : 33 Kg/m³
 - .2 Thermal resistance: ASTM C518, 180 j /23⁰C minimum 1,17 / 25mm RSI
 - .3 Long term thermal resistance: CAN/ULC S770 minimum 1,05 / 25mm RSI
 - .4 Dimensional stability: ASTM D 2126 (% change in volume, 28-day free sample), -200C Min., -0.03%, 70⁰C, H.R.>97 +/- 3% Max. +9.8%, 80⁰C, Max. +2.9%.
 - .5 Flame spread: CAN/ULC S102 Max. 200 IPF
 - .6 Smoke development: CAN/ULC S102 Max 396 IDF
 - .7 Compressive resistance: ASTM D1621 minimum 195 KPa
 - .8 Tear resistance: ASTM D1623 minimum 355 KPa
 - .9 Open cells: ASTM D6226 < 1%
 - .10 Water absorption: ASTM D2842 Max. 0.8%
 - .11 Mould resistance: ASTM C1338 minimum, no growth
 - .12 VOC: CAN/ULC S 774, max. 1 day
- .2 Insulation applied by injection: semi-rigid dual-component low-density polyurethane foam for application by injection, in accordance with CAN/ULC S705.1.
 - .1 Density: ASTM-D-1622, 8.08 kg/m³
 - .2 Water absorption (%): ASTM D-2842, 74%
 - .3 Heat resistance: ASTM C-518, 0.61 / 25mm RSI (180 days at 23°C)
 - .4 Dimensional stability: ASTM D-2126 % variation in volume (28 days)
 - 20°C min. 0.8%
 - 70°C max. -2.3% (90% HR)
- .3 Primers: in accordance with manufacturer's recommendations for surface conditions.
- .4 Thermal barrier: Portland cement based cementitious fireproofing approved by Underwriters Laboratories (ULC).
 - .1 Density: 384 kg/m³
 - .2 Bond strength : 2441 kg/m²

2.2 EQUIPEMENT

- .1 Spray equipment must comply with CAN/ULC S705.2 and manufacturer's recommendations.

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 VERIFICATION

- .1 Verify if work already carried out is ready for work under this section. Report any discrepancy or non-compliant component. Do not begin work until corrective measures have been applied.
 - .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 Ensure that all work to be performed before application of insulation is completed. This work includes, but is not limited to, the following:
 - .1 Masonry links;
 - .2 Furring, blockings, rough frames, backs of fasteners, recessed items;
 - .3 Coating, membrane, flashing, counter-flashing;
 - .4 Mechanical restraints;
 - .5 Mechanical and electrical work;
 - .6 Firewall;
 - .7 Primer.
- .3 In accordance with CAN/ULC-S705.2 and requirements below, check these conditions:
 - .1 Surfaces to be covered with foam thermal insulation must be free of moisture, frost, oil, rust or other foreign matter that may hamper product adhesion. In case of doubt, apply primer.
 - .2 Ensure full curing of substrates: concrete, mortar, coatings, membranes, primers or any other surfaces, before foam is sprayed.
 - .3 Ensure that adhesion of membranes and coatings to various substrates is adequate, taking account of weather conditions when membranes, coatings and sprayed insulation are applied.
- .4 Oily surfaces such as Z bars, steel deck, curtain wall purlin and mullion to be primed as described in CAN/ULC-S705.2, Section A 1.7.
- .5 Comply with acceptable moisture content for each material.

3.3 APPLICATION

- .1 Prime galvanized metal surfaces (sous-entremises) and others as recommended by manufacturer.
- .2 Drill hollow structural elements to allow the injection of insulation where indicated.
- .3 Temporarily brace doors and windows to prevent warping of frames due to expansion of sprayed in place insulation.
- .4 Apply insulation so as to ensure continuous heat protection to building items and empty spaces.
- .5 Follow recommendations in CAN/ULC-S705.2 regarding use of primer.

- .6 Apply insulation on clean, dry surfaces and when weather conditions meet requirements in CAN/ULC-S705.2 and in manufacturer's instructions.
- .7 Apply insulation when only when surface temperatures of substrate and ambient air are above -20°C.
- .8 Project insulation in successive layers each at least 15 mm and at most 50 mm thick.
- .9 Carefully adjust insulation on items to be covered and around electrical boxes, pipes, air ducts and framing running through it.
- .10 Do not apply insulation less than 75 mm from chimneys, steam ducts, recessed lighting or other heat sources.
- .11 In places where plastic foam insulation is exposed in shaft and depending on the details to the drawings, cover the insulation with a thermal barrier continues according to regulations and the requirements of the manufacturer.
- .12 Do not enclose insulation until installation work has been inspected and approved by Departmental Representative.

3.4 TOLERANCE

- .1 Apply product so as to have average total thickness of $\pm 6\text{mm}$ as indicated in drawings. Perform at least one inspection for every 150 m^2 of application surface.
- .2 Average is based on result of nine readings on a surface of 1 m^2 .

3.5 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.6 CLEANING

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Clean adjacent surfaces.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 00 - Common work results for masonry
- .2 Section 04 05 19 - Masonry anchorage and reinforcing
- .3 Section 06 10 00 - Rough Carpentry
- .4 Section 07 21 13 - Board insulation
- .5 Section 07 21 29.03 - Sprayed insulation – Polyurethane foam
- .6 Section 07 62 00 - Sheet Metal Flashing and Trim
- .7 Section 07 92 00 – Joint Sealing
- .8 Section 08 44 13 - Glazed aluminium curtain walls

1.2 Reference Standards:

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37-GP-56M (9th edition), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
 - .2 CAN/CGSB-51.34-34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.
- .2 American Society for Testing and Materials International (ASTM).
 - .1 ASTM D412-2013, Standard Test Methods for Mechanical Fasteners in Wood.
 - .2 ASTM D903-98 (2010), Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
 - .3 ASTM D1970 / D1970M – 16, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - .4 ASTM D5147/5147M-14, Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
 - .5 ASTM E 96/96M-16, Test Methods for Water Vapour Transmission of Materials.
 - .6 ASTM D5590 - 00(2010)e1, Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay.
 - .7 ASTM E154/154M-08a (2013)e1, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
 - .8 ASTM E283-04 (2012), Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - .9 ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls, by Uniform Static Air Pressure Difference.

- .10 ASTM E2178-13, Standard Test Method for Air Permeance of Building Materials.
- .11 ASTM E2357 – 11, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include:
 - .1 Product characteristics.
 - .2 Performance criteria.
 - .3 Limitations.
- .3 Submit one copy of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).
- .4 Mock-up:
 - .1 Construct mock-up approximately 6m² of sheet vapour retarder / air barrier installation including one lap joint, one inside corner and at one opening. Mock-up may be part of finished work.
 - .2 Mock-up will be used to judge workmanship, substrate preparation, and material application.
 - .3 Locate where indicated.
 - .4 Allow 48 hours for inspection of mock-up by Departmental Representative before proceeding with vapour barrier work.

1.4 QUALITY ASSURANCE

- .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Instructions: submit manufacturer's installation instructions and comply with written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.
- .4 Membrane must be installed by installer trained and recognized by manufacturer of product to be installed.
- .5 Installer must provide Departmental Representative proof of certification if requested.
- .6 Role of manufacturer's representative:
 - .1 Verify substrate prior to commencing work, during installation of membrane and upon completion of work.
 - .2 As required, provide technical assistance to installer and assist with installing membrane properly.

- .7 Materials: provide and install basic materials for each type of product from same manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Storage and protection:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver in labelled packaging. Store and handle in accordance with manufacturer's instructions. Protect from weather, extreme temperatures and work site incidents. Remove and dispose of damaged materials in accordance with applicable regulations.

1.6 SITE CONDITIONS

- .1 Site Environmental Requirements:
 - .1 Maintain substrate surface to be waterproofed at temperature indicated in written instructions of waterproofing sealant manufacturer.
 - .2 Install upon completion of construction work and preparation of substrate, ready to receive waterproofing membrane.
 - .3 Protect the plants and vegetation from damage caused by the work.

1.7 WASTE MANAGEMENT AND ISPOSAL

- .1 Separate waste materials for reuse 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 Divert unused sealants and caulking to a certified hazardous materials site.
- .4 Do not dispose of unused sealing products into waterways, storm or sanitary sewers, lake or other area representing a health and environmental risk.

1.8 EXTENDED WARRANTY

- .1 For Work of this Section 07 26 00 – Vapour retarders and air barrier, the 12-month warranty period is extended to 60 months.
- .2 Provide a written document jointly prepared and signed by the manufacturer and the installer and issued in the name of Canada, ensuring the work against defects in materials, workmanship and installation for the period specified above.

Part 2 Products

2.1 SELF-ADHESIVE MEMBRANE, TYPE 1

- .1 Transitional membrane, connection and sealing of perimeter of outer openings and sealing tape. SBS modified bitumen composite sheet with cross-laminated polyethylene film, minimum thickness 1.0 mm (40 mils) and suitable width.
- .2 Minimal requirements:
 - .1 Air leakage: <0.005 L/s.m² @ 75 Pa to ASTM E283-91;

- .2 Water vapour permeance: 1.71 ng/Pa.m².s (0.03 perms) to ASTM E96;
- .3 Low temperature flexibility: -30 °C to CGSB 37-GP-56M;
- .4 Elongation: 200% to ASTM D412-modified.

2.2 SELF-ADHESIVE MEMBRANE, TYPE 2

- .1 Through-wall Flashing and Dampproof Course Membrane. Self-adhered membrane consisting of an SBS rubberized asphalt compound, complete with a cross-laminated polyethylene film, of 1mm nominal thickness and appropriate width.
- .2 Minimal requirements :
 - .1 High Temperature Stability - Flow Resistance: 110 deg C, tested to ASTM D5147
 - .2 Air leakage: 0.005 L/s.m² @ 75 Pa to ASTM E283;
 - .3 Water vapour permeance: 1.6 ng/Pa.m².s to ASTM E96;
 - .4 Low temperature flexibility: -30°C to CGSB 37-GP-56M.

2.3 LIQUID VAPOUR RETARDER AND AIR BARRIER MEMBRANE, TYPE 3:

- .1 One component elastomeric bitumen, trowel or spray applied to a wet film thickness of 3mm and having the following characteristics:
 - .1 Solids By Weight: 55%
 - .2 Air permeability: 0.0006 L/s.m² @ 75 Pa., tested to ASTM E2178
 - .3 Tested to ASTM E2357 for Air Leakage of Air Barrier Assemblies
 - .4 Water Vapour Permeance: 5.0 ng/Pa.m².s., tested to ASTM E96
 - .5 Tensile Strength: 820 kPa, tested to ASTM D412
 - .6 Elongation : 800%, tested to ASTM D412
 - .7 Recovery: 90%, tested to CAN/CGSB 37.58
 - .8 Nail Sealability : Pass, tested to ASTM D1970
 - .9 Resistance to Mold, Mildew & Fungal Growth: No Growth, tested tp ASTM D5590
 - .10 Application Temperature: 4 deg C minimum

2.4 SELF-ADHESIVE MEMBRANE, TYPE 4:

- .1 Base sheet membrane composed of SBS modified bitumen with a glass mat reinforcement. The surface is sanded. The underface is covered with a release protection film.
- .2 Minimal requirements:
 - .1 Meet CAN/CGSB 37-GP 56;
 - .2 Thicknessr : 2.5mm;
 - .3 Strain energy : 8,4/8,3 KN/m;
 - .4 Breaking strength : 18/16 KN/m;
 - .5 Ultimate elongation : 55 / 56%;
 - .6 Tear resistance : 120N;
 - .7 Static puncture resistance : 380 N;

- .8 Cold bending :
 - .1 Initial: -30 degrés C
 - .2 90 days at 70 degrés C: -30 degrés C

2.5 PRIMER FOR SELF-ADHESIVE MEMBRANE

- .1 Primer composed of SBS synthetic rubbers, adhesion-enhancing resins and volatile solvents. It is used to enhance the adhesion of self-adhesive membranes on various substrates.

2.6 ADHESIVE FOR TYPE 4 MEMBRANE

- .1 SBS modified bitumen based liquid adhesive.

2.7 ACCESSORIES

- .1 Sealant: compatible with vapour retarder materials, recommended by vapour retarder manufacturer.

Part 3 Execution

3.1 EXAMINATION AND PREPARATION OF SURFACES

- .1 Inspect substrate and ensure related work is completed prior to beginning work. Commencement of work constitutes acceptance of installation conditions.
- .2 Ensure surfaces are smooth, dry, free of ice and debris prior to starting work in accordance with manufacturer's prescriptions and recommendations.
- .3 Do not install materials when it is raining or snowing.
- .4 Allow concrete to cure for fourteen (14) days; an adhesion test is recommended prior to installation.
- .5 Provide solid support for cracks bigger than 3.2 mm. Fill cracks using manufacturer's recommended method.
- .6 Cover expansion joints with self-adhering reinforcing membrane 150 mm centred on joint.

3.2 LAYING OF TRANSITIONAL MEMBRANE AT JOINTS AND OPENINGS

- .1 Prime surfaces to receive membrane at rate recommended by membrane manufacturer. Do not prime more than can be covered the same day with membrane. Prime surfaces again if membrane is not applied the same day.
- .2 Cover all interior and exterior angles with 150 mm wide membrane strip centred on corner. Apply directly to primed substrate, removing space between substrate and membrane.
- .3 All window frames, aluminum screens, hollow metal door frames, spandrel panels and interface of different materials to be covered with a strip of self-adhesive membrane.
- .4 Align and place self-adhesive transitional membrane, remove protective film and press firmly into place.

- .5 Lap each strip by 50 mm laterally and transversally.
- .6 Repair tears and holes with suitable membrane. Overlap damaged area minimum 100 mm. Seal patch with sealing compound.
- .7 After entire membrane is glued, apply pressure over surface using rubber roller.
- .8 Carefully examine membrane at the end of each day and prior to installation of liquid vapour retarder and air barrier membrane. Seal top edge of membrane with mastic at the end of the day when rain is forecast or if application is delayed by more than one day.
- .9 Cover small projections (pipes, etc.) with detail membrane and seal with mastic.
- .10 Use sheets of largest practical size to minimize joints.

3.3**LAYING OF TRANSITIONAL MEMBRANE ON ROOFS**

- .1 In places where a transitional membrane is to be installed on a roof, use a metal brush to scratch surface of waterproofing membrane to remove granular layer.
- .2 Prime surfaces to receive membrane at rate recommended by membrane manufacturer. Do not prime more than can be covered the same day with membrane. Prime surfaces again if membrane is not applied the same day.
- .3 Trowel apply the adhesive on the existing roof membrane, 125mm wide along the overlap strip.
- .4 Align and place self-adhesive transitional membrane, leaving a 25mm wide free edge for thermowelding, remove protective film and press firmly into place.
- .5 Lap each strip by 150 mm laterally.
- .6 After entire membrane is glued, apply pressure over surface using rubber roller.
- .7 Seal end of self-adhesive membrane to existing roof membrane by thermowelding 25mm wide.
- .8 Install pre-finished metal protective flashing on top of self-adhesive membrane. Refer to Section 07 62 00 – Sheet Metal Flashing and Trim.

3.4**THROUGH-WALL FLASHING INSTALLATION**

- .1 Prime surfaces to receive membrane at rate recommended by membrane manufacturer. Do not prime more than can be covered the same day with membrane. Prime surfaces again if membrane is not applied the same day.
- .2 Apply through-wall flashing and dampproof coursing membrane in accordance with CSA A371 Masonry Construction for Buildings; along the base of masonry veneer walls, over window, door and other wall openings required to be protected.
- .3 Applications shall form a continuous flashing membrane and shall extend a minimum of 200mm up the back-up wall.
- .4 150mm minimal longitudinal overlap.
- .5 Ensure through-wall flashing membrane extends fully to the exterior face of the exterior masonry veneer. At locations where flashing terminates or intersects wall openings including door frames, “end dam” flashing to protect openings and redirect water out. Trim off excess as directed by the consultant.

- .6 Align and position the leading edge of self-adhering through-wall flashing membrane with the front horizontal edge of the foundation walls, self angles and other substrates to be protected, partially remove protective film and roll membrane over surface and up vertically.
- .7 Press firmly into place. Ensure minimum 50mm overlap at all end and side laps. Promptly roll all laps and membrane to affect the seal.
- .8 Seal junctions with other surfaces to ensure continuity of air/vapour barrier system. Seal membrane penetrated by anchors or other construction element with liquid membrane.
- .9 Apply sealing bead at the end of each work day to top edge of membrane and ends to prevent water infiltration between substrate and membrane.

3.5 LAYING OF LIQUID MEMBRANE

- .1 Ensure that all intramural transitional membranes and flashing membranes are installed correctly before installing liquid membrane.
- .2 Squirt or trowel a continuous unbroken film of air- and vapour-blocking liquid membrane to a thickness of 3 mm of damp film.
- .3 Overlap transitional membranes by at least 50 mm.
- .4 Squirt or trowel air seal around edges of projections to ensure full, continuous covering.
- .5 Let air- and vapour-blocking membrane harden fully before laying insulation.

3.6 INSULATION INSTALLATION

- .1 Coordinate inspection of waterproofing work with Departmental Representative 48 hours in advance prior to installation of insulation.
- .2 Refer to section 07 21 29.03 - Sprayed insulation – Polyurethane foam.

3.7 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 RELATED REQUIREMENTS**

- .1 Section 04 05 00 - Common work results for masonry
- .2 Section 04 21 13 - Brick Masonry
- .3 Section 06 10 00 - Rough Carpentry
- .4 Section 07 26 00 – Vapour Retarders and Air Barriers
- .5 Section 07 92 00 – Joint Sealing
- .6 Section 08 44 13 - Glazed Aluminum Curtain Walls

1.2 REFERENCES

- .1 The Aluminum Association Inc. (AAI)
 - .1 AAI-Aluminum Sheet Metal Work in Building Construction-2002.
 - .2 AAI DAF45-03, Designation System for Aluminum Finishes.
- .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A240/A240M-15b, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - .2 ASTM A792/A792M-10(2015), Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .3 ASTM D523-14, Standard Test Method for Specular Gloss.
 - .4 ASTM D822/D822M-13, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .3 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual (2011).
- .4 Association des Maîtres Couvresseurs du Québec (AMCQ).
 - .1 Manuel de devis de l'AMCQ.
- .5 Canadian Standards Association (CSA)/CSA International
 - .1 AAMA/WDMA/CSA 101/I.S.2/A440-11, Standard/Specification for Windows, Doors, and Unit Skylights.
 - .2 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

- .3 Samples:
 - .1 Submit 2 - 50 x 50 mm samples of each type of sheet metal material, finishes and colours.
- .4 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.4 DELIVERY, STORAGE AND HANDLING

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

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Sort waste for reuse, recycling and recovery in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 SHEET METAL MATERIALS

- .1 Aluminum-zinc alloy coated steel sheet: to ASTM A792/A792M, commercial quality, grade AZ180 coating, not chemically treated, for paint finish, 0,65 mm base metal thickness.
- .2 Stainless steel sheet: to ASTM A240/A240M, grade 304.
- .3 Aluminum sheet: commercial quality, 1,6 mm base metal thickness

2.2 PREFINISHED STEEL SHEET

- .1 Flashing and metal trim for brick cladding: prefinished steel sheet, factory-coated with silicon-modified polyester layer, minimal thickness 0.65mm unless specified otherwise.
 - .1 Category: F1S
 - .2 Colour: chosen by the Representative of the Ministry, among the standard colors offered by the manufacturer. Consider a color per coating type.
 - .3 Specular gloss: 30 units, with a maximum deviation of 5 units more or less, according to ASTM D523.
 - .4 Coating thickness: at least 25 micrometers.
 - .5 Resistance to accelerated weathering with a chalk rating of 8, a bleach plus 5 units and an erosion of less than 20%: in accordance with ASTM D822 under the conditions of the following test.
 - .1 Exposure time weathering: 1000 hours.
 - .2 Duration of exposure to moisture: 1000 hours.

2.3 PREFINISHED ALUMINUM SHEET

- .1 Finishing coating: visible surfaces of constituent aluminum elements must be finished in accordance with "Designation System for Aluminum Finishes" published by Aluminum Association.
- .2 Natural anodized finish, Class 1, designation AA-M12C22A41.
- .3 Thickness specified for prefinished aluminum sheet applies to base metal.

2.4 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Sealants: refer to 07 92 00 – Joint Sealing.
- .3 Underlay for metal flashing: self-adhesive membrane; refer to Section 07 26 00 – Vapour Retarders.
- .4 Cleats: of same material, and temper as sheet metal, minimum 100 mm wide. Thickness same as sheet metal being secured.
- .5 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.
- .6 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .7 Touch-up paint: as recommended by prefinished sheet metal manufacturer.

2.5 FABRICATION

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details and as indicated.
- .2 Fabricate aluminum flashings and other sheet aluminum work in accordance with AAI-Aluminum Sheet Metal Work in Building Construction.
- .3 Form pieces in 2400 mm maximum lengths.
 - .1 Make allowance for expansion at joints.
- .4 Hem exposed edges on underside 12 mm.
 - .1 Mitre and seal corners with sealant.
- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.6 METAL FLASHINGS

- .1 Form flashings, copings and fascias to profiles indicated, of galvanized prefinished steel, and include staples.

2.7 REGLETS AND CAP FLASHINGS

- .1 Shape metal cap flashing and reglet strips of 0.65 mm thick sheet metal to be built-in work for base flashings as detailed.
 - .1 Provide slotted fixing holes and steel/plastic washer fasteners.

2.8 ALUMINUM FINISHES

- .1 Finish exposed surfaces of aluminum components in accordance with AA DAF45.
 - .1 Integral colour anodic finish: designation AA-M12C22A41 colour to match Departmental Representative's sample.
- .2 Appearance and properties of anodized finishes designated by Aluminum Association as Architectural Class 1, Architectural Class 2, and Protective and Decorative: to AAMA/WDMA/CSA-101/I.S.2/A440, for coating Classes 1, 2 and 3 respectively.

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

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

3.2 INSTALLATION

- .1 Install sheet metal work as detailed.
- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal.
 - .1 Secure in place and lap joints 100 mm.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
 - .1 Flash joints using S-lock seams forming tight fit over hook strips, as detailed.
- .5 Lock end joints and caulk with sealant.
- .6 Install surface mounted reglets true and level, and caulk top of reglet with sealant.
- .7 Insert metal flashing into reglets under cap flashing to form weather tight junction.
- .8 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.
- .9 Caulk flashing at reglet cap flashing with sealant.
- .10 Install pans, where shown around items projecting through roof membrane.

3.3 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 21 13 - Brick Masonry
- .2 Section 09 21 16 - Gypsum Board Assemblies.
- .3 Section 09 22 16 - Non-structural Metal Framing.

1.2 REFERENCES

- .1 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S115-11, Fire Tests of Fire stop Systems.
 - .2 CAN/ULC-S101-14, Standard Methods of Fire Endurance Tests of Building Construction and Materials Fifth Edition.
- .1 American Society for Testing and Materials (ASTM International)
 - .1 ASTM C612-14, Isolant thermique de fibre minérale en panneaux.
 - .2 ASTM E119-16, Standard Test Methods for Fire Tests of Building Construction and Materials.
 - .3 ASTM E814-13a, Standard Method of Fire Test of Through-Penetration Fire Stops.

1.3 DEFINITIONS

- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- .2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.
- .4 Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.
 - .1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.4 PERFORMANCE REQUIREMENTS

- .1 Perform work in strict accordance with flame resistance test data as per ASTM E-119 (CAN/ULC-S101) and with Underwriters' Laboratories (ULC) test. Complies with municipal and provincial regulations and with National Building Code requirements.

1.5 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.
- .3 Certification records
 - .1 Submit certification records to Departmental Representative for verification for each different fire seal situation.
 - .2 Each record must contain all necessary information on completion of sealing, implementation conditions, etc. It must include name of certification body, test number and name of product(s) to be used.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver and store materials in dry place protected from weather, in their sealed container, intact, original, placed above-ground, with manufacturer's label and lead seal intact.
- .2 Do not use materials that have come into contact with water before being used.

1.7 TEMPERATURE

- .1 Temperatures of substrates, materials and ambient air shall be those recommended by manufacturer of product to be used.

1.8 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 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
 - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3.
- .2 Mineral fibre flame-retardant insulation:
 - .1 Rock wool insulation, to CAN4-S115, Type 1, with density of 72 kg/m³ and compressive strength of 6.9 kPa, compressed to 25% or more, minimum thickness of 89 mm; flame spread 0; smoke developed 0.
 - .2 Anchoring and restraint devices: based on manufacturer's recommendations and compatible with specified assemblies.
- .3 Elastomeric sealant of modified acrylic latex, fire-resistant:
 - .1 Sealants against fire and smoke, water-soluble, non-toxic, meeting or exceeding requirements of CAN/ULC-S115, CAN/ULC-S1019, ASTM E814 and ASTM E119, to seal apertures around metal ducts, pipes, conduits, wall/ceiling junctions, etc., as indicated.

FIRE STOPPING

- .2 Following variants will be considered:
 - .1 Floor; crossing duct, single or multiple: high-performance intumescent fire-resistant caulking.
 - .2 Masonry wall and drywall; single crossing duct: high-performance intumescent fire-resistant caulking.
 - .3 Masonry wall and drywall; multiple crossing ducts: fire-resistant mortar.
- .4 Dual-component foam: formulated for complex orifices.
- .5 Non-flexible mortar: waterproof, made of fibre-reinforced mortar cement foam.
- .6 Intumescent foam: in form of prefabricated blocks, for complex orifices or those to be reopened in the short term.
- .7 Intumescent rings: solid intumescent foam and galvanized steel collars.
- .8 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .9 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .10 Restraining, support, backing and anchoring devices: based on manufacturer's recommendations and compatible with established entities, proven and deemed acceptable by competent authorities.

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

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

3.2 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

FIRE STOPPING

- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

3.4 INSPECTION

- .1 Inspections: before concealing or covering materials or fire-resistant entities, inform Departmental Representative that work is ready for inspection.

3.5 SCHEDULE

- .1 Fire stop and smoke seal at:
 - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
 - .2 Intersection of fire-resistance rated masonry and gypsum board partitions.
 - .3 Penetrations through fire-resistance rated floor slabs, ceilings and roofs
 - .4 Around mechanical and electrical assemblies penetrating fire separ.
 - .5 Rigid ducts: greater than 129 cm² : fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

3.6 CLEANING

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

Part 1 GENERAL JOINT SEALING**1.1 RELATED REQUIREMENTS**

- .1 Section 04 21 13 - Brick Masonry
- .2 Section 07 62 00 - Sheet metal flashing and trim
- .3 Section 08 44 13 - Glazed aluminum curtain walls
- .4 Section 08 80 50 - Glazing.
- .5 Section 09 21 16 - Non-structural Metal Framing.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM C919-12, Standard Practice for Use of Sealants in Acoustical Applications.
 - .2 ASTM C920-14a, Standard Specification for Elastomeric Joint Sealants.
 - .3 ASTM C1135-15, Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants.
 - .4 ASTM C1248-08 (2012), Standard Test Method for Staining of Porous Substrate by Joint Sealants.
 - .5 ASTM D217-10, Standard Test Methods for Cone Penetration of Lubricating Grease.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-19.13-M87 Sealing Compound, One-component, Elastomeric, Chemical Curing.
 - .2 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
 - .3 CAN/CGSB-19.21-M87, Sealing and Bedding Compound, Acoustical
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

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 joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Manufacturer's product to describe:

- .1 Caulking compound.
 - .2 Primers.
 - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
 - .4 Compressible seams.
- .3 Submit one (1) copy of data sheets required under WHMIS, in accordance with Sections 01 35 29.06 – Health and Safety Requirements.
- .3 Samples:
 - .1 Submit 2 samples of each type of material and colour.
 - .2 As required, for purposes of harmonization with adjacent materials, submit dried samples of sealants to be left visible, for each proposed colour.
- .4 Manufacturer's Instructions:
 - .1 Submit instructions to include installation instructions for each product used.

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 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 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 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management

1.6 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Proceed with installation of joint sealants only when:
 - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4 degrees C.
 - .2 Joint substrates are dry.
 - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

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

1.7 ENVIRONMENTAL REQUIREMENTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.
- .2 Departmental Representative will arrange for ventilation system to be operated on maximum outdoor air and exhaust during installation of caulking and sealants. Ventilate area of work as directed Departmental Representative by use of approved portable supply and exhaust fans.

Part 2 Products

2.1 SEALANT MATERIALS

- .1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
- .2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.
- .3 Where sealants are qualified with primers use only these primers.
- .4 Sealants and caulking should not contain VOCs exceeding 5% by weight as calculated from description of quantity of constituents used to make product.
- .5 In this section, products and materials with following characteristics will be favoured: water-based, water-cleanable, non-flammable, low VOC content, made without compounds contributing to destruction of ozone layer in upper atmosphere, made without compounds contributing to increased smog in lower atmosphere, without methylene chloride content and without chlorinated hydrocarbon content.

2.2 SEALANTS – DESCRIPTION

- .1 Single-component silicone-based sealant: to CAN/CGSB-19.13.
- .2 Sealant for acoustic insulation: to ASTM C919.
- .3 Preformed backing materials, compressible and non-compressible.
 - .1 Polyethylene, urethane, neoprene or vinyl foam units.
 - .1 Extruded cellular foam filling rods.
 - .2 Units oversized by 30% to 50%.
 - .2 Neoprene units.

- .1 Round and full rods, Shore A hardness of 70.
- .3 High-density foam units.
 - .1 Extruded cellular PVC foam units of extruded cellular polyethylene foam, Shore A hardness of 20, tensile strength of 140 to 200 kPa; or of extruded polyolefin foam, density of 32 kg/m³; or of neoprene, in dimensions recommended by manufacturer.
- .4 Non-bonding tape.
 - .1 Polyethylene tape not adhering to sealant.
- .5 Type 1 product: Low-module silicone sealant, to ASTM C920 and C1248.
 - .1 Zero flow and subsidence after 20 minutes.
 - .2 Shore A hardness: 15.
 - .3 Tensile strength (ASTM C1135): 0.24 Mpa.
 - .4 Tear strength (ASTM C1135): 0.7 kN/m.
 - .5 Adhesive strength on glass and aluminum: 5.2 kN/m.
 - .6 Joint movement: +100% to -50%.
- .6 Type 2 product: General silicone sealant, to ASTM C920.
 - .1 Zero flow and subsidence after 20 minutes.
 - .2 Loss of adhesion: None.
 - .3 Recovery: 93%.
 - .4 Joint movement: +25%.
- .7 Type 3 product: Silicone latex sealant, to ASTM C834 and CAN/CGSB 19-GP-17M.
 - .1 To CAN/CGSB-19.21 and ASTM D217, non-hardening, non-peelable, non-staining and consistent.
- .8 Type 4 product: Multi-component polyurethane sealant, to ASTM C920, Type M, Grade NS, Class 50.
 - .1 Tensile strength: 2.06 to 2.75 Mpa.
 - .2 Elongation: 550%.
 - .3 Joint movement: +25%.
 - .4 Colour: Grey.

2.3 SEALANTS – LOCATIONS

- .1 Perimeter of apertures formed in exterior walls (brick, block or prefabricated masonry unit) with frame contiguous with finishing coat: Type 1 product.
- .2 Control and expansion joints in exterior surfaces of unit masonry walls: sealant type 1.
- .3 Coping joints and coping-to facade joints: sealant type 1.
- .4 Cornice and wash (or horizontal surface joints): sealant type 1.
- .5 Seal interior perimeters of exterior openings as detailed on drawings: sealant type 2.
- .6 Perimeters of interior frames, as detailed and itemized: sealant type 1.
- .7 Visible dividing joints formed in drywall partition structures: Type 3 product.

- .8 Around drywall panels, against metal frames, in concealed position: Type 6 product.
- .9 Sealant for glazing and curtain walls: Type 4 product.

2.4 JOINT CLEANER

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

Part 3 Execution

3.1 EXAMINATION

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

3.2 SURFACE PREPARATION

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.
- .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- .4 Ensure joint surfaces are dry and frost free.
- .5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

- .1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
- .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

- .1 Apply bond breaker tape where required to manufacturer's instructions.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

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

3.6 APPLICATION

- .1 Sealant:
 - .1 Apply sealant in accordance with manufacturer's written instructions.
 - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
 - .3 Apply sealant in continuous beads.
 - .4 Apply sealant using gun with proper size nozzle.
 - .5 Use sufficient pressure to fill voids and joints solid.
 - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
 - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
 - .8 Remove excess compound promptly as work progresses and upon completion.
- .2 Curing:
 - .1 Cure sealants in accordance with sealant manufacturer's instructions.
 - .2 Do not cover up sealants until proper curing has taken place.

3.7 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.

3.8 PROTECTION

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

END OF SECTION

Part 1 GENERAL GLAZED ALUMINUM CURTAIN WALLS**1.1 RELATED REQUIREMENTS**

- .1 Section 06 10 00 – Rough Carpentry.
- .2 Section 07 21 29.03 – Sprayed insulation – Polyurethane foam.
- .3 Section 07 26 00 – Vapour retarders and air barrier.
- .4 Section 07 62 00 - Sheet metal flashing and trim.
- .5 Section 07 84 00 – Firestopping.
- .6 Section 07 92 00 - Joint Sealing.
- .7 Section 08 71 00 – Door Hardware.
- .8 Section 08 71 00-A1 – Door Hardware – Annex 1, Hardware groups
- .9 Section 08 80 50 – Glazing.

1.2 REFERENCES

- .1 Aluminum Association (AA)
 - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 American Architectural Manufacturers Association (AAMA)
 - .1 AAMA CW-10-15, Care and Handling of Architectural Aluminum From Shop to Site.
 - .2 AAMA CW-11-85, Design Wind Loads and Boundary Layer Wind Tunnel Testing.
 - .3 AAMA 501-05, Methods of Test for Exterior Walls.
- .3 ASTM International
 - .1 ASTM A123/A123M-15, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A167-99(2009), Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .3 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .4 ASTM B209-14, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - .5 ASTM B221-14, Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - .6 ASTM D2240-15, Standard Test Method for Rubber Property—Durometer Hardness.
 - .7 ASTM E283-04(2012), Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

- .8 ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls, by Uniform Static Air Pressure Difference.
- .9 ASTM E331-00(2009), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference.
- .10 ASTM E547-00 (2009), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference.
- .11 ASTM E1105-15, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1.108-M89, Bituminous Solvent Type Paint.
 - .2 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.
- .5 CSA International
 - .1 CSA-S157/S157.1-F05, Strength Design in Aluminum.
 - .2 AAMA/WDMA/CSA-101/I.S.2/A440-11, NAFS - North american fenestration standard/Specification for windows, doors, and skylights.
 - .3 CSA W59-13, Welded steel construction (metal arc welding).
- .6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113, Architectural Coatings.
- .7 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S710.1-11, Standard for Thermal Insulation – Bead-Applied One Component Polyurethane Air Sealant Foam, Part 1: Material Specification.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Co-ordination: co-ordinate work of this Section with installation of fire stopping, air barrier placement, vapour retarder placement, flashing placement, installing ductwork to rear of louvres, components or materials with Section 07 26 00 - Vapour retarders and air barrier.
- .2 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting 1 week prior to beginning work of this Section on-site installation, with Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's written installation instructions and warranty requirements.
- .3 Arrange for site visit with Departmental Representative prior to start of Work to examine existing site conditions adjacent to demolition Work.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for curtain wall components, anchorage and fasteners, glass and infill, and internal drainage details and include product characteristics, performance criteria, physical size, finish and limitations and water flow diagrams.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec, Canada.
 - .2 Indicate system dimensions, framed opening requirements and tolerances, adjacent construction, anchor details anticipated deflection under load, affected related Work, weep drainage network, expansion and contraction joint location and details, and field welding required.
 - .3 Indicate scope and location of earthquake protections. Include calculations of earthquake protection design.
- .4 Samples:
 - .1 Submit copies in duplicate, for review and acceptance, of sample sections of curtain wall, 300 mm x 300 mm, showing surface, finish, colour and texture of prefinished aluminum, including a section of infill panel.
 - .2 Submit 2 samples 300 mm x 300 mm in size illustrating prefinished aluminum surface, finish, colour, texture, specified glass units, insulated infill panels, glazing materials illustrating edge and corner.
- .5 Test Reports:
 - .1 Submit substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria, and supportive data.

1.5 CLOSEOUT SUBMITTALS

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

1.6 QUALITY ASSURANCE

- .1 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Produce work sample of an insulated gatehouse showing intermediate mullions, corner mullions, window mullions, column coverings, glazed surfaces, insulated infill panels, and doors.
 - .1 Mock up shall be of a typical window bay size.
 - .2 Mockup to be assembled to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.

- .3 Locate mock-up where indicated by Departmental Representative.
- .4 Allow 5 working days for inspection of mock-up by Departmental Representative before proceeding with work.
- .5 When accepted, mock-up will demonstrate minimum standard of quality and materials for work of this Section.
- .6 Mock-up may not remain as part of finished work.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements 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 Handle work of this Section in accordance with AAMA CW-10.
 - .2 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .3 Store and protect aluminum glazed curtain wall components from nicks, scratches, and blemishes.
 - .4 Protect prefinished aluminum surfaces with wrapping strippable coating. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.
 - .5 Replace defective or damaged materials with new.

1.8 AMBIENT CONDITIONS

- .1 Install sealants when ambient and surface temperature is above 5 degrees C minimum.
- .2 Maintain this minimum temperature during and for 48 hours minimum after installation of sealants.

1.9 EXTENDED WARRANTY

- .1 Contractor hereby warrants that glazed aluminum curtain wall will function as specified in accordance with CCDC 24, but for 120 months.
- .2 Provide a written document jointly prepared and signed by the manufacturer and the installer and issued in the name of Canada, ensuring the work against defects in materials, workmanship and installation for the period specified above.

Part 2 Products

2.1 SYSTEMS

- .1 Description:
 - .1 Glazed aluminum four sided pin curtain wall system, includes tubular aluminum sections, verticals in two coupling sections and screws and grooves horizontal elements, allowing for ladder shop assembly. Vision glass, insulated metal panel spandrel infill, swinging or sliding doors, column covers, and louvres; related flashings, anchorage and attachment devices.

- .2 Sloped glazing system includes thermally broken tubular aluminum sections with self supporting supplementary support framing, shop fabricated, factory prefinished, vision glass plastic, insulated metal panel infill; related flashings, anchorage and attachment devices.
- .3 Assembled system to permit re-glazing of individual glass (and infill panel) units from interior exterior without requiring removal of structural mullion sections.
- .2 Performance Requirements:
 - .1 Design and size components to withstand dead and live loads caused by pressure and suction of wind, acting normal to plane of system as calculated in accordance with NBC.
 - .2 Design and size components to withstand seismic loads and sway displacement as calculated in accordance with applicable codes.
 - .3 Limit mullion deflection to $L/175$ to ASTM E330 or to a maximum of 14 mm, with full recovery of glazing materials.
 - .4 Size glass units and glass dimensions to limits established in CAN/CGSB-12.20.
 - .5 Ensure system is designed to accommodate the following without damage to components or deterioration of seals.
 - .1 Movement within system.
 - .2 Movement between system and perimeter framing components.
 - .3 Dynamic loading and release of loads.
 - .4 Deflection of structural support framing.
 - .6 Thermal Resistance and transmission of
 - .1 Heat transfer coefficient: Glazing and frame shall present a heat transfer coefficient (U) not exceeding:
 - .1 Winter: $1,363 \text{ W/m}^2\text{K}$.
 - .2 Summer: $1,192 \text{ W/m}^2\text{K}$.
 - .2 Spandrel panels: RSI value of at least 4.16 for purlins of typical depth.
 - .7 Condensation resistance to the frame the thermal performance is in accordance with AAMA 1503 a Condensation Resistance Factor ("condensation resistance factor" or CRF) greater than 70.
 - .8 Limit air infiltration through assembly to $0.0003 \text{ m}^3/\text{s/m}^2$ of wall area, measured at a reference differential pressure across assembly of 75 Pa as measured in accordance with ASTM E283.
 - .9 Vapour seal with interior atmospheric pressure of 25 mm sp, 22 degrees C, 40% RH: no failure
 - .10 Water leakage: none, when measured to ASTM E331 and ASTM E547, at differential pressure of 720 Pa applied to entire panel.
 - .11 Ensure system allows for expansion and contraction within system components when temperature range is 95 degrees C over 12 hour period without causing detrimental affect to system components.
 - .12 Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.
 - .13 Maintain continuous air barrier and vapour retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.

- .1 Position thermal insulation on exterior surface of air barrier and vapour retarder.
- .14 Ensure no vibration harmonics, wind whistles, noises caused by thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system occur.

2.2 MATERIALS

- .1 Extruded aluminum: to ASTM B221 alloy 6063.
 - .1 Finishing coats: To AAMA 2605 and AA DAF 45 Architectural Class I, clear anodized finish, minimum thickness 18 µm.
- .2 Sheet aluminum: to ASTM B209, utility category, clear anodized finish, 1588 mm thick.
- .3 Sheet steel: 0.952 mm thick, in accordance with ASTM A653/A653M, galvanized at 458 g/m² with corners sealed in concealed areas.
- .4 Steel sections: to ASTM A167, Type 304 stainless]; shaped to suit mullion sections.
- .5 Anchors: 3-way adjustable hot-dip galvanized cast iron.
- .6 Fasteners: stainless cadmium plate.
- .7 Bituminous paint: to CAN/CGSB 1.108-M89, Type 1, without thinner.
- .8 Insulated glazing panels:
 - .1 Refer to section 08 80 50 – Glazing.
- .9 Fire safety material : refer to section 07 84 00 - Fire Stopping.
- .10 Sealant:
 - .1 Sealant and structural sealant: refer to Section 07 92 00 – Joint Sealants.
 - .2 Sealing joints: EPDM compatible with silicone or extruded silicone, in accordance with limitations and restrictions in guideline DCC-045 regarding chemical composition.
 - .3 Supporting blocks: Neoprene, to CCD-45 and ASTM D2240, Shore A hardness 80 to 90 on durometer.
 - .4 Insulation: Single-constituent liquid foam hardening in moisture, low expansion level of sprayed foam in place. Product in accordance with ULC - S710.1 and manufacturer's written recommendations

2.3 COMPONENTS

- .1 Mullion profile
 - .1 Nominal dimension:
 - .1 Type 1: 50 mm x 63 mm.
 - .2 Type 2: 75 mm x 63 mm.
 - .3 Type 3: 100 mm x 63 mm.
 - .2 Thermal break with interior tubular frames insulated from exterior support plates.
 - .3 Matching stops and pressure plate of sufficient size and strength to ensure adequate bite on glass and infill panels.

- .4 Drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system.
- .5 Internal mullion baffles to eliminate "stack effect" air movement within internal spaces.
- .2 Covers: Pressure plate and snap lids
 - .1 System 1:
 - .1 Clear anodized extruded aluminum perimeter only.
 - .2 Depth of seal 19 mm.
 - .3 Joints vertical and horizontal structural silicone on the joints (except the perimeter).
 - .4 Ensure mullions caps are free of gaps.
 - .2 System 1 (exterior wall):
 - .1 Perimeter :
 - .1 Clear anodised extruded aluminum.
 - .2 Cap depth : 19 mm.
 - .3 Assure that cap are tightly installed.
 - .2 Other locations :
 - .1 Horizontal and vertical structural silicone joints.
 - .2 No pressure plate required.
 - .3 System 2:
 - .1 Clear anodized extruded aluminum.
 - .2 Depth of seal 19 mm on all mullions.
- .3 Infill panel: internally reinforced, glazing edge sealed permitting internal air movement to glazing space, outside air barrier line
 - .1 Outer face: refer to section 08 80 50 - Glazing.
 - .2 Core: insulation: IR2 projected insulation. Refer to Section 07 21 29.03 – Sprayed Insulation – Polyurethane Foam.
 - .1 Thickness: Minimum 75 mm and 100 mm, depending on depth of mullions.
 - .3 Inner face:
 - .1 Non apparent: galvanized steel
 - .2 Apparent: aluminum 1.6 mm thick.
- .4 Aluminum doors
 - .1 Doors: Made of hollow extruded sections of at least 3 mm wall thickness.
 - .1 Type 1:
 - .1 Uprights: Nominal width of 63.5 mm.
 - .2 Top rail: Nominal width of 63.5 mm.
 - .3 Bottom rail: Nominal width of 98.4 mm.
 - .1 Type 2:
 - .1 Uprights: Nominal width of 63.5 mm.
 - .2 Top rail: Nominal width of 63.5 mm.

- .3 Bottom rail: Nominal width of 300 mm.
- .2 Mechanically interlocked corner joints: Reinforced for greater sturdiness.
- .3 Glazing beads: Set by simple pressure for glazing without putty. Glazing beads on outer side: Tamper-resistant.
- .4 Outside doors: Thermal break.
- .5 For supply of finishing hardware, refer to nomenclature of hardware items for doors and frames and to Section 08 71 00 – Door Hardware.
- .5 Apron: Aluminum extrusion in dipped 6063-T5 alloy, frame as indicated in drawings. Minimum depth to ensure projection of at least 30 mm with underlying coating.
 - .1 Anchor and staple device of extruded aluminum, pre-drilled to receive fasteners.
 - .2 Finish: Exposed surfaces of aluminum constituents must be finished in accordance with Designation System for Aluminum Finishes, published by Aluminum Association.
 - .3 Natural anodized finished, Class 1, designation AA-M12C22A41.
- .6 Vapour retarder: specified in Section 07 26 00 - Vapour Retarders
- .7 Air barrier: specified in Section 07 27 00.01 - Air Barriers - Descriptive or Proprietary.

2.4

FABRICATION

- .1 Fabricate system components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- .2 Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- .3 Prepare components to receive anchor devices. Install anchors.
- .4 Arrange fasteners and attachments to ensure concealment from view.
- .5 Door frames: to be made in curtain wall system. Mullions supporting doors and their hardware must contain vertical steel reinforcements.
- .6 Sub-frame to be integrated in curtain-wall to receive doors.
- .7 Prepare system components to receive exterior doors and hardware specified in Section 08 71 00 – Door Hardware.
- .8 Reinforce interior horizontal head rail to receive track brackets and attachments.
- .9 Reinforce framing members for external imposed loads.
- .10 Visible manufacturer's identification labels not permitted.
- .11 Doors:
 - .1 Doors and frames must come from same manufacturer.
 - .2 Doors and frames must be made in maximum frontal dimensions and profiles indicated. For insulating glass, rabbet must be at least 22 mm wide.
 - .3 If necessary, doors and frames must be equipped with structural steel braces.
 - .4 Joints of units must be tight and maintained by mechanical means.
 - .5 Fasteners must be concealed.

- .6 To receive hardware, doors, frames and braces must be grooved, reinforced, drilled and threaded at required places, using templates set out in Section 08 71 00 – Door Hardware.
- .7 Aluminum surfaces in direct contact with dissimilar metal surfaces, concrete surfaces or masonry surfaces must be covered with insulation coating.
- .12 Infill panels
 - .1 Infill panels must be equipped with metal-coated protective liners on all edges to allow for application and movement of peripheral seals.
 - .2 Inner face of façade panels must be reinforced to prevent deflection from effects of wind and suction.
 - .3 Joints and angles of units must be adjusted precisely and then secured firmly. Joints must be tight, flush and weatherproof.
 - .4 Insulating material placed inside panels must be secured by fasteners welded to outer wall of inner panels. Impale insulation on fasteners.
 - .5 Ventilation and pressure equalization in air spaces must be ensured toward outer face of insulating material.
 - .6 Fasteners and accessories must not be exposed.
- .13 Finishes
 - .1 Finish coatings: conform to AAMA 612 AA.
 - .2 Exterior exposed aluminum surfaces: to AAMA Class 1, A41 anodized to 215-R1, clear, de 0,7 mm thickness, pre-treatment.
 - .3 Interior exposed aluminum surfaces: to AAMA A41, anodized to 215-R1, clear, de 0,18 mm thickness.
 - .4 Shop and touch-up primer for steel components: SSPC 25 Paint red oxide.
 - .5 Touch-up primer for galvanized steel surfaces: SSPC 20 Paint zinc rich.
 - .6 Concealed steel items: galvanized in accordance with ASTM A123 600 g/m².
 - .7 Apply 1 coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.
 - .1 VOC limit of 200 g/L, maximum to SCAQMD Rule 1113.

2.5 SOURCE QUALITY CONTROL

- .1 Perform work in accordance with AAMA GSM-1 AAMA CW-I-9. Maintain 1 copy on site.
- .2 Manufacturer qualifications: company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.
- .3 Design structural support framing components to CAN/CSA-S157 under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the Province of Quebec.
- .4 Perform welding Work in accordance with CSA W59.2.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for aluminum curtain wall installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Verify dimensions, tolerances, and method of attachment with other work.
 - .3 Verify wall openings and adjoining air barrier and vapour retarder materials are ready to receive work of this Section.
 - .4 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed Departmental Representative.

3.2 INSTALLATION

- .1 Install curtain wall and sloped glazing system in accordance with manufacturer's instructions.
- .2 Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- .3 Use alignment attachments and shims to permanently fasten system to building structure. Clean weld surfaces; apply protective primer to field welds and adjacent surfaces.
- .4 Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.
- .5 Use thermal isolation where components penetrate or disrupt building insulation.
- .6 Install sill flashings.
- .7 Co-ordinate installation of fire stop insulation, specified in Section 07 84 00 - Fire Stopping, at each floor slab edge and intersection with vertical construction where indicated.
- .8 Co-ordinate attachment and seal of perimeter air barrier and vapour retarder materials.
- .9 Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- .10 Install fire-safing in areas as indicated.
- .11 Install perimeter sealant to method required to achieve performance criteria. Sealant, backing materials, and installation criteria in accordance with Section 07 92 00 - Joint Sealants.

3.3 SITE TOLERANCES

- .1 Maximum variation from plumb: 1.5 mm/m non-cumulative or 12 mm/30 m, whichever is less.
- .2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.
- .3 Maximum sealant space between curtain wall and adjacent construction: 13 mm.

3.4 FIELD QUALITY CONTROL

- .1 Inspection by independent testing agency will monitor quality of installation and glazing.
 - .1 Test system to: ASTM E1105, AAMA 501.
- .2 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer of curtain wall or glass verifying compliance of Work, in handling, installing, applying, protecting and cleaning of products, and submit written reports in acceptable format to verify compliance of Work with Contract within 3 days of review.
 - .2 Submit 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 Ensure manufacturer's representative of curtain wall of glass is present before and during critical periods of installation construction of field joints testing.
 - .4 Schedule site visits to review Work at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.

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 Remove protective material from prefinished aluminum surfaces.
 - .3 Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
 - .4 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.
 - .5 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.6 PROTECTION

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

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 08 44 13 - Glazed Aluminum Curtain Walls
- .2 Section 08 71 00-A1 – Door Hardware – Annex 1, Hardware groups
- .3 Division 26 - Electrical

1.2 REFERENCES

- .1 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA)/Association canadienne des fabricants de portes d'acier (ACFPA).
 - .1 CSDFMA/ACFPA, Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.
- .2 Canadian Standards Association (CSA).
 - .1 CAN/CSA B-651-04, Accessible design for the built environment.
- .3 American National Standards Institute (ANSI).
 - .1 ANSI/BHMA A156.1-2000, 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 A156.6-2001, Architectural Door Trim.
 - .7 ANSI/BHMA A156.8-2000, Door Controls - Overhead Stops and Holders.
 - .8 ANSI/BHMA A156.13-2005, Mortise Locks and Latches, Series 1000.
 - .9 ANSI/BHMA A156.16-2002, Auxiliary Hardware.
 - .10 ANSI/BHMA A156.18-2000, Materials and Finishes.
 - .11 ANSI/BHMA A156.19-2002, Power Assist and Low Energy Power Operated Doors.
 - .12 ANSI/BHMA A156.21-2001, Thresholds.
 - .13 ANSI/BHMA A156.22-2005, Door Gasketing and Edge Seal Systems.
 - .14 ANSI/BHMA A156.26-2000, Continuous Hinges.
 - .15 ANSI/BHMA A156.30-2003, High Security Cylinders.

1.3 DOCUMENTS/SAMPLES SUBMITTALS

- .1 Submit documents and samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit required product data sheets and manufacturer's specifications and documentation concerning the products including ANSI functions when ANSI is used in the present specifications, category, type, series, BHMA finish, fire resistance class in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Samples:

DOOR HARDWARE

- .1 Submit samples for review and approval of each element type.
- .2 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
- .3 After approval samples will be returned for incorporation in Work.
- .4 Hardware List:
 - .1 Submit door hardware element list.
 - .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
- .5 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.

1.4 MAINTENANCE MATERIALS SUBMITTALS

- .1 Submit documents or items required in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Provide operation and maintenance data sheets on door closers, locks, door retainers and accessories for emergency exit doors, and incorporate them in emergency exit manual.

1.5 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.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 All codes relating to fire safety and security of persons must be complied to in conformity to requirements of the competent authorities.
 - .2 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.
 - .3 Unless otherwise indicated, use locksets and latches provided with lever type handle in conformance with standard CAN/CSA-B651 Accessible design for the built environment.
- .2 Tests reports: submit tests reports certifying that products and materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Certificates: submit certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Meeting prior to installation: hold a meeting in which will be examined the works requirements, manufacturer's installation instructions and his warranty of products.
- .5 Inspection of work: by supplier of hardware parts during performance of work. Errors, omissions and corrective measures to be taken must be recorded in writing following each visit and send to Departmental Representative.

1.7 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 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 wrapping strippable coating.
 - .4 Replace defective or damaged materials with new.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste in conformity with section 01 74 21 – Construction/Demolition Waste management and Disposal.

1.9 DEPARTMENTAL REPRESENTATIVE'S SUPPLIER

- .1 Cylinders and keys shown in hardware groups are provided and installed by Departmental Representative's sole supplier, Serrurier Excel inc.
- .2 Supplier's contact information:
 - Serrurier Excel Inc.
 - 97 rue Industrielle
 - Delson, Québec
 - J5B 1V9
- .3 Contractor's bid must include costs for supply and installation of these components and preparation of shop drawings.
- .4 This supplier is under contractor's full responsibility. Coordinate supplier's activities so that hardware and keying items are integrated into project at appropriate times in accordance with project timeline.

1.10 ACCEPTABLE MATERIALS OR PRODUCTS

- .1 When materials or products are prescribed by brand name, consult Bidder Instructions to learn procedure for requesting approval of substitute materials or products.

Part 2 Products**2.1 GENERAL**

- .1 Only door hardware items certified according to standards ANSI/BHMA are acceptable for the present project.
- .2 All items of the same type must come from the same manufacturer.

2.2 DOOR HARDWARE

- .1 Continuous hinges

DOOR HARDWARE

- .1 Continuous hinges must be in aluminum when installed on aluminum doors, and mounted on edge (concealed leaves), heavy duty, no set back, having at least 32 butt bearings and holes for screws in staggered rows. Cut in factory for required lengths for the height of door. A visible heel of door of 12.7 mm is acceptable and recommended to ensure that the mobile pan of the hinge does not prolong beyond bottom of the door. For exterior doors, length must be reduced to permit installation of door sweep on the whole width of the door, without being a nuisance to the leaf of the hinge. To reduce cold transfer from aluminum exterior doors, hinge leaves must not be as thick as the aluminum doors.
- .2 Authorized products:
 - .1 Ives 112HD, finish 628;
 - .2 Hager 780-112HD, finish 628;
 - .3 Zero 914, finish AA (628);
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.
- .2 Mortise Lock: conforming to ANSI/BHMA A 156.13
 - .1 Mortise lock, 1000 series, category 1. Die Cast zinc lever with forged rose. The lever must be designed with a flat face (116mm length) returning 13 mm from face of door.
 - .2 Functions as prescribed.
 - .3 Authorized products:
 - .1 Schlage series L, lever 17B, finish 626;
 - .2 Sargent series 8200, lever LNP, finish 626;
 - .3 Dorma series M9000, lever LC, finish 626;
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.
- .3 Auxiliary locks and associated products: deadlock conforming to ANSI/BHMA A156.5.
 - .1 Mortise deadlock with small casing, with course of 25 mm E06071- deadlock functioning with key from exterior and a turn button inside. E06081 – deadlock functioning with key on one side only.
 - .2 Authorized products:
 - .1 Schlage series L400, finish 626;
 - .2 Sargent series 4870, finish 626;
 - .3 Dorma series D900, finish 626;
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.
- .4 High security cylinder: Cylinders conforming to standard ANSI/BHMA A156.30.
 - .1 Cylinders must be high security type from Abloy.
- .5 Exit door opening device.
 - .1 Type 1: exit door device for surface mounted lock with panic bar.
 - .2 Type 8: exit door device with concealed vertical rod and panic bar.
 - .3 Authorized products:
 - .1 Von Duprin Series 35A or 98, finish 626;

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- .2 Adams Rite Series 8400, finish 626;
 - .3 Precision Series 2000, finish 626;
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.
- .6 Decorative hardware accessories (architectural) for doors: push bars conforming to ANSI/BHMA A156.6.
 - .1 Type J402 push bar: round, 25.4 mm diameter, with 90 degrees canting, at 308.8 mm to center. Stainless steel type 304. Crossing mounting bolt concealed by an extremity cap, except at required recess to avoid concealed vertical rod.
 - .2 Type J405 pull bars: round, 25.4 mm diameter, installed at 228.6 mm to center on a rectangular plate 88.9 x 381.0 x 0.05 mm, of stainless steel type 304.
 - .3 Authorized products:
 - .1 CBH, finish 630;
 - .2 Ives, finish 630;
 - .3 Gallery, finish 630;
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.
- .7 Decorative hardware accessories (architectural) for doors: push bars conforming to ANSI/BHMA A156.6.
 - .1 Type J501: round, 25.4 mm diameter, centered between door supports, Stainless steel type 304. Crossing mounting bolt concealed, by an extremity cap.
 - .2 Authorized products:
 - .1 CBH, finish 630;
 - .2 Ives, finish 630;
 - .3 Gallery, finish 630;
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.
- .8 Secondary hardware accessories: flush bolts conforming to ANSI/BHMA.156.16.
 - .1 Flush bolt with rod and lever: rod length as indicated. Certified firestop at prescribed locations.
 - .2 Authorized products:
 - .1 Hager, finish 626;
 - .2 Ives, finish 626;
 - .3 Gallery, finish 630;
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.
- .9 Door closers: door closer conforming to ANSI/BHMA A156.4.
 - .1 Heavy duty, hydraulic rack and pinion, in cast iron cylindrical casing. Adjustable spring power and holding device. Metal cover.
 - .1 PT4F – delayed action
 - .2 EDA – extra heavy duty arm
 - .3 LPA – minus parallel arm
 - .2 Authorized products:
 - .1 LCN, 4040XP, finish 689;

DOOR HARDWARE

- .2 Sargent series 281, finish EN;
 - .3 Hager series 5100, finish 689;
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.
- .10 Doors with assisted opening and doors with automatic opening and closing with low kinetic energy: automatic door opener:
 - .1 Heavy-duty automatic door opener for swing door, with electronic control and adjustable opening, hold open device, delayed speed and closure time. Interface relay for electric strike where required. Includes also an on/off switch, an integrated adjustable stop device, and a circular push button control of 114 mm diameter for wall mounting, with engraved handicap 1 logo, vandal proof and water proof for exterior mounting. The maneuvering device must be installed in an extruded aluminum casing (114 mm wide x 165 high) with incorporated extremity caps. Removable full length cover.
 - .2 Authorized products:
 - .1 LCN, series 4600, finish ANCLR;
 - .2 Gyro Tech, series 710, finish 628;
 - .3 Dorma, ED200, finish 622;
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.
- .11 Decorative hardware accessories (architectural) for doors: push plates conforming to ANSI/BHMA A156.6.
 - .1 Type J301 : Stainless steel type 304, 1,27mm thick, with tapped and countersunk screw holes and beveled edges.
 - .2 Type J102: Stainless steel type 304, 1,27mm thick, at prescribed height x appropriate length, with tapped and countersunk screw holes and bevelled edges.
 - .3 Authorized products:
 - .1 CBH, finish 630;
 - .2 Ives, finish 630;
 - .3 Gallery, finish 630;
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.
- .12 Secondary hardware accessories: wall and floor mounted door stops conforming to ANSI/BHMA 156.16
 - .1 Zinc casted under pressure
 - .2 Wall stoppers must have a metal back plate fixed to the wall with (2) screws and protectors. The casing and the rubber piece must be adjusted on the back plate and fixed with a concealed screw. No screw or hole must be visible on the face of the stopper.
 - .3 Authorized products:
 - .1 CBH, finish 630;
 - .2 Ives, finish 630;
 - .3 Gallery, finish 630;
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.

- .13 Sills conforming to ANSI/BHMA 156.21
 - .1 Extruded aluminum profile, with slope and height complying to requirements of easy access. Width must be appropriate to frames and to floor conditions. Foresee longer elements to permit the scrolling around steel frame faces.
 - .2 Authorized products:
 - .1 Zero, finish AA;
 - .2 Unique, finish 627;
 - .3 KNC, finish 627;
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.
- .14 Sill lip conforming to ANSI/BHMA 156.21
 - .1 Aluminum with velvet sealant piece. Install on flat surface of sill against interior face of door.
 - .2 Authorized products:
 - .1 CBH, finish 630;
 - .2 Ives, finish 630;
 - .3 Gallery, finish 630;
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.
- .15 Door perimeter sealant system: weather stripping conforming to ANSI/BHMA 156.22
 - .1 Extruded aluminum frame and closed cell neoprene insert. Oblong screw holes tapped in advance for adjustments. Conceived for continuous waterproofing at lintels and jambs. Surface mounted door hardware must be fixed to frame through the weather stripping. Confirm that butt of frame cadre has sufficient width to support a profile of ± 44 , 5 mm wide. Provide wedges as needed.
 - .2 Extruded aluminum frame and closed cell neoprene insert. Additional support leg on the profile to prevent waving. Oblong screw holes tapped in advance for adjustments. Fixation by screws does not affect the neoprene.
 - .3 Authorized products:
 - .1 CBH, finish 630;
 - .2 Ives, finish 630;
 - .3 Gallery, finish 630;
 - .4 Or a substitute product approved by addenda in accordance with Bidder Instructions.

2.3 FASTENINGS

- .1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels. Self-tapping Tek screws are not acceptable for the present project.
- .2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .3 Exposed fastening devices to match finish of hardware.

- .4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.
- .5 Protection plates for door bottoms must be furnished with countersunk screws, flush mounted, appropriate to the material of the door.

2.4 KEYING

- .1 The supplier of hardware items must prepare detailed keying schedule in conjunction with the engineer and with his approval.
- .2 All locks must be integrated in the existing keying system of the Departmental Representative.
- .3 Number of keys
 - .1 Provide six (6) construction master keys.
 - .2 Provide three (3) extraction keys
 - .3 Provide four (4) master keys by group
 - .4 Provide two (2) spare keys per cylinder
- .4 Except for construction keys who must be delivered to the Contractor, all permanent keys must be delivered directly to the Departmental Representative.
- .5 All cores must be furnished with appropriate cams/bolts for the prescribed locking functions. Furnish appropriate compression washers, collars and blocking rings.
- .6 Contractor must submit to Departmental Representative a two-level keying chart (one level per floor) including diagrams of key paths and codification of cylinders as well as twenty-five (25) additional codes.

2.5 FINISHES

- .1 General recommendations for materials and finishes:

Hinges	628	transparent anodized aluminum
	630	satin finish stainless steel
	652	satin chrome finish on steel
Locksets	626	Satin chrome finish
Exit devices	626	Chromed
Door handles	630	satin finish stainless steel
Flush bolts	626	Satin chrome finish
Door-closers	689	aluminum finished with paint applied by pulverization
	SRI	special rust inhibitor
Automatic door operator	AAT	transparent anodized aluminum
Butt / protection plates	630	satin finish stainless steel
Door/wall butts	626	Satin chrome finish
Sills and weather stripping	AL	transparent anodized aluminum

2.6 Abbreviations

- .1 Equipment – material

<u>English</u>	<u>French</u>	
ALD	PAL	aluminum door
ALF	CAL	aluminum frame

DOOR HARDWARE

T.B.ALF	BARPT	thermal break aluminum frame
HMD	PMC	hollow metal door
INS.HMD	PMC ISO.	Insulated hollow metal door
PSF	BAE	steel frame
SCWD	PPB	solid core wood door
LH	PGP	left hand handle on push
RH	PDP	right hand handle on push
LHR	PGT	left hand handle reverse
RHR	PDT	right hand handle reverse
CLR	AAT	clear anodized aluminum
MS	VM	metal screw
WS	VB	wood screw
HR/FR	CF/H	hour of resistance / fire-resistance
L.T.S.	LA	length
FHTB	MBTPT	flat head through bolt

.2 Manufacturer

IVE	Ives Hinges
KNC	KN Crowder
SCH	Schlage
ADA	Adams Rite
VON	Von Duprin
ASA	Assa Abloy
CBH	Canadian Builders Hardware
GLY	Glynn Johnson
LCN	LCN
SCE	Schlage Electronics
BYO	By manufacturer
UNI	Société industrielle Unique Ltée
ZER	Zero International
RRB	RR Brink locking systems, Inc
TRI	TRIMCO

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

- .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 metal 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.

3.2 INSTALLATION

- .1 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction), elaborated by the Canadian Steel Door and Frame Manufacturers' Association (CSDFMA) or as indicated for special conditions
- .2 Only competent workers must be employed for the installation of door hardware. The installer must adjust, clean and bring to new all installed hardware items to the satisfaction of the engineer.
- .3 Division 26 (Electricity) must furnish electric embedded boxes, conduits with lead cords and electrical power (115V at lintels) for the two door operators. Install all hardware for the functioning of door operators at the most 1200 mm from the center line to finished floor. The hardware supplier is responsible for the installation of door operators and all related hardware.
- .4 Height : install all hardware for the operation of the door openers to more than 1200 mm from the center line to the finished floor. The supplier of the hardware is responsible for door openers installation and any related hardware.
- .5 The manufacturer, with the cooperation of hardware supplier, must prepare wiring diagrams with all the details of electrical components for each opening. Diagrams must indicate all components of systems listed in the present section.
- .6 The contractor must ensure that walls have the required blocking reinforcements so that they will not be eventually damaged by the wall door stops.
- .7 Sills must prolong from masonry opening to masonry opening and must be scrolled around exterior steel frame jamb. Installer must apply a sealant at the base of sills to ensure weather proofing.
- .8 During fabrication of templates, the supplier must take into account of the surface mounted weather stripping. 7.9 mm thick. The strikes of exit devices, parallel arms of door closers and supports of hold-open and butt devices installed at top of doors shall be installed over the weather stripping.

3.3 ADJUSTING

- .1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
- .2 Lubricate hardware, operating equipment and other moving parts.
- .3 Adjust door hardware to ensure tight fit at contact points with frames.
- .4 Adjust door closers of doors with manual operation so that they open with a force inferior to 22 Newton.

3.4 CLEANING

- .1 Cleaning during construction: clean in accordance with Section 01 74 11 – Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean hardware items with a humid cloth and a non-abrasive cleaner and polish them in conformity to manufacturer's instructions
 - .3 Remove protective material from hardware items where present.

- .4 Upon completion of works remove from site surplus materials, rubbish, tools, equipment and security enclosures in conformity with section 01 74 11 - Cleaning.

3.5 DEMONSTRATION

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

3.6 PROTECTION

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

3.7 LIST OF HARDWARE ITEMS

- .1 Refer to annex.

END OF SECTION

DOOR HARDWARE

Section 08 71 00

Annex 1

Hardware Group

GROUP/SERIE **CATEGORIES**

10	MAIN ENTRANCE
20	DOUBLE DOOR EXIT
30	SIMPLE DOOR EXIT
40	EXTERIOR

GROUP NO. 10

<u>QTY</u>	<u>DESCRIPTION</u>	<u>PRODUCT IDENTIFICATION</u>	<u>FINISH</u>	<u>MFR</u>
2	CONT. HINGE	112HD EPT X H. REQ.	628	IVE
2	TRANSFERT DE COURANT	EPT10 CON	689	VON
1	VERROU ANTI-PANIQUE ÉLEC.	LX-RX-QEL-3547A-EO-INS2CON X LARG. REQ.	626	VON
1	VERROU ANTI-PANIQUE ÉLEC.	LX-RX-QEL-3547A-NL-OP-388-INS2CON X LARG. REQ.	626	VON
1	CYLINDRE MORT. PERM.	STANDARDS SPAC X GCME	626	ABL
1	CYLINDRE À TIGE PERM.	STANDARDS SPAC X GCME	626	ABL
1	CYLINDRE MORTAISE CONST.	20-001 118 X CMC	626	SCH
1	CYLINDRE À TIGE CONST.	20-021 X CMC	626	SCH
2	POIGNÉES À TIRER	9264F 1829MM X 1422MM C/C X MTG. STD	630	IVE
1	BRAS D'ARRÊT ENCASTRÉ	SÉRIE 100S ADJ (PORTE MANUELLE)	630	GLY
1	BRAS D'ARRÊT ENCASTRÉ	SÉRIE 100SE ADJ (PORTE MOTORISÉE)	630	GLY
1	FERME-PORTE SURFACE	4040XP LONG MC	689	LCN
1	OUVRE-PORTE MOTORISÉ	4642 LONG ST-3554 WMS X FLUSH CEILING MOUNT	689	LCN
1	PLAQUE DE MONTAGE	4040-18G	689	LCN
2	DISPOSITIF D'ACTIVATION	8310-856	630	LCN
2	ÉCUSSON PROTECTEUR	8310-874	689	LCN
1	JEU DE COUPE-FROIDS	PAR MFR. PORTES ALUM.	628	
1	JEU D'ASTRAGALES	PAR MFR. PORTES ALUM.	628	
2	BALAIS DE PORTE	PAR MFR. PORTES ALUM.	628	
1	SEUIL BRIS THERMIQUE	625A-MSLA-10 X LARG. REQ.	A	ZER
2	COUETTES RACCORDEMENT	CON-38 (DANS LA PORTE)		VON
2	COUETTES RACCORDEMENT	CON-6W (DANS LE CADRE)		VON
1	INTERRUPTEUR À CLÉ	653-1415 L2	630	SCE
2	CONTACT MAGNÉTIQUE	679-05HM	BLK	SCE
1	ALARME SONORE	L1910S-1	WHT	SCE
1	DIAGRAMMES DE RACCORDEMENT	TEL QUE THÉORIE D'OPÉRATION		
1	MONITEUR DE PUISSANCE	PS904 900-BBK 900-4RL 900-4RL KL900	LGR	SCE
2	LECTEUR(S) DE CARTES	PAR SÉCURITÉ / DIV. 28		
1	PANNEAU CONTRÔLE ACCÈS	PAR SÉCURITÉ / DIV. 28		
2	SIGNALISATION/ÉCRITEAU	PORTES SOUS ALARME		

THEORY OF OPERATION:

- PORTES VERROUILLÉES LE SOIR / DÉVERROUILLÉES LE JOUR, PORTES SOUS ALARME LE SOIR.
- LE JOUR, LES PORTES SONT DÉVERROUILLÉES VIA LE CONTRÔLE D'ACCÈS, OU VIA L'INTERRUPTEUR À CLÉ QUI RÉTRACTE LES PÊNES DES VERROUS-PANIQUE ÉLECTRIFIÉS.
- LE SOIR, UTILISER LES PORTES EN MODE ISSUE DÉCLENCHÉ UNE ALARME SONORE/VISUELLE LOCALE QUI DOIT ÊTRE RÉINITIALISÉE À L'AIDE DE L'INTERRUPTEUR À CLÉ OU PAR LE CONTRÔLE D'ACCÈS. LES USAGERS ÉTANT MUNIS DE CARTES D'ACCÈS VALIDE PEUVENT

ACCÈDER AU BATÎMENT OU LE QUITTER SANS ALARME SONORE/VISUELLE SOUS PRÉSENTATION DE CARTE VALIDE.

- LIBRE ISSUE EN TOUT TEMPS, LA SORTIE N'EST PAS RETARDÉE.
- LA PLAQUE D'ACTIVATION EXTÉRIEUR EST ACTIVE LORSQUE LE PÊNE DU VERROU ANTI-PANIQUE EST RÉTRACTÉ PAR UNE CARTE VALIDE OU PAR CONTRÔLE D'ACCÈS. (STATUT INDIQUÉ PAR INTERRUPTEUR LX).
- CONTACT(S) MAGNÉTIQUES SURVEILLENT LE STATUT OUVERT/FERMÉ DE LA PORTE. LA PLAQUE D'ACTIVATION INTÉRIEURE EST ACTIVE EN TOUT TEMPS, PAR CONTRE L'UTILISER LE SOIR SANS CARTE VALIDE DÉCLENCHERA UNE ALARME SONORE.
- INTERRUPTEUR SUR OUVERE-PORTE PERMET DE BASCULER ENTRE LES MODES ON/OFF/RETENU EN POSITION OUVERT.

GROUP NO. 12

QTY	DESCRIPTION	PRODUCT IDENTIFICATION	FINISH	MFR
2	CHARNIÈRE(S) CONTINUES	112HD X HAUT. REQ.	628	IVE
2	JEU DE POIGNÉES À TIRER	PR 9266F 1829MM X 1422MM C/C X MTG. P	630	IVE
1	BRAS D'ARRÊT ENCASTRÉ	SÉRIE 100S ADJ (PORTE MANUELLE)	630	GLY
1	BRAS D'ARRÊT ENCASTRÉ	SÉRIE 100SE ADJ (PORTE MOTORISÉE)	630	GLY
1	FERME-PORTE SURFACE	4040XP LONG MC	689	LCN
1	OUVERE-PORTE MOTORISÉ	4642 LONG ST-3554 WMS X FLUSH CEILING MOUNT	689	LCN
1	PLAQUE DE MONTAGE	4040-18G	689	LCN
2	DISPOSITIF D'ACTIVATION	8310-856	630	LCN
2	ÉCUSSON PROTECTEUR	8310-874	689	LCN
1	DIAGRAMMES DE RACCORDEMENT	TEL QUE THÉORIE D'OPÉRATION		

THEORY OF OPERATION:

- DISPOSITIFS D'ACTIVATIONS INTÉRIEURS ET EXTÉRIEURS ACTIFS EN TOUT TEMPS POUR L'UTILISATION DE LA PORTE MOTORISÉE.
- INTERRUPTEUR SUR OUVERE-PORTE PERMET DE BASCULER ENTRE LES MODES ON/OFF/RETENU EN POSITION OUVERT.

GROUP NO. 20

QTY	DESCRIPTION	PRODUCT IDENTIFICATION	FINISH	MFR
2	CHARNIÈRE(S) CONTINUES	112HD EPT X HAUT. REQ.	628	IVE
2	TRANSFERT DE COURANT	EPT10 CON	689	VON
1	VERROU ANTI-PANIQUE LX-RX	LX-RX-CD-3547A-EO-INS2CON X LARG. REQ.	626	VON
1	VERROU ANTI-PANIQUE ÉLEC.	LX-RX-QEL-3547A-NL-OP-388-INS2CON X LARG. REQ.	626	VON
2	CYLINDRE MORT. PERM.	STANDARDS SPAC X GCME	626	ABL
1	CYLINDRE À TIGE PERM.	STANDARDS SPAC X GCME	626	ABL
1	CYLINDRE MORTAISE CONST.	20-001 114 XQ11-949 X CMC	626	SCH
1	CYLINDRE MORTAISE CONST.	20-001 118 X CMC	626	SCH
1	CYLINDRE À TIGE CONST.	20-021 X CMC	626	SCH
2	POIGNÉES À TIRER	9264F 1829MM X 1422MM C/C X MTG. STD	630	IVE
2	BRAS D'ARRÊT ENCASTRÉ	SÉRIE 100S ADJ	630	GLY
2	FERME-PORTE SURFACE	4040XP LONG MC	689	LCN
2	PLAQUE DE MONTAGE	4040-18G	689	LCN
1	JEU DE COUPE-FROIDS	PAR MFR. PORTES ALUM.	628	

1	JEU D'ASTRAGALES	PAR MFR. PORTES ALUM.	628	
2	BALAIS DE PORTE	PAR MFR. PORTES ALUM.	628	
1	SEUIL BRIS THERMIQUE	625A-MSLA-10 X LARG. REQ.	A	ZER
2	COUETTES RACCORDEMENT	CON-38 (DANS LA PORTE)		VON
2	COUETTES RACCORDEMENT	CON-6W (DANS LE CADRE)		VON
1	INTERRUPTEUR À CLÉ	653-1415 L2	630	SCE
2	CONTACT MAGNÉTIQUE	679-05HM	BLK	SCE
1	ALARME SONORE	L1910S-1	WHT	SCE
1	DIAGRAMMES DE RACCORDEMENT	TEL QUE THÉORIE D'OPÉRATION		
1	MONITEUR DE PUISSANCE	PS904 900-BBK 900-4RL 900-4RL KL900	LGR	SCE
2	LECTEUR(S) DE CARTES	PAR SÉCURITÉ / DIV. 28		
1	PANNEAU CONTRÔLE ACCÈS	PAR SÉCURITÉ / DIV. 28		
2	SIGNALISATION/ÉCRITEAU	PORTES SOUS ALARME		

THEORY OF OPERATION:

- PORTES VERROUILLÉES LE SOIR / VERROUILLÉES LE JOUR, PORTES SOUS ALARME EN TOUT TEMPS.
- LE JOUR, LES PORTES SONT DÉVERROUILLÉES VIA LE CONTRÔLE D'ACCÈS, OU VIA L'INTERRUPTEUR À CLÉ QUI RÉTRACTE LES PÊNES DES VERROUS-PANIKES ÉLECTRIFIÉS.
- LE SOIR, UTILISER LES PORTES EN MODE ISSUE DÉCLENCHÉ UNE ALARME SONORE/VISUELLE LOCALE QUI DOIT ÊTRE RÉINITIALISÉE À L'AIDE DE L'INTERRUPTEUR À CLÉ OU PAR LE CONTRÔLE D'ACCÈS. LES USAGERS ÉTANT MUNIS DE CARTES D'ACCÈS VALIDE PEUVENT ACCÈDER AU BATÎMENT OU LE QUITTER SANS ALARME SONORE/VISUELLE SOUS PRÉSENTATION DE CARTE VALIDE.
- LIBRE ISSUE EN TOUT TEMPS, LA SORTIE N'EST PAS RETARDÉE.
- CONTACT(S) MAGNÉTIQUES SURVEILLENT LE STATUT OUVERT/FERMÉ DE LA PORTE.
- INTERRUPTEUR SUR OUVERE-PORTE PERMET DE BASCULER ENTRE LES MODES ON/OFF/RETENU EN POSITION OUVERT.

GROUP NO. 21

QTY	DESCRIPTION	PRODUCT IDENTIFICATION	FINISH	MFR
2	CHARNIÈRE(S) CONTINUES	112HD EPT X HAUT. REQ.	628	IVE
2	TRANSFERT DE COURANT	EPT10 CON	689	VON
1	VERROU ANTI-PANIQUE LX-RX	LX-RX-CD-3547A-EO-INS2CON X LARG. REQ.	626	VON
1	VERROU ANTI-PANIQUE LX-RX	LX-RX-CD-3547A-NL-OP-388-INS2CON X LARG. REQ.	626	VON
2	CYLINDRE MORT. PERM.	STANDARDS SPAC X GCME	626	ABL
1	CYLINDRE À TIGE PERM.	STANDARDS SPAC X GCME	626	ABL
2	CYLINDRE MORTAISE CONST.	20-001 114 XQ11-949 X CMC	626	SCH
1	CYLINDRE MORTAISE CONST.	20-001 118 X CMC	626	SCH
1	CYLINDRE À TIGE CONST.	20-021 X CMC	626	SCH
2	POIGNÉES À TIRER	9264F 1829MM X 1422MM C/C X MTG. STD	630	IVE
2	BRAS D'ARRÊT ENCASTRÉ	SÉRIE 100S ADJ	630	GLY
2	FERME-PORTE SURFACE	4040XP LONG MC	689	LCN
2	PLAQUE DE MONTAGE	4040-18G	689	LCN
1	JEU DE COUPE-FROIDS	PAR MFR. PORTES ALUM.	628	
1	JEU D'ASTRAGALES	PAR MFR. PORTES ALUM.	628	
2	BALAIS DE PORTE	PAR MFR. PORTES ALUM.	628	
1	SEUIL BRIS THERMIQUE	625A-MSLA-10 X LARG. REQ.	A	ZER

2	COUETTES RACCORDEMENT	CON-38 (DANS LA PORTE)		VON
2	COUETTES RACCORDEMENT	CON-6W (DANS LE CADRE)		VON
1	INTERRUPTEUR À CLÉ	653-1415 L2	630	SCE
2	CONTACT MAGNÉTIQUE	679-05HM	BLK	SCE
1	ALARME SONORE	L1910S-1	WHT	SCE
1	DIAGRAMMES DE RACCORDEMENT	TEL QUE THÉORIE D'OPÉRATION		
1	MONITEUR DE PUISSANCE	PS902 900-BBK 900-4RL KL900	LGR	SCE
1	LECTEUR(S) DE CARTES	PAR SÉCURITÉ / DIV. 28		
1	PANNEAU CONTRÔLE ACCÈS	PAR SÉCURITÉ / DIV. 28		
2	SIGNALISATION/ÉCRITEAU	PORTES SOUS ALARME		

THEORY OF OPERATION:

- PORTES VERROUILLÉES LE SOIR / VERROUILLÉES LE JOUR, PORTES SOUS ALARME EN TOUT TEMPS.
- ACCÈS MÉCANIQUE CÔTÉ TIRÉ (PAR CLÉ) ET UTILISER LES PORTES EN MODE ISSUE DÉCLENCHÉ UNE ALARME SONORE/VISUELLE LOCALE QUI DOIT ÊTRE RÉINITIALISÉE À L'AIDE DE L'INTERRUPTEUR À CLÉ OU PAR LE CONTRÔLE D'ACCÈS. LES USAGERS ÉTANT MUNIS DE CARTES D'ACCÈS VALIDE PEUVENT QUITTER LE BÂTIMENT SANS ALARME SONORE/VISUELLE SOUS PRÉSENTATION DE CARTE VALIDE.
- LIBRE ISSUE EN TOUT TEMPS, LA SORTIE N'EST PAS RETARDÉE.
- CONTACT(S) MAGNÉTIQUES SURVEILLENT LE STATUT OUVERT/FERMÉ DE LA PORTE.

GROUP NO. 22

QTY	DESCRIPTION	PRODUCT IDENTIFICATION	FINISH	MFR
2	CHARNIÈRE(S) CONTINUES	112HD X HAUT. REQ.	628	IVE
2	JEU DE POIGNÉES À TIRER	PR 9266F 1829MM X 1422MM C/C X MTG. P	630	IVE
2	BRAS D'ARRÊT ENCASTRÉ	SÉRIE 100S ADJ	630	GLY
2	FERME-PORTE SURFACE	4040XP LONG MC	689	LCN
2	PLAQUE DE MONTAGE	4040-18G	689	LCN

GROUP NO. 30

QTY	DESCRIPTION	PRODUCT IDENTIFICATION	FINISH	MFR
1	CHARNIÈRE(S) CONTINUES	112HD EPT X HAUT. REQ.	628	IVE
1	TRANSFERT DE COURANT	EPT10 CON	689	VON
1	VERROU ANTI-PANIQUE LX-RX	LX-RX-CD-3547A-EO-INS2CON X LARG. REQ.	626	VON
2	CYLINDRE MORT. PERM.	STANDARDS SPAC X GCME	626	ABL
1	CYLINDRE MORTAISE CONST.	20-001 114 XQ11-949 X CMC	626	SCH
1	CYLINDRE MORTAISE CONST.	20-001 118 X CMC	626	SCH
1	BRAS D'ARRÊT ENCASTRÉ	SÉRIE 100S ADJ	630	GLY
1	FERME-PORTE SURFACE	4040XP LONG MC	689	LCN
1	PLAQUE DE MONTAGE	4040-18G	689	LCN
1	JEU DE COUPE-FROIDS	PAR MFR. PORTES ALUM.	628	
1	BALAIS DE PORTE	PAR MFR. PORTES ALUM.	628	
1	SEUIL BRIS THERMIQUE	625A-MSLA-10 X LARG. REQ.	A	ZER
1	COUETTES RACCORDEMENT	CON-38 (DANS LA PORTE)		VON
1	COUETTES RACCORDEMENT	CON-6W (DANS LE CADRE)		VON
1	INTERRUPTEUR À CLÉ	653-1415 L2	630	SCE
1	CONTACT MAGNÉTIQUE	679-05HM	BLK	SCE

1	ALARME SONORE	L1910S-1	WHT	SCE
1	DIAGRAMMES DE RACCORDEMENT	TEL QUE THÉORIE D'OPÉRATION		
1	MONITEUR DE PUISSANCE	PS902 900-BBK 900-4RL KL900	LGR	SCE
1	PANNEAU CONTRÔLE ACCÈS	PAR SÉCURITÉ / DIV. 28		
1	SIGNALISATION/ÉCRITEAU	PORTES SOUS ALARME		

THEORY OF OPERATION:

- PORTES VERROUILLÉES LE SOIR / VERROUILLÉES LE JOUR, PORTES SOUS ALARME EN TOUT TEMPS.
- AUCUN ACCÈS MÉCANIQUE CÔTÉ TIRÉ. UTILISER LES PORTES EN MODE ISSUE DÉCLENCHÉ UNE ALARME SONORE/VISUELLE LOCALE QUI DOIT ÊTRE RÉINITIALISÉE À L'AIDE DE L'INTERRUPTEUR À CLÉ OU PAR LE CONTRÔLE D'ACCÈS. AUCUN CONTOURNEMENT DE L'ALARME SONORE/VISUELLE PAR CARTE D'ACCÈS CÔTÉ POUSSÉ.
- LIBRE ISSUE EN TOUT TEMPS, LA SORTIE N'EST PAS RETARDÉE.
- CONTACT(S) MAGNÉTIQUES SURVEILLENT LE STATUT OUVERT/FERMÉ DE LA PORTE.

GROUP NO. 40

QTY	DESCRIPTION	PRODUCT IDENTIFICATION	FINISH	MFR
2	CHARNIÈRE(S) CONTINUES	112HD X HAUT. REQ.	628	IVE
1	VERROU ENCASTRÉ MANUEL	FB458	626	IVE
1	VERROU ENCASTRÉ MANUEL	FB458-610MM	626	IVE
1	GÂCHE ANTI-POUSSIÈRE	DP2	626	IVE
1	SERRURE MORTE DBL. CYL.	SÉRIE MS1950 X F.P. X MAIN X ÉCART	628	ADA
2	CYLINDRE MORT. PERM.	STANDARDS SPAC X GCME	626	ABL
2	CYLINDRE MORTAISE CONST.	20-013 114 X CMC	626	SCH
2	JEU DE POIGNÉES À TIRER	PR 9264F 1829MM X 1422MM C/C X MTG. P	630	IVE
2	BRAS D'ARRÊT ENCASTRÉ	SÉRIE 100S ADJ	630	GLY
2	FERME-PORTE SURFACE	4040XP LONG MC	689	LCN
2	PLAQUE DE MONTAGE	4040-18G	689	LCN
1	JEU DE COUPE-FROIDS	PAR MFR. PORTES ALUM.	628	
1	JEU D'ASTRAGALES	PAR MFR. PORTES ALUM.	628	
2	BALAIS DE PORTE	PAR MFR. PORTES ALUM.	628	
1	SEUIL BRIS THERMIQUE	625A-MSLA-10 X LARG. REQ.	A	ZER
2	CONTACT MAGNÉTIQUE	679-05HM	BLK	SCE
1	DIAGRAMMES DE RACCORDEMENT	TEL QUE THÉORIE D'OPÉRATION		
1	PANNEAU CONTRÔLE ACCÈS	PAR SÉCURITÉ / DIV. 28		

THEORY OF OPERATION:

- CONTACT(S) MAGNÉTIQUES SURVEILLENT LE STATUT OUVERT/FERMÉ DE LA PORTE.

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 07 92 00 - Joint Sealing.
- .2 Section 08 44 13 – Glazed aluminum curtain walls.
- .3 Section 08 71 00 – Hardware Groups.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM C542-05(2011), Standard Specification for Lock-Strip Gaskets.
 - .2 ASTM D2240-15, Standard Test Method for Rubber Property - Durometer Hardness.
 - .3 ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - .4 ASTM F1233-08(2013), Standard Test Method for Security Glazing Materials and Systems.
 - .5 ASTM F1592-12, Standard Test Methods for Detention Hollow Metal Vision Systems.
 - .6 ASTM F1915-05(2012), Standard Test Methods for Glazing for Detention Facilities.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-12.1-90, Tempered or Laminated Safety Glass.
 - .2 CAN/CGSB-12.2-91, Flat, Clear Sheet Glass.
 - .3 CAN/CGSB-12.3-91, Flat, Clear Float Glass.
 - .4 CAN/CGSB-12.8-97, Insulating Glass Units.
 - .5 CAN/CGSB-12.8-97 (Amendment), Insulating Glass Units.
 - .6 CAN/CGSB-12.9-91, Spandrel Glass.
 - .7 CAN/CGSB-12.10-76, Glass, Light and Heat Reflecting.
 - .8 CAN/CGSB-12.11-90, Wired Safety Glass.
- .3 Environmental Choice Program (ECP)
 - .1 DCC-045-95 (R2005), Sealants and Caulking Compounds.
- .4 Glass Association of North American (GANA)
 - .1 GANA Glazing Manual - 2008.
 - .2 GANA Laminated Glazing Reference Manual - 2009.
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.3 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, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned to the contractor for inclusion into work.
 - .3 Submit two (2) samples of 100 mm long of sealant material.
 - .4 Submit two (2) samples of 300 X 300 mm of each glazing type.
- .4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
 - .1 Submit testing analysis of glass under provisions of Section 01 45 00 - Quality Control.
 - .2 Submit shop inspection testing for glass.

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 QUALITY ASSURANCE

- .1 Certificates: 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 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 and frames from nicks, scratches, and blemishes.
 - .3 Protect prefinished aluminum surfaces with wrapping strippable coating.
 - .4 Replace defective or damaged materials with new.

1.7 AMBIENT CONDITIONS

- .1 Ambient Requirements:

- .1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.
- .2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.8 WASTE MANAGEMENT AND DISPOSAL

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

1.9 WARRANTY

- .1 For work in this Section 08 80 50 - Glazing, the 12-month warranty period set out in the General Conditions is extended to 120 months.
- .2 Provide a written document jointly prepared and signed by the manufacturer and the installer and issued in the name of Canada, ensuring the work against defects in materials, workmanship and installation for the period specified above.

Part 2 Products

2.1 MATERIALS

- .1 Design Criteria:
 - .1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow.
 - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
 - .2 Size glass to withstand wind loads, dead loads and positive and negative live loads to ASTM E330/E330M, acting normal to plane of glass.
 - .3 Limit glass deflection to 1/200 flexural limit of glass with full recovery of glazing materials.
- .2 Flat Glass:
 - .1 Type 1: Clear, select quality glass, tempered, 6 mm thick.
 - .1 Sintered ceramic coating (glazed coloured enamel) on side 2: white dot pattern, 30% opacity
 - .2 Type 2: Clear, select quality glass, tempered, 6 mm thick.
 - .1 Soft metal coating, Low E, obtained by vacuum metallization on side 3 (up to coefficient $U_g=1,0 \text{ W/(m}^2\text{.K)}$)
 - .3 Type 3: Clear, select quality glass, tempered, 6 mm thick.
 - .4 Type 4: Clear, select quality glass, tempered, 6 mm thick.
 - .1 Film applied by cathode sputtering on side 4, light grey colour.
- .3 Insulating Glass Units:
 - .1 Construction:
 - .1 Double-sealed, with two (2) panes, 25 mm thick over all.

- .2 Air space thickness: polycarbonate spacer, black colour, steel-reinforced with conductivity de $0.19 \text{ W/m}^2 \text{ K}$, 13.5 mm thick.
- .3 Inert gas space: argon.
- .2 Type **VT1**: Thermos glass for curtain wall, sintered with white dots.
 - .1 Exterior glazing: Type 1.
 - .2 Interior glazing: Type 2.
 - .3 U-value in centre: not more than $1.363 \text{ W/m}^2 \text{ } ^\circ\text{C}$.
 - .4 Visible light :
 - .1 Transmission : 55.5%
 - .2 Interior reflexion : 16.8%
 - .3 Exterior reflexion : 17%
 - .5 SC Coefficient : 0.46
- .3 Type **VT2**: Thermos glass for door.
 - .1 Exterior glazing: Type 3.
 - .2 Interior glazing: Type 2.
 - .3 U-value in centre: not more than $1.363 \text{ W/m}^2 \text{ } ^\circ\text{C}$.
 - .4 Visible light :
 - .1 Transmission: 55.5%
 - .2 Interior reflection: 16.8%
 - .3 Exterior reflection: 17%
 - .5 SC Coefficient : 0.46
- .4 Type **T1**: Thermos glass for spandrel panel.
 - .1 Exterior glazing : Type 1.
 - .2 Interior glazing : Type 4.
 - .3 U-value in centre: not more than $1.306 \text{ W/m}^2 \text{ } ^\circ\text{C}$.
- .4 Sealant: in accordance with Section 07 92 00 – Joint Sealants.
 - .1 Maximum VOC level: according to guideline DCC-045.
 - .2 Ensure that sealants comply with limitations and restrictions in guideline DCC-045 regarding chemical composition.

2.2

ACCESSORIES

- .1 Setting blocks: neoprene, 80-90 Shore A durometer hardness to ASTM D2240, length of 25 mm for each square meter of glazing.
- .2 Spacer shims: neoprene, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.
- .3 Glazing tape:
 - .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper, black colour.

- .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2 %, designed for compression of 25 %, to effect an air and vapour seal.
- .4 Glazing beads: resilient, polyvinyl chloride, extruded form, colour suiting rabbet.
- .5 Extruding joints with locking tabs: to ASTM C542.

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 Visually inspect substrate in presence of Departmental Representative.
 - .4 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

- .1 Clean contact surfaces with solvent and wipe dry.
- .2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- .3 Prime surfaces scheduled to receive sealant.

3.3 EXTERIOR GLAZING - DRY METHOD (PREFORMED GLAZING)

- .1 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Perform work in accordance with GANA Laminated Glazing Reference Manual for glazing installation methods.
- .3 Cut glazing tape to length; install on glazing light. Seal corners by butting tape and sealing junctions with sealant
- .4 Place setting blocks at ¼ points, with edge block maximum 150 mm from corners.
- .5 Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- .6 Install removable stops without displacing glazing tape. Exert pressure for full continuous contact.
- .7 Trim protruding tape edge.

3.4 INTERIOR GLAZING - DRY METHOD (TAPE AND TAPE)

- .1 Perform work in accordance with GANA Laminated Glazing Reference 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 $\frac{1}{4}$ 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.

3.5 CLEANING

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

3.6 PROTECTION

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

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 07 26 00 - Vapour retarders and air barrier.
- .2 Section 07 92 00 - Joint Sealing
- .3 Section 09 22 16 – Non-structural Metal Framing.
- .4 Section 09 91 23.01- Painting

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM C475/C475M-15, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - .2 ASTM C514-04(2014), Standard Specification for Nails for the Application of Gypsum Board.
 - .3 ASTM C840-08, Standard Specification for Application and Finishing of Gypsum Board.
 - .4 ASTM C954-15, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
 - .5 ASTM C1002-16, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - .6 ASTM C1047-14a, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - .7 ASTM C1396/C1396M-14a, Standard Specification for Gypsum Wallboard.
- .2 Association of the Wall and Ceilings Industries International (AWCI)
 - .1 AWCI Levels of Gypsum Board Finish-2010.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
 - .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
- .5 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-10, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit one (1) 300 mm x 300 mm size sample of gypsum board, and 300 m long sample of corner and casing beads.

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 gypsum board assemblies materials level off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
 - .3 Protect from weather, elements and damage from construction operations.
 - .4 Handle gypsum boards to prevent damage to edges, ends or surfaces.
 - .5 Protect prefinished aluminum surfaces with wrapping strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
 - .6 Replace defective or damaged materials with new.

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

Part 2 Products

2.1 MATERIALS

- .1 Standard gypsum board: to ASTM C1396/C1396M, standard and type X, of 16mm thick, 1200 mm wide x maximum practical length, ends square cut, edges bevelled.
- .2 Exterior gypsum board:
 - .1 Dimensions: 13 mm thick and 1200 mm wide x maximum practical length

- .2 Made of fibreglass integrated with polymer-modified waterproof gypsum core, paperless, covered with acrylic protective coat on outer side.
- .3 To ASTM C1177, ASTM C1396, CAN/CSA-A82.27. Attestation: CCMC 13095-R.
- .4 Moisture resistance: 0.4 mm deflection, to ASTM C 473.
- .5 Non-combustible to CAN/ULC S-102. Flame spread and smoke development: 0/0, to CAN/ULC S-102.
- .6 Dimensional stability: 16.7×10^{-6} , to ASTM E 228.
- .7 Mould resistance: Index 10, to ASTM D 3273.
- .3 Lightweight concrete panels:
 - .1 To ASTM D3273.
 - .2 Made of Portland cement reinforced with fibreglass and polymer adjuvants, 13 mm thick, 1200 mm wide and maximum effective length, with squared edges at ends and bevelled edges on sides.
 - .3 Smooth finish. 1500 kg/m³.

2.2

ACCESSORIES

- .1 Metal furring runners, hangers, tie wires, inserts, anchors: to CSA A82.30.
- .2 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.
- .3 Resilient clips: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.
- .4 Nails: to ASTM C514.
- .5 Steel drill screws: to ASTM C1002.
- .6 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, zinc-coated by electrolytic process, 0.5 mm base thickness, perforated flanges one piece length per location.
- .7 Self-adhesive acoustic insulation gasket: rubber, mould-resistant, 3 mm thick, closed-cell EPDM/SBR, to ASTM D1056-97a, class SCE-41-2C1, 19 mm wide, self-adhesive on one face.
- .8 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
- .9 Polyethylene: to CAN/CGSB-51.34, type 2.
- .10 Insulating strip: rubberized, moisture resistant, 3 mm thick closed cell neoprene, 12 mm wide, with self sticking permanent adhesive on one face, lengths as required.
- .11 Laminating compound: as recommended by manufacturer, asbestos-free.
- .12 Joint filler and priming coat: to ASTM C475, Smooth asbestos-free finish, standard white, in accordance with gypsum board manufacturer's recommendations.
- .13 Joint tape.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assemblies 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 ERECTION

- .1 Do application and finishing of gypsum board to ASTM C840 except where specified otherwise.
- .2 Do application of gypsum sheathing to ASTM C1280.
- .3 Place gypsum board on metal frame, as indicated, above suspended ceilings and up to real ceilings.
- .4 Erect hangers and runner channels for suspended gypsum board ceilings to ASTM C840 except where specified otherwise.
- .5 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .6 Install work level to tolerance of 1:1200.
- .7 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.
- .8 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.
- .9 Install wall furring for gypsum board wall finishes to ASTM C840, except where specified otherwise.
- .10 Furr openings and around built-in equipment, cabinets, access panels. Extend furring into reveals. Check clearances with equipment suppliers
- .11 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

3.3 APPLICATION

- .1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.
- .2 Apply single double layer gypsum board to wood metal furring or framing using screw fasteners stud adhesive for first layer, laminating adhesive screw fasteners for second layer. Maximum spacing of screws 300 mm on centre.
 - .1 Single-Layer Application:
 - .1 Apply gypsum board on ceilings prior to application of walls to ASTM C840.

- .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.
- .2 Double-Layer Application:
 - .1 Install gypsum board for base layer and exposed gypsum board for face layer.
 - .2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250 mm.
 - .3 Apply base layers at right angles to supports unless otherwise indicated.
 - .4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.
- .3 Where indicated, place one (1) or two (2) thicknesses of gypsum board on concrete block surfaces and secure them with laminating adhesive.
 - .1 Shore up or secure gypsum board until adhesive is fully set.
 - .2 Secure top and bottom of each gypsum board mechanically.
 - .3 Lay sheets forming visible side of this covering with joints staggered at least 250 mm compared to those on underside.
 - .4 Mechanically attach top and bottom of each gypsum board.
- .4 Apply water-resistant gypsum board where wall tiles coating to be applied adjacent to slop sinks janitors closets. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.
- .5 Appliquer un cordon continu de 12 mm de diamètre d'un produit d'étanchéité acoustique sur le pourtour de chaque paroi de cloison, au point de rencontre des plaques de plâtre et de la charpente, là où les cloisons aboutent les éléments fixes du bâtiment. Sceller parfaitement toutes les découpes pratiquées autour des boîtes électriques, des conduits, dans les cloisons dont le pourtour est garni d'un produit d'étanchéité acoustique.
- .6 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.
- .7 Install gypsum board with face side out.
- .8 Do not install damaged or damp boards.
- .9 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4 INSTALLATION

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure using contact adhesive for full length at 150 mm on centre.
- .2 Install casing beads around perimeter of suspended ceilings.
- .3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

- .4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.
- .5 Contraction joints:
 - .1 Prepare joints in places with change in nature of support, about every 10 m along long corridors, about every 15 m along ceilings.
 - .2 Prepare joints with two outcrop moulds placed back to back, inserted into coating formed by gypsum board and attached independently on each side of joint.
- .6 Provide continuous polyethylene dust barrier behind and across control joints.
- .7 Install control joints straight and true.
- .8 Construct expansion joints, at building expansion and construction joints. Provide continuous dust barrier.
- .9 Install expansion joint straight and true.
- .10 Install access doors to electrical and mechanical fixtures specified in respective sections.
 - .1 Rigidly secure frames to furring or framing systems.
- .11 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.
- .12 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWC Levels of Gypsum Board Finish.
 - .1 Levels of finish:
 - .1 Level 0: no tapping, finishing or accessories required.
 - .2 Level 1: embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable.
 - .3 Level 2: embed tape for joints and interior angles in joint compound and apply one separate coat of joint compound over joints, angles, fastener heads and accessories; surfaces free of excess joint compound; tool marks and ridges are acceptable.
 - .4 Level 3: embed tape for joints and interior angles in joint compound and apply two separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.
 - .5 Level 4: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.
 - .6 Level 5: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.
- .13 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
- .14 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.

- .15 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .16 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

3.5 RESURFACING OF PLASTER

- .1 Following demolition work, in place indicated in drawings, resurface existing plasterwork.
- .2 Use products compatible with and that adhere to existing surfaces.
- .3 Match finished work seamlessly with adjacent surfaces.
- .4 Match existing textured surfaces juxtaposed with new work as indicated by Departmental Representative.

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.

3.7 PROTECTION

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

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 05 50 00 - Metal Fabrications.
- .2 Section 06 10 00 – Rough Carpentry.
- .3 Section 07 21 16 - Blanket Insulation.
- .4 Section 07 26 00 - Vapour retarders and air barrier.
- .5 Section 07 92 00 - Joint Sealing.
- .6 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM C645-14 e1, Standard Specification for Nonstructural Steel Framing Members.
 - .2 ASTM C754-15, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
 - .3 ASTM D1056-14, Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.
- .2 Underwriters' Laboratory of Canada (ULC)
 - .1 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .3 The National Association of Architectural Metal Manufacturers:
 - .1 EMMA 557-99, Standards for Expanded Metal.
- .4 Environmental Choice Program (ECP)
 - .1 CCD-047, Architectural Surface Coatings.
 - .2 CCD-048, Surface Coatings - Recycled Water-Borne.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .6 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual – Current edition.
 - .1 MPI #26, Primer, Galvanized Metal, Cementitious.
- .7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

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

1.4 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 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 off ground 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.

Part 2 Products

2.1 MATERIALS

- .1 Non-load bearing channel stud framing: 41, 64, 92 and 152 mm stud size to ASTM C 645 and CAN/ULC-S102, roll formed from 0.53, 0.91 and 1.20 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum, designed for knock-out service holes at 460 mm centres.
 - .1 Interior metal framing:
 - .1 Partition up to 3 600mm: 0.53mm min. thickness.
 - .2 Partition up to 4 800mm: 0.91mm min. thickness.
 - .3 Partition up to 6 000mm: 1.20mm min. thickness.
 - .2 Jamb of interior apertures: 32 mm high.
- .2 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, of the following heights:
 - .1 Standard interior metal framing: 32 mm high.
 - .2 Jamb of interior apertures: 32 mm high.
- .3 Floor tracks: steel sheet, minimum thickness as prescribed according to type of partition, dimensions to fit those of columns, pressure-type, shaped to hold columns securely in place at 50 mm intervals.
- .4 Ceiling tracks: in sections of dimensions to fit those of columns, minimum thickness as prescribed according to type of partition, for assembly with saddles and doubled binding wires, 1.2 mm in diameter.

- .5 Galvanized steel furring units 19 mm thick, anchors and fasteners, to ASTM C841.
- .6 Metal channel stiffener: width of studs x 50 mm, 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.
- .7 Acoustical sealant: to Section 07 92 10 – Joint Sealant.
- .8 Insulating strip: rubberized, moisture resistant 3 mm thick closed cell neoprene/ EPDM /SBR, to ASTM D1056, Class SCE-41-2C1, 19 mm wide, one face self-adhering, length as required.
- .9 Compressible polystyrene foam, 6 mm thick, in rolls, width to suit metal framing.
- .10 Acoustic insulation: to Section 07 21 16 – Blanket insulation.

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 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 ERECTION OF STANDARD PARTITIONS

- .1 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.
- .2 Install damp proof course under stud shoe tracks of partitions on slabs on grade.
- .3 Place studs vertically at 400 mm on centre and not more than 50 mm from abutting walls, and at each side of openings and corners.
 - .1 Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
- .4 Erect metal studding to tolerance of 1:1000.
- .5 Attach studs to bottom ceiling track using screws crimp method pop rivets.
- .6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.
- .7 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.
- .8 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.
- .9 Install heavy gauge single jamb studs at openings.

- .10 Erect track at head of door/window openings and sills of sidelight/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.
- .11 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.
- .12 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.
- .13 Install steel studs or furring channel between studs for attaching electrical and other boxes.
- .14 Extend partitions to ceiling height except where noted otherwise on drawings.
- .15 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.
 - .1 Use 50 mm leg ceiling tracks. Use double track slip joint as indicated.
- .16 Install continuous insulating strips to isolate studs from uninsulated surfaces.
- .17 Install two continuous beads of acoustical sealant insulating strip under studs and tracks around perimeter of sound control partitions.

3.3 INSTALLING INSULATION

- .1 Install insulation so as to ensure continuous acoustic protection at places indicated.
- .2 Carefully adjust insulation on units to be covered as well as around electrical boxes, pipes, air ducts and frames that pass through it.
- .3 Do not compress insulation to fit spaces to be insulated.
- .4 Do not cover insulation before installation work has been inspected and approved by Departmental Representative.

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 non-structural metal framing application.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 05 50 00 - Metal Fabrications.
- .2 Section 06 10 00 - Rough Carpentry.
- .3 Section 07 21 16 - Blanket Insulation.
- .4 Section 07 84 00 - Firestopping.
- .5 Section 07 92 00 - Joint Sealing.
- .6 Section 09 21 16 - Gypsum Board Assemblies.
- .7 Section 09 22 16 – Non-structural Metal Framing.
- .8 Section 09 91 23 - Interior Re-painting

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM C635/C635M-13a, Standard Specifications for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
 - .2 ASTM C636/C636M-13a, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - .3 ASTM C645 - 14e1, Standard Specification for Nonstructural Steel Framing Members.
 - .4 ASTM A653 / A653M - 15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .5 ASTM E580/E580M–14, Practice for Application of Ceiling Suspension Systems for Acoustic Tile and Lay-in Panels in Areas Requiring Seismic Restraint
 - .6 ASTM E1264-14, Standard Classification for Acoustical Ceiling Products
- .2 CSA Group
 - .1 CSA B111-74 (R2003), Wire Nails, Spikes and Staples.Ceiling Systems Installation Handbook (CISCA)
- .3 American National Standard Institute (ANSI)/Illuminating Engineering Society of North America (IESNA)
 - .1 ANSI/IESNA RP-1-12, American National Standard Practice for Office Lighting.
- .4 CISCA Ceilings & Interior Systems Construction Association::
 - .1 Ceiling systems handbook
 - .2 Guidelines for seismic restraint for direct-hung suspended ceiling assemblies
 - .3 Recommendations for direct-hung acoustical tile and lay-in panel ceilings

1.3 CALCULATION CRITERIA

- .1 Maximum flexion: deflection of 1/360 of scope, determined by flexion tests prescribed in ASTM C 635 and ASTM E580.
- .2 Contractor is responsible of reassembling the ceilings to its original state, once the envelope repair work are completed.

1.4 REQUIREMENTS OF REGULATORY BODIES

- .1 Floor/ceiling and roof/ceiling assemblies with fire resistance ratings: certified by a Canadian certification body accredited by Standards Council of Canada.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for ceiling assemblies and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit samples of integrated ceiling components as follows:
 - .1 Duplicate full size samples of each type of acoustical units.
 - .2 One representative model of each type of ceiling suspension system

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect ceiling assembly materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.7 SITE CONDITIONS

- .1 Dry materials that give off moisture before starting work
- .2 Maintain temperature between 15 ° and 30 ° C and a relative humidity between 20 and 40% where the materials will be installed, before and during work.
- .3 Store materials where materials will be installed for 48 hours prior to installation.
- .4 In order to avoid mold, maintain relative humidity at no less than 70%.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse 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.

Part 2 Products**2.1 DESCRIPTION**

- .1 Suspended ceiling system incorporating acoustical, lighting, air distribution, sprinkler and fire protection rating as integral part of system.
- .2 Tiles and suspension must come from a single manufacturer.

2.2 MATERIALS

- .1 Tiles and suspension must come from a single manufacturer.
- .2 Metal suspension: intermediate duty system to ASTM C635, cold-rolled steel, commercial grade.
- .3 The integrated ceiling assemblies are to be dismantled, preserved, and reassembled once the envelope repair works are completed. The contractor will replace every damaged element (suspension or acoustical tiles) during construction.
 - .1 Suspension system for acoustical tiles:
 - .1 T suspension, exposed 24 mm, medium resistance, to ASTM C 635.
 - .2 Height: 38 mm.
 - .3 Material: hot-dipped galvanized steel, commercial grade.
 - .4 Finish: polyester paint, baked, white colour.
 - .5 Main tee for tiles: double-thick core, medium load, to ASTM C635.
 - .6 Secondary tee: double-thick core, bearing capacity of 18.6 kg/ml, medium.
 - .7 Perimeter trim, minimum dimension 24 mm x 24 mm, to meet vertical surface.
 - .8 Colour: white.
 - .2 Acoustic tiles :
 - .1 TA1 tiles: (Dune)
 - .2 Material: hydroformed mineral fibre, finished in acrylic latex paint, factory-applied, 610 mm x 1220 mm x 16 mm, square edges, white, to ASTM E-1264.
 - .3 Type: III
 - .4 Shape: 2.
 - .5 Texture: medium.
 - .6 Pattern: C E
 - .7 Noise reduction coefficient (NRC): 0.50.
 - .8 Ceiling transmission loss index (CAC): 33.

- .9 Light reflection (LR) index: 0.83.
- .10 Resistant to sagging in damp conditions.
- .11 Treated against mould and bacteria.
- .12 Resistant to shocks and scratches.

2.3 ACCESSORIES

- .1 Staples, nails and screws: to CSA B111, anti-corrosion finish, based on recommendations from manufacturer of acoustic items.
- .2 Assembly clips: specially designed to secure tiles to suspension frame. May be used in an installation with a fire resistance rating.

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 ceiling assemblies 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.
 - .4 Start installation of suspensions and acoustic tiles after inspecting installations to be concealed by ceiling and after receiving written approval from Departmental Representative.

3.2 INSTALLATION

- .1 Contractor is responsible of reassembling the ceilings to its original state, once the envelope repair work is completed.
- .2 Install integrated ceiling suspension system to ASTM C636 and E580 with hangers supported from building structural members at indicated heights.
- .3 Install suspension frames in accordance with manufacturer's instructions and calculation criteria tested by certification bodies.
- .4 Do not erect ceiling suspension system until anchors, blocking, sound or fire barriers, electrical and mechanical work above ceiling are inspected and approved by Departmental Representative
- .5 Fix the suspension to the upper frame using the mounting methods consistent with indications.
- .6 Ensure suspended system is co-ordinated with location of related components.
- .7 Install suspension assembly to upper frame using mounting methods consistent with UL indications.

- .8 Install electrical light fixtures and air diffusers to manufacturer's instructions. Provide stabilizing reinforcement at 150 mm at most from each angle, and at every 600 mm at most all around device.
- .9 Install acoustic units, detectors, speakers, light fixtures, in suspension system as per details.
- .10 Ensure ceiling is free of finger marks and, for the new tiles, touch-up scratched surfaces with field painting to match, supplied by manufacturer.
- .11 Install removable sections in sufficient quantity to ensure access to ceiling space on a surface equal to 50% of surface of suspended ceiling.
- .12 Ridges of finished ceiling must be square along walls, and must not have flatness deviation greater than 1:1000.
- .13 Produce expansion seals as indicated.
- .14 Installation in accordance with recommendations of CISCA and National Building Code for areas subject to light to moderate seismic activity (zones 0 to 2).
 - .1 Lattice must not be attached to wall trim.
 - .2 There must be 10 mm play on all sides.
 - .3 Lattice must overlap wall trim by 10 mm.
 - .4 Ends of girders and crossed tees must be tied together to keep them from separating.
 - .5 No suspension wire may be installed at perimeter.
 - .6 Suspension wire must be twisted at least three (3) turns on themselves, at both ends of their mooring.

3.3 INSTALLATION OF ITEMS ON SUSPENSION FRAME

- .1 Place panels and acoustic tiles on suspension frame.
- .2 Place fibrous absorbent material on entire hidden side of suspension frame.
- .3 For ceilings with fire resistance rating, attach panels on visible frame using assembly clips. On ceiling mounts, diffusers, return air grilles and other devices, protect them in accordance with requirements of certification bodies.

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 ceiling assemblies installation.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 07 92 00 – Produits d'étanchéité pour joints
- .2 Section 08 44 13 – Murs rideaux vitrés à ossature d'aluminium
- .3 Section 09 21 16 - Revêtement en plaques de plâtre

1.2 REFERENCE STANDARDS

- .1 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33
- .2 Environmental Protection Agency (EPA)
 - .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 The Master Painters Institute (MPI)
 - .1 Maintenance Repainting Manual 2004, Master Painters Institute (MPI), including Identifiers, Evaluation, Systems, Preparation and Approved Product List.
- .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.
- .8 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1113-04, Architectural Coatings.

1.3 QUALITY ASSURANCE

- .1 Conform to latest MPI requirements for interior repainting work including cleaning, preparation and priming.
- .2 Materials such as primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners and solvents shall be in accordance with the latest edition of the MPI Approved Product List and shall be from a single manufacturer for each system used.
- .3 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.
- .4 Standard of Acceptance: when viewed using final lighting source surfaces shall indicate the following:
 - .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

INTERIOR RE-PAINTING

- .2 Ceilings: no defects visible from floor at 45 degrees to surface.
- .3 Final coat to exhibit uniformity of colour and sheen across full surface area.
- .5 Mock-ups: construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .1 Produce a work sample for a full section length for heating cabinets and a full section length for ceiling finishing box. Prepare designated item (for each colour range) and apply prescribed paint or coating based on specified requirements in accordance with selected colours, textures and gloss levels.
 - .2 Mock-up will be used:
 - .1 To judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Architectural Painting Specification Manual standards.
 - .3 Produce samples of work at designated locations.
 - .4 Allow 24 hours for inspection of mock-up before proceeding with work.
 - .5 When approved, repainted room, surface and/or item shall become acceptable standard of finish quality and workmanship for similar on-site interior repainting work.
- .6 Pre-Installation Meeting:
 - .1 Convene a pre-installation meeting one week prior to beginning work of this Section, in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM), to review the following :
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Coordination with other building sub trades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
- .7 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit product data and instructions for each paint and coating product to be used.
 - .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 and curing.
- .3 Samples:
 - .1 Submit full range colour sample chips to indicate where colour availability is restricted.

INTERIOR RE-PAINTING

- .2 Submit duplicate 200 x 300 mm sample panels of each paint stain clear coating special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
 - .1 Use sample of each different base material (take minimum thickness prescribed for sample) receiving paint to apply to respective products.
- .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 Closeout Submittals
 - .1 Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals
 - .1 Submit a record of all products used. Indicate all products contained in each system, specifying information below for each of them.
 - .1 Product name, type and use (in other words, materials and the place where they are applied).
 - .2 Manufacturer's product number.
 - .3 Colour numbers.
 - .4 MPI Environmentally Friendly classification system rating.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements, supplemented as follows:
 - .1 Deliver and store materials in original containers, sealed, with labels intact.
 - .2 Labels to indicate:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
 - .3 Remove damaged, opened and rejected materials from site.
 - .4 Store and handle in accordance with manufacturer's recommendations.
 - .5 Store materials and equipment in secure, dry, well-ventilated area with temperature range between 7 degrees C to 30 degrees C. Store materials and supplies away from heat generating devices and sensitive products above minimum temperature as recommended by manufacturer.

INTERIOR RE-PAINTING

- .6 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Consultant Departmental Representative DCC Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative DCC Representative Consultant.
- .7 Remove paint materials from storage in quantities required for same day use.
- .8 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- .9 Fire Safety Requirements:
 - .1 Provide 9 one kg dry chemical Type ABC fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site daily.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Place materials defined as hazardous or toxic in designated containers.
 - .3 Handle and dispose of hazardous materials in accordance with CEPA.
 - .4 Ensure that empty containers are sealed and stored properly for disposal.
 - .5 Send unused paint products to an approved hazardous materials collection site accepted by Departmental Representative.
 - .6 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.
 - .7 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
 - .8 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
 - .9 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:
 - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.
 - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 - .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - .4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.

- .5 Empty paint cans are to be dry prior to disposal or recycling (where available).
- .10 Where paint recycling is available, collect waste materials by type and provide for delivery to recycling or collection facility.
- .11 Set aside and protect surplus and uncontaminated finish materials. Deliver to or arrange collection by employees, individuals, or organizations for verifiable re-use or re-manufacturing.

1.6 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
 - .1 Do not perform repainting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application and until paint has cured sufficiently.
 - .2 Co-ordinate use of existing ventilation system with General Contractor DCC Representative Owner Consultant Departmental Representative and ensure its operation during and after application of paint as required.
 - .3 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. Use of gas-fired appliances is not permitted.
 - .4 Do not perform painting work unless minimum lighting level of 323Lux is provided on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer, do not perform repainting work when:
 - .1 Ambient air and substrate temperatures are below 10 degrees C.
 - .2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.
 - .3 Relative humidity within area to be repainted is above 85%.
 - .2 Conduct moisture tests using properly calibrated electronic Moisture Meter, except use simple "cover patch test" on concrete floors to be repainted.
 - .3 Do not perform repainting work when maximum moisture content of substrate exceeds:
 - .1 12% for concrete and masonry (clay and concrete brick/block).
- .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 noted herein.
 - .3 Apply paint when previous coat of paint is dry or adequately cured, unless otherwise pre-approved by specific coating manufacturer.

- .4 Apply paint in occupied facilities unoccupied rooms or areas during silent hours only. Schedule operations to approval of the Consultant Departmental Representative DCC Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

1.7 MAINTENANCE

- .1 Extra Materials:
- .2 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .3 Submit one - one four litre can of each type and colour of stain finish coating. Identify type and colour in relation to established colour schedule and finish system.

Part 2 Products

2.1 MATERIALS

- .1 Paint materials listed in latest edition of MPI Approved Product List (APL) are acceptable for use on this project.
- .2 Where required by authorities having jurisdiction, paints and coatings to provide a fire resistant rating.
- .3 Paint materials for repaint systems to be products of single manufacturer.
- .4 Only qualified products with MPI "Environmentally Friendly" E2 E3 E1 rating are acceptable for use on this project.
- .5 Use only MPI listed L rated materials.
- .6 Paints, coatings, thinners, solvents, cleaners and other fluids used in repainting, to be as follows:
 - .1 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments;
 - .2 Water-based Water soluble Water clean-up;
 - .3 Non-flammable biodegradable;
 - .4 Manufactured without compounds which contribute to ozone depletion in the upper atmosphere;
 - .5 Manufactured without compounds which contribute to smog in the lower atmosphere.
- .7 Paints and coatings must not be formulated or manufactured with formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

2.2 COLOURS

- .1 Departmental Representative will submit the color selection to the contractor within 60 days of contract award.
- .2 Total of 6 different colors, 1 color per wall or element.
- .3 Selection of colours will be from manufacturers full range of colours.

- .4 Where specific products are available in restricted range of colours, selection will be based on limited range.
- .5 First coat in two 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. On-site tinting of painting materials is allowed with Departmental Representative's Project Manager's Consultant's DCC Representative's written permission.
- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Where thinner is used, addition not to exceed paint manufacturer's recommendations. Do not use kerosene or such organic solvents to thin water-based paints.
- .4 Thin paint for spraying in accordance with paint manufacturer' instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Project Manager Consultant DCC Representative Departmental Representative.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

- .1 Paint gloss defined as sheen rating of applied paint, in accordance with following MPI gloss / sheen standard values:

Gloss Level Category	Units @ 60 Degrees	Units @ 85 Degrees
G1 - matte finish	0 to 5	maximum 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	minimum 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	85	

- .2 Gloss level ratings of repainted surfaces shall be as specified herein as noted on Finish Schedule.

2.5 INTERIOR PAINTING SYSTEMS

- .1 RIN 5.1 - Structural Steel and Metal Fabrications.
 - .1 RIN 5.1L - Aluminum paint.
 - .2 Maximum VOC limit 250g/L.
- .2 RIN 9.1 - Spray Textured Surfaces: (Ceilings).
 - .1 RIN 9.1A - Latex Flat.
 - .2 Maximum VOC limit to SCAQMD Rule 1113
- .3 RIN 9.2 - Plaster and Gypsum Board: (gypsum wallboard, drywall, and "sheet rock type material".

- .1 RIN 9.2A - Latex insert gloss level.
- .2 Maximum VOC limit to SCAQMD Rule 1113

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 EXAMINATION

- .1 Interior surfaces requiring repainting: inspected by both painting contractor and Paint Inspection Agency who will notify DCC Representative Departmental Representative Consultant in writing of defects or problems, prior to commencing repainting work, or after surface preparation if unseen substrate damage is discovered.

3.3 PREPARATION

- .1 Perform preparation and operations for interior painting in accordance with MPI Maintenance Repainting Manual requirements except where otherwise specified.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.
- .3 Clean and prepare interior surfaces to be repainted in accordance with MPI Maintenance Repainting Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
 - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using stiff bristle brush to remove dirt, oil and surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and to dry thoroughly. Allow sufficient drying time and test surfaces using an electronic moisture metre before commencing work.
 - .5 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.
 - .6 Many water-based paints cannot be removed with water once dried. Minimize use of kerosene or such organic solvents to clean up water-based paints.
- .4 Clean metal surfaces to be repainted by removing rust, dirt, oil, grease and foreign substances in accordance with MPI requirements. Remove such contaminants from surfaces, pockets and corners to be repainted by brushing with clean brushes, blowing with clean dry compressed air, or brushing/vacuum cleaning as required.
- .5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining

coats. Touch-up, spot prime, and apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.

- .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from distance up to 1000 mm.

3.4 EXISTING CONDITIONS

- .1 Prior to commencing work, examine site conditions and existing interior substrates to be repainted. Report in writing to Project Manager DCC Representative Consultant General Contractor Departmental Representative damages, defects, or unsatisfactory or unfavourable conditions or surfaces that will adversely affect this 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" and report findings to DCC Representative Consultant Departmental Representative Project Manager General Contractor. Maximum moisture content not to exceed specified limits.
- .3 Do not commence until such adverse conditions and defects have been corrected and surfaces and conditions are acceptable to Painting Subcontractor and Inspection Agency.
- .4 Degree of surface deterioration (DSD) to be assessed using MPI Identifiers and Assessment criteria indicated in MPI Maintenance Repainting Manual. MPI DSD ratings and descriptions are as follows:

Condition	Description
DSD-0	Sound Surface (includes visual (aesthetic) defects that do not affect film's protective properties).
DSD-1	Slightly Deteriorated Surface (indicating fading; gloss reduction, slight surface contamination, minor pin holes scratches).
DSD-2	Moderately Deteriorated Surface (small areas of peeling, flaking, slight cracking, and staining).
DSD-3	Severely Deteriorated Surface (heavy peeling, flaking, cracking, checking, scratches, scuffs, abrasion, small holes and gouges).
DSD-4	Substrate Damage (repair or replacement of surface required).

3.5 PROTECTION

- .1 Protect existing surfaces and adjacent fixtures and furnishings from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Consultant Departmental Representative DCC 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 general public and building occupants in and about building.
- .5 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and surface mounted equipment, fittings and fastenings prior to undertaking re-painting operations. Store items and re-install after painting is completed.

INTERIOR RE-PAINTING

- .6 Move and cover furniture and portable equipment as necessary to carry out repainting operations. Replace as painting operations progress.
- .7 As repainting operations progress, place "WET PAINT" signs in occupied areas to approval of DCC Representative Consultant Departmental Representative.

3.6 APPLICATION

- .1 Apply paint by method that is best suited for substrate being repainted using air sprayer brush roller and/or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise. Methods of application as pre-approved by Consultant Departmental Representative DCC Representative before commencing work.
- .2 Brush and Roller Application:
 - .1 Apply paint in uniform layer using brush and/or roller of types suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple unless approved by Departmental Representative Consultant DCC Representative.
 - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray Application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 - .2 Keep paint ingredients properly mixed in containers during paint application by intermittent agitation continuous mechanical agitation frequently as necessary.
 - .3 Apply paint in uniform layer, with overlapping at edges of spray pattern.
 - .4 Back roll spray applications and brush out runs and sags immediately.
 - .5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.
- .4 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by DCC Representative Consultant Departmental Representative.
- .5 Apply paint coats in continuous manner and allow surfaces to dry and properly cure between coats for minimum time period as recommended by manufacturer. Minimum dry film thickness of coats not less than that recommended by manufacturer. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Sand and dust between coats to remove visible defects.

3.7 FIELD QUALITY CONTROL

- .1 Inspection:

- .2 Advise Departmental Representative Consultant DCC Representative Project Manager and Paint Inspection Agency when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
- .3 Co-operate with Paint Inspection Agency and provide access to areas of work.

3.8 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning, supplemented as follows:
 - .1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
 - .2 Keep work area free from unnecessary accumulation of tools, equipment, surplus materials and debris.
 - .3 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.
 - .4 Clean equipment and dispose of wash water used for water borne materials, solvents used for oil based materials as well as other cleaning and protective materials (e.g. rags, drop cloths, and masking papers), paints, thinners, paint removers/strippers in accordance with safety requirements of authorities having jurisdiction and as noted herein.
 - .5 Clean painting equipment in leak-proof containers that will permit particulate matter to settle out and be collected. Sediment remaining from cleaning operations to be recycled or disposed of in manner acceptable to authorities having jurisdiction.
 - .6 Recycle paint and coatings in excess of repainting requirements as specified.

3.9 RESTORATION

- .1 Clean and re-install hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashings on affected exposed surfaces. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .4 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant Departmental Representative DCC Representative Project Manager. Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Project Manager DCC Representative Consultant Departmental Representative.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 06 10 00 – Rough Carpentry.
- .2 Section 08 44 13 – Glazed Aluminum Curtain Walls
- .3 Section 09 21 16 – Gypsum Board Assemblies.
- .4 Section 09 22 16 – Non-structural Metal Framing.
- .5 Section 09 58 00 – Integrated ceiling assemblies.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM D1784-11, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
 - .2 ASTM E2180 – 07(2012), Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) In Polymeric or Hydrophobic Materials
- .2 National Fire Protection Association
 - .1 NFPA 701- 2015 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Indicate dimensions in relation to window jambs, operator details, top rail, conditions between adjacent blinds, corner conditions anchorage details, hardware and accessories details, electrical operating mechanisms, connections.
- .4 Samples:
 - .1 Submit one representative working sample of each type of blinds.
 - .2 Submit duplicate samples of manufacturer's standard colours, patterns and textures of specified vane and rail materials for selection by Ministerial Representative.
- .5 Work samples
 - .1 Submit a representative and manoeuvrable sample of each suggested type of blind.
 - .2 Submit two (2) samples of standard colours offered by manufacturer for selection by Departmental Representative.

1.4 QUALITY ASSURANCE

- .1 Mock-ups: Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .1 Produce a work sample in dimensions coordinated with those of work sample specified in Section 08 44 13 – Glazed Aluminum Curtain Wall.
 - .2 Samples will be used for following purposes:
 - .1 To assess performance of material, reflectivity, sunlight transmission level and visual aspect of fabric.
 - .3 Locate mock-up where indicated.
 - .4 Allow the persons in charge of examining samples 24 hours before starting work.
 - .5 When accepted, mock-up will demonstrate minimum standard of quality and materials for work of this Section.
 - .6 Mock-up may not remain as part of finished work.
- .2 Qualifications of installer: Installer must be certified by manufacturer and have minimum of five (5) years' experience in installation of roller shades.

1.5 EXTENDED WARRANTY

- .1 For Work of this Section 12 21 19 – Roller Blinds, the 12-month warranty period is extended to 60 months for roller shade parts, 120 months for fabrics, lifetime for mechanisms.
- .2 Provide a written document jointly prepared and signed by the manufacturer and the installer and issued in the name of Canada, ensuring the work against defects in materials, workmanship and installation for the period specified above.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .3 Store materials to prevent damage or contamination by water, freezing, foreign matter or other causes. Store cementitious materials in dry location, above ground or pavement.

Part 2 Products**2.1 DESIGN REQUIREMENTS**

- .1 Design roller blinds to following requirements:
 - .1 Allow replacement of wear susceptible parts by user or manufacturer.
 - .2 Guarantee of at least five-years of available replacement parts following discontinued products by manufacture.
 - .3 Provide instructions for replacing or repairing worn parts, including inventory numbers for parts and procedures for ordering replacement parts.
 - .4 Program allowing for refurbishing or return of used vertical louvre blinds.

- .5 Permit disassembly of components for recycling of materials where recycling markets exist.
- .6 Include stamps on major plastic components indicating composition code to facilitate recycling efforts.

2.2 MATERIALS, EQUIPMENT AND FABRICATION

- .1 At bays of curtain-wall on axis C9: motorized roller blind.
 - .1 Sunscreen blind:
 - .1 Fabric:
 - .1 Fibreglass and vinyl fibreglass screen fabric, 10% opening, certified NFPA 701 for fire resistance, certified ASTM E 2180 for bacteriological and fungal resistance.
 - .2 Colour and finish: Ministerial Representative's choice from manufacturer's standard range.
 - .2 Installation: joint coupling with connector.
 - .3 Operation of mechanism:
 - .1 Motorized system for six panels at same time.
 - .4 Dimensions of blinds:
 - .1 One shade per bay window.
 - .2 Width: centre-to-centre dimensions of vertical mullions.
 - .3 Height: outer dimensions of horizontal mullions.
 - .2 Accessories:
 - .1 Guiderails and curtain thresholds: extruded aluminum, profile as indicated, clear anodized finish, with concealed border strips and fasteners. Provide clear anodized aluminum closing plate as indicated.
 - .2 Fasteners and anchors: corrosion-resistant metal, compatible with fastening materials.
 - .2 General hardware for operation:
 - .1 Hardware must allow for removal of drum from supports without removing hardware from drum opening or supports.
 - .2 Hardware must allow for removal and reinstallation of curtain on site without removing drum, hardware for operation or drum supports.
 - .3 Chain hoist: stainless steel ball chain with tensile strength of 90 lbs., with capacity for multiple curtains to be operated with single chain.

2.3 FABRICATION

- .1 Assemble and finish units in shop.
- .2 Fabricate components thick enough to support their own weight plus imposed loads without sagging.
- .3 Fabricate blinds to overlap with frame's width. Unless indicated otherwise, joints between two blinds to be present at centre line of curtain wall mullion.
- .4 Hot-seal cut edges to fall straight with no curling or fraying.

- .5 Strengthen curtain fabric with stainless steel fins when width and height ratios prevent proper functioning of curtains.
- .6 Use fasteners to be concealed in final assembly.

Part 3 Execution

3.1 EXAMINATION

- .1 Check existing conditions: before installing roller blinds, ensure that condition of previously installed surfaces and supports under other sections or contracts are acceptable and allow for work in accordance with manufacturer's instructions.
 - .1 Conduct visual inspection of surfaces and supports in presence of Ministerial Representative.
 - .2 Inform Ministerial Representative immediately of any unacceptable condition detected.
 - .3 Begin installation work only after correcting unacceptable conditions.

3.2 LOCATION

- .1 Except for bay windows adjacent to door, install one roller blind for each bay window:
 - .1 On east and west façades, except between axes 5 - 5.5 and 12a - 13;
 - .2 On south façade, except between D - E and M - N;
 - .3 On north façade, between axes A - B and Q - R.

3.3 INSTALLATION

- .1 Install blinds square, plumb and aligned.
- .2 Adjust control chains and mechanism to ensure smooth, uniform operation.
- .3 Install blinds with fasteners and anchors that will be concealed in final assembly.
- .4 Ensure that blinds are securely attached, with no movement or play when handled.

3.4 ADJUSTMENT

- .1 Adjust roller blinds and components so that they function properly, in accordance with manufacturer's written instructions.
- .2 Adjust moving parts precisely and lubricate them so that they run smoothly.
- .3 Fabric must fall straight and roll up plumb and square.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.6 PROTECTION

- .1 Protect installed units against damage during construction work.

- .2 Repair damage to adjacent materials and equipment caused by roller blind installation work.

END OF SECTION

PART 1 - GENERAL**1.1 DESCRIPTION**

- .1 Excavation, trench digging and backfilling work include the supply of all the materials, supplies, services, labour, equipment, machinery and transport necessary for the complete execution of the work as indicated in the structural plans and in the current section. The work also includes, without being limited to:
 - .1 Detailed excavation for the footings and the pipes under the slabs.
 - .2 Backfilling of the foundations and of the pipes below the slabs.
 - .3 Excavation and backfill work for external features (landscaping).
 - .4 Installation of geotextile membranes and blind drains.
 - .5 Protection work of existing structures.
 - .6 Temporary support structures, ground-work and pumping work

1.2 RELATED SECTIONS

- .1 The specialized Contractor is responsible for obtaining a copy of all the sections of these specifications even if they do not appear to pertain to his speciality. If he does not, it shall be understood that he agrees to the clauses and requirements of all sections in these specifications. The specialized Contractor must consult the table of contents of these specifications to have knowledge of the complete list of the specifications sections.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C117-04, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63 (2007), Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .5 ASTM D1557-07, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³).
 - .6 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A3000-03, Cementitious Materials Compendium.
 - .2 CAN/CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of test and Standard Practices for concrete.
- .4 National Research Council Canada (NRC) and the Régie du Bâtiment du Québec.
 - .1 Québec Construction Code – Chapter 1, Building and National Building Code of Canada 2010 (amended) as well as the user's guide – NBC 2010: Structural Commentaries (Part 4 of Division B)

1.4 DEFINITIONS

- .1 Type of excavation:
 - .1 Regular excavation:

Digging out of all excavation materials of any type whatsoever not considered to be rock, including erratic dense land, compact clay, frozen and partially cemented materials, and existing foundations and roads that can be removed with heavy construction equipment.
 - .2 Rock removal:

Igneous, sedimentary or metamorphic rock, which before being excavated was part of solid rock, and stones or rock fragments whose individual volume exceeds 1 m³.
- .2 Topsoil: all material suitable for plant growth which may be used as supplementary soil for landscaping or seeding.
- .3 Waste materials: surplus materials or excavated materials that cannot be used for this project.
- .4 Borrowed materials: materials from areas located outside the areas to be backfilled, required for backfilling or other parts of the work.
- .5 Unsuitable materials:
 - .1 Weak, compressible materials located beneath excavated areas.
 - .2 Frost-prone materials located beneath excavated areas.
 - .3 Frost-prone materials:

EXCAVATION, DIGGING AND BACKFILLING

- .1 Fine-grained soil with a plasticity index of less than 10, according to the ASTM D4318 test, and sizing that complies with the specified limits of the ASTM C136 and ASTM D422 tests. Sieve slot sizes shall comply with the CAN/CGSB-8.1 and CAN/CGSB-8.2 standard.

- .2 Table

Sieve Slot Sizes	% of Sieved Material
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45

- .3 Coarse-grained soil of which more than 20% by weight passes through a 0.075 mm sieve.
- .6 Dimensionally stabilized fill materials (concrete fill): very weak mix composed of Portland cement, concrete aggregate and water that will not compact once placed in utility service mains, and which can be excavated without prior preparation.

1.5 DOCUMENTS/SAMPLES TO BE SUBMITTED

- .1 At least four (4) weeks before beginning the work, advise the Departmental Representative regarding the proposed source of supply for the [backfill materials] [dimensionally stabilized fill materials] and allow him to access the source for sampling and approval purposes.
- .2 Submit to the Departmental Representative the results of the sizing tests performed on the proposed backfill materials.
- .3 Provide the Departmental Representative with a laboratory analysis attesting that the backfill aggregate does not contain pyrite and is certified DB (*dalle de béton* or concrete slab).
- .4 All documents shall be submitted in triplicate. A single (1) annotated copy shall be returned to the Contractor. The Contractor shall be responsible for making additional copies and distributing them.
- .5 Submit to the testing laboratory for analysis 25 kg samples of each of the specified types of backfill as well as representative samples of the excavated material. For earth containing coarse gravel or large pieces of crushed stone, submit 70 kg samples.

1.6 EXCAVATION SLOPES, BRACING, CROSS BRIDGING, SUPPORT STRUCTURES AND UNDERPINNING WORK

- .1 Prevent the excavation walls from collapsing or sloughing. Prevent the shifting or compacting of adjacent and excavation soil, as well as soil adjacent to existing buildings, facilities and services or adjacent to buildings, facilities and services under construction.

EXCAVATION, DIGGING AND BACKFILLING

- .2 During excavation work, construct the required slopes and/or provide and place all the falsework, cofferdams, bracing or other supports needed for proper excavation. The Contractor shall be entirely responsible for all this work.
- .3 If support structures are required on the Departmental Representative's drawings: design, provide and install walls at these locations. Also design, provide and install the other additional walls or bracing required according to the excavation method selected by the Contractor.
- .4 The specialized Contractor is entirely responsible for engineering and designing earth retaining structures. The structures shall be designed to withstand the pressure exerted by the soil, water, overloads caused by the foundations or buildings adjacent to the work, highway overloads and overloads exerted by the machinery needed to construct the basin. In addition, their design shall comply with the Quebec Construction Code - Chapter I, Building and National Building Code of Canada 2010 (amended), in particular parts 4 and 8, as well as the supplement to the National Building Code of Canada 2010.
- .5 All costs for the support structures and excavation required to locate utilities shall be included in the submission costs.
- .6 The Contractor is solely responsible for damage to persons or existing buildings, installations and services that may result from the absence or weakness of support structures or cofferdams, or due to the use of incorrect slope angles, whether this damage is the result of their incorrect installation, poor maintenance or removal.
- .7 Include the cost of all work required to protect the excavations in the submission price.
- .8 In cold weather, protect the slopes from frost so that backfilling operations can continue without interruption.
- .9 Retain the services of an Engineer who is a member in good standing of the Ordre des Ingénieurs du Québec to design and inspect the retaining walls, cofferdams, sheet piles, as well as the support, cross bridging and underpinning structures required for the work, or to determine the required slope angle for excavation walls to ensure their stability in compliance with the most recent version of the Canadian Code for Construction Safety, and local by-laws.
- .10 At least 2 weeks before the start of the work, submit the design documents and related technical data for verification. All documents shall be submitted in triplicate. A single (1) annotated copy shall be returned to the Contractor. The Contractor shall be responsible for making additional copies and distributing them.
- .11 Design documents and related technical data shall bear the seal and signature of an Engineer recognized in the Province of Quebec.
- .12 The Departmental Representative responsible for designing the falsework and slope angles shall provide proof that he has a professional liability insurance policy, unless this Engineer is employed by the Contractor. If so, the Contractor shall provide proof that his insurance policy covers his engineer's work.
- .13 The excavation area shall not exceed the property lines and/or permanent easements and/or construction easements.
- .14 Take into account the recommendations of the geotechnical study on the thrusts to consider when designing the planned support systems.

1.7 PROTECTION OF EXISTING STRUCTURES

- .1 Protect the excavation bottoms against any softening. If softening occurs, remove the softened soil and replace it with type 2 compacted fill.
- .2 Protect excavation bottoms against frost.
- .3 Take the necessary measures to eliminate the dust generated.
- .4 Adequately protect existing facilities, buildings and services, and existing equipment located on site to ensure they are not damaged during the work.
- .5 Never stack waste material in an area where it could hinder the work or property drainage.
- .6 Underground structures and utility systems
 - .1 Details indicated on the drawings regarding the dimensions, location and depth at which underground structures and utilities are buried are only provided for general information purposes and are not necessarily accurate or complete.
 - .2 Before starting to dig trenches, notify the Departmental Representative and/or the authorities of the public utility companies involved and determine the location and condition of the underground structures and systems. Clearly identify the locations to prevent any service interruptions while the work is being performed.
 - .3 Confirm the location of the underground systems by carefully performing trial excavations.
 - .4 Maintain in operation and protect against any damage all water, sewage, gas, electricity and telephone lines as well as other systems or structures that might be in the areas to be excavated. Before moving or disturbing a structure or a public utility system in any way, obtain appropriate directives from the Departmental Representative.
 - .5 If required, provide the Departmental Representative and the public company with recommendations regarding the removal or detour of existing systems at the excavation site. Assume the costs for this work.
 - .6 Take note of the location of the underground lines that have been retained, diverted or abandoned.
 - .7 Confirm the location of excavations recently performed near the work area.
- .7 Existing buildings and structures on the property
 - .1 In the presence of the Departmental Representative, check the condition of the buildings, trees and other plants, lawns, fences, service poles, cables, railroad tracks, road surfaces, survey markers and elevation indicators that need to stay in place and which may be damaged during the work.
 - .2 Protect existing buildings and structures on the property likely to sustain damage, against all such damage while the work is being performed. In the event of damage, immediately restore the affected components to their original state, to the Departmental Representative's satisfaction.

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- .3 If roots or branches need to be cut to complete the excavation work, only perform this work after obtaining the Departmental Representative's approval.
- .8 Comply with municipal requirements and the Safety Code for the construction industry, S-2.1, r.6, Province of Quebec, regarding excavation and worker protection safety standards.
- .9 Adequately protect elevation indicators, alignment markers, survey markers and geodetic monuments located on the construction site.
- .10 Take all necessary measures to prevent any property damage and bodily injury.
- .11 Install protective barriers around all excavation sites.

1.8 CHOICE OF EXCAVATION METHODS

- .1 The Contractor is solely responsible for choosing the excavation methods to be applied. Submit these methods beforehand to the Departmental Representative for review and comments.

1.9 BLASTING OPERATIONS

- .1 No blasting shall be permitted during the work.

PART 2 - PRODUCTS**2.1 MATERIALS**

- .1 **Type 1 fill: crushed stone 20-0**

Clean, hard, durable crushed stone or gravel free of shale, clay and friable, organic or deleterious material; the sizing of the material shall remain within the range indicated below, when tested in accordance with the ASTM C136 and ASTM C117 standards, and the sizing curve plotted on a semi-logarithmic graph shall be continuous and progressive. The fill shall be certified DB 0-20 fill.

ASTM Sizing; % Throughs

31.5	mm	100
20	mm	90-00
14	mm	68-93
5	mm	35-60
1.25	mm	19-38
315	µm	9-7
80	µm	2-7

.2 Type 2 fill: granular Class A soils:

Compactable soils, essentially comprising granular, hard, durable, non-plastic material, such as MG-112 sand, gravel or crushed stone. These soils shall be free of shale, clay, and friable, organic or deleterious material, and of contaminated material. These soils shall not be frost prone. These soils shall not contain rubble greater than 100 mm in diameter.

.3 Type 3 fill: regular Class B soil:

All compactable, unfrozen material may be used except organic soils. The soil components must be minerals, free from stones greater than 150 mm in diameter, clinker, ashes, waste, pieces of sod or other harmful material.

.4 Drainage fill:

Crushed stone 19 mm in diameter, clean, hard and durable, containing no dust or foreign material, organic or plant material, or flat or elongated fragments.

.5 Stone dust:

Screened stone: hard, clean, durable, free of shale, clay and friable, organic or deleterious material; in compliance with the following sizing (ASTM C136-83 and ASTM C117-04):

ASTM Sizing: % Through

10	mm	100
5	mm	75-100
160	µm	4-25
80	µm	0-10

.6 Dimensionally stabilized fill materials:

- .1 0.4 MPa maximum compression strength at 28 days;
- .2 maximum Portland cement content of 25 kg/m³, [comprising [40]% fly ash as cement replacement]: in accordance with the CAN/CSA-A3000, Type [GU] standard;
- .3 0.07 MPa minimum strength at 24 hours;
- .4 concrete aggregate: in accordance with the CAN/CSA-A23.1/A23.2-04 standard;
- .5 Portland cement: type GU:
- .6 slump: 160 to 200 mm.

.7 Anti-shear reinforcement:

Biodegradable corrugated cardboard, 100 mm thick, treated to support cast-in-place concrete adequately until it has hardened.

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- .8 **Geotextile membrane:** Texel No. 7609 type or approved equivalent.
- .9 **Blind drain piping:** 150 mm diameter Big O type pipes.
- .10 Before using, have the Departmental Representative approve all fill materials. After receiving approval, always purchase the same materials from the same sources.
- .11 Before resorting to using borrowed material, the Contractor may use excavated material if it meets the requirements of this section of the specifications and is approved by the Departmental Representative. In-situ soils shall not be used as type 2 fill. They may be considered as type 3 fill if they meet the requirements for this type of fill.
- .12 Provide supplementary fill material suitable for the work, from an outside supplier.

PART 3 - PERFORMANCE**3.1 PREPARATORY WORK**

- .1 At the start of the work, clear away all obstacles, snow and ice from the surfaces of the excavation and backfill area to the extent indicated and/or required to perform the work.
- .2 Using a saw, carefully cut the surfaces of the roads and sidewalks along the perimeter of the proposed excavation so the surfaces break cleanly and uniformly.
- .3 The Contractor shall construct a work surface made of granular material to enable heavy machinery to travel to the work site.

3.2 TOPSOIL

- .1 Once the bushes, weeds and sod have been removed from the site, start excavating the topsoil in the areas required for completion of the work.
- .2 Excavate the topsoil down to the subsoil. Do not mix the topsoil with material from the subsoil.
- .3 Pile the topsoil in the areas designated by the Departmental Representative for later use in landscaping operations. Do not pile the earth higher than 2 m.
- .4 Remove the unused topsoil from the site.
- .5 Do not move the topsoil when it is damp or in any manner whatsoever that might alter the soil structure.

3.3 PILING

- .1 Pile the backfill material in the areas designated by the Departmental Representative and store the aggregate material to prevent any segregation.
- .2 Protect the fill materials against any contamination.

3.4 EXCAVATION DEWATERING AND UPLIFT PREVENTION

- .1 Keep the excavations dry throughout the work.
- .2 Submit to the Departmental Representative for [approval] [verification], the details of the proposed methods for dewatering the excavations or preventing uplift, such as the installation of dikes and filtration points, and sheet pile cut off.
- .3 If there is a risk of boiling or uplift, do not excavate below the water table. To prevent the conduits or the excavation floor from heaving, lower the water table, cut back the sheet piles or use other appropriate methods.
- .4 Protect open pits against flooding and damage that may result from surface runoff.
- .5 Evacuate the water in a manner that poses no risk to public or private properties, or to any part of the completed work or the work in progress.
- .6 Provide and install flocculation tanks, settling tanks or other water treatment facilities to remove suspended solids or other undesirable material before discharging the water into a storm sewer, watercourse or drainage basin.
- .7 Take the required measures to prevent heaving and to ensure the bottoms of deep excavations remain stable. Have an Engineer who is a member in good standing of the Ordre des Ingénieurs du Québec design the pumping method and establish the anticipated flows and the number of pumps required to achieve this objective. Submit a drawing of the method along with calculations to the Departmental Representative for review and comments, before the work begins.
- .8 Maintain pumping operations throughout the entire construction process to ensure the stability of the structures and to prevent them from uplift.
- .9 The Contractor is solely responsible for controlling groundwater as well as ensuring the stability of the structures and preventing them from uplift during construction.
- .10 The following deep groundwater pumping principles shall apply:
 - .1 The water level in all excavated areas shall be kept 0.3 m lower than the top of the granular base of the structure's raft foundation for the entire duration of the work (see geotechnical study).
 - .2 Pumping equipment in the excavations shall be operational at all times, even in cold weather or during electrical power outages. Carry out emergency measures to get any defective equipment operating again immediately or repair or replace it without delay. Keep a complete replacement pumping system on site in case of breakdown.
- .11 Quickly remove all water, mud and debris that might penetrate or accumulate inside structures built under this contract.
- .12 All expenses incurred to comply with the above-mentioned drainage requirements shall be included in the submission price.

3.5 EXCAVATION

- .1 Notify the Departmental Representative at least one week before starting the excavations and record the elevations of the natural land in his presence where necessary.
- .2 Perform the excavation work according to the indicated mapping, profiles, levels, cuts and dimensions to enable the installation, construction, inspection and drainage of the required structures.
- .3 During the excavation work, remove concrete structures, masonry, parking lot and access surfaces, sidewalks, demolished foundations and rubble as well as any obstructions.
- .4 Excavate according to specific lines and levels to minimize the quantity of fill required.
- .5 The excavation work shall in no way alter the load-bearing capacity of adjacent foundations.
- .6 Do not move the earth under the canopy of trees or bushes that are to remain in place. If it is necessary to excavate between the roots, excavate by hand and cut the roots with a well-sharpened axe or saw.
- .7 Unless the Departmental Representative provides written authorization, it is forbidden to dig more than 30 metres of trench before installing components to be buried and the length of unfilled trench shall not exceed 15 metres at the end of a work day.
- .8 Excavation materials and piled materials shall be stored at an adequate distance from the trenches.
- .9 Limit work performed with construction machinery in the immediate vicinity of unfilled trenches.
- .10 Permanently dewater all construction site areas during the work, as required under Section 3.5 of these specifications.
- .11 Remove all unsuitable material, stone or rock fragments from the excavation site or material that might slide down into it.
- .12 Excavation bottoms shall be free of loose, soft or organic material.
- .13 If the soil at the bottom of the excavations appears to be unsuitable, notify the Departmental Representative and follow his directives.
- .14 Once the excavations are completed in an area, have them approved by the Departmental Representative.
- .15 When the excavation has gone too deep, backfill the unauthorized excavation with type 2 fill material, installing it as required under Section 3.9 – Backfilling.
- .16 Contour the excavations by hand, reinforce the walls and remove all loose material and debris from the excavations. If the material at the bottom of the excavation has been disturbed, compact it until it is at least as dense as the undisturbed soil. Clean cracks found in the rock and fill them with concrete grout or mortar to the Departmental Representative's satisfaction.

3.6 REMOVAL OF EXCAVATED MATERIALS

- .1 Retain reusable excavation material for backfilling at the site.

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- .2 Transport off site deleterious debris, waste and surplus materials in compliance with all applicable laws.
- .3 When disposing off site of excavation materials, the contractor shall provide additional characterization tests requested on site at his own expense. The only tests provided by the Owner are those provided by the environmental study.

3.7 FILL AND COMPACTING MATERIALS

- .1 Densities achieved by compacting are percentages of calculated maximum densities based on the ASTM D698 and ASTM D1557 standards.
- .2 Use backfill materials that comply with the types defined in Section 2.1.
- .3 The specifications shown on the Departmental Representative's drawings for the various layers of fill material are minimum backfill specifications after compacting.
- .4 Backfill the area around completed structures to the levels indicated on the drawings, with the various layers of fill material specified thereon.
- .5 Unless otherwise indicated on the drawings, compact the various materials to achieve the densities indicated below:
 - .1 type 1: 95% Modified Proctor
 - .2 type 2: 95% Modified Proctor
 - .3 type 3: 90% Modified Proctor
- .6 Take the necessary measures to ensure the type 3 backfill material retains enough moisture to enable it to be compacted to the specified density.
- .7 Take care not to damage membranes, wall and slab insulation during backfill operations.
- .8 Unless otherwise indicated, install the backfill material in uniform horizontal layers not exceeding 300 mm in compacted thickness to the specified levels. Compact each layer before placing the next layer.
- .9 During the work, if tests indicate that the materials do not comply with the requirements described in these specifications, remove and replace the unacceptable materials at no additional cost and resume work.
- .10 After the backfill work is completed, rough grade the entire property to the levels and slopes required to ensure surface water runs away from the building and the topsoil and sod can be placed in accordance with the required slopes and levels.

3.8 BACKFILLING

- .1 Backfill the area along the walls only after the structural slabs are built at [] of elevation.

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- .2 Do not start backfilling before completion of the drainage, waterproofing and insulation work, and before the Departmental Representative has inspected the site and given his authorization.
- .3 The surfaces to be backfilled shall be free of debris, snow, ice, water or frozen earth. The backfill shall not contain any frozen material, ice, snow or debris.
- .4 Place the backfill material around the structures in compliance with the specifications of paragraph 3.8 of this section and the Departmental Representative's directives.
- .5 Do not place backfill material around or above cast-in-place concrete structures within 24 hours of removing the forms from the concrete.
- .6 Simultaneously backfill each side of walls or other structural component to ensure the stresses exerted by the soil cancel one another out. The difference in backfill height shall not exceed 500 mm.
- .7 When the earth is likely to exert uneven pressure temporarily on walls or other structures:
 - .1 allow the concrete to cure for at least 28 days, and wait until it is strong enough to support the pressure exerted by backfilling and compacting, and until it is approved by the Departmental Representative.
 - .2 if the Departmental Representative gives his approval, install supports or cross bridging to neutralize the uneven pressure and leave them in place until the Departmental Representative authorizes their removal.
- .8 Unless otherwise indicated by the Departmental Representative, remove the falsework from the excavations as backfilling progresses.
- .9 During backfilling:
 - .1 Do not remove the cross bridging before the fill material has reached the levels at which the cross bridging has been installed;
 - .2 Remove the sheet piles, as to keep the compacted backfill at least 500 mm above the bottom of the sheet piles.
- .10 Spread the backfill material in uniform horizontal layers not exceeding 150 mm in compacted thickness to the [specified levels]. Compact each layer before spreading the next layer.
- .11 Carry out dimensionally stabilized backfills at the specified locations.
- .12 Consolidate and level these dimensionally stabilized backfills using internal vibrators.
- .13 Install the drainage system in the backfill, according to the Departmental Representative's directives.

3.9 INSPECTION AND TRIALS

- .1 The materials and compacting analyses shall be performed by a testing laboratory designated and paid for by the Owner.

3.10 FROST PROTECTION

- .1 When backfilling is performed under freezing conditions, defrost and heat the material before placing and compacting it. Protect the ground against frost until the backfilling operation is completed.

3.11 BLIND DRAIN INSTALLATION

- .1 Conduit bed: place a layer of type 2 fill at least 150 mm thick; compact to specified levels, to 95% of maximum density, Modified Proctor. Then dig a shallow trench in the final surface to prevent the drain from moving.
- .2 Installation of the conduits:
 - .1 Ensure that the inside of the conduits and couplings are clean before installing them;
 - .2 Slope the conduits downward to the coupling points shown on the mechanical drawing (minimum slope: 2 mm per metre);
 - .3 Do not use any concrete, masonry components, stones, piece of wood or any other type of shim to give the conduits the desired slope;
 - .4 Connect the conduits using the type of couplings recommended by the manufacturer;
 - .5 Insert plugs into the ends of the drains;
 - .6 Every time the work is interrupted, protect the ends of the conduits against any damage and prevent foreign material from entering.
- .3 Installation of the drainage fill:
 - .1 Place the drainage fill after having the Departmental Representative approve the installation of the conduits.
 - .2 Place a 150 mm layer of drainage fill on each side of the conduit and a 300 mm layer above the conduit.
 - .3 Install the drainage fill by hand in 150 mm layers. Compact by gently tamping. Take care not to move the conduits.
 - .4 The backfill shall be covered with geotextile membrane complying with section 2.1.5.

3.12 SITE RESTORATION

- .1 Once the work is completed, remove any surplus material and debris, re-grade the slopes and correct any defects identified by the Departmental Representative.
- .2 Re-install the topsoil [according to the Departmental Representative's directives].
- .3 Re-install the sod to its pre-excavation level.

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- .4 Restore the surfaces of roads [and sidewalks] affected during the work to the condition and level that existed before the excavation began, ensuring that these structures are restored to their original thickness.
- .5 Clean and restore areas damaged during the work, according to the Departmental Representative's directives.
- .6 During the first 24 hours, use temporary shoring to support the loads exerted by traffic on the dimensionally stabilized backfills.

END OF SECTION