

SPECIFICATIONS

Modernization of the Elevators

**Issued for BID
January 19th 2021**

n : R.095799.001
BFAD n : 190703

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Page 1

ARCHITECTURE SPECIFICATION
Issued for BID, January 19th 2021.

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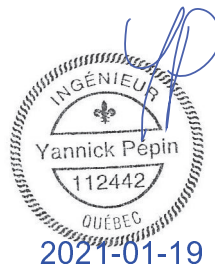
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Page 2

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Issued for BID, January 19th 2021.

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Page 3

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Issued for BID, January 19th 2021.

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Page 4

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Issued for BID, January 19th 2021.

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Page 5

STRUCTURAL SPECIFICATION
Issued for BID, January 19th 2021.

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2021-01-21

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END OF SECTION

2021-01-19

Page 1

**NUMBER
OF PAGES****DIVISION 00 – SUPPLY REQUIREMENTS AND CONTRACTS**

00 01 07	Seals page	5
00 01 10	Table of contents	3
00 01 15	List of documents	2

DIVISION 01 – GENERAL REQUIREMENTS

01 11 01	General information on the works	3
01 14 00	Work restrictions	3
01 32 16.19	Construction progress schedule – Bar (GANTT) CHART	9
01 33 00	Submittal procedures	5
01 35 29.06	Health and safety requirements	24
01 35 43	Environmental procedures	3
01 41 00	Regulatory requirements	2
01 51 00	Temporary utilities	2
01 52 00	Construction facilities	3
01 56 00	Temporary barriers and enclosures	2
01 61 00	Common product requirements	4
01 73 00	Execution	2
01 74 00	Cleaning	3
01 74 19	Waste management and disposal	4
01 77 00	Closeout procedures	2
01 78 00	Closeout submittals	7
01 79 00	Demonstration and training	2
01 79 00.13	Demonstration and training for building commissioning	3
01 91 13	General commissioning requirements	8
01 91 13.13	Commissioning plan	27
01 91 13.16	Commissioning forms	19
01 92 00	Facility operation	3

DIVISION 02 – EXISTING CONDITIONS

02 41 00.08	Demolition – Minor works	4
02 81 00	Hazardous materials	4

DIVISION 04 – MASONRY

04 20 00.08	Masonry for minor works	6
-------------	-------------------------	---

DIVISION 05 – METALS

05 12 23	Structural steel for buildings	6
05 50 00	Metal fabrications	5

2021-01-19

Page 2

**NUMBER
OF PAGES****DIVISION 06 – WOOD, PLASTICS AND COMPOSITES**

06 20 00	Finish carpentry	5
06 40 00	Architectural woodwork	6

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

07 56 14	Protected liquid elastomeric roofing membrane cold application system	6
07 62 00	Sheet metal flashing and trim	6
07 81 00	Applied fireproofing	6
07 84 00	Fire stopping	6
07 92 00	Joint sealants	7

DIVISION 08 – OPENINGS

08 80 50	Glazing	5
----------	---------	---

DIVISION 09 – FINISHES

09 21 99	Partitions for minor works	6
09 51 99	Acoustical ceilings for minor works	7
09 63 40	Stone flooring	6
09 65 19	Resilient tile flooring	5
09 91 99	Painting for minor works	12

DIVISION 14 –CONVEYING EQUIPMENT

14 00 00	Additional general conditions	12
14 20 06.1	Elevators 1, 2, 3, 4	26
14 20 06.2	Elevator 2S	7
14 20 06.3	Elevator 5	7
14 90 00	Elevator & freight elevator maintenance	15

DIVISION 21 – FIRE SUPPRESSION

21 05 00	Common Work Results for Fire Suppression	4
21 13 13	Wet Pipe Sprinkler Systems	2

DIVISION 22 – PLUMBING

22 05 00	Common Work Results for Plumbing	4
22 10 10	Plumbing Pumps	2
22 13 16.13	Sanitary Waste and Vent Piping - Cast Iron and Copper	2

2021-01-19

Page 3

**NUMBER
OF PAGES****DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)**

23 05 00	Common Work Results for HVAC	3
23 05 15	Common Installation Requirements for HVAC Pipework	3
23 05 29	Hangers and Supports for HVAC Piping and Equipment	5
23 05 48	Vibration and Seismic Controls for HVAC	3
23 05 53	Identification for HVAC Piping and Equipment	4
23 07 19	HVAC Piping Insulation	4
23 23 00	Refrigerant Piping	4
23 82 21	Air-Cooled Condenser Split System	3

DIVISION 26 – ELECTRICAL

26 05 00	Common Work Results for Electrical	6
26 05 05	Selective Demolition for Electrical	3
26 05 20	Wire and Box Connectors (0-1000 V)	2
26 05 21	Wires and Cables (0-1000 V)	2
26 05 29	Hangers and Supports for Electrical Systems	2
26 05 31	Splitters, Junction, Pull Boxes and Cabinets	1
26 05 32	Outlet Boxes, Conduit Boxes and Fittings	2
26 05 34	Conduits, Conduit Fastenings and Conduit Fittings	3
26 27 26	Wiring Devices	3
26 28 13.01	Fuses - Low Voltage	1
26 28 16.02	Moulded Case Circuit Breakers	2
26 28 20	Ground Fault Circuit Interrupters - Class A	2
26 28 23	Disconnect Switches - Fused and Non-fused	2
26 50 00	Lighting	3

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 31 00.01	Multiplex Fire Alarm System	4
-------------	-----------------------------	---

END OF SECTION

2021-01-19

Page 1

ARCHITECTURE**SPECIFICATION :**

Architecture specification prepared by Bisson Fortin architecture + design, Issued for BID, January 19th 2021.

DRAWINGS :

A01	Front page
A02	General ground floor plan
A03	General second floor plan
A04	General third floor plan
A05	General fourth floor plan
A06	Enlarge plan elevator No.1 – Demolition
A07	Enlarge plan elevator No.2 – Demolition
A08	Enlarge plan elevator No.2S – Demolition
A09	Interior elevations elevators No.2 et No.2S – Demolition
A10	Enlarge plan elevator No.3 – Demolition
A11	Enlarge plan elevator No.4 – Demolition
A12	Enlarge plan elevator No.5 – Demolition
A13	Enlarge plan elevator No.1 – Construction
A14	Enlarge plan elevator No.2 – Construction
A15	Enlarge plan elevator No.2S – Construction
A16	Interior elevations elevators No.2 et No.2S – Construction
A17	Enlarge plan elevator No.3 – Construction
A18	Enlarge plan elevator No.4 – Construction
A19	Enlarge plan elevator No.5 – Construction
A20	Enlarge details – Construction
A21	Enlarge details – Construction

MECHANICAL AND ELECTRICAL**SPECIFICATION :**

Mechanical and electrical specification, prepared by PAGEAU MOREL ET ASSOCIÉS INC., Issued for BID, January 19th 2021.

MECHANICAL DRAWINGS :

M-000	Title page
M-001	Mechanical legend and details
M-002	Fire protection elevator 1
M-003	Fire protection elevator 2
M-004	Fire protection elevator 2S
M-005	Fire protection elevator 3
M-006	Fire protection elevator 4
M-007	Fire protection elevator 5
M-008	Plumbing elevator 1 and 3
M-009	Plumbing elevator 2 for information
M-010	Plumbing elevator 2S
M-011	Plumbing elevator 4 demo.
M-012	Plumbing elevator 4 modified
M-013	Ventilation Elevator 2S
M-014	Ventilation roof

2021-01-19

Page 2

ELECTRICAL DRAWINGS :

E01	Title page
E02	Legend
E03	General ground floor plan
E04	Electrical panels – Existing
E05	Electrical panels – Modified
E06	Electrical distribution Normal Existing-Modified
E07	Electrical distribution Emergency Existing-Modified
E08	Details
E09	Lighting Elevator 1 Demolition-Modified
E10	Lighting Elevator 2 Demolition-Modified
E11	Lighting Elevator 2S Demolition-Modified
E12	Lighting Elevator 3 Demolition-Modified
E13	Lighting Elevator 4 Demolition-Modified
E14	Lighting Elevator 5 Demolition-Modified
E15	Services Elevator 1 Demolition-Modified
E16	Services Elevator 2 Demolition-Modified
E17	Services Elevator 2S Demolition-Modified
E18	Services Elevator 3 Demolition-Modified
E19	Services Elevator 4 Demolition-Modified
E20	Services Elevator 5 Demolition-Modified
E21	Fire alarm Elevator 1 Demolition-Modified
E22	Fire alarm Elevator 2 Demolition-Modified
E23	Fire alarm Elevator 2S Demolition-Modified
E24	Fire alarm Elevator 3 Demolition-Modified
E25	Fire alarm Elevator 4 Demolition-Modified
E26	Auxiliary services Elevator 1 Demolition-Modified
E27	Auxiliary services Elevator 2 Demolition-Modified
E28	Auxiliary services Elevator 2S Demolition-Modified
E29	Auxiliary services Elevator 3 Demolition-Modified
E30	Auxiliary services Elevator 4 Demolition-Modified

STRUCTURE**SPECIFICATION :**

Structural specification, prepared by Shellex Groupe Conseil., Issued for BID, January 19th 2021.

STRUCTURE DRAWINGS :

S01	Front page
S02	Enlarge plan elevator 2S –General notes and legend
S03	Enlarge plan elevator 2S – Construction – Plan views and details
S04	Enlarge plan elevator 2S – Construction – Sections and details
S05	Enlarge plan elevator 2S – Construction – Sections and details

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 02 41 00.08 – Demolition - Minor Works.
- .2 Section 05 50 00 – Metal Fabrications.
- .3 Section 06 40 00 – Architectural Woodwork
- .4 Section 07 84 00 – Fire-Stopping.
- .5 Section 08 80 50 – Glazing.
- .6 Section 09 21 99 – Partitions for Minor Works.
- .7 Section 09 51 99 – Acoustical Ceilings for Minor Works.
- .8 Section 09 63 40 – Stone Flooring.
- .9 Section 09 65 19 – Resilient Tile Flooring.
- .10 Section 09 91 99 – Painting for Minor Works.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work for the current Contract is comprised of the elevator modernization a federal building in the province of Quebec.

1.3 CONTRACT METHOD

- .1 Construct Work under single stipulated price contract.

1.4 WORK SEQUENCE

- .1 Construct Work in stages to accommodate Owner's continued use of premises during construction.
 - .2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.
 - .3 Required stages:
 - .1 Stage 1: elevator work n^os 1 and 2.
 - .2 Stage 2: elevator work n^os 3 and 4.
 - .3 Stage 3: elevator work n^os 2S and 5.
 - .4 Maintain fire access/control.
 - .5 The Departmental Representative reserves the right to postpone the start of a new phase by a few days to meet its operational requirements, up to a maximum of 10 working days, at no additional cost.
-

1.5 CONTRACTOR USE OF PREMISES

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

1.6 PARTIAL OWNER OCCUPANCY

- .1 Schedule and substantially complete designated portions of Work for Owner's occupancy prior to Substantial Performance of entire Work.
- .2 Owner will occupy designated areas.

1.7 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 Execute work with least possible interference or disturbance to building operations and normal use of premises. Arrange with Consultant to facilitate execution of work.
- .2 Use only elevators existing in building for moving workers and material.
 - .1 Protect walls of passenger elevators, to approval of Consultant prior to use.
 - .2 Accept liability for damage, safety of equipment and overloading of existing equipment.

1.8 EXISTING SERVICES

- .1 Notify, Consultant and utility companies of intended interruption of services and obtain required permission.
 - .2 Where Work involves breaking into or connecting to existing services, give Consultant 48 hours' notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to tenant operations.
 - .3 Establish location and extent of service lines in area of work before starting Work. Notify Consultant of findings.
 - .4 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.
 - .5 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
-

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

1.9 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 ACCESS AND EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.3 USE OF SITE AND FACILITIES

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

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.5 EXISTING SERVICES

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3 Provide for personnel and vehicular traffic.
- .4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.6 SPECIAL REQUIREMENTS

- .1 Work must be carried out from Monday to Friday between 7h and 17h.
 - .2 Carry out noise generating Work or Work that may cause vibrations or strong odours outside of normal working hours.
 - .3 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
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2021-01-19

Page 2

- .4 Keep within limits of work and avenues of ingress and egress.
- .5 Ingress and egress of Contractor vehicles at site is limited to loading dock and parking lot.
- .6 Deliver materials outside of peak traffic hours 17:00 to 07:00 and 13:00 to 15:00 unless otherwise approved by Departmental Representative. The Contractor must inform the Departmental Representative and CSA of dates, material delivery times, quantity and name of suppliers that will deliver materials. Materials must be delivered as needed.
- .7 Contractor must coordinate all sub-contractors' access to the site, including elevator sub-contractor.

1.7 SECURITY

- .1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.
- .2 Security clearances:
 - .1 Personnel employed on this project will be subject to security check. Obtain clearance, as instructed, for each individual who will require to enter premises.
 - .2 Obtain requisite clearance, as instructed, for each individual required to enter premises.
 - .3 Personnel will be checked daily at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.
 - .4 Contractor's personnel will require satisfactory RCMP initiated security screening in order to complete Work in premises and on site.
- .3 Security escort:
 - .1 Personnel employed on this project must be escorted when executing work in non-public areas during normal working hours. Personnel must be escorted in all areas after normal working hours.
 - .2 Submit an escort request to Departmental Representative at least (7) days before service is needed. For requests submitted within time noted above, costs of security escort will be paid for by Departmental Representative. Cost incurred by late request will be Contractor's responsibility.
 - .3 Any escort request may be cancelled free of charge if notification of cancellation is given at least (4) hours before scheduled time of escort. Cost incurred by late request will be Contractor's responsibility.
 - .4 Calculation of costs will be based on average hourly rate of security officer for minimum of (8) hours per day for late service request and of (4) hours for late cancellations.

1.8 BUILDING SMOKING ENVIRONMENT

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

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.
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2021-01-19

Page 3

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 OBJECTIVES

- .1 The Contractor must provide a Project Schedule in order to meet the following needs:
 - .1 Know the dates that the facility must provide certain equipment or services;
 - .2 Know the dates that the Professionals must respect for work within their expertise. (Approval of drawings and samples, etc.);
 - .3 Ensure that phasing required in Contract Documents is respected;
 - .4 Ensure that the deadlines mentioned in the Contract Documents are respected;
 - .5 Ensure continuous monitoring of the project so that if delays occur during the course of the project, there will be quick a response and intervention;
 - .6 Reasonably establish time frames caused by unpredictable construction conditions or Change Orders;
 - .7 Ensure proper follow-up when a request for information (RFI's) is made by Contractor to Professionals;
 - .8 Ensure follow-up and tracking for Change Order approval process.

1.3 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 Non-critical Activity: activity with a low total float margin.
 - .3 Critical Activity: activity with a total float margin equal to zero
 - .4 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally, Bar Chart should be derived from commercially available computerized project management system.
 - .5 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
 - .6 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
 - .7 Project Schedule Baseline: accepted by Contractor and Owner as the project schedule to be followed to carry out project. This schedule can be modified along the way after agreement between the contractor and the owner.
 - .8 Updated Project Schedule: Reference execution schedule on which the actual start and end dates, the planned start and end dates and the updated percentages progress have been entered.
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- .9 Modified Project Schedule: Work execution schedule that changes the list of activities or relationships contained in the reference execution schedule. When approved, it becomes the new Project Schedule Baseline.
- .10 Project Planning: Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.
- .11 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .12 Construction Work week: five (5) day week work week, Monday to Friday, defining scheduled calendar working days shown in the Bar (GANTT) Chart submission.
- .13 Quantified Days Duration: number of work periods (discounting statutory holidays or other nonworking periods) required to complete activity or other project task. Usually expressed as workdays or workweeks.
- .14 Stakeholder: Company or individual responsible for carrying out a task (activity).
- .15 Milestone: significant event in project, usually corresponding to the completion of an important (deliverable) product. In MS Project software, the milestone is represented by an activity that has a duration of zero days.
- .16 Completion Milestone: event corresponding to the end of the project (issuance certificate of substantial completion).
- .17 Elapsed Day: name given to a calendar day in the MS Project software.
- .18 Critical Path: the longest path between the start and the end of the project. On this path, all activities have a total float margin equal to 0.
- .19 Constraints: restrictions or limits having repercussions on the realization of the project. Its restrictions are normally beyond the control of the contractor. Anything that affects the timing of an activity.
- .20 Control: comparison between the actual execution and planned execution, deviation analysis, possible solution evaluation, and implementation of appropriate corrective measures.
- .21 Start Date: point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, baseline, target or current date.
- .22 Late Start Date: latest possible point in time when uncompleted portions of a schedule activity can start based on schedule network logic without delaying project, and schedule constraints if applicable.
- .23 Early Start Date: contains the earliest date that a task could possibly begin, based on schedule network logic without modifying project, and schedule constraints if applicable.
- .24 Expected Start Date: contains the date at which the task is expected to start. In the Baseline Project Schedule, it is the earliest start date.
- .25 Actual Start Date: shows the date and time that a task or an assignment actually began.
- .26 Finish Date: point in time associated with a schedule activity's completion. Usually qualified by one of following: actual, planned, estimated, scheduled, early, late, baseline, target, or current.
-

- .27 Late Finish Date: latest possible point in time when uncompleted portions of a schedule activity can finish based on schedule network logic, and schedule constraints if applicable.
- .28 Early Finish Date: contains the earliest date that a task (project) could possibly finish, based on schedule network logic, and schedule constraints if applicable.
- .29 Expected Finish Date: contains the date at which the task is expected to be finished. In the Baseline Project Schedule, corresponds to the earliest finish date.
- .30 Actual Finish Date: shows the date and time when a task or assignment was actually completed.
- .31 Update Work: date on or until which information on the actual status of the project, provided by the reporting system, applies or is valid.
- .32 Status Date: is almost never the current date, so you need to set it in MS Project.
- .33 Free Float (Slack) Margin: amount of time that a task can be delayed without delaying any successor tasks. If the task has no successors, Free Float is the amount of time that a task can be delayed without delaying the entire project's finish date. The Float Margin is calculated arithmetically and may change depending on the progress of the project and changes to the project plan.
- .34 Total Float (Slack) Margin: contains the amount of time a task's finish date can be delayed without delaying the project's finish date. The float margin is calculated arithmetically and may change depending on project progress and changes to the project plan.
- .35 Project Schedule Network Diagram: graphical representation of logical relationships among project schedule activities. Always drawn from left to right to reflect Project chronology.
- .36 Follow up (Progress Analysis): information gathering about the status of a project activity, analysis, usually in comparison with performance baselines; report production.

1.4 TOOLS TO BE USED

- .1 The Contractor is to provide the Owner with a Project Schedule built in accordance with precedence model rules (CPM with activities on the knots). This Project Schedule shall be prepared using the MS Project software (version 2017). All Project Schedule versions requested by Owner or submitted to Owner must be accompanied by an MPP format file (created by MS Project) that will have been used to prepare these Project Schedules.

1.5 REQUIREMENTS

- .1 Ensure that Master Plan and Detail Schedules are practical and remain within specified Contract duration.
 - .2 Plan to complete Work in accordance with specified milestones and time frame.
 - .3 Limit activity durations to a maximum of approximately 10 working days, to allow for progress reports.
 - .4 Ensure that it is understood that Award of Contract or start date, work progress, provisional certificate and final certificate are definite project steps and are of essence of this contract.
-

- .5 The Contractor will assign an employee responsible for planning and controlling construction projects to carry out and track the Project Schedule. This employee must have enough knowledge to efficiently use the MS Project software.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative, within 15 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan. The Departmental Representative must advise the Contractor of the work schedule compliance within 5 working days following submission.
- .4 If submitted project schedule meets all criteria listed below, the Departmental Representative will issue a compliance notice, if not the Departmental Representative will provide Contractor with a list of corrections to make project schedule compliant.
- .5 **Construction Work will not be authorized to begin unless Contractor has submitted project schedule.**
- .6 If the Project Schedule is deemed incompliant, the Contractor will have 5 working days to correct the Project Schedule, in accordance with Departmental Representative's requirements and provide a revised copy. The Departmental Representative will have 5 working days to assess compliance of revised Project Schedule.
- .7 If, during review, the timetable schedule is deemed incompliant by Departmental Representative because corrections have not been made, the Departmental Representative shall correct the schedule and the corrected schedule will become the standard project reference and Contractor must comply to the updated schedule as if he/she himself/herself had prepared and submitted it.
- .8 **If submission deadlines for the previously listed project schedule are not respected by Contractor, the first payment request will be withheld until project schedule is received and approved.**
- .9 The accepted revised schedule will become the master plan, which will serve as a benchmark for updates.
- .10 Approval of Project Schedule reference :
 - .1 The initial Project Schedule submitted by the Contractor will be reviewed by the Owner for compliance with Contract document requirements.
 - .2 The Project Schedule will be refused and returned to Contractor if it does not fully comply with the following rules:
 - .1 Generalities
 - .1 It must be designed as a precedence type network (CPM with activities on the knots) and all Start dates at the earliest, End dates at the earliest, Start dates at the latest, and End dates at the latest, total and free margins must be calculated using the mathematical model corresponding to this type of Project Schedule.
 - .2 It must be prepared with the MS Project software or any other software that can generate an MPP format file and that can be directly used by the MS Project software (version 2017).

- .3 It must be electronically delivered to the Owner and accessible as an MPP format file, compatible with MS Project (version 2017).
- .2 Activity List
 - .1 Each activity must be performed by a single stakeholder and be able to be continuously performed without carrying out other activities.
 - .2 All activities must have at least one predecessor and at least one End-to-Start or End-to-End successor.
 - .3 All Start and End dates must be calculated using the mathematical model. No Start or End date should be imposed on an activity.
 - .4 Milestones must always have predecessors or successors.
 - .5 The dates imposed on the milestones, if any, must not create negative margins.
 - .6 All procurement activities must appear on the Project Schedule.
 - .7 Activities must be grouped in accordance with Article 1.8 requirements.
- .3 Length of activities
 - .1 The length of activities shall be indicated as working days or calendar days.
- .4 Scheduling
 - .1 Procurement activities must be interconnected as requested in Article 1.9.
- .5 Schedule
 - .1 The Project Schedule must include all legal holidays.
- .6 Stakeholders
 - .1 All activities must have at least one affected resource to identify responsible stakeholder for the activity.

1.7 PROJECT MILESTONES

- .1 The project must begin with a milestone entitled « Award of Contract » which has no predecessors and whose Start date is that of the Award of Contract at the earliest.
- .2 The Construction Work is preceded by a milestone entitled « Authorization to begin Work » which has as a predecessor the activity « Award of Contract » and whose Start date is the earliest one at which Work can begin on-site.
- .3 The project ends with a milestone entitled « Project Delivery » which has no successors and whose End date at the earliest is calculated using the mathematical model of the precedence network. It is the earliest End date of this milestone that determines the project's completion date according to the Project Schedule.
- .4 If the contractual documents stipulate that the facility must provide equipment or services at specific dates or at specific project phases, the Project Schedule must provide milestones for each of these requirements with suitable constraints.
- .5 If the contractual documents stipulate that the project must be delivered in stages, the Project Schedule should provide milestones for each stage. Each step will be subject to partial Provisional Acceptance.
- .6 The Project Schedule must include all activities necessary for delivery of each project stage: Final Cleaning, Inspection, Tests, Deficiency correction.

1.8 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule derived from Master Plan.

- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Project management including at least the following subgroups:
 - .1 Project start (mobilization, obtaining permit, relocation, etc.);
 - .2 Delivery of project (Mechanical, elevator and ventilation testing, inspections, deficiency corrections etc.)
 - .2 Project procurement divided into the following sub-groups :
 - .1 Award of sub-contracts.
 - .2 Shop drawing and sample preparation (shop drawing and sample list must correspond to the list provided by the Professionals).
 - .3 Approval of shop drawings and samples by the Professionals.
 - .4 Approval of drawings and samples, if necessary, by the establishment.
 - .5 Manufacturing and delivery.
 - .6 Materials provided with a long delivery time.
 - .7 Delivery dates requested for equipment provide by the Engineer.
 - .3 Construction
 - .1 Excavation.
 - .2 Backfill.
 - .3 Building footings.
 - .4 Slab on grade.
 - .5 Structural Steel.
 - .6 Siding and Roofing.
 - .7 Interior Architecture (Walls, Floors and Ceilings).
 - .8 Plumbing.
 - .9 Lighting.
 - .10 Electrical.
 - .11 Piping.
 - .12 Controls.
 - .13 Heating, Ventilating, and Air Conditioning.
 - .14 Millwork.
 - .15 Fire Systems.
- .3 Each activity must be carried out by a single stakeholder (ex.: formwork sub-contractor, plumbing sub-contractor, General Contractor, Departmental Representative) and this activity must be able to be carried out on an ongoing basis by the same stakeholder without having to wait for other activities to begin or end. However, there are two exceptions to this rule. The first is where installation is performed by one stakeholder and supply of materials by another. The second is where the work must be carried out by several stakeholders at the same time and in close collaboration for a very short period of time (ex. pouring of concrete).
- .4 Activity description should be easily understood by all. It must clearly identify the activity even if is isolated from its structure. (ex. 1st floor Drywall Installation).
- .5 Activity numbering must be independent of its position on the Project Schedule and must be permanent for the length of the entire project (use the field « Unique ID » in MS Project or the static WBS numbering).

1.9 SEQUENCING

- .1 All activities must have at least one predecessor and one successor such as End-to-Start or End-to-End.
- .2 The milestones must be linked to at least one task by a predecessor or a successor, depending on the case.

- .3 Procurement activities must respect the following principle: Award of sub-contract, follow-up of shop drawing preparation necessary for sub-contract realization, follow-up of shop drawing approval, follow-up of fabrication or delivery for all components/elements appearing on shop drawing, and follow-up of construction activity for these components. .
- .4 The Contractor is responsible for scheduling activities. The Departmental Representative will be able to report to Contractor any links which may seem faulty, missing or unnecessary. The decision, however, without appeal, will be the Contractor's.

1.10 DURATION OF ACTIVITIES

- .1 The duration of activities are set by the Contractor.
- .2 The duration of activities to be carried out by the Owner or by the Owner's Representative's must respect the durations indicated in the contractual documents. (Drawing approval time frame, etc.).
- .3 The Departmental Representative will be able to report to the Contractor activity durations that appear to be faulty. The decision without appeal, however will belong to the Contractor.

1.11 STAKEHOLDERS

- .1 The Contractor must assign at least one resource to each activity defining the stakeholder's specialty allowing stakeholder to carry out this activity.

1.12 PROJECT MEETINGS

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

1.13 WORK PROGRESS REPORT

- .1 Update Project Schedule twice a month before site meetings, to reflect changes in activities, completion of activities and ongoing activities.
 - .2 Attach a narrative report to the Project Schedule indicating work progress, comparing progress against reference schedule and presents current projections, expected delays, impacts of these elements and possible mitigation measures.
 - .3 Completed dates:
 - .1 For all activities that began before the stated date, the Contractor will enter the date on which the activity began in the field « Actual Start » and progress percentage in the « % completed » field.
 - .2 If the activity is expected to last longer than planned, the Contractor will correct the activity duration to reflect new duration. The Contractor will indicate this change in the « Comment » field of the activity.
 - .3 For all activities that ended before the stated date, enter the date on which the activity ended in the « Actual End » field.
 - .4 For updating purposes, the Contractor must not modify links, add or remove activities except for requests for Information and for follow-up activities of change notices.
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- .4 Predictable dates:
 - .1 If the Contractor anticipates that certain activities will begin on a different date than on the Project Schedule, the date can be modified by entering the new date in the « Start » field and indicating this change in the « Comment » field.
 - .2 During the update, the Contractor should not change the links that unite the activities.
 - .3 Request for Information :
 - .1 If the Contractor issues requests for information, they will have to be added as new activities in the schedule.
 - .2 The Contractor will place under the same group entitled « Request for Information » all requests for information.
 - .3 During updates, the Contractor will track these activities in the same way as construction activities are tracked.
 - .4 Change Orders (CO)
 - .1 The CO's that may affect project duration or various phase delivery or actions to be carried out by the facility, will have to be included in the Project Schedule. If the Contractor decides not to include a CO in the Progress Schedule, the Departmental Representative will interpret that the CO has no repercussions to the Project Schedule timeline.
 - .2 The Contractor must enter all changes in a group entitled « CO follow-up ».
 - .3 Each CO must include the following activities:
 - .1 CO Issuance.
 - .2 Contractor's quote.
 - .3 Proposal evaluation by the Professionals.
 - .4 CO Approval.
 - .5 Modification execution.
 - .4 Following OC approval, the Contractor must replace « Modification execution » activity with one or more activities required by the change. In some cases, only the duration of certain existing activities may occur.
 - .5 When updating the Project Schedule, the Contractor will track these activities in the same way as for construction activities.

1.14 MODIFICATION OF WORK SCHEDULE REFERENCE

- .1 Definition:
 - .1 Unlike the update, the changes in the Project Schedule are intended to modify the Project Schedule reference model. If the Project Schedule reference cannot be respected or must be changed because of unpredictable site conditions, or changes requested by Owner or for any other reason, the Contractor may change the Project Schedule reference with the Owner's consent.
- .2 Content:
 - .1 To do this, the Contractor will first need to update by setting the stated date to the date on which he/she wishes to make the changes.
 - .2 The Contractor will then make all the required modifications.
 - .3 The Contractor submits the revised Project Schedule to the Owner with a document explaining all changes to the Project Schedule. The Departmental Representative establishes compliance of the modified Project Schedule, by applying the same criteria as for the Project Schedule reference.
 - .4 Once the modified Project Schedule is accepted by the Departmental Representative, it becomes the Project Schedule reference.

2021-01-19

Page 9

.3 Frequency:

.1 The schedule must be changed whenever events beyond the Contractor's control prevent the Contractor from respecting the sequence of activities planned in the Work schedule reference.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 02 41 00.08 – Demolition - Minor Works.
- .2 Section 05 50 00 – Metal Fabrications.
- .3 Section 06 40 00 – Architectural Woodwork
- .4 Section 07 84 00 – Fire-Stopping.
- .5 Section 08 80 50 – Glazing.
- .6 Section 09 21 99 – Partitions for Minor Works.
- .7 Section 09 51 99 – Acoustical Ceilings for Minor Works.
- .8 Section 09 63 40 – Stone Flooring.
- .9 Section 09 65 19 – Resilient Tile Flooring.
- .10 Section 09 91 99 – Painting for Minor Works.

1.2 REFERENCE STANDARDS

- .1 Not Used.

1.3 ADMINISTRATIVE

- .1 Submit to Consultant submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
 - .2 Do not proceed with Work affected by submittal until review is complete.
 - .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
 - .4 Where items or information is not produced in SI Metric units converted values are acceptable.
 - .5 Review submittals prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
 - .6 Notify Departmental Representative in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
 - .7 Verify field measurements and affected adjacent Work are co-ordinated.
 - .8 Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.
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2021-01-19

Page 2

- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant's review.
- .10 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 drawings stamped and signed by professional engineer registered or licensed in the province of Quebec, Canada.
 - .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
 - .4 Allow 10 days for Consultant's review of each submission.
 - .5 Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
 - .6 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of revisions other than those requested.
 - .7 Accompany submissions with transmittal letter, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
 - .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
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- .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
 - .9 After Consultant's review, distribute copies.
 - .10 Submit (1) electronic copy of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.
 - .11 Submit (1) electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.
 - .12 Submit (1) electronic copy of test reports for requirements requested in specification Sections and as requested by Consultant.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within (3) years of date of contract award for project.
 - .13 Submit (1) electronic copy of certificates for requirements requested in specification Sections and as requested by Consultant.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
 - .14 Submit (1) electronic copy of manufacturer's instructions for requirements requested in specification Sections and as requested by Consultant.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
 - .15 Submit (1) electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant.
 - .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
 - .17 Submit (1) electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Consultant.
 - .18 Delete information not applicable to project.
 - .19 Supplement standard information to provide details applicable to project.
 - .20 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, electronic copy 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.
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- .21 The review of shop drawings by the Consultant is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that the Consultant approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.5 SAMPLES

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

1.6 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit (1) electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement and as directed by Consultant.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 20 photos per day.
- .4 Frequency of photographic documentation: as needed and monthly and as directed by Consultant.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.
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2021-01-19

Page 5

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

GENERAL NOTE: in this section the term “site” includes all the facilities located at the site where the work is taking place (construction site, buildings, access, infrastructure, parkings, bays, etc.).

1.1 RELATED REQUIREMENTS

- .1 Section 02 41 00.08 – Demolition - Minor Works.
- .2 Section 02 81 00 – Hazardous Materials.
- .3 Section 05 50 00 – Metal Fabrications.
- .4 Section 07 84 00 – Fire Stopping.
- .5 Section 08 80 50 – Glazing.
- .6 Section 09 21 99 – Gypsum Board Assemblies.
- .7 Section 09 51 99 – Acoustical Ceilings for Minor Works.
- .8 Section 09 63 40 – Stone Flooring.
- .9 Section 09 65 19 – Resilient Tile Flooring.
- .10 Section 09 91 99 – Painting for Minor Works.
- .11 Division 14.

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, 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 to Departmental representative WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittals and Section 02 81 00 - Hazardous Materials. Contractor must also keep one copy of these documents on the construction 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.

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.

- .2 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.
- .3 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.
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- .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 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;
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- .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.
-

1.11 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..

At the worksite there is in particular the presence of the following:

- .1 Laboratories;
- .2 Nuclear disposition.

The Contractor shall process to a risk assessment of the site to validate this information and see if other risks are present on the site. He must include in its prevention program all risks that have been identified.

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

- .1 The worksite is occupied by employees and/or the public at all times during the work period, although employees and/or the public will not have access to the Contractor's site.
- .2 These requirements must be included in the Contractor's site-specific safety plan as well as any other measures provided by the Contractor to protect the health and safety of employees and / or the public on the site.

1.13 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.

1.14 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;
 - .2 Have site-related working experience of at least 5 years 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.

1.15 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.

1.16 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.

1.17 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.

1.18 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 la 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.

1.19 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 equipment to lockout-tagout;
 - .3 Identification of energy sources that feeds the 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/equipment to lockout-tagout puts his name on the data sheet and signs it.

1.20 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.
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1.21 ASBESTOS EXPOSURE

- .1 It is not anticipated that the work covered by the present specifications involves the manipulation of materials containing asbestos; however, if the Contractor or the Departmental representative or his agent discover materials which are susceptible of containing asbestos, the Contractor must immediately stop the work and advise the Departmental representative. If more investigation demonstrates that the materials do contain asbestos, the Contractor shall comply with the following requirements.

1.22 FUNGAL CONTAMINATION

- .1 It is not anticipated that the work covered by the present specifications involves the manipulation of materials contaminated by mould; however, if the Contractor or the Departmental representative or his agent discover materials which are susceptible of being contaminated by mould, the Contractor must immediately stop the work and advise the Departmental representative. If more investigation demonstrates that the materials do contain mould, the Contractor shall comply with the following requirements.

1.23 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.

1.24 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.
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1.25 SCAFFOLDINGS

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 the 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.

1.26 CONFINED SPACES

In addition to the requirements of the provincial regulation applicable to confined spaces, the Contractor must respect the requirements in the following paragraphs.

The Departmental Representative reserves the right, depending on the nature of the risk of the confined spaces, of the work to be done and/or of the level of competence in confined spaces demonstrated by the Contractor, to require from the latter that he use the services of a firm specialized in health and safety or in confined space work to perform the analysis of the risks inherent to the confined spaces, to complete the entry permit, to conduct surveillance of the work or for any other task related to the work in confined spaces.

- .1 Information on confined spaces existing on the construction site
 - .1 The following presents a non-exclusive list of the confined spaces that the Contractor will likely have to access during this project:
 - .2 *List of confined spaces*
 - .3 The Contractor shall take into consideration each of these confined spaces and must also add to this list the confined spaces that he is likely to build/install during this project.

- .2 Person in charge of the health and safety for the work in confined spaces
 - .1 The Contractor shall designate a person to be in charge of the health and safety for the work in confined spaces. This person shall be qualified, as defined in the article 297 of the *Règlement sur la santé et la sécurité du travail* (S-2.1, r.13) (Occupational Health and Safety Regulation). This person must be present at all times during work in confined spaces and must make sure that all the requirements of the regulation and the ones specified in this section are respected. This person must amongst other things fill out and issue the entry permit for the confined spaces.
- .3 Training
 - .1 All persons having access to a confined space, including the person in charge and the watcher of the confined space shall have completed training on entry in confined spaces.
 - .2 All persons who have to use supplied-air respirator to access the confined spaces shall have completed training on the use of these apparatus.
 - .3 All persons identified as rescuers for confined spaces shall have completed training on confined spaces rescue.
 - .4 Each training required in the preceding paragraphs must be provided by a firm specialized in health and safety or in confined spaces.
 - .5 The training certificates of the persons mentioned above must be submitted to the Departmental Representative before the beginning of the work in confined spaces.
- .4 Risk assessment of confined spaces
 - .1 For each of the confined spaces listed at the beginning of this article, the Contractor must obtain the necessary information from the site representative and proceed to the assessment of the risk inherent to each confined space and relative to:
 - .1 The prevailing internal atmosphere, namely the concentration of oxygen, inflammable gases and vapours, combustible or explosive dusts as well as the categories of contaminants likely to be present in this enclosed area or nearby;
 - .2 The fact that the natural or mechanical ventilation is insufficient
 - .3 The materials that are present there and that can cause the worker to sink, to be buried or to drown, such as sand, grain or a liquid;
 - .4 The interior configuration;
 - .5 Pipes and conduits penetrating the confined space;
 - .6 Energies such as electricity, moving mechanical parts, heat stress, noise and hydraulic energy;
 - .7 Ignition sources such as open flames, lighting, welding and cutting, static electricity or sparks;
 - .8 All other particular circumstances, such as the presence of vermin, rodents or insects.

These risk assessments must be done by the person in charge of the health and safety of the work in confined spaces. They must be submitted to the Departmental Representative for analysis at least 10 days before the proposed date for the work in confined spaces and they must also include the following information:

- .1 Location of the confined space;
- .2 Description of the confined space;
- .3 Dimensions of the confined space;
- .4 Number, location and dimensionS of the openings;
- .5 Content of the confined space (material, substances, etc.);
- .6 Date of the assessment;
- .7 Name and signature of the person who conducted the assessment and the name of his employer.

The Contractor must repeat the same process for each of the confined spaces that he will build/install during this project.

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- .5 Confined spaces entry permits
- .1 At least 5 days before the scheduled date for the work in a confined space the Contractor must submit for analysis to the Departmental Representative a copy of each entry permit specific to the confined spaces where he must access. The entry permits must be completed by the person in charge of the health and safety of the work in confined spaces, and must contain the following information as a minimum:
- .1 Description of the work that will be carried out and the method of work, including the materials and tools needed to do this work;
 - .2 Description of the risks and corresponding preventive measures according to the risk assessment inherent to the confined space done previously and according to the work to be carried out;
 - .3 Safety equipment that will be used to control the risks of confined spaces (e.g.: fan, gas detectors, local exhaust ventilation, personal protective equipment, etc.);
 - .4 Rescue procedure covering at least the following:
 - .5 Means of communication between the supervisor of the confined space and the workers in the confined space;
 - .6 Lifesaving equipment specific to each confined space;
 - .7 Confirmation that the municipal emergency response service has been advised that work in confined spaces would be going on at this specific construction site and that they may intervene do to a confined space rescue; otherwise, the Contractor must identify the workers on the construction site that will act as rescuers in a confined space in the case where such rescuers must enter the confined space (rescue training is mandatory);
 - .8 Location of telephone and phone number of the municipal emergency response service (if applicable);
 - .9 Date of entry permit;
 - .10 Name of person who issued the permit and the name of his employer;
 - .11 Name of the confined space safety watcher and the name of his employer;
 - .12 Name of the workers who must enter the confined space and the name of each one's employer.
- .2 In cases where the site representative requires the use of a confined space entry permit specific to his site, the Contractor must comply with the requirements of that permit.
- .6 Medical surveillance
- .1 The Contractor must submit to the Departmental Representative a medical certificate dated in the last two years for all persons who must use a supplied-air respirator. The certificate must confirm the ability of each person to use this type of apparel.
- .2 It is recommended that the persons who have to work in sewer collection systems or other similar systems be vaccinated against diphtheria, tetanus and hepatitis "B".
- .7 Requirements while working in confined spaces
- .1 Before each entry into a confined space, the person in **charge** of the health and safety for the work in confined spaces shall take readings of oxygen concentration, flammable gases and all toxic gases likely to be present and record these readings on the entry permit required earlier.
- .2 No worker can access the confined space if the following requirements are not respected:
- .1 The concentration of oxygen shall be greater than or equal to 19.5% and less than or equal to 23 %;
 - .2 The concentration of inflammable gases or vapours shall be less than or equal to 10 % of the lower explosion limit;
 - .3 The concentration of other gases must not exceed the standards prescribed in annex I of the *Règlement sur la santé et la sécurité du travail* (S-2.1, r.13) (Occupational Health and Safety Regulation).
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- .3 If the oxygen and gas concentrations measured respect the regulatory values, the person in charge of the health and safety for the work in confined spaces must ensure that all preventive measures indicated on the permit are in place and then must complete the entry permit (date, time, signatures, etc.) before issuing the permit and allow entry into the confined space.
 - .4 A permit is only valid for one work shift; the Contractor must submit a new permit for each extra shift.
 - .5 During the work inside the confined space, the gas concentration must be measured continuously and the gas detector must be installed at the level of the breathing area of the workers. If the conditions inside the confined space are such that the workers might not hear/see the detector's alarm, the Contractor must find a way for the confined space safety watcher to watch the concentration measures while maintaining the measurements at the level of the breathing zone of the workers.
 - .6 If the work is organized in a way that the workers are scattered far away from each other in a large confined space, the Contractor needs to provide additional gas detectors.
 - .7 The Contractor must provide the gas detectors and maintain them in good condition. He must be able to show that the gas detectors used have been calibrated and adjusted by the person in **charge** of the health and safety for the work in confined spaces or by a qualified person, in accordance with the manufacturer's recommendations. The Departmental Representative can at all times have the accuracy of the measuring devices checked. In the event of the failure of a detection device, the work must be stopped immediately and all workers must leave the confined space.
 - .8 The manufacturer's manual of the gas detectors must be available on the construction site.
 - .9 The Contractor shall provide a ventilation system to keep concentrations of contaminants below the regulatory limits.
 - .10 If work generating contaminants are performed (welding, use of products, etc.), the Contractor must, if needed, install an aspiration system for the contaminants so that the regulatory values of air quality can be maintained at all times.
 - .11 If a detecting device alarm goes off, all workers shall leave the confined space. The measured levels of concentration must then be recorded on the entry permit. The Contractor shall then find the source of contamination, neutralize it, ventilate the confined space to eliminate contaminant residues and authorize access to the confined space only when concentrations of oxygen and gas have returned to normal.
 - .12 Compressed gas cylinders or welding equipment shall not be brought into confined spaces: this equipment shall remain outside and shall not block entrances or exits; all cylinders shall be properly secured.
 - .13 Tools and electrical devices used to work in the confined spaces shall be grounded and, when necessary, designed to be explosion-proof. All equipment must be connected to a ground fault interrupter outlet or to a step-down transformer. The Contractor shall, at his own cost, hire a qualified electrician to adjust power receptacles and/or circuit breakers that he intends to use which do not meet these criteria.
 - .14 The Contractor shall obtain a Hot Work Permit and respect the requirements to that effect when the work to be carried out includes hot work.
 - .15 The Contractor must assign a competent person to assume the duties of confined space safety watcher. The supervisor shall be exclusively dedicated to these duties and must constantly remain outside of the confined space as long as there is a worker in it. He must also:
 - .1 Ensure that the entry permit has been filled, signed and posted near the confined space;
 - .2 Be familiar with the work procedure specific to the confined space and ensure that it is respected;
 - .3 Ensure continuous communication with all the workers in the confined space and ensure that all the equipment required in case of emergency is present;
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- .4 Have a good knowledge of the backup ventilation systems and ensure their proper functioning for the duration of the work;
- .5 Prevent access to unauthorized persons;
- .6 Ensure that the conditions around the confined space zone is not a health or security risk for the workers inside the confined space;
- .7 Initiate the emergency procedure if needed.
- .16 The same person may act as a confined space safety watcher and as the person in charge of the health and safety of the work in confined spaces, provided all requirements of both functions are met.

1.27 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:
 - .1 All other lifting operation, according to 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;
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- .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.

1.28 HOT WORK

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.

- .1 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.
- .2 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.
- .3 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.
- .4 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.
- .5 Welding and cutting
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 cylinders more than 6 metres from a flammable gas cylinder (ex: acetylene) or a combustible such as oil or grease, unless the oxygen cylinder is separated from it by a wall made of non-combustible material as mentioned in the article 3.13.4 of the *Code de sécurité pour les travaux de construction*, S-2, r. 6 (Safety code for the construction industry)
 - .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:
 - They have been cleaned and air samples indicating that work can be done without danger has been taken; and
 - .1 Provisions to ensure the safety of the workers have been made.

1.29 STEEL STRUCTURE ERECTION OR DISMANTLING WORK

- .1 In addition to respecting section 3.24 du *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 Contractor must submit the following documents to the Departmental representative before the beginning of steel structure erection work:
 - .1 Erecting procedures in accordance with article 3.24.10 du *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry);
 - .2 Rescue procedures for the release of a worker suspended in a safety harness within a maximum of 15 minutes; procedures must be adapted to the construction site and in accordance with article 3.24.4 of that same code; the procedure must be accompanied by a written confirmation that it has been tested;
 - .3 Statement from an engineer that the anchor rods have been installed in accordance with the anchoring plan as required by the article 3.24.12 of that same code;
 - .4 Hoisting procedures in cases where the lifting is done in one of the ways described in the article 3.24.15 of that same code;
 - .5 Name of the individual identified as rescuer and his rescue training certificate;
 - .6 Name of the individual identified as first-aid attendant and his first-aid training certificate.
- .3 The Contractor must make sure that the following documents are available for consultation on construction site at all times:
 - .1 Steel structure manufacturer's erection plan in accordance with the requirements of article 3.24.9 du *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry);
 - .2 Column anchor rod's anchoring plan in accordance with the requirements of article 3.24.11 du *Code de sécurité pour les travaux de construction* (S-2.1, r.4) (Safety code for the Construction Industry).

2021-01-19

Page 19

1.30 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

1.31 SPECIAL PREVENTION AND HYGENE PROCEDURES CONCERNING COVID-19

- .1 The Contractor must put into place procedures to ensure that hygiene measures recommended by CNESST and INSPQ concerning Covid-19 are respected.

1.32 DEVELOPMENT OF SAFE WORKING PROCEDURES

- .1 The Contractor shall be compliant to the Canadian Space Agency (CSA) requirements. Refer to CSA document attached in PART 4.

PART 2 - PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 - EXECUTION**3.1 NOT USED**

- .1 Not Used.

PART 4 - DEVELOPMENT OF SAFE WORKING PROCEDURES**1. Subject**

The Contractor shall be responsible for developing the safe working procedures required under Section 4. Safety requirements. The Contractor shall draft the procedures and have them approved by the Representative of the Canadian Space Agency (CSA) prior to the start of the maintenance work.

2. Equipment covered

The safe working procedures to be developed for the Property Management Branch (PMB) at the CSA's John H. Chapman Space Centre (JHCSC), in St. Hubert, are for the following six (6) elevators:

- 2.1. Passenger elevator No. 1 that gives access to levels 1, 2 and 3.
- 2.2. Passenger elevator No. 2 that gives access to levels 1, 2 and 3.
- 2.3. Passenger elevator No. 3 that gives access to levels 1, 2 and 3.
- 2.4. Passenger elevator No. 4 that gives access to levels 1, 2 and 3 in addition to the mechanical lean-to building (4).
- 2.5. Passenger elevator No. 5 that gives access to level 1 and to the conference centre (CC) (half level).
- 2.6. Service elevator No. 2S that gives access to levels 1, 2 and 3.

3. Types of maintenance work covered

The safe working procedures to be developed are specifically for two types of maintenance work:

- 3.1. Work in the elevator shaft below the car; and
 - 3.2. Work above the car in the elevator shaft.
-

4. Safety requirements

4.1. Work in a confined space

For work in the elevator shaft below the car; the Contractor shall:

- a) Obtain a permit for enclosed-space entry from the CSA and establish in collaboration with the Representative of the CSA and in accordance with the appended Risk Assessment Sheets the control measures to be applied according to the work to be performed, as, for example:
 - i. Monitoring the atmosphere;
 - ii. Control and isolation of hazardous energy and lockout devices;
 - iii. Ventilation;
 - iv. Use of respiratory protective equipment; or
 - v. Use of any other control measure (e.g., fall arrest system) required by the risk assessment to be confirmed by obtaining the permit.
- b) Demonstrate that the workers assigned to the work have received training on enclosed-space entry.
- c) The supervisor shall be provided by the CSA.
- d) Notify the Representative of the CSA at least 24 hours prior to the start of the work.

4.2. Maintenance work in a *hazardous area*

For tasks requiring work in the hazardous area of certain equipment, the Contractor shall:

- a) Develop an energy *control method* for each of the tasks. These methods may include:
 - i. Lockout procedures; or
 - ii. If it plans to apply a method other than lockout, it shall first ensure that the method has been made equally safe.
- b) Obtain an energy control method permit from the CSA.
- c) Demonstrate that the workers assigned to the work have received training on the lockout procedure after January 2016.
- d) A supervisor shall be provided by the CSA.
- e) Notify the Representative of the CSA at least 24 hours prior to the start of the work.

5. Glossary:

Confined space: A space that is totally or partially enclosed and that:

- a) is not designed to be occupied by people or intended to be, except for the purpose of performing work;
- b) has restricted means of entry and exit;
- c) may present risks to any person that enters it, due to:
 - i) Its design, construction, location or atmosphere,
 - ii) The material or substances it contains,
 - iii) Or other related conditions.

[Art.11.1 COHSR]

Control methods: The hazardous energy control methods to be selected vary according to whether the task may or may not be performed with the power off. In all cases, the primary control method shall be lockout. When the lockout method is not used, other methods shall be applied in view of protecting the employees while they carry out their work. Nevertheless, prior to any other control method, the Contractor shall perform a risk assessment that demonstrates the adequacy of the assessment and effectiveness of the protective measures.

[Article 7.2 Standard CSA Z-460-13]

Standard CSA Z-460-13 (C2018): Hazardous energy control: Lockout and other methods, confirmed in 2018.

Hazardous phenomenon: Potential source of injury for the staff.
[Article 3 Standard CSA Z-460-13].

Hazardous area: Area around a machine, equipment or process inside which a *hazardous phenomenon* is created by the movement of a machine or a system's power supply.
[Article 3 Standard CSA Z-460-13].



RISK ASSESSMENT SHEET

Number: **CSA 1,2,2S,3 and 4 and 5**

Name or number of the confined space: CSA 1,3,4,2,2S and 5

1. ENTRY AND EXIT

Precise location of the confined space: Building1, building 3, building 4, building 2 north south, building 5

Is entry mandatory? No ☐ Yes ☒ If yes, at what frequency: Once per year or as needed

Number and location of the access points: 3 x, building 1, 3 and 4

Dimensions of the access point: 42"x84"

Dimensions of the interior: 64"x100"

Particular divisions: No ☒ Yes ☐ If yes: _____

Fall arrest equipment required: No ☒ Yes ☐ _____

Particular supervision: No ☐ Yes ☒ If yes: Supervisor required

Signage required: No ☐ Yes ☒ If yes: On every floor + protection at opening

Have all measures been taken to prevent unauthorized access? No ☐ Yes ☒

If not, what should be put in place:

Does the design of the confined space present any particular risks for workers or rescue workers? No ☐ Yes ☒

If yes, which ones? Ensure that hazardous energy has been controlled prior to entry

PHOTO 1



PHOTO 2

**2. SET ENERGY TO ZERO (EQUIPMENT REQUIRING A ENERGY CONTROL)****Equipment 1****Location****Equipment 2****Location**

Elevator cars

**RISK ASSESSMENT SHEET****3. ASSESSMENT OF THE ATMOSPHERE**

Content in the confined space (refer to the safety data sheet):

Ignitable atmosphere or $\geq 10\%$ LEL ☐ Oxygen $> 23\%$ ☐ or $< 19.5\%$ ☐ H₂S ☐ OC ☐Specific contaminants to detect? No ☒ Yes ☐ If yes, which ones: _____Must the confined space be emptied prior to entry? No ☒ Yes ☐ If necessary ☐Must the confined space be cleaned prior to entry? No ☒ Yes ☐ If necessary ☐Must the confined space be purged prior to entry? No ☒ Yes ☐ If necessary ☐

4. GENERAL VENTILATION REQUIRED





What is the natural ventilation flow? Acceptable ☒ Insufficient, for work requiring ventilation ☐

Flow of dilution ventilation required: _____
 Number, type, capacity and position of ventilators required: _____

5. OTHER RISKS ASSESSED IN THE CONFINED SPACE

Physical hazard		Biological hazard		Others:
<input type="checkbox"/> Fall	<input type="checkbox"/> Drowning	<input type="checkbox"/> Wastewater	<input type="checkbox"/> Sediments	<input type="checkbox"/>
<input type="checkbox"/> Flying particles	<input type="checkbox"/> Noise	<input type="checkbox"/> Bioaerosol	<input type="checkbox"/> Dust	<input type="checkbox"/>
<input type="checkbox"/> Free flow	<input checked="" type="checkbox"/> Equipment	<input type="checkbox"/> Mold	<input type="checkbox"/> Rodents	<input type="checkbox"/>

6. EQUIPMENT

Minimum equipment for the work				Emergency equipment			
							
							

7. EMERGENCY PROCEDURE

Contact _____ and inform them that they have to contact _____.

Inform _____ that this is a confined space rescue.

Remain in contact with _____.

8. DEVELOPMENT OF THE RISK ASSESSMENT SHEET

Performed by: _____ For: _____ Development date _____
 Qualified person CSA Representative

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Not Used.

1.2 REFERENCE STANDARDS

- .1 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC 2-2008 Stipulated Price Contract.
- .2 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.
 - .2 EPA General Construction Permit (GCP) 2012.

1.3 DEFINITIONS

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

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Product Data:
 - .1 Submit (2) copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.
 - .3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Consultant.
 - .4 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.
 - .5 Address topics at level of detail commensurate with environmental issue and required construction tasks.
 - .6 Include in Environmental Protection Plan:
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
 - .3 Names and qualifications of persons responsible for training site personnel.
 - .4 Descriptions of environmental protection personnel training program.
 - .5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations and EPA 832/R-92-005, Chapter 3.
-

- .6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
- .7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.
 - .1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.
- .8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
 - .1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
- .9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
- .10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
- .11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
- .12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .13 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.
- .14 Pesticide treatment plan to be included and updated, as required.

1.5 FIRES

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

1.6 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
 - .1 Provide temporary enclosures where directed by Consultant.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.7 HISTORICAL/ ARCHAEOLOGICAL CONTROL

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

2021-01-19

Page 3

1.8 NOTIFICATION

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

PART 2 - PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 - EXECUTION**3.1 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Bury rubbish and waste materials on site where directed after receipt of written approval from Consultant.
- .3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

PART 1 - GENERAL**1.1 SUMMARY**

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

1.2 RELATED REQUIREMENTS

- .1 Section 02 41 00.08 – Demolition - Minor Works.

1.3 REFERENCES TO REGULATORY REQUIREMENTS

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

1.4 HAZARDOUS MATERIAL DISCOVERY

- .1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Consultant.
- .2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Consultant.
- .3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Consultant.

1.5 BUILDING SMOKING ENVIRONMENT

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

1.6 QUALITY ASSURANCE

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

2021-01-19

Page 2

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

2021-01-19

Page 1

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Not Used.

1.2 REFERENCE STANDARDS

- .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 OF MATERIAL

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

1.5 DEWATERING

- .1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.6 WATER SUPPLY

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

1.7 TEMPORARY HEATING AND VENTILATION

- .1 Not Used.

1.8 TEMPORARY POWER AND LIGHT

- .1 Departmental Representative will provide and pay for temporary power during construction for temporary lighting and operating of power tools, depending on building availability.
 - .2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
 - .3 Temporary power for electric cranes and other equipment requiring in excess of above is responsibility of Departmental Representative.
 - .4 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.
-

2021-01-19

Page 2

1.9 TEMPORARY COMMUNICATION FACILITIES

- .1 Not Used.

1.10 FIRE PROTECTION

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

PART 2 - PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 - EXECUTION**3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Not Used.

END OF SECTION

2021-01-19

Page 1

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Not Used.

1.2 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
 - .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 CSA Group (CSA)
 - .1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-0121-M1978(R2003), Douglas Fir Plywood.
 - .3 CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.
 - .4 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.
- .3 Public Works Government Services Canada (PSPC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.
- .4 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 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Identify areas which have to be gravelled to prevent tracking of mud.
- .3 Indicate use of supplemental or other staging area.
- .4 Provide construction facilities in order to execute work expeditiously.
- .5 Remove from site all such work after use.

1.5 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding and ladders for work execution.

1.6 HOISTING

- .1 Not used.
-

2021-01-19

Page 2

1.7 ELEVATORS AND FREIGHT ELEVATORS

- .1 Not Used.

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.
- .3 No interior room will be granted to the Contractor for storage of materials. The Contractor must provide a lockable outdoor shed, which can be left in the Owner's parking lot, at a location designated by the Owner.

1.9 CONSTRUCTION PARKING

- .1 Parking will be permitted on site in designated location by Owner.
- .2 Provide and maintain adequate access to project site.

1.10 SECURITY

- .1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.11 OFFICES

- .1 Not Used.

1.12 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.

1.13 SANITARY FACILITIES

- .1 Designated permanent facilities may be used on approval of Departmental Representative.

1.14 CONSTRUCTION SIGNAGE

- .1 No other signs or advertisements, other than warning signs, are permitted on site.
 - .2 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
 - .3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Consultant.
-

1.15 CLEAN-UP

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

PART 2 - PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 - EXECUTION**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Not Used.

1.2 REFERENCE STANDARDS

- .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 CSA Group (CSA)
 - .1 CSA-O121-M1978(R2003), Douglas Fir Plywood.
- .3 Public Works Government Services Canada (PSPC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

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 GUARD RAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.
- .2 Provide as required by governing authorities.

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.

1.6 DUST TIGHT SCREENS

- .1 When work is to be executed outside of temporary partitions, provide dust tight screens to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.

1.7 TEMPORARY PARTITIONS

- .1 Build temporary partitions and temporary ceilings around the site with 1hr fire resistance, in accordance with the 2015 NFC, with the following materials:
 - .1 Gypsum board type X, 16 mm.
 - .2 Steel studs, 92 mm @ 610 mm o/c max, 25-gauge.

- .3 Acoustic and fireproof roxul insulation, 89 mm thick.
- .4 Gypsum board type X, 16 mm with taped joints, sanded, paint entire gypsum board (public side) (1 primer coat and 2 finish coats) colour to be selected by Consultant.
- .2 Provide access door and steel frame to be painted, with fire resistance equivalent to partition. Provide UL compliant hardware and a lockable lock.
- .3 Provide, as necessary, temporary lighting.
- .4 Protect floor and partitions located inside work limit.
- .5 Maintain temporary partitions and move them as necessary until the end of construction work. If necessary, repair finishes following removal.

1.8 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 Consultant locations and installation schedule (5) days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

1.9 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling.

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 REFERENCE STANDARDS

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

1.3 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 and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Consultant based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.4 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 Consultant 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 Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

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

1.6 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 Consultant. Unload, handle and store such products.

1.7 MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Consultant to require removal and re-installation at no increase in Contract Price or Contract Time.

1.8 QUALITY OF WORK

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required Work is such as to make it impractical to produce required results.
-

- .2 Do not employ anyone unskilled in their required duties. Consultant reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.

1.9 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.

1.10 CONCEALMENT

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

1.11 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.

1.12 LOCATION OF FIXTURES

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

1.13 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.
-

1.14 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.

1.15 PROTECTION OF WORK IN PROGRESS

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

1.16 EXISTING UTILITIES

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

PART 2 - PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 - EXECUTION**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

2021-01-19

Page 1

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 MATERIALS

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

1.4 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.
-

2021-01-19

Page 2

1.5 EXECUTION

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

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.

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 REFERENCE STANDARDS

- .1 Not Used.

1.3 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site, unless approved by Consultant.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Provide on-site containers for collection of waste materials and debris.
- .5 Provide and use marked separate bins for recycling.
- .6 Dispose of waste materials and debris off site.
- .7 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.4 FINAL CLEANING

- .1 When Work is Substantially Performed and at the end of each project phase, 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 that caused by Owner or other Contractors.
-

- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site, unless approved by Consultant.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
- .9 Clean lighting reflectors, lenses, and other lighting surfaces.
- .10 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .11 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .14 Remove dirt and other disfiguration from exterior surfaces.
- .15 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .16 Sweep and wash clean paved areas.
- .17 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .18 Clean roofs, downspouts, and drainage systems.
- .19 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .20 Remove snow and ice from access to building.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.
-

2021-01-19

Page 3

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL**1.1 OBJECTIVES FOR WASTE MANAGEMENT**

- .1 PWGSC's objectives in terms of waste management is to reduce by 90 % the total flux of construction/renovation/demolition (CRD) directed to a landfill. Provide Departmental Representative with documents certifying that extensive waste management (CRD) measures and procedures have been applied (recycling, reuse, recyclables and reuse).

1.2 REFERENCE STANDARDS

- .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM E 1609 01, Standard Guide for Development and Implementation of a Pollution Prevention Program
- .2 Recycling Certification Institute (RCI):
 - .1 RCI Certification Construction and Demolition Materials Recycling

1.3 DEFINITIONS

- .1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.
 - .2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, repair and demolition operations.
 - .3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity or reactivity.
 - .4 Non-hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.
 - .5 Non-toxic: Not poisonous to humans either immediately or after a long period of exposure.
 - .6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
 - .7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
 - .8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.
 - .9 Return: To give back reusable items or unused products to vendors for credit.
 - .10 Reuse: To reuse a construction waste material in some manner on the project site.
 - .11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
 - .12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.
-

- .13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- .14 Toxic: Poisonous to humans either immediately or after a long period of exposure.
- .15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- .16 Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing:
 - .1 Solvents in paints and other coatings;
 - .2 Wood preservatives; strippers and household cleaners;
 - .3 Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.
 - .4 When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.
- .17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.
- .18 Construction Waste Management Plan: A project related plan for the collection, transportation, and disposal of the waste generated at the construction site; the purpose of the plan is to ultimately reduce the amount of material being landfilled.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the project, and ensure that requirements of the Construction Waste Management Plan are followed.
- .2 Preconstruction Meeting: Arrange a pre-construction meeting before starting any Work of the Contract attended by the Owner, Contractor, affected Subcontractor's discuss the Contractor's Construction Waste Management Plan and to develop mutual understanding of the requirements for a consistent policy towards waste reduction and recycling.

1.5 STORAGE, HANDLING AND MATERIAL PROTECTION

- .1 Store where indicated by Departmental Representative, recovered material waste for recycling/reuse.
 - .2 Unless otherwise indicated, waste material to be evacuated becomes the Contractor's property.
 - .3 Store waste in container as indicated in Section 01 52 00 – Construction Facilities.
 - .4 Sort waste from recoverable items. Transport and deliver waste to authorized facility specialized in waste sorting.
 - .5 Non demolished framing components left in place, must be protected against displacement and damage.
 - .6 Support any elements affected by the Work. If building security is at risk of being compromised, cease Work and immediately inform Departmental Representative.
 - .7 Protect surface water drainage structures, to prevent from damage or clogging; protect mechanical and electrical installations.
 - .8 Sort and store material waste generated by dismantling of structures in designated areas.
-

- .9 Prevent waste material contamination to be recovered or recycled, in accordance with designated facilities acceptance conditions.
 - .1 Evacuate material waste collected all together to an off-site sorting facility.
 - .2 Provide a transport letter for sorted material waste.

1.6 WASTE ELIMINATION

- .1 It is forbidden to send waste to the landfill.
- .2 Recover waste progressively as project advances for deconstruction/disassembling.
- .3 **For the duration of the Work, transport containers to waste sorting site. Provide a minimum of one (1) transport per month. Provide a report each month.**

1.7 USE OF PREMISES AND INSTALLATIONS

- .1 Perform Work without hindering too much on normal use of premises.
- .2 Maintain safety measures established by the existing facility.

1.8 WORK SCHEDULE

- .1 Coordinate waste management with other activities, to ensure orderly process of Work.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 CLEANING

- .2 Sort residue for reuse or recycling and place them in specified locations.
- .3 Clean Work areas progressively.
- .4 Upon completion of work, remove surplus materials, rubbish, tools and equipment. Leave area clean and in order.

3.2 CONSTRUCTION WASTE MANAGEMENT REPORT FORM

- .1 Complete form « CONSTRUCTION WASTE MANAGEMENT REPORT FORM for construction, renovation and demolition projects » and submit to Departmental Representative.
-

3.3 CONSTRUCTION WASTE MANAGEMENT REPORT FORM for construction, renovation and demolition projects.

PART 4 Material	Real weight diverted (tons)		Destination and final use for diverted materials	Total Weight buried (tons)	TOTAL WEIGHT (tons)	Diverted Rate (%)
	Reused	Recycled				
Masonry and pavement						
Walls and ceilings						
Metals						
Mechanical						
HVAC						
Plumbing						
Sanitary equipment						
Other						
Doors and windows						
Wood						
Carpentry and woodwork						
Floor finishes						
Electrical						
Wiring						
Lighting						
Other						
Roofing						
Specialties and various components						
Cardboard						
Other wrapping						
Mixed Recycling						
General waste						
Other						
TOTALS						

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Not Used.

1.2 REFERENCE STANDARDS

- .1 Canadian Construction Documents Committee (CCDC)
 - .1 CCDC 2-2008, Stipulated Price Contract.
- .2 Canadian Environmental Protection Act (CEPA)
 - .1 SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor must conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Departmental Representative inspection.
 - .2 Departmental Representative Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written 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 and balanced and fully operational.
 - .4 Certificates required by Fire Commissioner and Utility companies: submitted.
 - .5 Operation of systems: demonstrated to Owner's personnel.
 - .6 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.
 - .7 [Underground][Aboveground] storage tank inspection documentation, registration, forms, decommissioning and removal in accordance with CEPA SOR/2008-197.
 - .8 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 Owner and Departmental Representative, complete outstanding items and request re-inspection.
- .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

- .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
- .7 Final Payment:
 - .1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
 - .2 Refer to Contract: when Work deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.
- .8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.4 FINAL CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 05 50 00 – Metal Fabrications.
- .2 Section 07 84 00 – Fire Stopping.
- .3 Section 08 80 50 – Glazing.
- .4 Section 09 21 99 – Partitions for Minor Works.
- .5 Section 09 51 99 – Acoustical Ceilings for Minor Works.
- .6 Section 09 63 40 – Stone Flooring.
- .7 Section 09 65 19 – Resilient Tile Flooring.
- .8 Section 09 91 99 – Painting for Minor Works.

1.2 REFERENCE STANDARDS

- .1 Canadian Environmental Protection Act (CEPA)
 - .1 SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Two (2) weeks prior to Substantial Performance of the Work, submit to the Consultant, two (2) final copies of operating and maintenance manuals in French.
- .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products supplied.

1.4 FORMAT

- .1 Organize data as instructional manual.
 - .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 216 x 279 mm with spine and face pockets.
 - .3 When multiple binders are used correlate data into related consistent groupings.
 - .1 Identify contents of each binder on spine.
 - .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
 - .5 Arrange content by systems, process flow, under Section numbers and sequence of Table of Contents.
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- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
 - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in dwg format on USB key.

1.5 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data.
- .6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.6 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, in addition to requirements in General Conditions, at site for Consultant one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.

- .5 Keep record documents and samples available for inspection by Consultant.

1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

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

1.8 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
 - .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
 - .3 Include installed colour coded wiring diagrams.
 - .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
 - .2 Include summer, winter, and any special operating instructions.
 - .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
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2021-01-19

Page 4

- .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.
- .15 Additional requirements: as specified in individual specification sections.

1.9 MATERIALS AND FINISHES

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

1.10 MAINTENANCE MATERIALS

- .1 Spare Parts:
 - .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 location as directed by Owner; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Consultant.
 - .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 location as directed by Owner; place and store.
-

2021-01-19

Page 5

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

1.11 DELIVERY, STORAGE AND HANDLING

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

1.12 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Consultant approval.
- .3 Warranty management plan to include required actions and documents to assure that Consultant 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 Consultant 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 (10) 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 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 commissioned 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 Procedure and status of tagging of equipment covered by extended warranties.
 - .5 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .9 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .10 Written verification to follow oral instructions.
 - .1 Failure to respond will be cause for the Consultant to proceed with action against Contractor.

1.13 WARRANTY TAGS

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

2021-01-19

Page 7

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 ADMINISTRATIVE REQUIREMENTS**

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of interim completion.
- .2 Owner: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
- .3 Preparation:
 - .1 Verify conditions for demonstration and instructions comply with requirements.
 - .2 Verify designated personnel are present.
 - .3 Ensure equipment has been inspected and put into operation in accordance with Section 01 91 13.
 - .4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS and equipment and systems are fully operational.
- .4 Demonstration and Instructions:
 - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.
 - .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
 - .3 Review contents of manual in detail to explain aspects of operation and maintenance.
 - .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.
- .5 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment or system.
 - .1 Section 14 - Elevators: 14 hours of instruction spread over several formations.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.
- .3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .4 Give time and date of each demonstration, with list of persons present.
- .5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.3 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 TRAINEES**

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

1.2 INSTRUCTORS

- .1 Consultant will provide:
 - .1 Descriptions of systems.
 - .2 Instruction on design philosophy, design criteria, and design intent.
- .2 Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following:
 - .1 Start-Up, operation, shut-down of equipment, components and systems.
 - .2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.
 - .3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.
- .3 Contractor and equipment manufacturer to provide instruction on:
 - .1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.

1.3 TRAINING OBJECTIVES

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

1.4 TRAINING MATERIALS

- .1 Instructors to be responsible for content and quality.
 - .2 Training materials to include:
 - .1 "As-Built"; Contract Documents.
 - .2 Operating Manual.
 - .3 Maintenance Manual.
 - .4 Management Manual.
 - .5 TAB and PV Reports.
 - .3 Project Manager, Commissioning Manager and Facility Manager will review training manuals.
 - .4 Training materials to be in a format that permits future training procedures to same degree of detail.
-

- .5 Supplement training materials:
 - .1 Transparencies for overhead projectors.
 - .2 Multimedia presentations.
 - .3 Manufacturer's training videos.
 - .4 Equipment models.

1.5 SCHEDULING

- .1 Include in Commissioning Schedule time for training.
- .2 Deliver training during regular working hours, training sessions to be 3 hours in length.
- .3 Training to be completed prior to acceptance of facility.

1.6 RESPONSIBILITIES

- .1 Be responsible for:
 - .1 Implementation of training activities,
 - .2 Coordination among instructors,
 - .3 Quality of training, training materials,
- .2 Departmental Representative will evaluate training and materials.
- .3 Upon completion of training, provide written report, signed by Instructors, witnessed by Departmental Representative.
- .4 Extent of training: estimate length of training required for the equipment or system of elevators in Division 14 according to the following indications:
 - .1 3 general safety trainings of 2 hours each.
 - .2 1 in-depth training for SPAC-OACI of 2 hours.
 - .3 2 trainings for the programming of 3 hours each.

1.7 TRAINING CONTENT

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

1.8 VIDEO-BASED TRAINING

- .1 Manufacturer's videotapes to be used as training tool with Departmental Representative's review and written approval 1 month prior to commencement of scheduled training.

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 GENERAL**

- .1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:
 - .1 Verify installed equipment, systems and integrated systems operate in accordance with Contract Documents and design criteria and intent.
 - .2 Ensure appropriate documentation is compiled into the BMM.
 - .3 Effectively train O&M staff.
- .2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
 - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
- .3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

1.2 COMMISSIONING OVERVIEW

- .1 Section 01 91 13.13 - Commissioning Plan.
- .2 For Cx responsibilities refer to Section 01 91 13.13 - Commissioning Plan.
- .3 Cx to be a line item of Contractor's cost breakdown.
- .4 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .5 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .6 Departmental Representative will issue Interim Acceptance Certificate when:
 - .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
 - .2 Equipment, components and systems have been commissioned.
 - .3 O&M training has been completed.

1.3 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

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

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

1.4 PRE-CX REVIEW

- .1 Before Construction:
 - .1 Review Contract Documents, confirm by writing to Departmental Representative.
 - .1 Adequacy of provisions for Cx.
 - .2 Aspects of design and installation pertinent to success of Cx.
- .2 During Construction:
 - .1 Co-ordinate provision, location and installation of provisions for Cx.
- .3 Before start of Cx:
 - .1 Have completed Cx Plan up-to-date.
 - .2 Ensure installation of related components, equipment, sub-systems, systems is complete.
 - .3 Fully understand Cx requirements and procedures.
 - .4 Have Cx documentation shelf-ready.
 - .5 Understand completely design criteria and intent and special features.
 - .6 Submit complete start-up documentation to Departmental Representative.
 - .7 Have Cx schedules up-to-date.
 - .8 Ensure systems have been cleaned thoroughly.
 - .9 Complete TAB procedures on systems, submit TAB reports to Departmental Representative for review and approval.
 - .10 Ensure "As-Built" system schematics are available.
- .4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

1.5 CONFLICTS

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

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit no later than 4 weeks after award of Contract:
 - .1 Name of Contractor's Cx agent.
 - .2 Draft Cx documentation.
 - .3 Preliminary Cx schedule.
 - .2 Request in writing to Departmental Representative for changes to submittals and obtain written approval at least 3 weeks prior to start of Cx.
 - .3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 3 weeks prior to start of Cx.
 - .4 Provide additional documentation relating to Cx process required by Departmental Representative.

1.7 COMMISSIONING DOCUMENTATION

- .1 Refer to Section 01 91 13.16 - Commissioning Forms: Installation Check Lists and Product Information (PI)/Performance Verification (PV) Forms for requirements and instructions for use.
- .2 Departmental Representative to review and approve Cx documentation.
- .3 Provide completed and approved Cx documentation to Departmental Representative.

1.8 COMMISSIONING SCHEDULE

- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart.
- .2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
 - .1 Approval of Cx reports.
 - .2 Verification of reported results.
 - .3 Repairs, retesting, re-commissioning, re-verification.
 - .4 Training.

1.9 COMMISSIONING MEETINGS

- .1 Convene Cx meetings following project meetings: this section and as specified herein.
- .2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
- .3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
- .4 At 60 % construction completion stage. Departmental Representative to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
 - .1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
 - .2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
- .5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
- .6 Meeting will be chaired by Departmental Representative, who will record and distribute minutes.
- .7 Ensure subcontractors and relevant manufacturer representatives are present at 60 % and subsequent Cx meetings and as required.

1.10 STARTING AND TESTING

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

1.11 WITNESSING OF STARTING AND TESTING

- .1 Provide 14 days notice prior to commencement.
 - .2 Consultant to witness of start-up and testing.
-

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

1.12 MANUFACTURER'S INVOLVEMENT

- .1 Factory testing: manufacturer to:
 - .1 Coordinate time and location of testing.
 - .2 Provide testing documentation for approval by Departmental Representative.
 - .3 Arrange for Departmental Representative to witness tests.
 - .4 Obtain written approval of test results and documentation from Departmental Representative before delivery to site.
- .2 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Departmental Representative.
 - .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
 - .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.
- .3 Integrity of warranties:
 - .1 Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.
 - .2 Verify with manufacturer that testing as specified will not void warranties.
- .4 Qualifications of manufacturer's personnel:
 - .1 Experienced in design, installation and operation of equipment and systems.
 - .2 Ability to interpret test results accurately.
 - .3 To report results in clear, concise, logical manner.

1.13 PROCEDURES

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- .2 Conduct start-up and testing in following distinct phases:
 - .1 Included in delivery and installation:
 - .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
 - .2 Visual inspection of quality of installation.
 - .2 Start-up: follow accepted start-up procedures.
 - .3 Operational testing: document equipment performance.
 - .4 System PV: include repetition of tests after correcting deficiencies.
 - .5 Post-substantial performance verification: to include fine-tuning.
- .3 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.
- .4 Document require tests on approved PV forms.
- .5 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Departmental Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:
 - .1 Minor equipment/systems: implement corrective measures approved by Consultant.
 - .2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Consultant.

- .3 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.
 - .1 Rejected equipment to be remove from site and replace with new.
 - .2 Subject new equipment/systems to specified start-up procedures.

1.14 START-UP DOCUMENTATION

- .1 Assemble start-up documentation and submit to Departmental Representative for approval before commencement of commissioning.
- .2 Start-up documentation to include:
 - .1 Factory and on-site test certificates for specified equipment.
 - .2 Pre-start-up inspection reports.
 - .3 Signed installation/start-up check lists.
 - .4 Start-up reports,
 - .5 Step-by-step description of complete start-up procedures, to permit Departmental Representative to repeat start-up at any time.

1.15 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

- .1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.
- .2 With assistance of manufacturer develop written maintenance program and submit Departmental Representative for approval before implementation.
- .3 Operate and maintain systems for length of time required for commissioning to be completed.
- .4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

1.16 TEST RESULTS

- .1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.
- .2 Provide manpower and materials, assume costs for re-commissioning.

1.17 START OF COMMISSIONING

- .1 Notify Departmental Representative at least 21 days prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.18 INSTRUMENTS/EQUIPMENT

- .1 Submit to Departmental Representative for review and approval:
 - .1 Complete list of instruments proposed to be used.
 - .2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.
 - .2 Provide the following equipment as required:
 - .1 2-way radios.
 - .2 Ladders.
 - .3 Equipment as required to complete work.
-

1.19 COMMISSIONING PERFORMANCE VERIFICATION

- .1 Carry out Cx:
 - .1 Under actual operating conditions, over entire operating range, in all modes.
 - .2 On independent systems and interacting systems.
- .2 Cx procedures to be repeatable and reported results are to be verifiable.
- .3 Follow equipment manufacturer's operating instructions.
- .4 EMCS trending to be available as supporting documentation for performance verification.

1.20 WITNESSING COMMISSIONING

- .1 Departmental Representative to witness activities and verify results.

1.21 AUTHORITIES HAVING JURISDICTION

- .1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.
- .2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.
- .3 Provide copies to Departmental Representative within 5 days of test and with Cx report.

1.22 COMMISSIONING CONSTRAINTS

- .1 Since access into secure or sensitive areas will be very difficult after occupancy it is necessary to complete Cx of occupancy, weather, and seasonal sensitive equipment and systems in these areas before issuance of the Interim Certificate, using, if necessary, simulated thermal loads.

1.23 EXTRAPOLATION OF RESULTS

- .1 Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by Departmental Representative in accordance with equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.

1.24 EXTENT OF VERIFICATION

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

1.25 REPEAT VERIFICATIONS

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

1.26 SUNDRY CHECKS AND ADJUSTMENTS

- .1 Make adjustments and changes which become apparent as Cx proceeds.
- .2 Perform static and operational checks as applicable and as required.

1.27 DEFICIENCIES, FAULTS, DEFECTS

- .1 Correct deficiencies found during start-up and Cx to satisfaction of Departmental Representative.
- .2 Report problems, faults or defects affecting Cx to Departmental Representative in writing. Stop Cx until problems are rectified. Proceed with written approval from Departmental Representative.

1.28 COMPLETION OF COMMISSIONING

- .1 Upon completion of Cx leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.
- .3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Departmental Representative.

1.29 ACTIVITIES UPON COMPLETION OF COMMISSIONING

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

1.30 TRAINING

- .1 In accordance with Section 01 79 00.13 - Demonstration and Training for Building Commissioning.

1.31 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

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

1.32 OCCUPANCY

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

1.33 INSTALLED INSTRUMENTATION

- .1 Use instruments installed under Contract for TAB and PV if:
 - .1 Accuracy complies with these specifications.
 - .2 Calibration certificates have been deposited with Departmental Representative.
- .2 Calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.

1.34 PERFORMANCE VERIFICATION TOLERANCES

- .1 Application tolerances:
 - .1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10 % of specified values.
- .2 Instrument accuracy tolerances:
 - .1 To be of higher order of magnitude than equipment or system being tested.
- .3 Measurement tolerances during verification:
 - .1 Unless otherwise specified actual values to be within +/- 2 % of recorded values.

1.35 OWNER'S PERFORMANCE TESTING

- .1 Performance testing of equipment or system by Departmental Representative will not relieve Contractor from compliance with specified start-up and testing procedures.

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 GENERAL**

- .1 Provide a fully functional :
 - .1 Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.
 - .2 O&M personnel have been fully trained in aspects of installed systems.
 - .3 Optimized life cycle costs.
 - .4 Complete documentation relating to installed equipment and systems.
- .2 Term Cx; in this section means Commissioning.
- .3 Use this Cx Plan as master planning document for Cx:
 - .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
 - .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
 - .3 Sets out deliverables relating to O&M, process and administration of Cx.
 - .4 Describes process of verification of how built works meet Owner requirements.
 - .5 Produces a complete functional system prior to issuance of Certificate of Occupancy.
 - .6 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
 - .1 Overview of Cx.
 - .2 General description of elements that make up Cx Plan.
 - .3 Process and methodology for successful Cx.
- .4 Acronyms:
 - .1 Cx - Commissioning.
 - .2 BMM - Building Management Manual.
 - .3 EMCS - Energy Monitoring and Control Systems.
 - .4 WHMIS Safety Data Sheets (SDS).
 - .5 PI - Product Information.
 - .6 PV - Performance Verification.
 - .7 TAB - Testing, Adjusting and Balancing.
 - .8 WHMIS - Workplace Hazardous Materials Information System.
- .5 Commissioning terms used in this Section:
 - .1 Bumping: short term start-up to prove ability to start and prove correct rotation.
 - .2 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

1.2 DEVELOPMENT OF 100% CX PLAN

- .1 Cx Plan to take into account:
 - .1 Approved shop drawings and product data.
 - .2 Approved changes to contract.
 - .3 Contractor's project schedule.
 - .4 Cx schedule.
 - .5 Contractor's, sub-contractor's, suppliers' requirements.
 - .6 Project construction team's and Cx team's requirements.
 - .2 Submit completed Cx Plan to Departmental Representative and obtain written approval.
-

1.3 REFINEMENT OF CX PLAN

- .1 During construction phase, revise, refine and update Cx Plan to include:
 - .1 Changes resulting from Client program modifications.
 - .2 Approved design and construction changes.
- .2 Revise, refine and update every 4 weeks during construction phase. At each revision, indicate revision number and date.
- .3 Submit each revised Cx Plan to Departmental Representative for review and obtain written approval.
- .4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

1.4 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM

- .1 Departmental Representative to maintain overall responsibility for project and is sole point of contact between members of commissioning team.
- .2 Project Manager will select Cx Team consisting of following members:
 - .1 Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress.
 - .2 Quality Assurance Commissioning Manager: ensures Cx activities are carried out to ensure delivery of a fully operational project including:
 - .1 Review of Cx documentation from operational perspective.
 - .2 Review for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under conditions of operation.
 - .3 Protection of health, safety and comfort of occupants and O&M personnel.
 - .4 Monitoring of Cx activities, training, development of Cx documentation.
 - .5 Work closely with members of Cx Team.
 - .3 Departmental Representative is responsible for:
 - .1 Organizing Cx.
 - .2 Monitoring operations Cx activities.
 - .3 Witnessing, certifying accuracy of reported results.
 - .4 Witnessing and certifying TAB and other tests.
 - .5 Developing BMM.
 - .6 Ensuring implementation of final Cx Plan.
 - .7 Performing verification of performance of installed systems and equipment.
 - .8 Implementation of Training Plan.
 - .4 Construction Team: contractor, subcontractors, suppliers and support disciplines, is responsible for construction/installation in accordance with Contract Documents, including:
 - .1 Testing.
 - .2 TAB.
 - .3 Performance of Cx activities.
 - .4 Delivery of training and Cx documentation.
 - .5 Assigning one person as point of contact with Consultant and Cx Manager for administrative and coordination purposes.
 - .5 Contractor's Cx agent implements specified Cx activities including:
 - .1 Demonstrations.
 - .2 Training.
 - .3 Testing.
 - .4 Preparation, submission of test reports.
 - .6 Property Manager: represents lead role in Operation Phase and onwards and is responsible for:
 - .1 Receiving facility.

- .2 Day-To-Day operation and maintenance of facility.

1.5 CX PARTICIPANTS

- .1 Employ the following Cx participants to verify performance of equipment and systems:
 - .1 Installation contractor/subcontractor:
 - .1 Equipment and systems except as noted.
 - .2 Equipment manufacturer: equipment specified to be installed and started by manufacturer.
 - .1 To include performance verification.
 - .3 Specialist subcontractor: equipment and systems supplied and installed by specialist subcontractor.
 - .4 Client: responsible for intrusion and access security systems.
 - .5 Ensure that Cx participant:
 - .1 Could complete work within scheduled time frame.
 - .2 Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O&M personnel, including:
 - .1 Modify ventilation rates to meet changes in off-gassing.
 - .2 Changes to heating or cooling loads beyond scope of EMCS.
 - .3 Changes to EMCS control strategies beyond level of training provided to O&M personnel.
 - .4 Redistribution of electrical services.
 - .5 Modifications of fire alarm systems.
 - .6 Modifications to voice communications systems.
 - .6 Provide names of participants to Departmental Representative and details of instruments and procedures to be followed for Cx 1 month prior to starting date of Cx for review and approval.

1.6 EXTENT OF CX

- .1 Cx Structural and Architectural Systems:
 - .1 Architectural and structural:
 - .1 Vertical transportation systems:
 - .1 Elevators 1, 2, 2S, 3, 4, 5.
 - .2 Real-Mode elevator operation testing with fire alarm systems and emergency power.
 - .2 Commission mechanical systems and associated equipment:
 - .1 Plumbing and drainage networks
 - .2 HVAC and exhaust air systems
 - .1 Bi-block cooling systems
 - .3 Fire and life safety systems
 - .1 Underwater sprinkler systems (modified).
 - .4 Seismic protection and earthquake protection measures
 - .1 Compliance reports to be provided
 - .5 Control / regulation / control systems for IAQ and ambient conditions
 - .1 Control / regulation / control systems for ambient conditions in redeveloped areas.
- .3 EMS
- .4 Integration with existing EMS. Commission electrical systems and equipment:
 - .1 Low voltage below 750 V:
 - .1 Low voltage equipment.

- .2 Low voltage distribution systems.
- .2 Lighting systems:
 - .1 Lighting equipment.
 - .2 Distribution systems.
 - .3 Emergency lighting systems, including battery packs.
- .3 Fire alarm systems, equipment.

1.7 DELIVERABLES RELATING TO O&M PERSPECTIVES

- .1 General requirements:
 - .1 Compile French documentation.
 - .2 Documentation to be computer-compatible format ready for inputting for data management.
- .2 Provide deliverables:
 - .1 Warranties.
 - .2 Project record documentation.
 - .3 Inventory of spare parts, special tools and maintenance materials.
 - .4 Maintenance Management System (MMS) identification system used.
 - .5 WHMIS information.
 - .6 WHMIS Safety Data Sheets (SDS).
 - .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

1.8 DELIVERABLES RELATING TO THE CX PROCESS

- .1 General:
 - .1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.
- .2 Definitions:
 - .1 Cx as used in this section includes:
 - .1 Cx of components, equipment, systems, subsystems, and integrated systems.
 - .2 Factory inspections and performance verification tests.
- .3 Deliverables: provide:
 - .1 Startup, pre-Cx activities and documentation for systems, and equipment.
 - .2 Completed installation checklists (ICL).
 - .3 Completed product information (PI) report forms.
 - .4 Completed performance verification (PV) report forms.
 - .5 Results of Performance Verification Tests and Inspections.
 - .6 Tests of following witnessed by Design Quality Review Team:
 - .1 Heatpump.
 - .7 Training Plans.
 - .8 Cx Reports.
 - .9 Prescribed activities during warranty period.
- .4 Consultant to witness and certify tests and reports of results provided to Departmental Representative.
- .5 Departmental Representative to participate.

1.9 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Items listed in this Cx Plan include the following:
 - .1 Pre-Start-Up inspections: by General Contractor prior to permission to start up and rectification of deficiencies to Departmental Representative's satisfaction.
-

- .2 General Contractor to use approved check lists.
 - .3 Consultant will monitor some of these pre-start-up inspections.
 - .4 Include completed documentation with Cx report.
 - .5 Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed and certified by Departmental Representative and does not form part of Cx specifications.
 - .6 Consultant will monitor some of these inspections and tests.
 - .7 Include completed documentation in Cx report.
 - .2 Pre-Cx activities - ARCHITECTURAL AND STRUCTURAL:
 - .2 Vertical transportation:
 - .1 Elevators 1, 2, 2S, 3, 4, 5.
 - .3 Pre-Cx activities - MECHANICAL:
 - .1 Plumbing systems:
 - .1 N/A.
 - .2 HVAC equipment and systems:
 - .1 "Bump" each item of equipment in its "stand-alone" mode.
 - .2 At this time, complete pre-start-up checks and complete relevant documentation.
 - .3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
 - .4 Perform TAB on systems. TAB reports to be approved by Consultant.
 - .3 EMCS:
 - .1 EMCS trending to be available as supporting documentation for performance verification.
 - .2 Perform point-by-point testing in parallel with start-up.
 - .3 Carry out point-by-point verification.
 - .4 Demonstrate performance of systems, to be witnessed by Departmental Representative prior to start of 30 day Final Acceptance Test period.
 - .5 Perform final Cx and operational tests during demonstration period and 30 day test period.
 - .6 Only additional testing after foregoing have been successfully completed to be "Off-Season Tests".
 - .4 Pre-Cx activities - LIFE SAFETY SYSTEMS
 - .3 N/A.
 - .5 Pre-Cx activities - ELECTRICAL:
 - .1 Low voltage distribution systems under 750 V:
 - .1 Requires independent testing agency to perform pre- energization and post-energization tests.
 - .2 Perform a phase balance check (on load) for the distribution elements designated by the customer. Provide the load test procedure beforehand for approval.
 - .2 Emergency power generation systems.
 - .1 N/A.
 - .3 Lighting systems:
 - .1 Emergency lighting systems:
 - .1 Tests to include verification of lighting levels and coverage, initially by disrupting normal power.
 - .4 Fire alarm systems: test after other safety and security systems are completed. Testing to include a complete verification in accordance with ULC requirements. Witnessed and certified report, demonstrate devices and zones to Consultant.
 - .5 Low voltage systems: these include:
-

.1 N/A.

1.10 START-UP

- .1 Start up components, equipment and systems.
- .2 Equipment manufacturer, supplier, installing specialist sub-contractor, as appropriate, to start-up, under Contractor's direction, following equipment, systems:
- .3 Consultant to monitor some of these start-up activities.
 - .1 Rectify start-up deficiencies to satisfaction of Departmental Representative.
- .4 Performance Verification (PV):
 - .1 Approved Cx Agent to perform.
 - .1 Repeat when necessary until results are acceptable to Departmental Representative.
 - .2 Use procedures modified generic procedures to suit project requirements.
 - .3 Contractor to witness and certify reported results using approved PI and PV forms.
 - .4 Consultant to approve completed PV reports and provide to Departmental Representative.
 - .5 Departmental Representative will verify up to 30 % of reported results at random.
 - .6 Failure of randomly selected item shall result in rejection of PV report or report of system startup and testing.

1.11 CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Perform Cx by specified Cx agency using procedures developed by General Contractor and approved by Departmental Representative.
- .2 Consultant to monitor Cx activities.
- .3 Upon satisfactory completion, Cx agency performing tests to prepare Cx Report using approved PV forms.
- .4 General Contractor to witness, certify reported results of, Cx activities and forward to Departmental Representative.
- .5 Departmental Representative reserves right to verify a percentage of reported results at no cost to contract.

1.12 CX OF INTEGRATED SYSTEMS AND RELATED DOCUMENTATION

- .1 Cx to be performed by specified Cx specialist, using procedures developed by General Contractor and approved by Departmental Representative.
- .2 Tests to be witnessed by Consultant and/or Departmental Representative and documented on approved report forms.
- .3 Upon satisfactory completion, Cx specialist to prepare Cx Report, to be certified by Contractor and submitted to Departmental Representative for review.
- .4 Departmental Representative reserves right to verify percentage of reported results.
- .5 Integrated systems to include:
 - .1 HVAC and associated systems forming part of integrated HVAC systems.
 - .2 Fire alarm systems.
 - .3 Emergency power system (emergency supply only)

- .6 Identification:
 - .1 In later stages of Cx, before hand-over and acceptance Departmental Representative, Property Manager, Contractor and Cx Manager to co-operate to complete inventory data sheets and provide assistance in full implementation of MMS identification system of components, equipment, sub-systems, systems.

1.13 INSTALLATION CHECK LISTS (ICL)

- .1 Refer to Section 01 91 13.16 - Commissioning Forms: Installation Check Lists and Product Information (PI)/Performance Verification (PV) Forms.

1.14 PRODUCT INFORMATION (PI) REPORT FORMS

- .1 Refer to Section 01 91 13.16 - Commissioning Forms: Installation Check Lists and Product Information (PI)/Performance Verification (PV) Forms.

1.15 PERFORMANCE VERIFICATION (PV) REPORT

- .1 Refer to Section 01 91 13.16 - Commissioning Forms: Installation Check Lists and Product Information (PI)/Performance Verification (PV) Forms.

1.16 DELIVERABLES RELATING TO ADMINISTRATION OF CX

- .1 General:
 - .1 Because of risk assessment, complete Cx of occupancy, weather and seasonal-sensitive equipment and systems in these areas before building is occupied.

1.17 CX SCHEDULES

- .1 Prepare detailed Cx Schedule and submit to Departmental Representative for review and approval same time as project Construction Schedule. Include:
 - .1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:
 - .1 Pre-TAB review: 28 days after contract award, and before construction starts.
 - .2 Cx agents' credentials: 30 days before start of Cx.
 - .3 Cx procedures: 1 month after award of contract.
 - .4 Cx Report format: 1 month after contract award.
 - .5 Discussion of heating/cooling loads for Cx: 1 month before start-up.
 - .6 Submission of list of instrumentation with relevant certificates: 21 days before start of Cx.
 - .7 Notification of intention to start TAB: 21 days before start of TAB.
 - .8 TAB: after successful start-up, correction of deficiencies and verification of normal and safe operation.
 - .9 Notification of intention to start Cx: 14 days before start of Cx.
 - .10 Notification of intention to start Cx of integrated systems: after Cx of related systems is completed 14 days before start of integrated system Cx.
 - .11 Identification of deferred Cx.
 - .12 Implementation of training plans.
 - .13 Cx reports: immediately upon successful completion of Cx.
 - .2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Property Manager.
 - .3 6 months in Cx schedule for verification of performance in all seasons and wear conditions.
- .2 After approval, incorporate Cx Schedule into Construction Schedule.
- .3 Consultant, Contractor, Contractor's Cx agent, and Departmental Representative will monitor

progress of Cx against this schedule.

1.18 CX REPORTS

- .1 Submit reports of tests, witnessed and certified by Departmental Representative to Departmental Representative who will verify reported results.
- .2 Include completed and certified PV reports in properly formatted Cx Reports.
- .3 Before reports are accepted, reported results to be subject to verification by Departmental Representative.

1.19 PRELIMINARY AND FINAL CX

- .1 N/A.

1.20 ACTIVITIES DURING WARRANTY PERIOD

- .1 Cx activities must be completed before issuance of Interim Certificate, it is anticipated that certain Cx activities may be necessary during Warranty Period, including:
 - .1 Fine tuning of HVAC systems.
 - .2 Adjustment of ventilation rates to promote good indoor air quality and reduce deleterious effects of VOCs generated by off-gassing from construction materials and furnishings.
 - .4 Full-scale emergency evacuation exercises.
 - .5 Live mode tests of elevators on the fire alarm system.
 - .6 Live mode tests of elevators on emergency power system.

1.21 TESTS TO BE PERFORMED BY OWNER/USER

- .1 None is anticipated on this project.

1.22 TRAINING PLANS

- .1 Refer to Section 01 79 00.13 - Demonstration and Training for Building Commissioning.

1.23 FINAL SETTINGS

- .1 Upon completion of Cx to satisfaction of General Contractor lock control devices in their final positions, indelibly mark settings marked and include in Cx Reports.

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

- .1 Not Used.
-

END OF SECTION

APPENDIX

COMMISSIONING PLAN

R.095799

**Plan de mise en service
électromécanique**

Révision – SR4-Pour soumission

Le 19 janvier 2021

5209-000-SR8
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Table des matières

Abréviations	1
Introduction	2
1 Objectif de la mise en service.....	3
2 Portée de la mise en service.....	4
2.1 Systèmes architecturaux et structuraux :	4
2.2 Systèmes mécaniques :	4
2.3 Systèmes électriques :	4
3 Rôles et responsabilités.....	4
3.1 Principaux intervenants	4
3.2 Organigramme des intervenants	5
4 Phases de la mise en service	6
4.1 Préconception et conception	6
4.2 Construction	6
4.3 Manuels	7
4.4 Formation	7
4.5 Complétion significative et occupation	8
4.6 Fermeture de la mise en service	8
5 Mise en service prévue.....	9
5.1 Systèmes architecturaux	9
5.2 Systèmes mécaniques	9
5.3 Systèmes électriques	9
Annexe 1	1

Abréviations

C	Consultant
CP	Contrôle de performance
EC	Équipe de construction
ERE	Essai, réglage et équilibrage
GMAO	Gestion de maintenance assistée par ordinateur
LI	Listes d'installation et démarrage
N/A	Non applicable
MES	Mise en service
RBQ	Régie du bâtiment du Québec
RM	Représentant du Ministère
RMS	Responsable de la mise en service de l'entrepreneur
RP	Renseignements sur les produits

Introduction

Le mandat consiste à procéder à une étude de conformité et la préparation des plans et devis pour la mise aux normes des ascenseurs du bâtiment. Six (6) ascenseurs sont considérés

N° d'ascenseur.	Année de mise en service
1, 2, 3, 4	1992
2S	2005
5	2014

Le consultant s'implique en tant que concepteur en électromécanique et exerce aussi la surveillance de chantier pour ces disciplines.

Le présent plan de mise en service est publié au moment de la conception (SR4). En réponse aux exigences du devis, il précise notamment les activités associées à la mise en service durant la construction. Le plan décrit le processus, les rôles des différents intervenants ainsi que les documents associés à la mise en service du projet, de manière à l'intégrer efficacement à la construction. Le plan met aussi en la place la mise en service de l'installation en tant que telle, dont les phases clés se déroulent en fin de projet.

1 Objectif de la mise en service

La mise en service (MES) a été introduite depuis quelques décennies chez le représentant du ministère. En fonction de leur importance, elle est requise dans tous les projets.

La MES est un effort commun de l'ensemble des intervenants dont l'objectif est de s'assurer que le projet est conçu, construit et étalonné de façon à fonctionner tel que requis. Au terme du processus, le client a en mains tous les outils (documentation, formation) pour maintenir les performances de manière optimale.

La MES va plus loin qu'une surveillance traditionnelle. Elle implique un niveau accru de documentation et de démonstration et comprend notamment l'évaluation de la performance des systèmes sur une base individuelle et dans l'ensemble des interactions.

2 Portée de la mise en service

Les systèmes généralement visés peuvent être regroupés en trois (3) catégories. Dans le cadre du réaménagement, les items suivants sont cités au devis de MES :

2.1 Systèmes architecturaux et structuraux :

- Non inclus.

2.2 Systèmes mécaniques :

- Plomberie et drainage;
- Refroidissement.

2.3 Systèmes électriques :

- Éclairage;
- Éléments de distribution électrique;
- Système d'alarme incendie;
- Autres.

3 Rôles et responsabilités

3.1 Principaux intervenants

Le présent plan de mise en service s'adresse avant tout aux membres de l'équipe de mise en service. Le rôle des membres de cette équipe est décrit dans cette section.

Le Représentant du Ministère (RM)

Le Représentant du Ministère (RM) détient la responsabilité générale de la gestion du projet. Il est la personne-ressource du client, des consultants et de tous les autres membres de l'équipe du projet. En tant que Représentant du Ministère, il peut déléguer une partie de ses responsabilités. Le RM coordonne les réunions de MES et en rédige le procès-verbal. Il approuve les documents de MES, incluant les manuels et plans de formation et assiste aux essais critiques.

Le consultant (C)

Il conçoit l'installation en respectant les exigences fonctionnelles et opérationnelles et prépare les documents de construction, incluant le devis et le plan de MES. Il réalise la surveillance de chantier et dans ce contexte, assiste comme témoin aux démonstrations et essais critiques. Le consultant exerce aussi une surveillance des activités de mise en service. Il vérifie et commente les divers rapports d'essai et le plan de formation. Le consultant participe à la résolution des problèmes relatifs à la MES, révisé les manuels et plans de formation et valide les plans « tel que construit », et transmet la documentation de fin de projet et la documentation de mise en service soumise par l'Entrepreneur afin de constituer le Manuel d'Exploitation et d'entretien.

L'équipe de construction (EC)

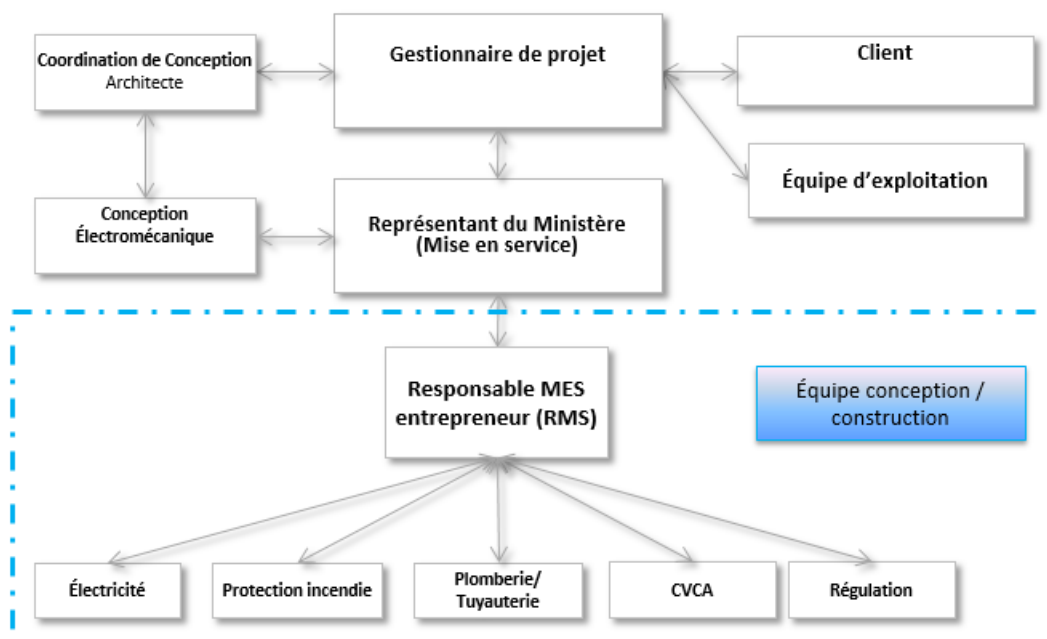
Elle est composée de l'entrepreneur, de ses fournisseurs et des divers corps de métier qui réalisent la construction conformément aux documents contractuels. Sous la coordination du responsable de la mise en service de l'entrepreneur (RMS) l'équipe accomplit aussi toutes les activités de la MES, notamment les essais et la documentation, à la satisfaction du Représentant du Ministère. L'équipe réalise la mise au point, dispense la formation et assemble les manuels et participe à la résolution des problèmes relatifs à la mise en service.

Le responsable de la mise en service de l'entrepreneur (RMS)

Il est désigné par l'entrepreneur en fonction de sa compréhension du processus de MES, dont il assure la planification et la coordination. Il révise le plan de mise en service et les formulaires pour s'assurer de leur compréhension par les sous-traitants et de leur validité. Il fournit le calendrier de MES, et s'assure de l'exécution de toutes les activités de MES exigées. Il complète ou contresigne les fiches de mise en service pour tous les systèmes visés. Il reçoit et analyse les documents d'ERE avant de les transmettre au Consultant et au Représentant du Ministère. Il rassemble et vérifie les manuels et voit à la mise en œuvre du plan de formation. Le RMS se rend aussi disponible pour offrir un service d'urgence et de dépannage pendant la première année d'occupation pour effectuer des réglages et des modifications qui ne font pas partie des responsabilités du personnel d'exploitation et d'entretien.

3.2 Organigramme des intervenants

L'organigramme ci-dessous est la représentation graphique des différents membres de l'équipe de mise en service énoncée au point 3.1.



Les flèches représentent les canaux de communications. En cours de projet, les moyens de communication seront principalement les comptes rendus de réunions, les rapports de visites, et le courrier électronique.

4 Phases de la mise en service

La mise en service fait idéalement partie de toutes les étapes d'un projet. La subdivision présentée ici résume les principales activités et livrables des diverses phases.

4.1 Préconception et conception

Le devis présente la MES aux sections suivantes :

- 01 79 00.13 - Démonstration et formation - MES de bâtiment;
- 01 91 13 - Mise en service, exigences générales;
- 01 91 13.13 - Mise en service, plan de MES;
- 01 91 13.16 - Mise en service, documents de MES.

De plus, des procédures et critères MES sont inclus aux sections de devis des différentes disciplines par les concepteurs.

4.2 Construction

Une rencontre de démarrage de la mise en service est à prévoir le plus tôt possible. Elle permet notamment aux membres de l'équipe de mise en service de valider leur interprétation des tâches, de confirmer la liste des documents attendus et de bâtir le calendrier de MES, dont la fourniture relève du RMS. Les réunions ultérieures pourront être combinées aux réunions de chantier.

La section 01 91 13.16 du devis liste les documents de mise en service normalement applicables. Ils seront requis à l'achèvement des travaux (voir 01 78 00).

- .1 Les renseignements sur les produits sont consignés dans des fiches de RP. Il s'agit notamment des informations de la plaque signalétique.
- .2 Les essais statiques - ou de démarrage préliminaire - sont consignés dans une liste d'installation et de démarrage (LI). Les listes fournies par le manufacturier sont généralement acceptées ; valider auprès du RM. Pour la tuyauterie et les conduites de ventilation, là où des essais d'étanchéité et de pression sont prévus au devis, le rapport de test suffit à documenter l'installation/démarrage.
- .3 L'atteinte des critères d'acceptabilité des équipements décrits dans les plans et devis est validée lors d'essais de performance. Pour un équipement visé, ceci est documenté dans les formulaires de contrôle de performance (CP).

Finalement, les résultats des essais pour les systèmes intégrés sont documentés dans des formulaires de mise en service des systèmes intégrés. Ceux-ci sont produits par les concepteurs et utilisés par le RM lors des démonstrations de fonctionnalités. La forme générique est présentée en annexe du présent plan de MES.

4.2.1 Fourniture, installation et démarrage des composantes

L'objectif est de s'assurer que chaque système est complet et conforme (RP), d'utilisation sûre et prêt pour son amorçage lorsque les listes d'installation et démarrage (LI) sont complétées. Les données rassemblées à cette phase permettent aussi d'amorcer les procédures de GMAO. Cette phase statique de la mise en route est suivie par les essais de performances des équipements et sous-systèmes qui en requièrent sont ensuite réalisés et documentés (CP).

Note : Dans le cas d'appareils existants réinstallés ou modifiés, les fiches LI et CP pourraient être exigées afin d'assurer qu'ils sont bien réinstallés et pour définir leur performance actuelle. La portion RP sera à compléter si requis, en fonction des procédures de GMAO en place. Selon les résultats initiaux obtenus (échantillon mentionné au Tableau 1, paragraphe 5), le processus pourra cependant être simplifié en cours de route. Vérifier auprès des responsables de la MES.

Il est à noter que les rapports d'essai, réglage et équilibrage (ERE) font partie des documents de performance puisqu'ils permettent de confirmer les débits et pressions spécifiés au devis.

4.2.2 Mise en service des systèmes intégrés

Cette étape vise les systèmes complexes, composés de plusieurs équipements. Avant de débiter cette phase, le RP, LI et CP doivent avoir été documentés, c'est-à-dire que les fiches sont complètes, transmises et approuvées. La complétion de l'équilibrage est aussi requise.

Les essais sur les systèmes intégrés sont réalisés par le responsable MES de l'Entrepreneur, en présence de l'Ingénieur et du RM, et documenté dans des formulaires de mise en service des systèmes intégrés.

4.3 Manuels

Le manuel d'opération et entretien est présenté au concepteur aux fins de révision et d'acceptation. Des renseignements sur ces manuels sont donnés dans la section 01 92 00 du devis. Valider cette formulation auprès du Représentant du Ministère.

Le manuel d'opération et entretien est présenté au concepteur aux fins de révision et d'acceptation. Se référer à la section 01 78 00 pour les la structure générale du manuel et aux exigences de MES applicables au manuel.

Les sections du manuel devraient être utilisées lors des formations. De cette manière, elles pourront faire l'objet d'une mise au point en fonction des commentaires des personnes suivant ces formations.

4.4 Formation

Des séances de formation à l'intention de l'équipe d'exploitation sont à prévoir pour les items sélectionnés ; se référer à la section 01 79 00.13 pour les exigences en matière de formation. Le calendrier et le contenu de ces séances doivent être transmis au Consultant et au RM.

4.5 Complétion significative et occupation

Le Représentant du Ministère est le destinataire final de l'ensemble des documents de MES durant la construction. L'approbation du matériel de MES par le RM est un des prérequis à l'achèvement substantiel. Le RM sera aussi responsable du suivi durant l'occupation et de la coordination d'essais saisonniers si requis, auquel cas l'Entrepreneur et le Consultant pourront être appelés à collaborer.

4.6 Fermeture de la mise en service

La dernière étape de la MES est la revue du projet à la fin de la première année d'opération sous garantie, au moment du suivi des déficiences et de leur correction.

5 Mise en service prévue

Les documents de mise en service pour les systèmes visés sont résumés dans le tableau suivant.

Tableau 1 : Résumé des livrables MES

	Fiche de MES	Test au devis	MES intégrée
5.1 Systèmes architecturaux			
Autre	(si applicable)	N/A*	N/A*
5.2 Systèmes mécaniques			
Composants de protection incendie	non	selon NFPA	non
Composants de plomberie	non	non	non
Unité de climatisation bi-bloc	Non	Équilibrage	oui
Composantes de ventilation	Non	Étanchéité Équilibrage	oui
Autre	(si applicable)	N/A*	N/A*
5.3 Systèmes électriques			
Distribution basse tension	Oui	Équilibre des phases Fuites à la terre	N/A*
Éclairage	Non	Intégration à la régulation Programmation	N/A*
Alarme incendie	non	Par firme spécialisée	N/A*
Autre	(si applicable)	N/A*	N/A*

* N/A : non applicable

ANNEXE 1

MES des systèmes intégrés

Unité de climatisation bi-bloc									
Vérifications préfonctionnelles complétées de manière adéquate					Installation documentée	Performance des composantes	ERE Documenté	Contrôles validés (point à point)	
Notes									
Opération					Programmation complétée	Simulation / Essai réel	Résultat adéquat	Vérifié par	Note #
Notes									

Composantes de ventilation									
Vérifications préfonctionnelles complétées de manière adéquate					Installation documentée	Performance des composantes	ERE Documenté	Contrôles validés (point à point)	
Notes									
Opération					Programmation complétée	Simulation / Essai réel	Résultat adéquat	Vérifié par	Note #
Notes									

Points divers									
Des points seront ajoutés au besoin									
Préalables complétés et documentés de manière satisfaisante :					Installation documentée	Performance des composantes	ERE Documenté	Contrôles validés (point à point)	
Notes									
	Séquence				Programmation complétée	Simulation / Essai réel	Résultat adéquat	Accepté par	Note #
Communication données BACnet									
Notes									

PART 1 GENERAL**1.1 INSTALLATION/START-UP CHECK LISTS**

- .1 Include the following data:
 - .1 Product manufacturer's installation instructions and recommended checks.
 - .2 Special procedures as specified in relevant technical sections.
 - .3 Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.
- .2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Consultant supplemental additional data lists will be required for specific project conditions.
- .3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.
- .4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Contractor. Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project.
- .5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

1.2 PRODUCT INFORMATION (PI) REPORT FORMS

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

1.3 PERFORMANCE VERIFICATION (PV) FORMS

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

1.4 SAMPLES OF COMMISSIONING FORMS

- .1 Consultant will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.
 - .2 Revise items on Commissioning forms to suit project requirements.
-

- .3 Samples of Commissioning forms and a complete index of produced to date will be attached to this section.

1.5 CHANGES AND DEVELOPMENT OF NEW REPORT FORMS

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

1.6 COMMISSIONING FORMS

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.
- .2 Strategy for Use:
 - .1 Consultant provides Contractor project-specific Commissioning forms with Specification data included.
 - .2 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
 - .3 Confirm operation as per design criteria and intent.
 - .4 Identify variances between design and operation and reasons for variances.
 - .5 Verify operation in specified normal and emergency modes and under specified load conditions.
 - .6 Record analytical and substantiating data.
 - .7 Verify reported results.
 - .8 Form to bear signatures of recording technician and reviewed and signed off by Contractor.
 - .9 Submit immediately after tests are performed.
 - .10 Reported results in true measured SI unit values.
 - .11 Provide Consultant with originals of completed forms.
 - .12 Maintain copy on site during start-up, testing and commissioning period.
 - .13 Forms to be both hard copy and electronic format with typed written results in Building Management Manual in accordance with Section 01 78 00 - Facility Operation.

1.7 LANGUAGE

- .1 To suit the language profile of the awarded contract.

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

APPENDIX

COMMISSIONING FORMS

TABLE DES MATIÈRES

FICHES DE MISE EN SERVICE 1

1.1 Fiche de renseignement de produit (RP) 1

1.2 Essais de tuyauterie ou de conduits 2

1.3 Unité bi-bloc..... 3

1.4 Essai de fuite à la terre 4

FICHES DE MISE EN SERVICE

1.1 FICHE DE RENSEIGNEMENT DE PRODUIT (RP)

PROJET/ PROJECT	Nom : <i>Name:</i>			
	Bâtiment : <i>Building:</i>			
	Numéro de Projet : <i>Project number:</i>			
IDENTIFICATION	Équipement : <i>Equipment:</i>			
	Description sommaire : <i>Summary:</i>			
	Identification aux plans : <i>No. On Drawings:</i>		Identification système de contrôle du bâtiment : <i>MSS Identifier:</i>	
	Équipement relié au système : <i>Equipment linked to system:</i>			
RENSEIGNEMENT	Fabricant : <i>Man'fr:</i>			
	Modèle : <i>Model:</i>			
	No série <i>Serial no.:</i>			
	Capacité : <i>Capacity:</i>		Taille : <i>Size:</i>	
	Efficacité : <i>Efficiency:</i>			
	Tension : <i>Voltage:</i>	Volt ./ #Ø / Fréquence		
	Courant : <i>Current:</i>	FLA/LRA		
	Autres : <i>Other:</i>			
ACHAT/ PURCHASE	Fournisseur : <i>Contractor:</i>	Nom/adresse <i>Name/address</i>		
	Distributeur : <i>Distributor:</i>	Nom/adresse <i>Name/address</i>		
	Garantie : <i>Guarantee:</i>			
	Date d'achat : <i>Purchase date:</i>			
	Garantie spécifique : <i>Specific guarantee:</i>			
	Date de démarrage : <i>Date of start-up:</i>			
	Remplacé le : <i>Replaced:</i>			

1.2 ESSAIS DE TUYAUTERIE OU DE CONDUITS

IDENTIFICATION	Service :	Localisation :	Fluide :
	CARACTÉRISTIQUES SPÉCIFIÉES		

Préalables (cocher pour confirmer que le préalable est documenté)

DOCUMENTATION	<input type="checkbox"/> Dessin d'ateliers reçus	<input type="checkbox"/> Installation complétée et documenté (fiche jointe)
	Commentaires:	
	<p>.....</p> <p>.....</p> <p>.....</p>	

MESURES	PROPRIÉTÉS	INSTRUMENT (Portable/BAS/Local)	PRESCRIT	MESURÉ 1	MESURÉ 2
	Pression initiale (kPa – PSI)				
	Pression après 30 minutes (kPa – PSI)				
	<ul style="list-style-type: none"> Pression rétablie à la pression initiale (kPa – PSI) 				
	Pression après 1 heure (kPa – PSI)				
	<ul style="list-style-type: none"> Pression rétablie à la pression initiale (kPa – PSI) 				
	Pression stabilisée à _____ (kPa – PSI)				
	<ul style="list-style-type: none"> Heure de début Heure de fin Durée, heures/minutes 				
	Commentaires				
	<p style="text-align: center;">Essai concluant ou non, avec description</p> <p>.....</p> <p>.....</p> <p>.....</p>				

Participants à la réalisation (R), la validation (V) et l'approbation (A) des essais :

Autorité/Compagnie	Nom	Activité	Signature	Date
Plomberie				
Ventilation				
Contrôles				
Balancement				
Témoin (entrepreneur général)		V		
Agent de mise en service				

1.3 UNITE BI-BLOC

IDENTIFICATION	N° au plan :	Service :	Localisation :
	Manufacturier :	Modèle :	No de série :
	Caractéristiques spécifiées		
	Capacité	Type	Réfrigérant
	Efficacité chauffage	Refroidissement	Volume de Réfrigérant :

Préalables (cocher pour confirmer que le préalable est documenté)

DOCUMENTATION	<input type="checkbox"/> Dessin d'ateliers reçus	<input type="checkbox"/> Liste d'installation complétée	<input type="checkbox"/> Rapport de test en usine (si applicable)
	<input type="checkbox"/> Installation conforme documentée	<input type="checkbox"/> ERE hydronique complété	<input type="checkbox"/> ERE hydronique approuvé (Date____)
	<input type="checkbox"/> Séquence de régulation active	<input type="checkbox"/> ERE aéraulique complété	<input type="checkbox"/> ERE aéraulique approuvé (Date____)
	Commentaires:		

PERFORMANCES	Élément de performance	Valeur Prescrite	Valeur mesurée
	Côté air		
	- Débit, l/s		
	- Température à l'entrée, °C		
	- Température à la sortie, °C		
	- Perte de pression, kPa		
	Ampérage moteur compresseur ($T_1 / T_2 / T_3$)		
	Voltage moteur compresseur ($T_1 - T_2 / T_2 - T_3 / T_3 - T_1$)		
Commentaires			

1.4 ESSAI DE FUITE A LA TERRE

L'essai vise les prises installées près d'un appareil de plomberie.

Présenter les résultats sous forme de tableau et faire approuver la formulation par le responsable de la MES

1.5 ELEVATOR : TEST DATA FORM - ELEVATOR**PERFORMANCE VERIFICATION (PV)**

Elevator no : _____

Date : _____

Test Description	Result
Nominal Speed	m/s
Full load speed	m/s
Speed governor	Type _____
- Tripping speed :	_____ m/s
- Overspeed switch :	_____ m/s
Car safeties overspeed test – nominal load	
- Tripping speed :	_____ m/s
- Stopping distance :	_____ mm
- Platform level	___ mm/meter
Car buffer test at nominal loads & speed	
Counterweight buffer test	
Break test at nominal loads & speed – down direction	mm
Auxiliary break (rope gripper) – operation	
Safety switch	
Final terminal stopping devices (up & down)	
Pit stop switch	
Top of car stop switch	
Top of car inspection unit	

Top of car emergency exit switch	
Overspeed stop by 'Drive'	
Overspeed stop by PLC or CPU	
Overspeed stop by auxiliary PLC or CPU	
Electrical security circuit check	
Emergency light	
Emergency Recall Operation - Phase I	
Emergency In-Car Operation - Phase II	
Communication system	
Emergency power operation	
Currents measurement (AC currents at controller) :	
Ascending – no load	UP
Descending – no load	DOWN
Ascending – balanced loads	UP
Descending – balanced loads	DOWN
Ascending – nominal loads	UP
Descending – nominal loads	DOWN
Ascending start at nominal loads	UP
Descending start at nominal loads	DOWN

Note: Fill the table and check if the result is correct

Note : Table continued on next page

TEST DATA FORM – ELEVATOR (CONTINUED)**PERFORMANCE VERIFICATION (PV)**

Elevator no : _____

Date : _____

Test Description	Result
Setting & Clearance:	
Operating Time – up	m/s
Operating Time – down	m/s
Door Open Time	sec
Door Close Time	sec
Door Dwell - Car Call	sec
Door Dwell – Hall Call	sec
Door Nudging Time	sec
Ambient Noise Level	dBa
Door Noise Level	dBa
Running Noise Level	dBa
Door Force (door closing pressure)	lbs
Leveling	mm
Pre-Opening	mm
Counterweight balancing	%
Load weight system setting	%

Top clearance	mm
Bottom clearance	mm
Top runby	mm
Bottom runby	mm

Note: Fill the table and check if the result is correct

Identification & signature :

Elevator – Name & Title

Compagny name

1.6 ELEVATOR :TEST DATA FORM – HYDRAULIC MACHINE & CYLINDER**PERFORMANCE VERIFICATION (PV)**

Elevator no : _____

Date : _____

Test Description	Result
Equipment visual check	
Sealing of joints and pipes	
Cylinder end limit test (make a run up and stop at full speed on the piston end stop)	
PVC pressure test	
Check of top & bottom oil level	
Check of top & bottom runby	
Check of car starts & stops	
Check of operation speed : low & full speed	
Check of levelling (floor levelling)	

Note: Fill the table and check if the result is correct

Identification & signature :

Elevator – Name & Title_____
Compagny name

1.7 ELEVATOR :TEST DATA FORM – HYDRAULIC OIL COOLER**PERFORMANCE VERIFICATION (PV)**

Elevator no : _____

Date : _____

Test Description	Result
Equipment visual check	
Sealing of joints and pipes	
Checking the operation of the oil cooler in automatic mode	

Note: Fill the table and check if the result is correct

Identification & signature :

Elevator – Name & Title_____
Compagny name

1.8 ELEVATOR : TEST DATA FORM – INTERCOMMUNICATION SYSTEM**PERFORMANCE VERIFICATION (PV)**

System : _____

Elevator no : _____

Date : _____

Test Description	Result
Check the functionality of the following items (master station):	
Selection for calls to each car;	
Selection for calls in the machine rooms;	
Indicate the origin of the calls;	
Indicate lines on hold;	
Indicate the status of the AC power;	
Indicate the status of the battery;	
Indicate the status of the telephone line;	
Make an alarm when the system is operating.	
Check the operation of the master station at CCS (wall)	
Check the operation of the master station at CCS (desk)	
Check the operation of the master station in machine room	
Check the operation in car	
Manufacturer / Model	
Incoming call number	

Emergency call number	
Phone activation	
Dialing the correct number	
Confirmation of recorded message	
Sound quality	
Sound level	
Phone deactivation	
Compliance of operations	
Telephone line monitoring module (B44-10 and +)	

Note: Fill the table and check if the result is correct

Identification & signature :

Elevator – Name & Title

Compagny name

1.9 ELEVATOR : TEST DATA FORM : FIRE ALARM / EMERGENCY POWER**PERFORMANCE VERIFICATION (PV)**

Elevator no : _____

Date : _____

Test Description	Result
Connecting the fire alarm signals	
Connecting the emergency power signals	
Emergency Recall Operation – Phase I	
Recall activated by fire alarm (General alarm)	
Recall activated by fire alarm (Designated floor)	
Recall activated by fire alarm (Each floor)	
Recall activated by fire alarm (Hoistway)	
Recall activated by fire alarm (MR)	
Recall activated by key switch - Hall	
Recall activated by key switch - CCS	
Conformity of car maneuvers	
Conformity of of signage	
Closing doors at reduced speed	
Emergency In-Car Operation – Phase II	
Operation of the key switch	
Operation of the open & close buttons	
Other door reopening devices	

Conformity of car maneuvers	
Conformity of of signage	
Emergency power	
Operation of the telephone in the car	
Operation of the key switch	
Operation of the indicator lights	
Operation of the car	
Conformity of of signage	

Note: Check if the result is correct

Following the elevator modernization work performed in this building, we certify that the fire alarm and emergency power tests were carried out successfully.

Identification & signature :

Elevator – Name & Title

Compagny name

Fire alarm – Name & Title

Compagny name

Emergency power – Name & Title

Compagny name

1.10 ELEVATOR : COMMISSIONING PLAN (95%)

[illegible]

PART 1 GENERAL**1.1 GENERAL REQUIREMENTS**

- .1 Standard letter size paper 216 mm x 279 mm.
- .2 Methodology used to facilitate updating.
- .3 Drawings, diagrams and schematics to be professionally developed.
- .4 Electronic copy of data to be in a format accepted and approved by Departmental Representative.

1.2 APPROVALS

- .1 Prior to commencement, co-ordinate requirements for preparation, submission and approval with Departmental Representative.

1.3 GENERAL INFORMATION

- .1 Provide Contractor the following for insertion into appropriate Part and Section of BMM:
 - .1 Complete list of names, addresses and telephone and fax numbers of the contractor and of the subcontractors who participated in the performance of the work - Tab A of the manual.
 - .2 Letters of guarantee - Tab B
 - .3 Approved shop drawings - Tab C
 - .4 Test reports, including ERA, commissioning checklists, duly completed, including Product Information (PR) and Performance Check (PC) report forms, reviewed and accepted by the MES manager of the Contractor and / or the Consultant. Tab D.
 - .5 Final sequences of operations for these systems after commissioning - Tab E.
 - .1 If necessary, the consultant may attach brief descriptions of the mechanical, electrical and fire protection systems installed and put into service.
 - .6 Information on the operation and maintenance of systems installed and commissioned, including preventive and corrective maintenance and maintenance schedules - Tab F.
 - .7 Construction drawings - Tab G.
 - .8 EMIS forms duly completed, by the Owner's staff in collaboration with the Contractor's MES manager - Tab H.
 - .9 Inspection reports - Tab I.
 - .10 Commissioning reports. - J.

1.4 SUPPORTING DOCUMENTATION FOR INSERTION INTO SUPPORTING APPENDICES

- .1 Provide Departmental Representative supporting documentation relating to installed equipment and system, including:
 - .1 General:
 - .1 Finalized commissioning plan.
 - .2 WHMIS information manual.
 - .3 Procedures used during commissioning.
 - .4 Cross-Reference to specification sections.
 - .2 Fire prevention, suppression and protection:
 - .1 Test reports.
 - .3 Mechanical:
 - .1 Piping pressure test certificates.
 - .2 Ducting leakage test reports.

- .3 TAB and PV reports.
- .4 Charts of valves and steam traps.
- .5 Copies of posted instructions.
- .4 Electrical:
 - .1 TAB and PV reports.
 - .2 Electrical work log book.
 - .3 Charts and schedules.
 - .4 Locations of cables and components.
 - .5 Copies of posted instructions.

- .2 Assist Consultant with preparation of BMM.

1.5 LANGUAGE

- .1 English and French Language to be in separate binders.

1.6 IDENTIFICATION OF FACILITY

- .1 When submitting information to Departmental Representative for incorporation into BMM, use following system for identification of documentation:
 - .1 See Section 23 05 53 - Identification.
- .2 Vertical transport system
 - .1 Section 0 - General
 - .1 List of suppliers
 - .2 Description of inspections and maintenance
 - .3 Statement of Work Compliance Document (RBQ) and Test Forms
 - .4 Letters of Guarantee
 - .5 Key Training
 - .2 Section 1 - Controllers
 - .1 Product Description
 - .2 User's Manual
 - .3 Electrical plans
 - .4 Adjustment - drive / control parameters
 - .5 Other
 - .3 Section 2 - Traction Machine
 - .1 Traction machine equipment
 - .2 Measurement of cables
 - .3 Other
 - .4 Section 3 - Hydraulic Machine
 - .1 Hydraulic equipment
 - .2 Other
 - .5 Section 4 - Door Equipment
 - .1 Door Operator
 - .2 Equipment for landing and car doors
 - .3 Door Reopening Device
 - .4 Other
 - .6 Section 5 - Hoistway Equipment
 - .1 Position reader
 - .2 Inspection Device
 - .3 Hoistway Switches
 - .4 Other

- .7 Section 6 - Accessories
 - .1 Car and floors fixtures
 - .2 Voice Announcer
 - .3 Car and CCS Communication System
 - .4 CCS Keyed Console
 - .5 Computer Console
 - .6 Load Measurement Device - Description / Adjustment
 - .7 Parts Catalog
 - .8 Complete list of spare parts.
 - .9 Other
- .8 Section 7 - Plans " As Built "
- .9 Section 8 - Miscellaneous

1.7 USE OF CURRENT TECHNOLOGY

- .1 Use current technology for production of documentation. Emphasis on ease of accessibility at all times, maintain in up-to-date state, compatibility with user's requirements.
- .2 Obtain Departmental Representative's approval before starting Work.

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 74 19 – Waste Management and Disposal.

1.2 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .2 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Assessment Act (CEAA), 2012
 - .2 Canadian Environmental Protection Act (CEPA), 2012
 - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.
 - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations
 - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34
 - .4 Motor Vehicle Safety Act (MVSA), 1995
 - .5 Hazardous Materials Information Review Act, 1985
- .3 National Fire Protection Association (NFPA)
 - .1 NFPA 241 - 96, Standard for Safeguarding Construction, Alteration, and Demolition Operations
- .4 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).
 - .2 National Fire Code of Canada 2015 (NFC).
- .5 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S660-08, Standard for Nonmetallic Underground Piping for Flammable and Combustible Liquids
 - .2 ULC/ORD-C58.15-1992, Overfill Protection Devices for Flammable Liquid Storage Tanks
 - .3 ULC/ORD-C58.19-1992, Spill Containment Devices for Underground Flammable Liquid Storage Tanks
- .6 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles
 - .2 EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles
 - .3 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- .7 ANSI/ASSP A10.6 Safety and Health Program Requirements for Demolition Operations.

1.3 DEFINITIONS

- .1 Demolition: rapid destruction of building following removal of hazardous materials.
-

- .2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate with Departmental Representative for the material ownership including but not limited to:
 - .1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Action Submittals: Provide the following submittals before starting any work of this Section:
 - .1 Shop Drawings: Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec as follows.
- .2 Informational Submittals: Provide the following submittals when requested by the Consultant:
 - .1 Qualification Data: Submit information for companies and personnel indicating their capabilities and experience to perform work of this Section including; but not limited to, lists of completed projects with project names and addresses, names and addresses of Consultants and Consultant, for work of similar complexity and extent.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: Ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial/Territorial and Municipal regulations.
- .2 Comply with hauling and disposal regulations of Authority Having Jurisdiction.
- .3 Standards: Comply with ANSI A10.6 and NFPA 241.

1.7 SITE CONDITIONS

- .1 Review "Designated Substance Report" and take precautions to protect environment.
- .2 If material resembling spray or trowel-applied asbestos or other designated substance be encountered, stop work, take preventative measures, and notify Consultant immediately.
 - .1 Proceed only after receipt of written instructions have been received from Consultant.
- .3 Notify Consultant before disrupting building access or services.

1.8 EXISTING CONDITIONS

- .1 Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - .1 Hazardous materials will be as defined in the Hazardous Materials Act.
-

1.9 SHIPPING, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Package Waste Management: recover packaging waste for reuse and manufacturer reuse of packaging materials such as pallets, crates, boards and other packaging material, in accordance with Section 01 74 19 – WASTE MANAGEMENT AND DISPOSAL.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Survey existing conditions and correlate with requirements indicated to determine extent of demolition required.
- .2 Review Project Record Documents of existing construction provided by Consultant.
- .3 Consultant does not guaranty that existing conditions are the same as those indicated in Project Record Documents.
- .4 Inventory and record the condition of items being removed and salvaged.
- .5 When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element.
- .6 Promptly submit a written report to Consultant.
- .7 Verify that hazardous materials have been remediated before proceeding with demolition operations.

3.2 PREPARATION

- .1 Protection of In-Place Conditions:
 - .1 Prevent movement, settlement, or damage to adjacent structures, and parts of building to remain in place. Provide bracing and shoring required.
 - .2 Keep noise, dust, and inconvenience to occupants to minimum.
 - .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.
 - .2 Demolition/Removal:
 - .1 Demolish parts as indicated.
-

- .2 Trim edges of partially demolished building elements to tolerances as defined by Consultant to suit future use.
- .3 At end of each day's work, leave Work in safe and stable condition.
- .4 Demolish to minimize dusting. Keep materials wetted as directed by Consultant.
- .5 Only dispose of material specified by an ecological method.

3.3 SITE RESTORATION & REPAIRS

- .1 Provide a smooth transition between adjacent existing grades and new grades.
- .2 General: Promptly repair damage to adjacent construction caused by demolition operations.
- .3 Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
- .4 Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Refer to demolition drawings and specifications for items to be salvaged for reuse.

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 01 74 19 – Waste Management and Disposal.
- .2 Section 02 41 00.08 – Demolition - Minor Works.
- .3 Section 05 50 00 – Metal Fabrications.
- .4 Section 06 40 00 – Architectural Woodwork.
- .5 Section 07 84 00 – Fire Stopping.
- .6 Section 08 80 50 – Glazing.
- .7 Section 09 91 99 – Painting for Minor Works.

1.2 REFERENCE STANDARDS

- .1 Canadian Environmental Protection Act, 1999 (CEPA 1999)
 - .1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).
- .2 Department of Justice Canada (Jus)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDG Act) 1992, (c. 34).
 - .2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).
- .3 Green Seal Environmental Standards (GS)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
 - .2 GS-36-00, Commercial Adhesives.
- .4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .5 National Research Council Canada (NRC)
 - .1 National Fire Code of Canada 2015 (NFC).
- .6 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, Adhesive and Sealant Applications.

1.3 DEFINITIONS

- .1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
 - .2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into environment.
 - .3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.
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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 hazardous materials and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures to Consultant for each hazardous material required prior to bringing hazardous material on site.
 - .3 Submit hazardous materials management plan to Consultant that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.
 - .4 Hazardous waste classification: identify waste codes applicable to each hazardous waste material based on applicable federal and provincial acts, regulations, and guidelines. Waste profiles, analyses, and classification submitted to contract offices for review and approval.

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 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
 - .1 When exporting hazardous waste to another country, ensure compliance with Export and Import of Hazardous Waste and Hazardous Recyclable Materials Regulations.
- .4 Storage and Handling Requirements:
 - .1 Co-ordinate storage of hazardous materials with Consultant and abide by internal requirements for labelling and storage of materials and wastes.
 - .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
 - .3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada (NFC) requirements.
 - .4 Keep no more than 20 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
 - .1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
 - .5 Transfer of flammable and combustible liquids is prohibited within buildings.
 - .6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.
 - .7 Solvents or cleaning agents: non-flammable or have flash point above 38 degrees C.
 - .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
 - .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.

- .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
 - .1 Store hazardous materials and wastes in closed and sealed containers.
 - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
 - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
 - .4 Segregate incompatible materials and wastes.
 - .5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.
 - .6 Store hazardous materials and wastes in secure storage area with controlled access.
 - .7 Maintain clear egress from storage area.
 - .8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.
 - .9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
 - .10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
 - .11 When hazardous waste is generated on site:
 - .1 Co-ordinate transportation and disposal with Consultant.
 - .2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.
 - .3 Use licensed carrier authorized by provincial authorities to accept subject material.
 - .4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.
 - .5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.
 - .6 Only trained personnel handle, offer for transport, or transport dangerous goods.
 - .7 Provide photocopy of shipping documents and waste manifests to Consultant.
 - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to Consultant.
 - .9 Report discharge, emission, or escape of hazardous materials immediately to Consultant and appropriate provincial authority. Take reasonable measures to control release.
 - .12 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
 - .13 Report spills or accidents immediately to Consultant. Submit a written spill report to Consultant within 24 hours of incident.
 - .5 Waste Management and Disposal:
 - .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Package Waste Management: recover packaging waste for reuse and manufacturer reuse of packaging materials such as pallets, crates, boards and other packaging material, in accordance with Section 01 74 19 – WASTE MANAGEMENT AND DISPOSAL.
-

PART 2 - PRODUCTS**2.1 MATERIALS**

- .1 Description:
 - .1 Bring on site only quantities hazardous material required to perform Work.
 - .2 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.
 - .3 Spill Response Materials: provide spill response materials which can be used for absorbing/shoveling and containing hazardous materials.
 - .4 Provide personal protective equipment.

PART 3 - EXECUTION**3.1 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 01 74 19 – Waste Management and Disposal.
- .2 Section 07 92 00 – Joint Sealants.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM A 1064/A 1064M-17 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 - .2 ASTM C 73-14 Standard Specification for Calcium Silicate Face Brick (Sand-Lime Brick).
- .2 CSA Group (CSA)
 - .1 CAN/CSA-A82-14, Fired Masonry Brick Made From Clay or Shale.
 - .2 CAN/CSA-A165 SERIES-14(R2014), CSA Standards on Concrete Masonry Units (Consists of A165.1-04 Concrete Block Masonry Units, A165.2 Concrete Brick Masonry Units, A165.3 Prefaced Concrete Masonry Units).
 - .3 CAN/CSA-A179-14(R2014), Mortar and Grout for Unit Masonry.
 - .4 CAN/CSA-A370-14, Connectors for Masonry.
 - .5 CAN/CSA A371-14(R2014), Masonry Construction for Buildings.
 - .6 CSA G30.18-09 (R2014), Carbon Steel Bars for Concrete Reinforcement.
 - .7 CSA S304-14 - Design of masonry structures.
- .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 1113-A2013, Architectural Coatings.

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 unit masonry products, mortar and grout, connectors, anchorage and reinforcing, and accessories. Include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit (2) copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
 - .3 Provide manufacturer's certificates of compliance that attest to compression resistance, water absorption, density, ULC-certified and other.
- .3 Samples:
 - .1 As requested by Departmental Representative, submit duplicate samples of each unit exposed in final construction for review and acceptance.
 - .2 Samples will be returned for inclusion into work.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .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 and in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect masonry products from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Waste Management and Disposal:
 - .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Package Waste Management: recover packaging waste for reuse and manufacturer reuse of packaging materials such as pallets, crates, boards and other packaging material, in accordance with Section 01 74 19 – WASTE MANAGEMENT AND DISPOSAL.

1.5 COLD WEATHER REQUIREMENTS

- .1 Supplement requirements of CAN3-A371 as follows:
 - .1 Maintain temperature of mortar between -5oC and 5oC until used.

1.6 HOT WEATHER REQUIREMENTS

- .1 Supplement requirements of CAN3-A371 as follows:
 - .1 Protect freshly laid masonry from drying too rapidly by means of waterproof, non-staining coverings.

PART 2 - PRODUCTS

2.1 MASONRY UNITS

- .1 Special fire resistant concrete block units: to CAN/CSA-A165.1 as modified below.
 - .1 Classification: H/15/C/O, except as modified by 1hr fire resistance requirements specified below.
 - .2 Fire resistant characteristics: aggregate used in units and equivalent thickness of units to National Building Code of Canada (NBC) 2015, for fire-resistance ratings indicated.
 - .3 Size: modular metric.
 - .4 Dimensions: 190 mm in Height x 390 mm in Length x Width as indicated in drawings.
 - .5 Solid Percentage %: as per fire resistance required and thickness of block units varying from 56 % or 53 %.
 - .6 Special shapes: Provide purpose-made shapes for lintels and bond beams [and provide additional shapes as indicated.

2.2 REINFORCEMENT AND CONNECTORS

- .1 Bar reinforcement: to CAN/CSA-A371 and CSA G30.18, Grade 400.
 - .2 Wire reinforcement: knurled wire to CAN/CSA-A371 and ASTM A 1064/A 1064M.
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- .3 Connectors: to CAN/CSA-A370.
 - .1 Corrosion resistance: to CAN/CSA-A370
 - .1 Interior: Level I.
 - .2 Ties:
 - .1 Conventional dovetail, corrugated strip tie.

2.3 MORTAR AND GROUT

- .1 Materials:
 - .1 Materials and aggregates provided from the same manufacturer for the entirety of the Work, to maintain colour uniformity and other mixing characteristics.
 - .2 Aggregates: to CAN/CSA-A179-14.
 - .3 Water: to CAN/CSA-A179, clean and exempt of ice, oils, acids, alkalis, organic matter or all other harmful matter.
 - .4 Portland Cement GU (once known as type 10): to CSA A3000-13.
 - .5 Hydrate Lime type S: to ASTM C207-06 (2011).
 - .6 Colour: metallic oxide pigments to ASTM C979-16.
 - .1 The use of mortar or grout consisting exclusively of masonry cement as a binder is prohibited.
 - .2 Adjuvants should not be added to mortar or grout. Antifreeze, calcium chloride, calcium chloride antifreeze, salts or other similar materials should not be added to mortar or grout to lower freezing point or speed up curing time. The use of calcium chloride is prohibited.
 - .3 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.
 - .4 Grout cannot be replaced with concrete or mortar.
- .2 Mortar type for interior loadbearing or non-loadbearing walls: Type S, as specified based on CAN/CSA-A179-14 properties, factory pre-mixed, and standard colour grey.
- .3 Water: to CAN/CSA-A179, clean and exempt of ice, oils, acids, alkalis, organic matter or all other harmful matter.
- .4 Parging mortar for concrete blocks, type suitable for application, and factory pre-mixed.

2.4 ACCESSORIES

- .1 Cavity screening: three dimensional random weave plastic mesh, thickness to match cavity, minimum height 3 brick masonry courses.
- .2 Loose steel lintels: in accordance with National Building Code of Canada (NBC) 2015.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Do masonry work in accordance with CAN/CSA-A371 except where specified otherwise.
 - .1 Bond: running stretcher bond with vertical joints in perpendicular alignment and centered on adjacent stretchers above and below.
 - .2 Coursing height: 200 mm for one block and one joint.
 - .3 Jointing: as per existing, tooled where exposed or where paint or other finish coating is specified.
- .2 Build masonry plumb, level, and true to line, with vertical joints in alignment.
- .3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.3 CONSTRUCTION

- .1 Exposed masonry:
 - .1 Remove chipped, cracked, and otherwise damaged units, in exposed masonry and replace with undamaged units.
 - .2 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects. Make cuts straight, clean, and free from uneven edges.
- .2 Building-in:
 - .1 Install masonry connectors and reinforcement where indicated on drawings.
 - .2 Build in items required to be built into masonry.
 - .3 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
 - .4 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.
 - .5 Install loose steel lintels centered over openings where indicated, with minimum 200 mm end bearing.
- .3 Concrete block lintels:
 - .1 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.
 - .2 End bearing: not less than 200 mm as indicated on drawings.
- .4 Support of loads:
 - .1 Use concrete to Section 03 30 00 - Cast-in-Place Concrete, where concrete fill is used in lieu of solid units.
 - .2 Use grout to CAN/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.
- .5 Provision for movement:
 - .1 Leave 6 mm space below shelf angles.
 - .2 Leave 6 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
 - .3 Built masonry to tie in with stabilizers, with provision for vertical movement.
 - .4 Build expansion and control joints where and as indicated.
- .6 Interface with other work:
 - .1 Cut openings in existing work as indicated.
 - .2 Openings in walls: approved DCC Representative.
 - .3 Make good existing work. Use materials to match existing.

3.4 REINFORCING AND CONNECTING

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

3.5 BONDING AND TYING

- .1 Bond walls of two or more wythes using metal connectors in accordance with CAN/CSA-A371, and as indicated.
- .2 Tie masonry veneer to backing in accordance with National Building Code of Canada (NBC) 2015, CAN/CSA-A371, CSA S304.1 and as indicated.

3.6 MODIFICATIONS TO EXISTING MASONRY

- .1 Match existing bond and coursing height of adjacent masonry to remain.
- .2 Tooth new masonry into existing masonry in run of wall and at intersections with existing partitions.
- .3 At new openings in masonry walls, remove units, clean and re-install rotated to conceal cut and expose finish surface.
- .4 Clean bond areas of adjacent masonry to remain, remove loose material and prepare masonry to receive new masonry toothed in.
- .5 Install reinforcement as necessary to provide continuity of reinforcing and stability between existing and new masonry work.
- .6 Provide repair anchors as necessary to stabilize existing masonry adjacent to and affected by the Work.

3.7 REINFORCED LINTELS AND BOND BEAMS

- .1 Reinforce masonry lintels and bond beams as indicated.
- .2 Place and grout reinforcement in accordance with CAN/CSA-A179, CAN/CSA-A371.

3.8 GROUTING

- .1 Grout masonry in accordance with CAN/CSA-A179, CAN/CSA-A371 and as indicated.

3.9 ANCHORS

- .1 Supply and install metal anchors as indicated.

3.10 LATERAL SUPPORT AND ANCHORAGE

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

3.11 SITE TOLERANCES

- .1 Tolerances of CAN/CSA-A371 apply.
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3.12 FIELD QUALITY CONTROL

- .1 Inspection and testing will be carried out by Testing Laboratory designated by Departmental Representative.

3.13 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management:
 - .1 Separate waste materials for recycling.

3.14 PROTECTION

- .1 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect from wind-driven rain until masonry work is completed and protected by flashings or other permanent construction.
- .2 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.
- .3 Repair damage to adjacent materials caused by masonry products installation.

END OF SECTION

PART 1 - GENERALITIES

1.1 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A 36/A 36M, Specification for Structural Steel.
 - .2 ASTM A 193/A 193M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
 - .3 ASTM B 209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate Metric.
 - .4 ASTM B 210M, Specification for Aluminum and Aluminum-Seamless Alloy Drawn Tubes.
 - .5 ASTM B 211M, Specification for Aluminum and Aluminum Alloy Bar, Rod and Wire.
 - .6 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 Tensile Strength psi.
 - .7 ASTM A 325, Specification for Structural Bolts, Steel, Heat Treated, 120/105ksi Minimum Tensile Strength.
 - .8 ASTM A 325M, Specification for High-Strength Bolts for Structural Steel Joints.
 - .9 ASTM A 490, Specification for Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.
 - .10 ASTM A 490M, Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints.
 - .11 ASTM F 593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - .12 ASTM A 653/A 653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .13 ASTM A 792/A 792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .14 ASTM A 792/A 792M, Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .2 American Association for State Highway and Transportation Officials (AASHTO)
 - .1 AASHTO Standard Specifications for Highway Bridges
 - .3 General Standards Board of Canada (GSC)
 - .1 CAN/CGSB-1.40, Paint for primary anti-corrosion layer, alkyd resins, for construction steel.
 - .2 CAN/CGSB-1.105- Quick-drying primer paint.
 - .3 CAN/CGSB-1.181- Zinc-rich, organic and prepared coating.
 - .4 CAN/CGSB-85.10, Metal Protective Coatings.
 - .5 CAN/CGSB-85.100, Paint.
 - .4 Canadian Institute of Steel Construction (CICA)/Canadian Association of the Paint and Coating Industry.
 - .1 CISC/AFPC 1-73a, Paints a quick drying layer for frame steel.
 - .2 ICCA/AFPC 1-73b, Paint a quick drying layer for frame steel.
 - .3 ICCA/AFPC 2-75, Primary Layer Paint, Fast-Drying for Framing Steel.
 - .5 American Welding Society (AWS)
 - .1 A5.10/A5.10M, Specification for Bare Aluminum and Aluminum Alloy Welding Electrodes and Rods.
 - .6 Canadian Standards Association (CSA)/CSA
 - .1 CSA C22.2 No. 79, Cellular Metal and Cellular Concrete Floor Raceways and Fittings.
 - .2 CAN/CSA-G40.20/G40.21, General Requirements for Laminated or Welded Construction Steel/Construction Steels.
 - .3 CAN/CSA-G164, Hot Galvanization of irregularly shaped objects.
 - .4 CAN/CSA S6, Canadian Code for the Calculation of Road Bridges.
 - .5 CAN/CSA-S16, Limit States Design of Steel Structures.
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- .6 CAN/CSA-S16.1, Rules for Calculating the Boundary States of Steel Frames.
- .7 CAN/CSA-S136, Limit States Design of Steel Structures.
- .8 CSA-S136.1, Commentary on CSA Standard S136.
- .9 CAN3-S157, Calculation of the mechanical strength of aluminum elements.
- .10 CSA S269.1, Falsework for Construction Purposes.
- .11 CSA W47.1, Certification of steel welding companies.
- .12 CSA W47.1, Steel Smelting Company Certification.
- .13 CSA W47.2, Aluminium Smelting Welding Company Certification.
- .14 CSA W48, Input metals and associated materials for arc welding.
- .15 CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .16 CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .17 CSA W59, Welded Steel Construction.
- .18 CSA-W59S1, Supplement Number 1, Fixed Offshore Steel Structures, CSA W59, Welded Steel Construction (Arch Welding).
- .19 CSA W59.2, Welded Aluminium Construction.
- .7 Master Painters Institute
 - .1 MPI-INT 5.1, Structural Steel and Metal Manufacturing.
 - .2 MPI-EXT 5.1, Structural Steel and Metal Manufacturing.
 - .3 MPI - EXT 5.5D, Oil Paint.
 - .4 MPI - 18, Organic Zinc Rich Primer.
- .8 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI 10M, Standard for steel roof aprons.
 - .2 CSSBI 12M, Standard for steel composite aprons.
 - .3 CSSBI 50M, Manual of lightweight steel frame elements.
 - .4 CSSBI 52M, Lightweight Steel Framing Binder.
 - .5 CSSBI - A few words about steel 3, Maintenance of prefinished steel sheet products.
 - .6 CSSBI Technical Bulletin Vol. 7, No. 2, Changing Standard Thicknesses for Canadian Lightweight Steel Framing Applications.
 - .7 CSSBI S5, Guide Standard for wind-resistant steel half-timbers.

1.2 COMPUTATIONAL CRITERIA

- .1 The work details and assemblies must be calculated in accordance with CSA-S16, CSA-S136 and CSA-S136.1 standards, in order to withstand the indicated shear forces, times and stresses, and to allow for the expected thermal movements.
 - .2 Shear-stressed assemblies
 - .1 Prescribe shear-resistant triangulated frame assemblies (standard assemblies) in accordance with industry-recognized publications such as the Handbook of the Canadian Institute of Steel Construction.
 - .2 If shear stresses are not mentioned, prescribe or calculate the assemblies so that they can withstand the stresses of the uniformly distributed maximum load that the bending beams can safely withstand, provided they are not subjected to any concentrated load.
 - .3 For non-standard assemblies, submit sketches and calculation notes bearing the bucket and the signature of a competent Engineer in good standing of the Order of Engineers of Quebec.
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1.3 WORKSHOP DRAWINGS

- .1 Submit required workshop drawings, including shaping and assembly documents, design and assembly details, shaping details, diagrams and assembly instructions, and lists of materials and materials.
 - .2 Assembly drawings: must gather all the details and information needed to assemble and assemble the elements, including:
 - .1 Working methods;
 - .2 The order of assembly of the elements;
 - .3 The type of equipment to be used for assembly;
 - .4 Temporary bracing devices of the structural elements.
 - .3 Each drawing submitted must bear the seal and signature of a member engineer in good standing of the Order of Engineers of Quebec.
 - .4 Check that the drawings submitted for the assemblies, the building blocks and the components designed by a shaper bear the bucket and the signature of a member engineer of the Order of Engineers of Quebec.
 - .5 Workshop drawings must include all shaping and fitting details, including workshop seals, cuts, notches, assemblies, drills, support plates, threaded anchors, rivets and welds. Welds must be indicated using symbols defined in CSA W59.
 - .6 Documents setting out the proposed welding methods must be approved by the Canadian Welding Bureau and must bear the seal of the canadian welding bureau.
 - .7 Submit a description of the working methods, bracing and temporary reinforcements, the order of assembly and the type of equipment proposed for the assembly of the construction steel elements.
 - .8 Drawings of the temporary sneezing works submitted must bear the seal and signature of a member engineer of the Order of Engineers of Quebec.
 - .9 The drawings submitted must bear the seal and signature of a member engineer in good standing of the Order of Engineers of Quebec.
 - .10 Submitted designs must indicate cuts, chaperones, assemblies, drillings, threaded fastening devices, rivets, welds and other required elements. Welds must be represented using symbols shown in Appendix A of CSA W59.2.
 - .11 Submit documents describing working methods, order of assembly of frame elements and type of equipment that will be used.
 - .12 Submit the required shaping details and mounting drawings.
 - .13 Mounting drawings should indicate relevant details, such as marks, depth and spacing of the truss, braces, supports and anchors.
 - .14 Include, on the workshop drawings, the characteristics relating to the geometry of the truss, the frames, the supports, the joints and the anchors, as well as the dimensions and properties of the elements, the stresses and constraints, specified and weighted, taking into account various loads, as well as the arrow and arch.
 - .15 Submit the workshop drawings as well as the required sneezing and assembly drawings.
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- .16 In the case of concrete-covered decks, workshop drawings must indicate, show or understand relevant details regarding the temporary supply of steel decks, including the location of the slabs, the timing of their installation and removal, and the expected duration of each of these operations.
- .17 Workshop drawings should indicate the calculation loads, the dimensions of the frame elements, the materials used, the nominal thicknesses before the coatings were implemented, the details of the coatings, assembly and bracing, the dimensions and spacing of the screws, and the details of the anchors.
- .18 Workshop drawings must indicate the location, dimensions and openings of related works, as well as the requirements for them.
- .19 Use symbols recommended in CSA W59 to represent welds.
- .20 Before starting work, submit two (2) certified copies of the manufacturing workshop reports outlining the properties of the materials provided.

1.4 TRANSPORTATION, STORAGE AND HANDLING

- .1 Ensure the transportation, storage and handling of the items.
- .2 Provide and place protective holds for transport, lifting and storage of items.
 - .1 During shaping, transporting and mounting, necessary precautions must be taken to ensure that the beams and beams are not damaged.
 - .2 Do not nick the edges of the elements.
 - .3 Do not subject the elements to undue hardship.
- .3 Mark the mass on items that weigh more than 3 metric tons.
- .4 Protect unpainted patinated steel elements before assembly with a waterproof tarpaulin.
- .5 Ensure that no part of the steel elements comes into contact with the ground.
- .6 At least 7 days before the items are shipped, give the Engineer the delivery schedule.
- .7 Protect steel poles during transportation, on-site storage and implementation.

1.5 MEASURING FOR PAYMENT

- .1 The cost of all materials and work prescribed in this section must be included in the lump sum indicated in the bid for the Construction Steel lot. This lump sum must also include:
 - .1 X-ray control of optional workshop welded joints and additional welded joints on site.

1.6 QUALITY ASSURANCE

- .1 Submit two (2) copies of the workshop test reports 4 weeks before the construction steel works are assembled.
 - .1 Workshop test reports must indicate the chemical and physical properties of steel to be used in this work, as well as various other relevant details.
 - .2 These test reports must be certified by competent metallurgists qualified to practice in the province of Quebec.
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PART 2 - PRODUCTS

2.1 BUILDING STEEL

- .1 Equipements and materials
 - .1 Construction steel: CAN/CSA-G40.20/G40.21, nuanced according to the indications to the plans.
 - .2 Anchor bolts: CAN/CSA-G40.20/G40.21, 300W shade
 - .3 Bolts, nuts and washers: ASTM A 325 compliant
 - .4 Welding materials: CSA W48 and CSA W59 compliant and approved by the Canadian Welding Bureau.
 - .5 Primary layer paint applied in the workshop: SSPC SP-2 compliant.
 - .6 Shear studs: according to CSA W59, Appendix H
- .2 Shaping
 - .1 Construction steel components must be shaped in accordance with CAN/CSA-S16 and CAN/CSA-S136 standards and indicates of checked workshop designs.
 - .2 Shear studs must be installed in accordance with CSA W59.
- .3 In-workshop painting
 - .1 Construction steel elements must be cleaned, prepared and coated with a primary coat of paint in the workshop in accordance with CAN/CSA-S16
 - .2 Items must be cleaned and removed from rolling mill slag, rust, oil, dust and other foreign objects. Surfaces must be prepared using the SSPC-SP-2 method.
 - .3 A primary coat of paint should be applied in the workshop on all steel surfaces, with the exception of the following surfaces:
 - .1 Surfaces drowned in concrete;
 - .2 The surfaces to which shear studs will be attached on the site itself;
 - .3 The surfaces and shorelines that need to be welded on the site;
 - .4 The contact surfaces of friction assemblies;
 - .5 Surfaces below ground level that are directly in contact with the ground.
 - .4 Paint should be applied in a sheltered area on dry surfaces when the temperature of ambient air and treated surfaces is above 5 degrees Celsius.
 - .5 Painted elements should be kept dry and at a temperature of at least 5 degrees Celsius until the paint is completely dry.
 - .6 Paint on bolts, nuts, sharp edges and corners must be removed before being dry.

PART 3 – EXECUTION

3.1 BUILDING STEEL

- .1 Generalities
 - .1 Build steel structures in accordance with CAN/CSA-S16 and CAN/CSA-S136 requirements.
 - .2 Perform welding work in accordance with CSA W59.
 - .3 Welding companies must be certified under Division 1 of this estimate or section 2.1 of CSA W47.1 for smelting steel structures, and/or CSA W55.3 for the resistance welding of the frame elements.
- .2 Connection to an existing structure
 - .1 Before starting to shape the elements, check the dimensions and condition of the existing structure, and then notify the Engineer of any dimensional deviations or possible connection problems in order to obtain new guidelines.

- .3 Marking
 - .1 Mark items in accordance with CAN/CSA G40.20/G40.21 requirements. However, it is forbidden to mark them by stamping. In the case of steel elements not intended for painting, the marks must be placed in such a way as not to be visible once the assembly is complete.
 - .2 Inscription of assembly markers: mark the joints and supporting elements in the workshop in order to obtain well-fitting assemblies.
- .4 Mounting
 - .1 Mount the construction steel elements as directed and in accordance with CAN/CSA-S16 and CAN/CSA-S136 standards and the verified assembly designs.
 - .2 The modification or cutting of structural elements on the site must be approved by the Engineer.
 - .3 At the end of the assembly, clean with a mechanical brush and retouch bolts, rivets, welds and surfaces whose primary paint layer applied in the workshop is burned or scraped.
 - .4 Seal seals with continuous welding at the indicated locations. Then grind the welds by grinding.
- .5 On-site quality control
 - .1 The inspection and verification of the equipment, materials and quality of execution of the work will be carried out by the test laboratory designated by the Engineer.
 - .2 Provide safe work areas and access routes for on-site testing, as required by the testing agency and in accordance with the engineer's authorizations.
 - .3 Submit test reports to the Engineer within 2 weeks of the inspection.
 - .4 Submit shear studs to a test in accordance with CSA W59.
- .6 Painting on the job site
 - .1 Unless otherwise indicated, retouch all damaged surfaces and surfaces that have not been painted in the workshop with a primary coat paint compliant with SSPC-SP-6. Apply paint in accordance with CAN/CGSB 85.10 requirements.

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 01 74 19 – Waste Management and Disposal.
- .2 Section 08 80 50 – Glazing.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM A 53/A 53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A 269M-15a, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A 307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

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, pipes, tubing and bolts, and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS
 - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.
- .3 Shop Drawings :
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada and member of the OIQ.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 WELDING COMPANY CERTIFICATION

- .1 Welding companies must be certified under section 2.1 of the CSA W47.1 standard when using the fusion welding method or CSA W55.3 standard when using the resistance welding method. Submit proof of certification from welding companies.

1.5 CALCULATION CRITERIA

- .1 The steps, levels, and railing of metal staircase and all anchoring accessories must be designed to withstand the vertical and horizontal loads, depending on the NBC requirements.
 - .2 The subcontractor must design structural details and elements indicated in the plans to reproduce drawing intent as indicated in drawings. Subcontractor must provide workshop drawings including seal and signature of an engineer, member of the OIQ, to validate the design details.
 - .3 Provide all ribs, welds, hidden screws and plate anchorages required, quantities and dimensions as needed for metal fabrication components as indicated in drawings.
-

1.6 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.
- .3 Meeting prior to installation: hold a meeting in which work requirements, manufacturer installation instructions and guarantee terms will be examined.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials 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 Waste Management and Disposal:
 - .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Package Waste Management: recover packaging waste for reuse and manufacturer reuse of packaging materials such as pallets, crates, boards and other packaging material, in accordance with Section 01 74 19 – WASTE MANAGEMENT AND DISPOSAL.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 350W.
 - .2 Welding materials: to CSA W59.
 - .3 Welding electrodes: to CSA W48 Series.
 - .4 Bolts and anchor bolts: to ASTM A 307.
 - .5 Aluminum sheet: proprietary utility sheet, general use smooth, 1.0 mm minimum thickness, pre-painted shop finish.
 - .6 Stainless steel: to A269, Type 304, exposed surfaces, brushed finish.
 - .7 Stainless steel tubing: to ASTM A 269, Type 304, commercial grade.
 - .8 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.
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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 headed screws on items requiring assembly by screws or as indicated.
- .3 Where possible, fit and shop assemble work, ready for erection.
- .4 Exposed welds continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

- .1 Shop coat primer: MPI in accordance with chemical component limits and restrictions requirements and VOC limits.

2.4 ISOLATION COATING

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

2.5 SHOP PAINTING

- .1 Primer: VOC limit 250 g/L maximum to GS-11.
- .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. Paint when temperature minimum 7 degrees C.
- .4 Powder coated :
 - .1 Allow (4) smooth finished colour and brilliance 17±3 units on 60, colour as selected by DCC Representative.
 - .2 Minimum Characteristics :

.1	Density	1,48 approx.
.2	Hardness (ASTM D3363)	H-2H
.3	Humidity (ASTM D2247)	No blisters
.4	Flexibility (ASTM D522)	3/16"
.5	Adhesion Test (ASTM D3359)	5B
 - .3 The entirety of the work will have to be cleaned, degreased and decontaminated with a cleaner in accordance with SSPC-SP1 and rinse well. Repeat the process as needed, until surface is sound and free from contaminants.
 - .4 All steel works will be subjected to a mechanical cleaning in accordance with SSPC-SP5: eliminate all visible traces of oil, grease, dirt, rolling crust, rust, paint, oxidation, corrosion and other foreign metal deposits. Obtain surface profile of 1 mil (25 µ).
- .5 Clean surfaces to be field welded; do not paint.

2.6 HANDRAILS AND BUMPERS

- .1 Stainless steel handrail, type 304, brushed finish, dimensions as indicated in drawings.
- .2 Stainless steel wall bumpers, type 304, brushed finish, dimensions as indicated in drawings.

2.7 CAB WALL FINISHES

- .1 Stainless steel sheet, type 304, vertically brushed finish, suitable gauge for application or as specified in division 14.

2.8 CAB CEILINGS

- .1 Aluminum sheet, smooth finish, to be shop painted, cut with polished edges (non-cutting), 1.0 mm thickness, glued on fire-rated particleboard.
- .2 Suspensions and mouldings as indicated in drawings.
- .3 Escape hatch, as indicated in division 14.

PART 3 - EXECUTION

3.1 ERECTION - GENERAL

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 Make field connections as indicated in drawings.
- .7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion.
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
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3.3 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 07 56 14 – Protected liquid elastomeric roofing membrane cold application system
- .2 Section 07 62 00 – Sheet Metal Flashing and Trim.
- .3 Section 07 92 00 – Joint Sealants.

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI A208.1-09, Particleboard.
 - .2 ANSI A208.2-09, Medium Density Fibreboard (MDF) for Interior Applications.
 - .3 ANSI/HPVA HP-1-10, American National Standard for Hardwood and Decorative Plywood.
 - .4 ANSI/BHMA A156.16 Auxiliary Hardware.
 - .5 ANSI/ASME 18.6.1 1981 (R2012) Wood Screws (Inch Series).
 - .2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
 - .1 Architectural Woodwork Quality Standards, 2nd edition, 2014.
 - .3 ASTM International
 - .1 ASTM A 153/A 153M-16, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - .2 ASTM E 1333-14 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber.
 - .3 ASTM F 1667-13 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
 - .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-11.3-M87, Hardboard.
 - .5 CSA International
 - .1 CSA O121-08(R2013), Douglas Fir Plywood.
 - .2 CSA O151-09(R2014), Canadian Softwood Plywood.
 - .3 CSA O153-M13, Poplar Plywood.
 - .4 CAN/CSA-Z809-08(R2013), Sustainable Forest Management.
 - .6 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
 - .7 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
 - .8 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
 - .9 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2015-2019 Standard.
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- .10 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S104-10, Standard Method for Fire Tests of Door Assemblies.
 - .2 CAN/ULC-S105-09, Standard Specification for Fire Door Frames.
- .11 Roofing specifications, from the Association des Maîtres Couvresseurs du Québec.

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, data sheets and catalogue pages for specified products. Include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
 - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Shop Drawings:
 - .1 Prepare and submit shop drawings in general accordance with AWMAC AWS manual.
 - .2 Indicate profiles and dimensions, assembly techniques, jointing, methods of fastening, terminations and other related details.
 - .3 Indicate materials, thicknesses, finishes and hardware.
 - .4 Include schedule or key plan.
 - .5 Show profiles, elevations and details at scales recommended by AWMAC AWS.
 - .6 Where necessary, show location and type of blocking and backing required within supporting assemblies.
- .4 Samples:
 - .1 Submit triplicate 300 mm long representative samples of each typical item of finish carpentry.
 - .1 Panel materials: 300 mm x 300 mm.
- .5 Certifications: submit certificates signed by manufacturer certifying materials comply with specified performance characteristics, physical properties and requirements of referenced standards.
- .6 Test and Evaluation Reports: submit certified test reports from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

1.4 QUALITY ASSURANCE

- .1 Wood markings: classification stamp by an organization recognized by the Canadian Lumber Standards Accreditation Board (CLSAB).
- .2 Plywood panel markings: to applicable CSA and ANS regulations.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with AWS recommendations and as follows.
 - .2 Deliver finish carpentry materials only when area of work is enclosed, plaster and concrete work is dry, area is broom clean and site environmental conditions are acceptable for installation.
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- .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 products on site as specified for minimum 72 hours prior to installation.
 - .3 Store and protect finish carpentry products from moisture, nicks, scratches, and blemishes.
 - .4 l'Association des Maîtres Couvresseurs du Québec. l'Association des Maîtres Couvresseurs du Québec. l'Association des Maîtres Couvresseurs du Québec. Replace defective or damaged materials with new.
- .4 Waste Management: for packaging and materials, in accordance with Section 01 74 19 - Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Softwood and hardwood lumber: Sound lumber to specified AWS grade requirements, kiln-dried to moisture content recommended for location of the Work.
 - .1 Machine stress-rated lumber is acceptable for all purposes.
- .2 Douglas fir plywood (DFP): to CSA O121, standard construction.
- .3 Canadian softwood plywood (CSP): to CSA O151, standard construction.
- .4 Hardwood plywood: to ANSI/HPVA HP-1.
- .5 Poplar plywood (PP): to CSA O153, standard construction.
- .6 Exterior type plywood, classification "square edge construction".
- .7 Wood treatment product:
 - .1 Surface applied preservation product: colourless waterproof preservation product, or a 5 % pentachlorophenol solution.
 - .2 The use of pentachlorophenol is limited to wood elements in contact with the ground and which are prone to rotting or to being attacked by insects. If necessary, wood treated with pentachlorophenol should be coated with two coats of a suitable sealant product.
 - .3 Wood construction work treated with pentachlorophenol and with inorganic arsenics, should not be used for food storage, and wood should not come into contact with drinking water.

2.2 INSULATION

- .1 Flexible thermal insulation: mineral fibre for use in parapets, control joints, expansion joints, frames, equipment base or wherever else required in plans, of required thickness to fill in space to be filled.

2.3 FASTENINGS

- .1 Provide screws, bolts, expansion shields and other fastening devices required for satisfactory installation.
 - .2 Nails and staples: to ASTM F 1677, galvanized to ASTM A 153/A 153M for exterior work; plain finish elsewhere.
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2021-01-19

Page 4

- .3 Wood screws: to ANSI/ASME 18.6.1, countersunk flush type unless indicated otherwise, in sizes to suit application, galvanized to ASTM A 153/A 153M for exterior work, interior humid areas.
- .4 In solid masonry or concrete; use expandible pads with lag screws or lead anchors.
- .5 In concrete, use dowels pressed with a nail gun.

2.4 VARIOUS MATERIALS

- .1 Soundproofing for door perimeter; self-adhesive silicone sealant such as s44c x 1/head and 2/jamb, Pemko black colour. Adequately clean all surfaces before installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for wood products installation in accordance with AWS tolerances and requirements of Contract Documents.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Install items of finish carpentry in accordance with AWMAC AWS grade specified for respective items.
- .2 In case of conflict between Contract Documents and AWS grade requirements, Contract Documents govern.
- .3 Install items of finish carpentry at locations shown on drawings.
 - .1 Position accurately, level, plumb straight.
 - .2 Fasten and anchor securely.
- .4 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.
- .5 Form joints to conceal shrinkage.

3.3 CONSTRUCTION

- .1 Fastening:
 - .1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
 - .2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
 - .3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.
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- .4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 74 19 – Waste Management and Disposal.
- .2 Section 05 50 00 – Metal Fabrications.
- .3 Section 08 80 50 – Glazing.
- .4 Section 09 65 19 – Resilient Tile Flooring.
- .5 Division 14.

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI/ASME 18.6.1 1981 (R2012), Wood Screws (Inch Series)
 - .2 ANSI/BHMA A156.18-2012, Materials and Finishes
 - .3 ANSI/BHMA A156.20-2006, Strap and Tee Hinges and Hasps
 - .4 ANSI A208.1-09, Particleboard
 - .5 ANSI A208.2-09, Medium Density Fibreboard (MDF) for Interior Applications.
 - .6 ANSI/HPVA HP-1-10, Standard for Hardwood and Decorative Plywood
 - .2 Architectural Woodwork Manufacturers Association of Canada (AWMAC)
 - .1 Architectural Woodwork Standards (AWMAC AWS), 2014.
 - .3 ASTM International
 - .1 ASTM A 153/A 153M-16, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - .2 ASTM E 1333-14, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.
 - .3 ASTM F 1667-13 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
 - .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-11.3-M87, Hardboard.
 - .2 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
 - .3 CAN/CGSB-71.19-M88, Adhesive, Contact, Sprayable.
 - .5 CSA International
 - .1 CSA O112-M Series 1977 (R2006) Standards for Wood Adhesives.
 - .2 CSA O121-08(R2013), Douglas Fir Plywood.
 - .3 CSA O141-05 (R2014), Softwood Lumber.
 - .4 CSA O151-14, Canadian Softwood Plywood.
 - .5 CSA O153-M1980 (R2014), Poplar Plywood.
 - .6 CAN/CSA-Z809-08(R2013), Sustainable Forest Management.
 - .6 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
 - .7 Green Seal Environmental Standards (GS)
 - .1 GS-11-2015, Paints, Coatings, Stains and Sealers.
 - .2 GS-36-2013, Adhesives for Commercial Use.
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- .8 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .9 National Electrical Manufacturers Association (NEMA)
 - .1 ANSI/NEMA LD-3-05, High-Pressure Decorative Laminates (HPDL).
- .10 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-A2011, Architectural Coatings.
 - .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
- .11 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2015-2019 Standard and Rules.

1.3 PRE-INSTALLATION MEETING

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

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Product Data:
 - .1 Prepare and submit material list in accordance with AWMAC AWS, cross-referenced to specifications.
 - .2 Include manufacturer's instructions, printed product literature, data sheets and catalogue pages for all materials and products to be incorporated into architectural wood casework and include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
 - .3 Submit two (2) copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
 - .3 Hardware List:
 - .1 Submit hardware list cross-referenced to specifications.
 - .2 Include manufacturer's specification sheets indicating name, model, material, function, finish, BHMA designations and other pertinent information.
 - .4 Shop Drawings:
 - .1 Prepare and submit shop drawings in accordance with AWMAC AWS and as follows.
 - .2 Submit two sets of shop drawings for initial review in accordance with requirements of Division 01. Revise as directed, submit two (2) copies for final acceptance and distribution.
 - .3 Indicate details of construction, profiles, jointing, fastening and other related details.
 - .1 Scales: profiles full size, details half full size.
 - .4 Indicate materials, thicknesses, finishes and hardware.
 - .5 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.
 - .6 Show location on casework elevations of backing required in supporting structure for attachment of casework.
 - .7 Indicate AWMAC AWS quality grade where different from predominant grade specified.
 - .8 Include color schedule of all casework items, including all countertop, exposed, and semi-exposed cabinet finishes, finish material manufacturer, pattern, and color.
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- .5 Samples:
 - .1 Prepare and submit samples in accordance with AWMAC AWS and as follows.
 - .2 Apply sample finishes to specified substrate or core material minimum 300 x 300 mm to match designer sample. For veneers with transparent finish submit three samples to illustrate range and colour of grain expected.
 - .3 Shop applied coatings:
 - .1 For transparent finish, submit duplicate samples of each species and cut of wood to be used, finished to match project sample as specified.
 - .2 For opaque finish, submit triplicate samples for each colour selection, finished to match project sample as specified.
 - .4 Submit duplicate samples of laminated plastic for each specified colour selection.
 - .5 Submit duplicate samples of laminated plastic joints, edging, cutouts and post-formed profiles.
 - .6 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .7 Submit statement of experience and qualifications of architectural wood casework fabricator.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- .1 Submit manufacturer's Chain-of-Custody Certificate number for CAN/CSA-Z809 or FSC or SFI certified wood.
 - .1 Submit manufacturer's FSC Chain-of-Custody Certificate number.
- .2 Submit ASTM E 1333 test report for formaldehyde emissions from composite wood products showing compliance with specified limits.
- .3 Submit product data indicating compliance with other specified sustainable design characteristics.

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 Deliver wood casework only when area of work is enclosed, plaster and concrete work is dry, and area is broom clean and site environmental conditions are acceptable for installation.
- .3 Protect millwork against dampness and damage during and after delivery.
- .4 Store millwork in ventilated areas, protected from extreme changes of temperature and humidity, and within range recommended by AWMAC AWS for location of project.
- .5 Store materials indoors, in dry location in clean, dry, well-ventilated area.
- .6 Protect architectural woodwork and hardware from nicks, scratches, and blemishes.
- .7 Replace defective or damaged materials with new.
- .8 Waste Management and Disposal:
 - .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Package Waste Management: recover packaging waste for reuse and manufacturer reuse of packaging materials such as pallets, crates, boards and other packaging material, in accordance with Section 01 74 19 – WASTE MANAGEMENT AND DISPOSAL.

1.7 WARRANTIES

- .1 Provide a written warranty against warping, delaminating or shifting for a period of two (2) years from the date of Substantial Performance of Work.

1.8 BRACING AND TOUCH-UPS

- .1 All required non identified fasteners and bracing must be added to ensure the solidity of the whole.
- .2 All required touch-ups to conceal joints and corrections shall be executed simultaneously, as well as for joints around electrical or mechanical equipment.

1.9 COORDINATION

- .1 Coordinate all bracing position (nailing backers) required for work execution.
- .2 Before fabricating the project millwork, coordinate equipment and mechanical and electrical outlet, gas and other, wherever dimensions may influence the millwork. This information must be indicated on the shop drawings.

PART 2 - PRODUCTS**2.1 QUALITY GRADE**

- .1 Provide all materials and perform all fabrication in accordance with AWMAC AWS Custom Grade and as follows, except where specified otherwise:
 - .1 Premium Grade.
- .2 In case of conflict between Contract Documents and AWMAC AWS grade requirements, Contract Documents govern.

2.2 LUMBER

- .1 Softwood and Hardwood Lumber: Sound lumber to specified AWMAC AWS quality grade requirements, kiln-dried to moisture content recommended by AWMAC AWS for location of the Work.
- .2 Machine stress-rated lumber is acceptable for all purposes.

2.3 PANEL MATERIALS

- .1 Interior mat-formed wood particleboard: to ANSI/NPA A208.1, industrial grade M-2 or M-3, medium density (640-800 kg/m³), thickness 19 mm unless indicated otherwise.

2.4 SOLID SURFACE

- .1 Solid acrylic surface, non-porous and uniform, composed of polymethyle methacrylate acrylic resin and natural minerals.
 - .1 Acceptable product: solid surface Avonite type.
 - .2 Colour: metallic black, such as Starshine #7820
 - .3 Thickness: 12 mm
 - .4 Flame spread index = 0, smoke emission index = 0
 - .5 Follow manufacturer's recommendations for handling and installation.

2.5 ACCESSORIES

- .1 Primer for porous substrate, type recommended by glazing manufacturer.
- .2 Silicone based adhesive, type recommended by glazing manufacturer, provided in Section 08 80 50 – Glazing.
- .3 Double-sided adhesive tape, type recommended by glazing manufacturer, provided in Section 08 80 50 – Glazing.
- .4 Stainless steel moulding, type 304, brushed finish, suitable dimensions.
- .5 Z fasteners for interior wall mounting, aluminum 6063-T6, 38 mm in length x 5 mm superposition projection of 2 Z's, 79 mm in total height.
- .6 Wood screws: stainless steel, type and size suitable to application.
- .7 Clous et cavaliers : to CSA B111 and ASTM F 1667.
- .8 Sealant: in accordance with Section 07 92 00 - Joint Sealants.

2.6 SHOP APPLIED FINISH COATINGS

- .1 Finish system: AWMAC AWS system.
- .2 Apply finish system component materials in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

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

- .1 Cut wood panels to the size of glass.
 - .2 Ensure that the glass panel lacquer is not scratched before bonding on substrate. Ensure that the glass and lacquer are adequately fused before sticking it onto the substrate.
 - .3 Clean and dry glazing and wood panels before sticking. Prepare wooden panels.
 - .4 Adhere glass panels to wood panels using adhesive and duct tape as recommended by the glass manufacturer.
 - .5 Placement, in glass holes for handrail and bumper, provide adhesive tape.
 - .6 Allow sufficient time to dry flat, but not less than 48 hours.
-

- .7 Trim and paste stainless steel mouldings. Install at required locations and in locations specified in drawings.

3.3 INSTALLATION

- .1 Install Z anchors at the back of wood panels and on elevator cab walls.
- .2 Install prefinished panels on elevator cab walls.
- .3 Fasten and anchor millwork securely.
- .4 Fit hardware accurately and securely in accordance with manufacturer's written instructions.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove excess glue, pencil and ink marks from surfaces.

3.5 PROTECTION

- .1 Protect all work from damage until final inspection.
- .2 Protect installed products and components from damage during construction.
- .3 Repair damage to adjacent materials caused by architectural woodwork installation.
- .4 Leave work to be site finished ready for finishing by Section 09 91 99 – Painting for Minor Works.

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 06 20 00 – Finish carpentry.
- .2 Section 07 62 00 – Metal flashing and trim.
- .3 Section 07 92 00 – Joint sealants.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM C 1177/C 1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - .2 ASTM C 1396/C 1396M-11, Standard Specification for Gypsum Wallboard.
 - .3 ASTM D 2178-04, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.5-M89, Cutback asphalt plastic cement.
 - .2 CGSB 37-GP-9Ma-83, Primer asphalt, unfilled for asphalt roofing, dampproofing and waterproofing.
 - .3 CAN/CGSB-37.29-M89, Rubber-Asphalt sealing compound.
 - .4 CAN/CGSB-51.34-FM86 (C1988), Vapour barrier, polyethylene sheet for use in building construction.
- .3 CSA International
 - .1 CSA A231.1/A231.2-FM06(R2010), Precast concrete paving slabs/precast concrete pavers.
 - .2 CSA O121-F2008, Douglas fir plywood.
 - .3 CSA O151-F09, Canadian softwood plywood.
- .4 Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .5 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .2 CAN/ULC-S706-09, Standard for Wood Fibre Insulating Boards for Buildings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Fiches techniques
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for liquid applied elastomeric roofing membrane for protected and include product characteristics, performance criteria, physical size, finish and limitations.
-

- .3 Product Data:
 - .1 The submitted shop drawings must bear the seal and signature of a competent engineer recognized or authorized to practice in the province of Quebec, Canada.
 - .2 Indicate the following on the drawings:
 - .1 Flashing.
 - .2 Roof penetrations.
 - .3 Junctions executed on site.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect dampproofing materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Waste Management and Disposal:
 - .1 Waste Management and Disposal
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

1.5 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Cold applied rubberized bitumen membranes must be installed only when ambient and surface temperatures are within limits prescribed by manufacturer.
 - .2 It is forbidden to install the cold applied rubberized bitumen membrane when the air temperature and the substrate temperature are below 5 degrees Celsius, or when the wind produces an equivalent cooling effect.
 - .3 The substrate must be dry, free from snow and ice. Use only dry materials, and apply them only when atmospheric conditions will not cause moisture infiltration into the waterproofing layers.
- .2 Safety: comply with the requirements of Workplace Hazardous Materials Information System (WHMIS) for handling, storage and disposal of rubberized bitumen, sealants, layers base and caulking.

1.6 WARRANTY

- .1 The existing roof was completely repaired in November 2014. The roofer's 5-year warranty (Entreprises J. Veilleux et fils inc.) has expired. The 20 year warranty from the membrane manufacturer, Tremco, is active until November 2034 and must be maintained
 - .2 For the work covered by this section 07 56 14 – Protected Liquide Elastomeric Roofing Membrane cold application system, the warranty period of 12 months is extended to 24 months.
-

PART 2 - PRODUCTS**2.1 MATERIAL COMPATIBILITY**

- .1 It is essential that system components and adjoining materials are compatible with each other. Provide the Departmental Representative with a written declaration certifying that the materials and components of the system are compatible with existing materials.
- .2 In order to maintain the manufacturer's warranty for existing materials, only Tremco products will be accepted.

2.2 BASE MEMBRANE SHEET

- .1 Roofing membrane for protected membrane roofing system, one component modified polyurethane bitumen membrane, for cold trowel application to vertical surfaces, conforming to ASTM C 836-89, having the following characteristics:
 - .1 Elongation at break (ASTM D412-92) : 700 % on vertical surfaces.
 - .2 Traction resistance (ASTM D 412-92) : 17,5 kg/cm² on vertical surfaces.
 - .3 Hardness (shore 00) (ASTM D2240-86) 85 à 90 % for vertical surfaces.
 - .4 Water vapor transmission (ASTM E96-80) 0,26 metric perms for vertical surfaces.

2.3 MEMBRANE FLASHING

- .1 Membrane flashing composed of a mixture of EPDM and SBR polymer reinforced with a polyester woven fabric, for cold adhesion to the base layer, having the following characteristics:
 - .1 Polymer ratio : 30 EPDM parts for 70 SBR parts.
 - .2 Thickness (ASTM D-751) : 1.14 + 1,12 mm.
 - .3 Hardness (shore A) : 65 to 75.
 - .4 Breaking Strenght (ONCG 37-GP-52M) : MD 1446N (500 N min).
 - .5 Tear Resistance (ONCG 37-GP-52M) : MD 313 N (35 N min.).
 - .6 Resistance to Dynamic Shocks (ONGC-37-GP-52M) : at 23°C : pass (cote 3), at -10°C : pass (cote 3).

2.4 REINFORCEMENT FOR JOINTS

- .1 Vinyl coated woven glass mesh membrane having the following characteristics.
 - .1 Size : en rouleaux.
 - .2 Colour : green.
 - .3 Width: 152 or 305 mm.
 - .4 Tear Resistance at 21,1°C : W 140 lb/po.
- .2 Adhesive for glass mesh membrane, one-component elastomeric sealant solvent free, having the following characteristics:
 - .1 Traction resistance @ 25°C (ASTM D412-87) : 207 to 345 kPa.
 - .2 Elongation at 25°C (ASTM D412-87) : 1 000 %.

2.5 SEPARATION SHEET

- .1 Glass felt impregnated with bitumen: in accordance with ASTM D 2178, type IV.
 - .2 Polyethylene film: in accordance with CAN / CGSB-51.34, type 1, 0.125 mm thick.
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2.6 POLYSTYRENE INSULATION

- .1 Existing polystyrene insulation.

2.7 FASTENERS

- .1 Fastening of the membrane to a steel support: flat head tapping screws, cadmium, number 10, type A or, AB.

2.8 FILTER CLOTH

- .1 Existing filter cloth.

2.9 BALLAST

- .1 Existing ballast.

2.10 PREFABRICATED EQUIPMENT BASE

- .1 Prefabricated and insulated equipment base, tubular steel insulated with polyurethane with anchor plate, sleeve 356 mm high x 89 mm outside diameter and anchor plate 305 x 305 x 10 mm, complete with " a steel angle for mounting brackets 50 x 50 x 6 mm, aluminum sealing sleeve 1.6 mm thick.
- .2 Plastic cement recommended by the manufacturer.

2.11 PRECAST MASTIC BLOCKS

- .1 System composed of precast borders and pourable sealant made of moisture-hardening polyester resin. Hot chimney system.
- .2 Primer recommended by the manufacturer.
- .3 Sealant and structural adhesive recommended by manufacturer.

PART 3 - EXECUTION**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for protected liquid elastomeric roofing membrane cold application system 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 EXAMINATION OF ROOF DECKS

- .1 Examine the roof deck and inform the Departmental Representative of any defect, without delay and in writing.
 - .2 Before starting work, check the following items :
-

- .1 The deck is solid, level, smooth, dry and free of snow, ice and frost, and any other contaminant; remove dust and debris with a broom.
- .2 The border walls have already been built.
- .3 The drains have been installed at the appropriate level in relation to that of the finished work.
- .4 The sleeves, vents, pipes and other penetrations of the support intended to receive the work prescribed in this section are correctly and securely installed.
- .5 The nailing plywood or lumber plates have been installed on walls and parapets as indicated.

3.3 PREPARATION – PROTECTION MEASURES

- .1 Cover walls, walks, slopped roofs and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of Work.
- .3 Clean off drips and smears of bituminous material immediately.
- .4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.
- .5 Metal flashing around vents and pipes of mechanical installations: provide a standard elastomeric reinforcing sheet, and install it around the vents and membrane penetrations. Position the sheet and seal it with rubberized bitumen and a clamping collar. For substrate penetrations, use prefabricated metal sleeves.
- .6 Tar sleeves: place the tar sleeves over the membrane. Glue a standard elastomeric reinforcement sheet into the membrane and cover the sleeve flange. Fill the sleeve with rubberized bitumen or plastic mastic, so that water can evacuate.

3.4 INSTALLATION OF THE PREFABRICATED SUPPORT ROOF SLEEVES

- .1 Install prefabricated supports according to manufacturer's written instructions and shop drawings.
- .2 Fasten the sleeve securely to the deck. Use appropriate fasteners. Use a mortar to cover the anchors and smooth out the surface.
- .3 Apply rubberized bitumen membrane and reinforcement. Treat the membrane seal. Apply a sealant joint.
- .4 Install the weatherproofing sleeve using plastic cement
- .5 Apply a rubberized bitumen membrane and reinforcement to the base of the sleeve. Apply a sealant joint.

3.5 MEMBRANE

- .1 Apply the rubberized bitumen in cold application and install the flashings and the reinforcing fabric, in accordance with the CAN / CGSB-37.51 standard and the manufacturer's recommendations.
 - .2 Maintain air barrier continuity of building envelope.
 - .3 Treat joints according to manufacturer's recommendations.
-

3.6 INSULATION INSTALLATION

- .1 Lay and adjust the insulation panels.

3.7 FILTER CLOTH INSTALLATION

- .1 Poser Install a continuous layer of filter cloth, without adhesion, on the insulation; overlap the joints by at least 300 mm..
- .2 Cut the filter cloth around the equipment bases; raise the filter cloth against the vertical wall of the crossings, and cover it with a flashing.

3.8 BALLAST ET AND PROTECTION FACING

- .1 Distribute the stone ballast as soon as possible after the installation of the filter cloth, at a rate of at least 75 kg / m².
- .2 Place stone ballast so as to obtain a layer of uniform thickness over the entire surface. Encroach the stone by at least 100 mm over the base of the metal flashings.
- .3 If necessary, spread more stone on the perimeter of the surface, over a minimum width of 1200 mm, in order to bring the ballast density to 125 kg / m².

3.9 PROTECTION OF FINISHED WORKS

- .1 Before installing the protection panels, make sure that the waterproofing membrane is not damaged.

3.10 CLEANING

- .1 Cleaning during work: carry out cleaning work in accordance with section 01 74 00 - Cleaning.
 - .1 Leave the premises clean at the end of each working day.
- .2 Final cleaning: remove surplus materials and equipment, waste, tools and equipment from site, in accordance with section 01 74 00 - Cleaning.
- .3 Check that the drains are free and that they are functioning correctly. Clear the site of surplus materials, debris and equipment.
- .4 Waste management: sort waste for reuse / reuse and recycling, in accordance with section 01 74 19 - WASTE MANAGEMENT AND DISPOSAL.
 - .1 Remove recycling bins and skips from site and dispose of materials at appropriate facilities..

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 01 74 19 – Waste Management and Disposal.
- .2 Section 06 20 00 – Finish Carpentry.
- .3 Section 07 56 14 – Protected Liquid Elastomeric Roofing Membrane Cold Application System.
- .4 Section 07 92 00 – Joint Sealants.

1.2 REFERENCE STANDARDS

- .1 The Aluminum Association Inc. (AAI)
 - .1 AA Aluminum Design Manual 2015 Part VIII Guidelines for Aluminum Sheet Metal Work in Building Construction.
 - .2 AAI DAF45-2003(R2009), Designation System for Aluminum Finishes.
 - .2 American Architectural Manufacturers Association (AAMA)
 - .1 AAMA 611-14 Voluntary Specifications for Anodized Architectural Aluminum.
 - .2 AAMA 621-02 Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Substrates.
 - .3 AAMA 2603-15, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
 - .4 AAMA 2604-13 Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
 - .5 AAMA 2605-13 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
 - .3 American National Standards Institute (ANSI)
 - .1 ANSI/SPRI/FM 4435/ES-1, Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems 2011.
 - .4 ASTM International
 - .1 ASTM A 240/A 240M-16, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - .2 ASTM A 606/A 606M-15, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
 - .3 ASTM A 653/A 653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .4 ASTM A 755/A 755M-16e1 Standard Specification for Steel Sheet, Metallic coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - .5 ASTM A 792/A 792M-10(2015), Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .6 ASTM B 32-08(2014), Standard Specification for Solder Metal.
 - .7 ASTM B 209-14 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - .8 ASTM D 523-14, Standard Test Method for Specular Gloss.
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- .9 ASTM D 1970/D 1970M-15a Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
- .10 ASTM D 4587-11 Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings.
- .11 ASTM F 1667-15 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
- .5 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .6 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual 2012.
- .7 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI S8-2008 Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.
 - .2 CSSBI B17-2002 Barrier Series Prefinished Steel Sheet: Product Performance & Applications.
 - .3 CSSBI Sheet Steel Facts #12 2003 Fastener Guide for Sheet Steel Building Products.
- .8 CSA Group
 - .1 CSA A123.3-05(2015), Asphalt Saturated Organic Roofing Felt.
 - .2 CSA A123.22-08(2013) Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
- .9 FM Global
 - .1 Property Loss Prevention Data Sheets 1-49 Perimeter Flashing.
- .10 Green Seal Environmental Standards
 - .1 Standard GS-11-2015, Paints, Coatings, Stains, and Sealers.
 - .2 Standard GS-36-2013, Adhesives for Commercial Use.
- .11 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .12 Sheet Metal and Air Conditioning Contractors Association of North America (SMACNA)
 - .1 Architectural Sheet Metal Manual (2012)
 - .2 Residential Sheet Metal Guidelines (2001)

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 including product specifications and technical data sheets for sheet metal flashing fasteners and accessory materials. Include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two (2) copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements.
 - .3 Shop Drawings:
 - .1 Submit shop drawings [for all sheet metal fabrications.
 - .2 Indicate sheet thickness, flashing dimensions and fastenings. Include anchorage, expansion joints and other provisions for thermal movement.
 - .3 Submit manufacturer's catalogue cut sheets for manufactured items.
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- .4 Samples:
 - .1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colour.

1.4 PRE-INSTALLATION MEETING

- .1 Include sheet metal flashing and trim on agenda of pre-installation meetings of affected sections.

1.5 MOCK-UPS

- .1 Include flashings in mock-ups as specified for work of other affected sections.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Handle and store flashing materials to prevent creasing, buckling, scratching, or other damage.
- .3 Waste Management and Disposal:
 - .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Package Waste Management: recover packaging waste for reuse and manufacturer reuse of packaging materials such as pallets, crates, boards and other packaging material, in accordance with Section 01 74 19 – WASTE MANAGEMENT AND DISPOSAL.

1.7 WARRANTY

- .1 Roofing contractor will issue a written warranty in the owner's name against all labour and material defects for a period of one (1) year from the date of Substantial Completion of work.
- .2 Provide a written manufacturer warranty on prepainted galvanized steel flashings against any defects to the factory applied exterior finish during the warranty period, from the date of Substantial Completion of installation work, against any cracking, flaking or peeling (loss of adhesion). The product is guaranteed for vertical and non-vertical applications, for degree of discoloration and surface chalk-in, and shall be compliant to efficiency criteria. The warranty period specified in general conditions is prolonged by sixty (60) months.

PART 2 - PRODUCTS

2.1 BASE SHEET METAL MATERIALS

- .1 Provide sheet metal in base metal thickness specified. Where no thickness specified, provide base sheet metal in thickness recommended in SMACNA Architectural Sheet Metal Manual for type of item being fabricated, but not less than the thickness required by the authority having jurisdiction.
 - .2 Zinc coated steel sheet: 24-gauge (0.604 mm thickness, base) for flashings and 20-gauge (0.911 mm thickness, base) for cap flashings, or as indicated in drawings, commercial quality, to ASTM A 653/A 653M, with Z275 designation zinc coating, indicated as galvanized steel in drawings.
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2.2 PREFINISHED STEEL SHEET

- .1 Prefinished steel sheet with coating system consisting of base metal pre-treatment, primer, with two (2) silicone modified polyester or polyester topcoats, total sheet thickness 0.9 to 1.1 mils.
 - .1 Category F1S.
 - .2 Colour selected by Architect from standard colours offered by manufacturer. Provide 1 colour for the project.

2.3 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Pourable sealer: proprietary two-part polyurethane pourable sealer designed for sealing penetration pockets.
- .3 Loose laid underlay for metal flashing: dry sheathing to CAN/CGSB-51.32.
- .4 Self-adhesive membrane underlay and tie-in membrane for metal flashings: To CSA A123.22 or ASTM D 1970.
- .5 Sealants: in accordance with Section 07 92 00, in colour to match flashing finish colour.
- .6 Cleats and hook strips: of same material, and temper as sheet metal, minimum 50 mm wide
- .7 Nails: of same material as sheet metal, [ring thread] flat head roofing nails of length and thickness suitable for application.
- .8 Screws: of same material as sheet metal, suitable for substrate and material being fastened.
- .9 Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered.
- .10 Touch-up paint: as recommended by prefinished material manufacturer.

2.4 FABRICATION

- .1 Fabricate sheet steel flashings and other sheet steel work as indicated in drawings.
- .2 Form pieces in 2400 mm maximum lengths.
 - .1 Make allowance for expansion at joints.
- .3 Hem exposed edges on underside 12 mm.
 - .1 Mitre and seal corners with sealant.
- .4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 METAL FLASHINGS

- .1 Form flashings, cap flashings, copings and fascias to profiles indicated in drawings, with prepainted galvanized steel sheets.
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2.6 REGLETS AND CAP FLASHINGS

- .1 Form recessed reglets (concealed fasteners) destined to receive flashing. The metal cap flashings of sheet metal to be built-in concrete work for base flashings in accordance to drawing details.
 - .1 Provide slotted fixing holes and steel/plastic washer fasteners.
 - .2 Cover face and ends with plastic tape.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install sheet metal work in accordance with CRCA FL series details and the AMCQ's indications.
- .2 Use concealed fastenings except where approved by Departmental Representative before installation, that they may be left exposed.
- .3 Provide underlay under sheet metal.
 - .1 Secure in place and lap joints 100 mm.
 - .2 Provide self-adhesive membrane to tie into adjacent assemblies.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
 - .1 Flash joints using standing seams forming tight fit over hook strips, as indicated.
- .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 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 with sealant.
- .10 Install pans, where shown around items projecting through roof membrane.
- .11 Where flashing installed with mechanical fasteners, install fasteners in slots or oversize holes to allow expansion and contraction of flashings.
- .12 Provide isolation coating or impervious self-adhesive membrane to separate aluminum items from concrete and masonry.

3.3 CLEANING

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

- .3 Leave work areas clean, free from grease, finger marks and stains.
- .4 Waste Management and Disposal:
 - .1 Sort waste for re-use and/or recycling in accordance with Section 01 74 19 – Waste Management and Disposal (CRD)

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 01 74 19 – Waste Management and Disposal.

1.2 REFERENCE STANDARDS

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .2 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN-ULC-S101-04, Standard Methods of fire Endurance Tests of Building Construction and Materials.
 - .2 CAN-ULC-S102-03, Method of Test for Surface Burning Characteristics of Building Materials and 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 product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.
- .3 Samples: submit duplicate 300 x 300 mm size sample of exposed fireproofing for approval of texture and colour.
- .4 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Test Reports:
 - .1 Submit product data including certified copies of test reports verifying fireproofing applied to substrate as constructed on project will meet or exceed requirements of Specification.
 - .2 Submit test results in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
 - .3 For assemblies not tested and rated, submit proposals based on related designs using accepted fireproofing design criteria.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and surface preparation.
 - .4 Manufacturer's Field Reports: submit to manufacturer's written reports within [3] days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company specializing in sprayed-on fireproofing.
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- .2 Site Meetings:
 - .1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations, with contractor's representative and Departmental Representative accordance with Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Charts to:
 - .1 Verify Project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review [manufacturer's] installation instructions and warranty requirements.
 - .2 Prior to start of Work arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work.
 - .3 Hold project meetings every week.
 - .4 Ensure key personnel, site supervisor and project manager attend.
 - .5 Departmental Representative will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.
- .3 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
 - .1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.
 - .2 Upon completion of Work, after cleaning is carried out.

1.5 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 Deliver packaged materials in original unopened containers, marked to indicate brand name, manufacturer and ULC markings.
- .2 Storage and Protection:
 - .1 Store materials indoors, in dry location.
 - .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
 - .3 Damaged or opened containers will be rejected.
 - .4 Packaging to indicate shelf-life and materials to be applied prior to expiration of shelf-life.
 - .5 Provide temporary enclosures to prevent spray from contaminating air beyond application area.
 - .6 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of fireproofing materials.
- .3 Waste Management and Disposal:
 - .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Package Waste Management: recover packaging waste for reuse and manufacturer reuse of packaging materials such as pallets, crates, boards and other packaging material, in accordance with Section 01 74 19 – WASTE MANAGEMENT AND DISPOSAL.

1.6 AMBIENT CONDITIONS

- .1 At temperatures less than 5 degrees C, ensure that 5 degrees C air and substrate temperature is maintained during and for 24 hours after application. Ensure that natural ventilation to properly dry the fireproofing during and subsequent to its application is provided. In enclosed areas lacking openings for natural ventilation, ensure that interior air is circulated and exhausted to the outside.
- .2 Maintain relative humidity within limits recommended fireproofing manufacturer.
- .3 Ensure that natural ventilation to properly dry fireproofing during and subsequent to its application is provided.
- .4 If application is executed in enclosed areas lacking openings for natural ventilation, ensure that interior air is circulated and exhausted to the outside. Provide at least four (4) air renewals per hour by forced-air circulation.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Sprayed fireproofing: ULC certified plaste and/or Portland cement based, ULC markings, qualified for use in ULC Designs specified and fungus resistant for 28 days.
- .2 Primers: type recommended by fireproofing manufacturer and approved for use of specified ULC models.
- .3 Curing compound: type recommended by fireproofing manufacturer, qualified for use in ULC Designs specified.
- .4 Sealer: type recommended by fireproofing manufacturer, qualified for use in ULC Design specified.
 - .1 Colour: green.
- .5 Fireproofing: minimum dry density and cohesion/adhesion properties as follows:
 - .1 Fireproofing for concealed structural components above ceiling or inside walls, openings or between furrings: minimum applied dry density of 240 kg per cubic meter and cohesion/adhesion strength of 9.57 kPa.
 - .2 Fireproofing for exposed structural components unless otherwise specified: minimum applied dry density of 350 kg per cubic meter and cohesion/adhesion strength of 20.83 kPa.
 - .3 Fireproofing for structural components located in mechanical rooms and storage rooms: minimum applied dry density of 640 kg per cubic meter and cohesion/adhesion strength of 350 kPa.
 - .4 Ensure spray-applied fireproofing: does not crack, spall or delaminate under downward deflection conditions over 3 m clear span.
 - .5 Spray-Applied fireproofing material: not contribute to corrosion of test panels.
 - .6 Dust removal: not exceed 0.0025 gram per square meter.
- .6 Portland cement-based fireproofing (minimum 65 % per density), sprayable and with ULC label, approved for use as specified, formulated without commercial asbestos or mineral fiber, with a minimum average dry density of 350 kg/m³ (22 lb/pi³).

- .7 The fireproofing will have to meet requirements indicated in drawings, technical specifications and the following performance test criteria:
 - .1 The fireproofing must have a mould inhibitor. Tested in accordance with ASTM G21, the fireproofing will demonstrate resistance to mould spread for a period of 21 days for general use and 60 days for materials installed in plenums.
 - .2 Fireproofing will have the following surface combustion characteristics, in accordance with ASTM E84 :
 - .1 Flame spread : 10
 - .2 Smoke developed : 0
 - .3 Water: Water used for mixing shall be clean, fresh, potable and exempt of mineral salts or other organic substances in quantities that will not affect fireproofing application.
 - .4 Primers: in accordance to manufacturer recommendations.
 - .5 Equipment: Spraying equipment must comply to manufacturer requirements and 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.
- .2 Following demolition and construction work, repair existing fireproof cladding at the deck level by applying new fireproof cladding to ensure a new total ULC index of 2 h for existing concrete floor. Take note that existing floor offers a 1.5 h ULC index only.

3.2 PREPARATION

- .1 Substrate: free of material, which would impair bond.
 - .2 Verify that painted substrates are compatible and have suitable bonding characteristics to receive fireproofing.
 - .3 Remove incompatible materials.
 - .4 Ensure that items required to penetrate fireproofing are placed before installation of fireproofing.
 - .5 Ensure that ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is completed.
 - .6 Verify if completed work is able to receive described works in this Section. Report any anomaly or non-concordance. Do not undertake work until corrections have been made.
 - .7 Application of the fireproofing will not begin until General Contractor and fireproofing applicator have examined surfaces to determine if they are suitable for receiving fireproofing.
 - .8 Confirm compatibility of substrates with fireproofing.
 - .9 In special conditions, follow manufacturer's recommendations.
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2021-01-19

Page 5

- .10 Provide covers for work, tarps/sheeting and other satisfactory protections to protect surfaces from applied fireproofing.
- .11 Adequately protect the top of elevator cab, rails and components before applying fireproofing.

3.3 APPLICATION

- .1 Apply bonding adhesive or primer to substrate if recommended by manufacturer.
- .2 Apply fireproofing to correspond with tested assemblies, or acceptable calculation procedures to provide following fire resistance ratings.
- .3 Apply fireproofing over substrate, building up to required thickness to cover substrate with monolithic blanket of uniform density and texture.
- .4 Tamp smooth, surfaces visible in finished work.
- .5 Apply curing compound to surface of cementitious fireproofing as required by manufacturer.
- .6 Apply sealer to surface of mineral fibre fireproofing as required by manufacturer where fireproofing is to be painted and as indicated.
- .7 Keep fireproofing product in a dry location until time of use. Cover and elevate from ground all bags containing material and removed from moist surfaces. Throw any bag that has been exposed to water. Use material before expiry date.
- .8 Applied Fireproofing must be done in accordance with manufacturer's instructions.
- .9 Apply fireproofing on surface, in as many successive layers or steps to achieve a monolithic layer of required thickness and desired uniform texture, with a minimum average dry density of 350 kg/m³ (22 lb/pi³).
- .10 Never deviate from applicable fire rating description.
- .11 Work within temperature, moisture and other special condition limits specified by manufacturer.
- .12 Maintain substrate and ambient air temperature of at least 4.5°C, preceding, during and following fireproof application. If necessary, General Contractor will heat work area to maintain specified temperatures.

3.4 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.
- .2 Inspection and Site Tests:
 - .1 Inspection and testing of fireproofing will be carried out by Testing Laboratory designated by Departmental Representative.

3.5 PATCHING

- .1 Patch damage to fireproofing caused by testing or by other trades before fireproofing is concealed, or if exposed, before final inspection.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 00 – Cleaning.
- .2 Final Cleaning : upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Waste Management : separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management and Recycling and 01 35 21 – LEED Requirements.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 01 74 19 – Waste Management and Disposal.
- .2 Section 09 21 99 – Partitions for Minor Works.

1.2 REFERENCE STANDARDS

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .2 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).
- .3 Underwriter's Laboratories of Canada (ULC)
 - .1 ULC-S115-1995, Fire Tests of Fire stop Systems.

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 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 two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials
 - .3 Respond to requirements and specifications of Section 01 35 35 - DND Fire Safety Requirements, articles 1.19, 1.20 and 1.21.
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- .3 Shop Drawings:
 - .1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.
 - .2 Construction details should accurately reflect actual job conditions.
- .4 Samples:
 - .1 Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.

1.5 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company specializing in fire stopping installations.
- .2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.6 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 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name and ULC markings.
- .2 Storage and Protection:
 - .1 Store materials indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .3 Waste Management and Disposal:
 - .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Package Waste Management: recover packaging waste for reuse and manufacturer reuse of packaging materials such as pallets, crates, boards and other packaging material, in accordance with Section 01 74 19 – WASTE MANAGEMENT AND DISPOSAL.

1.7 WARRANTY

- .1 Provide a written warranty, in the name of the Owner, certifying that the Work specified in this Section are exempt of all material and execution defects, in particular against waterproofing losses, cracking, crumbling, loss of consistency, contraction, loss of adhesion and tarnishing of adjacent surfaces, for a period of five (5) years from the date of Provisional Acceptance.
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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 Fire stop system rating: as specified in PART 3
 - .3 Fire stopping/smoke retardant gasket.
 - .4 Flexible firestop acrylic sealant, sealing rigid or low-movement/wall, for fire-rated joints, paintable, such as CP-606 by HILTI or approved equivalent by Departmental Representative. Apply this product when application is visible unless application does not meet CAN-ULC-S115 standard requirements.
 - .5 Smoke and acoustic sealant, non fire-rated, paintable, such as CP-506 by HILTI or approved equivalent by Departmental Representative.
 - .6 Elastic firestop sealant that provides maximum movement in fire-rated applications for expansion joints and HVAC penetrations, such as CP-601S by HILTI or approved equivalent by Departmental Representative.
 - .7 Silicone-based, self-levelling firestop sealant, single component, for use with through-penetrations as well as construction joints in floors such as CP-604 by HILTI or approved equivalent by Departmental Representative.
 - .8 Firestop sealant spray used to clog highly mobile dynamic joints, such as CFS-SP WB by HILTI or approved equivalent by Departmental Representative.
 - .9 Smoke and acoustic spray, paintable, such as CP 572 from HILTI or approved equivalent by Departmental Representative.
 - .10 Firestop foam such as CP 620 by HILTI or approved equivalent by Departmental Representative.
 - .11 Firestop mortar to be used in concrete block walls for filling pipe penetrations of various spans, such as CP 637 from HILTI or approved equivalent by Departmental Representative.
 - .12 Cement-based self-levelling concrete for filling in openings in concrete block walls and poured concrete that may be used for 25 to 450 mm concrete thicknesses, such as SIKACRETE – 08 SCC from SIKA, or approved equivalent by Departmental Representative.
 - .13 Firestop Block to be used in concrete block or gypsum walls, for concealed openings (above ceilings), dimensions 50 x 125 x 200 mm, such as FIRESTOP BLOCK CFS-BL by HILTI, or approved equivalent by Departmental Representative.
 - .14 Mineral wool speed plugs or speed strips for decking such as CP 737 and CP 777 by HILTI or approved equivalent by Departmental Representative.
 - .2 Fire stopping filler material:
 - .1 Ceramic fibre wool or rock insulation, density 64 kg/m³, compressed at 25 % tightness in the opening up to a depth minimum depth of 89 mm; Z-shaped metallic fastener clips to hold insulation in horizontal openings.
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- .3 Service penetration assemblies: systems tested to CAN-ULC-S115.
- .4 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.
- .5 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .6 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .8 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .9 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .10 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .11 Sealants for vertical joints: non-sagging.

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.
 - .1 Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation 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.
 - .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
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- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.
- .6 For all exposed fire stopping surfaces, refurbish and finish exposed surfaces (smooth surfaces, ready to painted, colour to match partition).

3.4 SEQUENCES OF OPERATION

- .1 Proceed with installation only when submittals have been reviewed by Departmental Representative.
- .2 Install floor fire stopping before interior partition erections.
- .3 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.
- .4 Mechanical pipe insulation: certified fire stop system component.
 - .1 Ensure pipe insulation installation precedes fire stopping.

3.5 FIELD QUALITY CONTROL

- .1 Inspections: notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
- .2 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.7 SCHEDULE

- .1 Fire stop and smoke seal at:
 - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
 - .2 Edge of floor slabs at curtain wall and precast concrete panels.
 - .3 Top of fire-resistance rated masonry and gypsum board partitions.
 - .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
 - .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
 - .6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
 - .7 Openings and sleeves installed for future use through fire separations.
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- .8 Around mechanical and electrical assemblies penetrating fire separations.
- .9 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.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 74 19 – Waste management and disposal.
- .2 Section 09 21 99 – Partitions for minor works.
- .3 Section 09 65 19 – Resilient tile flooring.
- .4 Section 09 91 99 – Painting for minor works.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM C 919-08, Standard Practice for Use of Sealants in Acoustical Applications.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
 - .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
 - .3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
 - .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
 - .5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.
- .3 General Services Administration (GSA) - Federal Specifications (FS)
 - .1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .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 [joint sealants] and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Manufacturer's product to describe:
 - .1 Caulking compound.
 - .2 Primers.
 - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
 - .3 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
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2021-01-19

Page 2

- .3 Samples:
 - .1 Submit 2 samples of each type of material and colour.
 - .2 for harmonization with adjacent materials, submit cured samples of exposed sealants for each color where required to match adjacent material which must be left visible, for each color proposed.
- .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 and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect joint sealants from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Waste Management and Disposal:
 - .1 Waste Management and Disposal
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

1.6 SITE CONDITIONS

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

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

1.7 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.

1.8 WARRANTY

- .1 Provide a written warranty, issued in the name of the owner, certifying that the work specified in this section will be free from any defect in materials and workmanship, in particular against loss of waterproofing, cracking, spalling, loss of consistency, contraction, sagging, loss of adhesion and tarnishing of adjacent surfaces, for a period of thirty-six (36) months from the date of final acceptance.
- .2 The warranty must cover the cost of any expense generated in repairing the aforementioned defects and any other damage to the building resulting from defects in the work of this section.
- .3 The guarantee formulation must be approved by the Departmental Representative.

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

- .1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
- .2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.
- .3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

- .1 Primers: the type recommended by the sealant manufacturer.
 - .2 Non-corrosive and non-greasy cleaning agents compatible with sealant and sealant materials and recommended by sealants manufacturer.
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.3 Sealants:

- .1 Sealants, except those described in CAN / CGSB-19.1 and CAN / CGSB-19.18, must be on the list of approved products, published by the Product Certification Commission. of the ONGC (CGSB). In the case of sealants that have been approved with a primer, only this primer should be used with the sealant. All products must be low VOC (LEED).
- .1 Product n° 1 :
- .1 Multicomponent polyurethane sealant, colors to be chosen by the Departmental Representative and in accordance with CAN / CGSB-19.24-M90 Class B, Type II.
- .1 Tensile Strength % Elongation (ASTM 800-900% D 412)
- .2 Hardness Properties ASTM C 661 40 ± 5
- .3 Movement Capability +50% / -50%
- .2 Applications :
- .1 Expansion or control joints in interior and exterior masonry.
- .2 Joints between exterior door frames and access hatches, windows, curtain walls and shutters or other and exterior masonry walls.
- .3 Seams to support angles of masonry or exterior panels.
- .4 All miscellaneous joints required by plans but not covered by other sections.
- .5 Acoustic sealant for exposed structures.
- .6 Joints between masonry elements
- .2 Produit n° 2 :
- .1 Multi-component, polyurethane joint sealant, self leveling, colors to be chosen by the Departmental Representative and in accordance with the U.S. Federal Specification TT-S-00227E, ASTM C920, type M, Grade P, Class 25
- .1 Hardness, durometer scale « A » (ASTM C 30 - 35 661)
- .2 Concrete peel strength (ASTM C 794) 18 – 22 pli
- .3 Mouvement capacity (ASTM C 719) ±25 %
- .4 Tensile strenght (ASTM D 719) 190-230 psi
- .2 Applications :
- .1 Contraction or control joints in ceramic, granite, concrete floors.
- .2 Expansion joints in terrace floors.
- .3 Horizontal joints subject to traffic, such as door sills, sidewalks, ramps, etc.
- .3 Produit n° 3 :
- .1 Single component, acetoxysilicone sealant, cellant de silicone acétoxy, colors to be chosen by the Departmental Representative, with fungicide for sanitary installations, in accordance with CAN/ONGC-19.13-M87.
- .2 Applications :
- .1 Sealing of openings of plumbing pipes in gypsum structures, under pipe flange.
- .4 Product n° 4 :
- .1 Single-component, moisture-cure, acetoxysilicone sealant, colors to be chosen by the Departmental Representative and in accordance with CAN/ONGC-19.13-M87.
- .1 Hardness (Shore A) (ASTM C 661) 26 à 30
- .2 Peel Strength Aluminum and Glass (ASTM C 794) 2,28 – 2,63 kN/m
- .3 Dynamic Movement (ASTM C 719) ±25%

- .4 Tensile Strength at 100% Max Elongation 0,345-0,552 MPa (ASTM C 1184)
- .2 Applications :
 - .1 Caulking of metal flashings (roofing).
 - .2 Sealing of plumbing pipe penetrations in gypsum structures, under the fitting collars.
 - .3 Joint between interior door frame, glazed partition or other and materials other than gypsum.
 - .4 Sealing joints between gypsum and window elements and curtain walls.
 - .5 Sealing between gypsum and metallic structures.
- .5 Product n° 5 :
 - .1 High-performance, fast-curing, single-component, lowmodulus, hybrid sealant, colors to be chosen by the Departmental Representative and in accordance with.
 - .1 Hardness Properties (ASTM C 661) 25
 - .2 Adhesion to Aluminum (ASTM C 794) 20 – 25 pli
 - .3 Movement Capability (ASTM C 719) ±35%
 - .2 Applications :
 - .1 Joint between interior door frame, glazed partition or other and materials other than gypsum.
 - .2 Sealing joints between gypsum and window elements and curtain walls.
 - .3 Sealing between gypsum and metal structures.
- .6 Product n° 6 :
 - .1 Flame retardant sealant: refer to section 07 81 00 – Applied fireproofing
- .4 Sealing and caulking products shall not contain or be made from the following components: aromatic solvents, talc or asbestos fibers, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium, barium and derivatives, with the exception of barium sulphate.
- .5 In order to minimize health risks and maximize product performance, it is important that these be accompanied by detailed instructions regarding the method of application and necessary information regarding waste disposal methods.
- .6 Caulking products that emit strong odors, contain toxic chemicals or are not certified to be of a mold resistant type should not be used in air handling units.
- .7 If you can not help but use toxic products, restrict use to areas where fumes can be exhausted outdoors or where they will be confined behind air barrier barriers. or apply them several months before the place is occupied so as to allow evacuation of the fumes over the longest possible period

2.3 BACKING MATERIAL

- .1 Preformed, compressible and non-compressible
 - .1 Elements made of polyethylene foam, urethane, neoprene or vinyl.
 - .1 Extruded cellular foam filling rods.
 - .2 Oversized elements from 30 to 50%.
 - .2 Neoprene or rubber-butyl parts.
 - .1 Round and solid rods with a Shore A hardness of 70.

2021-01-19

Page 6

- .3 High density foam elements.
 - .1 Extruded cellular PVC foam extruded cellular polyethylene foam with Shore A hardness of 20 and tensile strength of 140 to 200 kPa, extruded polyolefin foam, density of 32 kg / m³, or neoprene, recommended by the manufacturer.
- .4 Anti-seizing tape.
 - .1 Polyethylene tape that does not adhere to the sealant.

2.4 COLOR OF SEALANTS AND MASTICS

- .1 In general, the color of each sealant and mastics, at the discretion of the Departmental Representative, will match that of adjacent surfaces (submit color chart)

2.5 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 from 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.
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2021-01-19

Page 7

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

3.8 PROTECTION

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 74 19 – Waste management and disposal.
- .2 Section 05 50 00 – Metal fabrications.
- .3 Section 06 40 00 – Architectural woodwork.
- .4 Section 09 63 40 – Stone Flooring.
- .5 Section 09 65 19 – Resilient tile flooring.
- .6 Division 14.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM C 542-05, Standard Specification for Lock-Strip Gaskets.
 - .2 ASTM D 790-07e1, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - .3 ASTM D 1003-07e1, Standard Test Method for Haze and Luminous Transmittance of Plastics.
 - .4 ASTM D 1929-96(R2001)e1, Standard Test Method for Determining Ignition Temperature of Plastics.
 - .5 ASTM D 2240-05, Standard Test Method for Rubber Property - Durometer Hardness.
 - .6 ASTM E 84-10, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - .7 ASTM E 119-16a, Standard Test Methods for Fire Tests of Building Construction and Materials
 - .8 ASTM E 330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - .9 ASTM F 1233-08, Standard Test Method for Security Glazing Materials and Systems.
 - .2 American national standards institute
 - .1 ANSI Z97.1-2015, For safety glazing materials used in buildings - safety performance specifications and methods of test
 - .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
 - .2 CAN/CGSB-12.2-M91, Flat, Clear Sheet Glass.
 - .3 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
 - .4 CAN/CGSB-12.4-M91, Heat Absorbing Glass.
 - .5 CAN/CGSB-12.6-M91, Transparent (One-Way) Mirrors.
 - .6 CAN/CGSB-12.8-97, Insulating Glass Units.
 - .7 CAN/CGSB-12.8-97 (Amendment), Insulating Glass Units.
 - .8 CAN/CGSB-12.9-M91, Spandrel Glass.
 - .9 CAN/CGSB-12.10-M76, Glass, Light and Heat Reflecting.
 - .10 CAN/CGSB-12.11-M90, Wired Safety Glass.
 - .11 CAN/CGSB-12.12-M90, Plastic Safety Glazing Sheets.
 - .12 CAN/CGSB-12.13-M91, Patterned Glass.
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- .4 National Fire Protection Association (NFPA).
 - .1 NFPA 80-2016, Standard for Fire Doors and Fire Windows.
 - .2 NFPA 251-2006, Standard Methods of Tests of Fire Resistance of Building Construction and Materials
 - .3 NFPA 252-2017, Standard Method of Fire Tests of Door Assemblies.
 - .4 NFPA 257-2017, Standard Method of Fire Tests for windows and glass block assemblies.
- .5 Laboratoire des assureurs du Canada (ULC).
 - .1 CAN/ULC S101-14 (5th edition), Standard Methods of Fire Endurance Tests of Building Construction and Materials.
 - .2 CAN/ULC S104-15 (4th edition), Standard Method for Fire Tests of Door Assemblies
 - .3 CAN/ULC S105-15 (4th edition), Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104.
 - .4 CAN/ULC S106-15 (4th edition), Standard Method for Fire Tests of Window and Glass Block Assemblies.
- .6 Environmental Choice Program (ECP)
 - .1 CCD-045-95(R2005), Sealants and Caulking Compounds.
- .7 Glass Association of North American (GANA)
 - .1 GANA Glazing Manual - 2008.
 - .2 GANA Laminated Glazing Reference Manual - 2009.
- .8 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 WORK DESCRIPTION

- .1 Performance requirements
 - .1 Comply with the following requirements relating to glazing and glass materials in order to ensure the continuity of the air and water vapor barrier system of the building envelope.
 - .1 The interior glass of multiple sealed units must ensure continuity of the air and water vapor barrier system.
 - .2 The dimensions of the glazing must be determined in such a way that they resist the dead loads, the overloads due to the wind as well as the forces of pressure and wind suction calculated according to the standard ANSI / ASTM E330.
 - .3 The maximum bending of the glazing must not exceed 1/200, and this deformation must not in any way alter the physical properties of the glass materials.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting 1 week prior to beginning work of this Section and on-site installation, with Contractor's Representative and Departmental Representative, which will cover the following:
 - .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.
- .2 Arrange for site visit with Departmental Representative prior to start of Work to examine existing site conditions adjacent to demolition Work.

- .3 Ensure key personnel, site supervisor and subcontractor representatives attend.
- .4 Departmental Representative will submit written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

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 glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec, Canada.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit duplicate mm size samples of 300mm x 300mm and sealant material.
- .5 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .6 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
 - .1 Submit testing and analysis of glass under provisions of Section 01 45 00 - Quality Control.

1.6 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.

1.7 QUALITY ASSURANCE

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

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
 - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Protect prefinished aluminum surfaces with strippable coating.
 - .3 Replace defective or damaged materials with new.
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- .4 Waste Management and Disposal:
 - .1 Waste Management and Disposal
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

1.9 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.

1.10 WARRANTY

- .1 Provide a written warranty, issued in the name of the owner, certifying that the fire-rated glass work specified in this section will be free from all defects in materials and components as well as labor, for a period of five (5) years and that the glazing is free of any material obstructing the vision, for a period of ten (10) years, starting from the date of delivery.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Design Criteria:
 - .1 Limit glass deflection to 1/200 flexural limit of glass with full recovery of glazing materials.
- .2 Flat Glass:
 - .1 Float glass: to CAN/CGSB-12.3, glazing quality, 6 mm thick.
 - .2 Sheet glass: to CAN/CGSB-12.2, AA-special selected, 6 mm thick.
 - .3 Safety glass: to CAN/CGSB-12.1, transparent, 6 mm thick.
 - .1 Type 2-tempered.
 - .2 Class B-float.
 - .3 Category 1.

2.2 ELEVATOR CAB GLAZING

- .1 Matte glass type VE1, in accordance with standards ASTM C1048 and ANSI Z97.1, having the following characteristics:
 - .1 Ultra-clear Clear Vision float glaze, 6mm thick, clear tempered, acid-etched finish (mat) on side 1
 - .2 Backing (side 2) is coated with a white lacquer chosen by the Departmental Representative
 - .3 Edges: chamfered
- .2 Glossy glaze type VE2, in accordance with standard ASTM C1048 and ANSI Z97.1, having the following characteristics:
 - .1 Ultra-clear Clear Vision float glass, 6mm thick, clear tempered,
 - .2 Backing (side 2) is coated with a white lacquer chosen by the Departmental Representative
 - .3 Edges: chamfered

- .3 Prepare the glaze, pre-drilled to receive the fastening rods for the handrails and bumpers. Leave sufficient space between the glass and the fastening rod of the handrails and bumpers.

2.3 ACCESSORIES

- .1 Silicone-based adhesive, for interior application, type recommended by the glass manufacturer.
- .2 Double-sided rubber-based adhesive tape, for mounting type recommended by the glass manufacturer.
- .3 Glazing clips: manufacturer's standard type.
- .4 Lock-strip gaskets: to ASTM C 542.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTION

- .1 Compliance: comply with manufacturer's written requirements, recommendations and specifications, including technical bulletins and installation instructions specified in product catalogs and on packing boxes, as well as technical data sheets.

3.2 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.
- .2 To avoid a distortion effect, ensure that when applying the lacquer and soaking, the glass panels are placed in the same direction as their installation

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .1 Remove traces of primer, caulking.
 - .2 Remove glazing materials from finish surfaces.
 - .3 Remove labels.
 - .4 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.
 - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.4 PROTECTION

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

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 01 74 19 – Waste Management and Disposal.
- .2 Section 05 50 00 – Metal Fabrications.
- .3 Section 09 51 99 – Acoustical Ceilings for Minor Works.
- .4 Section 09 91 99 – Painting for Minor Works.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM C 1396/C 1396M-09a, Standard Specification for Gypsum Wallboard.
 - .2 ASTM C 475/C 475M-02(2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - .3 ASTM C 514-04(2009) e1, Standard Specification for Nails for the Application of Gypsum Board.
 - .4 ASTM C 645-09a, Standard Specification for Nonstructural Steel Framing Members.
 - .5 ASTM C 754-09a, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
 - .6 ASTM C 840-08, Standard Specification for Application and Finishing of Gypsum Board.
 - .7 ASTM C 954-10, 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 0.122 in. (2.84 mm) in Thickness.
 - .8 ASTM C 1002-07, 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.
 - .9 ASTM C 1047-10, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - .10 ASTM C 1178/C 1178M-08, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.
 - .2 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
 - .3 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-07, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .4 Seismic Design Category C : 2009 & 2006 IBC® International Building Code - Section 1613 (2007 CBC California Building Code)
 - .1 American Society of Civil Engineers 7-05: Minimum Design Loads for Buildings and Other Structures.
 - .2 CISCA: Guidelines for Seismic Restraint Direct Hung Suspended Ceiling Assemblies Seismic Zones 0-2.
 - .5 Seismic Design Category C : 2012 IBC® International Building Code - Section 1613 (2010 CBC California Building Code)
 - .1 American Society of Civil Engineers 7-10: Minimum Design Loads for Buildings and Other Structures.
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- .6 CISCA Ceiling Systems Installation Handbook.

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, framing, sealants and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Shop drawings for partitions with seismic bracing must have a seal and signature of a competent engineer recognized or capable of practicing in the Province of Quebec, Canada, and is a member of the OIQ.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit one (1) 300 x 300 mm size sample of gypsum board and 300 mm long samples of corner and casing beads and insulating strip.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store materials inside, level, under cover. Protect from weather, damage from construction operations and other causes, in accordance with manufacturer's printed instructions.
 - .3 Handle materials to prevent damage to edges or surfaces. Protect metal accessories and trim from being bent or damaged.
 - .4 Store and protect partition materials from nicks, scratches, and blemishes.
 - .5 Replace defective or damaged materials with new.
- .4 Waste Management and Disposal:
 - .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Package Waste Management: recover packaging waste for reuse and manufacturer reuse of packaging materials such as pallets, crates, boards and other packaging material, in accordance with Section 01 74 19 – WASTE MANAGEMENT AND DISPOSAL.

1.5 INSTALLATION REFERENCES

- .1 Unless otherwise indicated, and more restrictive in documents, execute work in accordance with recommended content in « The Gypsum Construction Handbook CGC », current edition.
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1.6 WARRANTY

- .1 Provide a written warranty on behalf of Owner, certifying that the specified work of this Section will be free of any material and execution defects, for a period of one (1) year from the date of Final Acceptance of Work.

PART 2 - PRODUCTS

2.1 PERFORMANCE DESIGN CRITERIA

- .1 Partitions : non-combustible construction.

2.2 NON-STRUCTURAL METAL FRAMING

- .1 Non-load bearing channel stud framing: to ASTM C 645, 41, 64, 92 and 152 mm stud size, roll formed from 20 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460 mm centres.
- .2 Floor and ceiling tracks: to ASTM C 645, in widths to suit stud sizes, 32 mm flange height.
- .3 Metal channel stiffener: 19 x 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.
- .4 Uncoupling track: to ASTM A1003 and ASTM A653, in sheets the same thickness as metal framing, suitable width and same size as framing, with a 64 mm high footing for non-structural metal framing.
- .5 Posts must be designed to screw drywall panels, and have openings for conduits, half-perforated and arranged at a maximum of 610 mm on-centre or otherwise indicated in drawings.
- .6 Other profiles including secondary galvanized steel framing « Z » shaped, or other metallic furring shapes, mouldings, concealed fasteners, pieces and all other accessories required to complete work.
- .7 Insulating strip: rubberized, moisture resistant 3 mm thick strip, and same width as tracks, resistant to humidity, with self-sticking adhesive on one face, lengths as required.
- .8 Metal furring channels, suspensions, hanger wires, return pieces and fasteners.
- .9 Steel screw drill : to ASTM C 1002
- .10 Polyethylene: to CAN/CGSB-51.34, type 2.

2.3 GYPSUM BOARD

- .1 Standard board: to ASTM C 1396/C 1396M regular, 13 mm thick and Type X, 16 mm thick, 1200 mm wide x maximum practical length, ends square cut, edges tapered.
 - .2 Joint filler: to ASTM C 475, asbestos-free.
 - .3 Casing beads, corner beads, control joints and edge trim: to ASTM C 1047, PVC and/or Zinc, 0.5 mm base thickness, perforated flanges, one piece length per location.
 - .4 Staggered metallic profile bracing at 2 400 mm o/c maximum, designed to brace partitions attached to suspended seismic type ceiling system. Bracing must be calculated by a structural engineer, member of the OIQ.
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2.4 ACCESSORIES

- .1 Ceiling hatch, upward opening, primed with steel finish, door must be insulated with 25 mm fiberglass, an aluminum frame with threaded rod for fastening and adjustment. The frame must be designed to receive gypsum. Equipped with hinges, handle and spring lever. Dimensions indicated in drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

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

- .1 Install steel framing members to receive screw-attached gypsum board in accordance with ASTM C 754 except where specified otherwise.
 - .2 All current gypsum board system manufacturer recommendations must be respected, unless otherwise indicated in plans and specifications.
 - .3 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.
 - .4 Place studs vertically at 406 mm on centre and maximum of 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
 - .5 Erect metal studding to tolerance of 1:1000.
 - .6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.
 - .7 Include two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.
 - .8 Install heavy gauge single jamb studs at openings.
 - .9 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.
 - .10 Include 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.
 - .11 Install steel studs or furring channel between studs for attaching electrical and other boxes.
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- .12 Extend partitions to ceiling height except where indicated.
- .13 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use double track slip joint.
- .14 Install continuous insulating strips to isolate studs from uninsulated surfaces.
- .15 Install insulating strip under studs and tracks around perimeter of sound control partitions.

3.3 ERECTION OF GYPSUM BOARD AND ACCESSORIES

- .1 Do application and finishing of gypsum board in accordance with ASTM C 840 except where specified otherwise.
- .2 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C 840 except where specified otherwise.
- .3 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .4 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, and grilles.
- .5 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.
- .6 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.
- .7 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.
- .8 Install wall furring for gypsum board wall finishes in accordance with ASTM C 840, except where specified otherwise.
- .9 Install gypsum boards in direction that will minimize number of end-butt joints. Stagger end joints 250 mm minimum.
- .10 Screw only one (1) gypsum board thickness on framing components or on furring channels. Screws to be at 300 mm on-centre.
- .11 Do not install damaged or humid gypsum board panels.

3.4 TAPE AND JOINT FILLER

- .1 Strictly respect manufacturer's recommendations.
 - .2 Use only paper joint tape and setting-type joint compound for taped layer from the same manufacturer as gypsum boards and in accordance with manufacturer's requirements. Use standard joint compound all-purpose ready to use for the second and third layers (do not use a light compound).
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3.5 INSTALLATION

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on-centre using contact adhesive for full length.
- .2 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.
- .3 Install access doors to electrical and mechanical fixtures specified in respective sections.
 - .1 Rigidly secure frames to furring or framing systems.
- .4 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.
- .5 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.
- .6 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.
- .7 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.7 PROTECTION

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

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 01 74 19 – Waste management and disposal.
- .2 Section 04 20 00.08 – Masonry for minor works.
- .3 Section 05 50 00 – Metal fabrications.
- .4 Section 09 91 99 – Painting for minor works.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM C 635/C 635M-07, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
 - .2 ASTM C 636/C 636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - .3 ASTM E 1477-98a(2008), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
 - .4 ASTM A653/A653M-17 - Standard Specification for Sheet Steel, Zinc-coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process
 - .5 ASTM C423-17 - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - .6 ASTM D3273-16 - Resistance to Growth of Mold of Interior Coatings in an Environmental Chamber
 - .7 ASTM D4828 (2016)- Standard Test Methods for Practical Washability
 - .8 ASTM E84-18- Surface Burning Characteristics of Building Materials
 - .9 ASTM E119-18 - Fire Tests of Building Construction and Materials
 - .10 ASTM E580/E580M-17 - Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
 - .11 ASTM E1264-14- Classification for Acoustical Ceiling Products
 - .12 ASTM E1414/E1414M-16 - Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
 - .13 ASTM E580/E580M-17 (Section 4) - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions
 - .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.
 - .3 Green Seal Environmental Standards (GS)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
 - .4 Seismic Design Category C : 2009 & 2006 IBC® International Building Code - Section 1613 (2007 CBC California Building Code)
 - .1 American Society of Civil Engineers 7-05 : Minimum Design Loads for Buildings and Other Structures.
 - .2 CISCA : Guidelines for Seismic Restraint Direct Hung Suspended Ceiling Assemblies Seismic Zones 0-2.
 - .5 Seismic Design Category C : 2012 IBC® International Building Code - Section 1613 (2010 CBC California Building Code)
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- .1 American Society of Civil Engineers 7-10 : Minimum Design Loads for Buildings and Other Structures.
- .6 CISCA Ceiling Systems Installation Handbook.
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .7 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .8 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-[A2007], Architectural Coatings.
- .9 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-2007, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .10 NFPA 70 - 2008 National Electrical Code (NEC) Section 410-36

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 [ceiling panels and ceiling suspension system] and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Shop Drawings:
 - .1 The submitted shop drawings must bear the seal and signature of a competent earthquake engineer recognized or authorized to practice in Canada, in the province of Quebec, to the effect that the design of the ceilings' suspension frames respects the prescriptions of the National Building Code of Quebec 2010 regarding installation precautions relating to earthquakes (article 4.1.8.18 and part 4 Calculation rule, Paragraph J.223 which refers to the CSA S-832 standard (referring to the standard American ASTM E580).
 - .2 Indicate lay-out, insert and hanger spacing and fastening details, splicing method for main and cross runners, change in level details, acoustical unit support at ceiling fixture and lateral bracing and accessories.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit duplicate full size samples of each type acoustical units.

1.4 QUALITY ASSURANCE

- .1 Regulatory agencies' requirements
 - .1 Sole Supplier Responsibility: To obtain the combined warranty for the suspension system and acoustic tiles, guarantee color match or compatibility of ceiling tiles and suspension system, all acoustic tiles and all Suspension system components must be manufactured and supplied by a single manufacturer. The use of materials supplied by more than one manufacturer is not acceptable.
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- .2 Subcontractor qualifications: The installer must have satisfactory experience in the installation of suspended ceiling systems for projects with requirements similar to those of this specification.
- .3 **Regulatory agencies' requirements:** Floor / ceiling and roof / ceiling assemblies with a degree of fire resistance: certified by a Canadian certification body accredited by the Standards Council of Canada.
- .4 Quality control of the supply:
 - .1 Test reports: The manufacturer must provide tests certification with respect to minimum requirements in accordance with applicable industry standards or according to performance standards prescribed by various organizations.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store materials inside, level, under cover. Protect from weather, damage from construction operations and other causes, in accordance with manufacturer's printed instructions.
 - .3 Handle materials to prevent damage to edges or surfaces. Protect metal accessories and trim from being bent or damaged.
 - .4 Store and protect [acoustic ceiling materials] from [nicks, scratches, and blemishes].
 - .5 Replace defective or damaged materials with new.
- .4 Waste Management and Disposal:
 - .1 Waste Management and Disposal
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

1.6 CONDITIONS OF IMPLEMENTATION

- .1 Installation of acoustic tiles must not begin until the building is closed, the permanent heating and air conditioning system is working and residual moisture due to plastering, concreting, or terrazzo works is dissipated.
- .2 Do not use ceiling tiles in excessive humidity conditions or in areas constantly exposed to high humidity or exposed directly to weather or water. Ceiling tiles are sized and designed for use in humidity and temperature conditions within the normal occupancy range, i.e. between 18 and 29 ° C (65 and 85 ° F) and relative humidity not exceeding 70%
- .3 Allow the necessary time to vary the dimensions of the ceiling tiles stored in temperature and humidity conditions well outside the recommended indices.

1.7 REPLACEMENT MATERIALS

- .1 Provide acoustic elements for replacement in accordance with section 01 78 00 - Documents / Elements to be submitted upon completion of work.

- .2 Provide an additional quantity of acoustic elements equivalent to 10% of the gross ceiling area, for each type and model of acoustic elements used in the context of this work.
- .3 Ensure that the replacement materials come from the same manufacturing lots as the materials used for the work.
- .4 Clearly identify each type of acoustic element, also indicating color and texture.
- .5 Deliver the replacement materials to the Departmental Representative, once the work hereunder this section has been completed.

1.8 WARRANTY

- .1 Provide a written warranty, issued in the name of the owner, certifying that the work specified in this section will be free from any defect in materials and workmanship, for a period of one (1) year from the date of final acceptance.
- .2 Provide a written warranty from the suspension system manufacturer, issued in the name of the owner, certifying that the work specified in this section will be free from manufacturing defects, for a period of ten (10) years from the date of purchase.

PART 2 - PRODUCTS

2.1 CONCEPTION CRITERIAS

- .1 Design requirements: Maximum deflection: deflection 1/360 of span, determined by deflection tests prescribed in ASTM C635 / ASTM C635M.
- .2 Ceiling location category (design): category C

2.2 ACOUSTICAL CEILING ELEMENTS

- .1 Acoustic tiles for suspended ceilings type PF1: in accordance with ASTM E1264.
 - .1 Material: hydroformed mineral fiber with transparent acoustic membrane.
 - .2 Flame spread rating of 25 or less in accordance with CAN/ULC-S102.
 - .3 Smoke developed 50 or less in accordance with CAN/ULC-S102.
 - .4 Class A fire resistance.
 - .5 Noise Reduction Coefficient (NRC) designation of 0.85, (CAP) : 28.
 - .6 Light Reflectance (LR) range of 0.86 to ASTM E 1477.
 - .7 Depression resistance: Humiguard plus
 - .8 Anti-mold and bacteria: Bio-block antimicrobial treatment
 - .9 Edge type bevelled.
 - .10 Finish: transparent acoustic membrane with factory-applied latex paint
 - .11 Colour Standard white.
 - .12 Size 600mm x 610mm x 22 mm thick (imperial).
 - .13 Texture: Smooth.
 - .14 Accepted product: (standard edifice), Armstrong Calla # 2822.

2.3 SUSPENSION FRAME FOR ACOUSTIC CEILINGS

- .1 Suspension frames for acoustic ceilings, type PF1, exposed tee system 15/16 ".
 - .1 Visible framing elements with a T profiles grid: double-web steel construction with 25mm exposed visible flange design. Secondary tees surmounted by a rectangular tubing, with web terminated in tabs Ensuring attachment to the main tees, with a lower flange with a flush offset at crossings.

- .2 Characteristics: intermediate strength, according to ASTM C635.
- .3 Material and finish: hot-dipped galvanized steel.
- .4 Type: no fire resistance degree, consisting of a visible T-profiles grid.
- .5 Color: powder-coated finish in Blizzard White (ZW), factory-applied.
- .6 Size: 15/16 " (imperial).
- .7 Accepted Product: (Building standard), Armstrong Prelude XL

2.4 SUSPENSION FRAME ACCESSORIES FOR ACOUSTIC CEILINGS (Seismic Category C)

- .1 Ceiling weight including all services: equal to or less than 2.5 lb / p².
- .2 Perimeter molding: 23.8 mm (15/16 ").
- .3 Fasteners and staples (clip): earthquake-resistant type, Armstrong BERC2.
- .4 Hangers and ties: soft annealed, galvanized steel wire, 12 gauge.
- .5 All accessories, materials, and equipment required for the installation of a seismic ceiling.
- .6 Accessories: fishplates, fasteners, wire ties, staples and wall-ceiling joint moldings necessary to make a complete suspension frame, in accordance with the manufacturer's recommendations.
- .7 Fasteners for hangers: specially manufactured

2.5 ACCESSORIES

- .1 Flush 23 mm (15/16 ") transition molding for drywall / acoustic tile transition.

PART 3- EXECUTION

3.1 EXAMINATION

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

- .1 The start of the installation work implies acceptance of the present conditions in the area that will receive the ceiling tiles.
 - .2 Examine the areas that will receive the ceiling tiles in order to detect conditions likely to have a negative impact on the installation.
 - .3 Do not begin work until unsatisfactory conditions have been corrected.
 - .4 Work that will be concealed: Ensure that work above the ceiling is completed and executed in a way that will not interfere with the layout and installation of ceiling tiles.
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- .5 Protect work completed above the ceiling system from damage during installation of ceiling elements.
- .6 Requirements for fire resistant systems: Any work above an assembly with a fire resistance rating must comply with the UL / ULC assembly requirements.

3.3 ASSEMBLY – GENERAL WORKS

- .1 Install framing elements in accordance with ASTM C 636 except where specified otherwise.
- .2 Suspension System:
 - .1 Erect ceiling suspension system after work above ceiling has been inspected by Departmental Representative.
 - .2 Secure hangers to overhead structure using attachment methods as indicated.
 - .3 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.
 - .4 Lay out centreline of ceiling both ways, to provide balanced borders at room perimeter. Lay out system according to reflected ceiling plan.
 - .5 Install wall moulding to provide correct ceiling height.
 - .6 Completed suspension system to support super-imposed loads, such as lighting fixtures and diffusers.
 - .7 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
 - .8 Interlock cross member to main runner to provide rigid assembly.
 - .9 Ensure finished ceiling system is square with adjoining walls and level within 1:1000.
- .3 Acoustic Panels:
 - .1 Install acoustical panels and tiles in ceiling suspension system.
 - .2 Co-ordinate ceiling work with work of other sections such as interior lighting, fire protection communication, and intrusion and detection systems.

3.4 ASSEMBLY FOR SEISMIC CEILINGS (CATEGORY C)

- .1 Install seismic ceilings in accordance with the manufacturer's written recommendations, ASTM E580, the Cisca Ceiling Systems Handbook, and the National Building Code, Quebec edition.
- .2 Ensure that the maximum weight of the ceiling including tile, suspension, lighting fixtures is 2.5 lbs / p² maximum.
- .3 Ensure that the main and secondary suspension tees will have a compressive tensile strength of at least 60 lbs. Leave a space of at least 3/8 " between the wall and the ends of the tees on two of the adjacent walls. The BERC2 earthquake-resistant fasteners on these two adjacent walls allow the tees to move freely.
- .4 On the two other adjacent walls, the tees are cut, the tees are against the wall and the BERC2 seismic fasteners are used to lock the ceiling in place.
- .5 The entire perimeter must be stabilized with BERC2 ties.
- .6 The hangers should be attached to the main beams every 1220 mm c/c and banding 3 times around the hangers on 75 mm (3 ") and secured to the structure above.
- .7 Install a 15/16 "min. Perimeter molding. On two of the walls, maintain a minimum clearance of 9.5mm (3/8 ") between the end of the grid and the wall. Perimeter tees must be supported by additional wire no more than 200mm from the wall.

- .8 The mesh connection fastened to two adjacent walls is prohibited for a category C earthquake-resistant assembly.
- .9 Link the ends of perimeter tees.
- .10 Anchors to the slab or to the structure must be able to support at least 100 lbs each.
- .11 Lighting devices (all types) must be mechanically fastened to the grid in accordance with NEC code 410-06 (two fasteners per device unless the device is supported separately).
- .12 Support pendant lights directly to the structure with 9 gauge wire
- .13 Rigid free-standing or recessed lighting fixtures must be properly fastened according to their weight and applicable standards.
- .14 The air diffusers, if they are less than 20 lbs, must be securely attached to the grid and if they are between 21 and 56 lbs they must be securely attached to the grid and provided with two 12 gauge wires attached to the structure
- .15 Provide 9.5 mm clearance on all sides of sprinkler heads and other penetrations.

3.5 WORK COORDINATION

- .1 Coordinate the installation of the ceiling system with the other trades works affected by this installation, with special attention given to mechanical and electrical work to be installed and operating before ceiling work can begin.
- .2 Coordination with other work:
 - .1 General: Coordinate works supported by the ceiling or penetrating it, including mechanical and electrical work, and partition systems.
 - .2 Mechanical work: Before the installation of the ceiling elements, the ducts above the ceiling must be installed and the permanent heating and air conditioning equipment must be in operation according to the expected climatic conditions.
 - .3 Electrical work: The installation of conduits above the ceiling must be completed before the installation of the ceiling elements.
 - .4 Fire protection work: Ducts or fire protection equipment above the ceiling must be in place and tested before installation of ceiling elements.

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.7 PROTECTION

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

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 01 74 19 – Waste Management and Disposal.
- .2 Section 05 50 00 – Metal Fabrications.
- .3 Section 06 40 00 – Architectural Woodwork.
- .4 Section 08 80 50 – Glazing.
- .5 Division 14.

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)/Tile Council of North America
 - .1 ANSI A108/A118 /A136.1-2013, American National Specification for the Installation of Ceramic Tile - A Collection of 20 ANSI A108.1A-C, 108.4-13, A118.1-10, ANSI A136.1.
 - .2 ANSI A208.1-09, Particleboard.
 - .2 ASTM International
 - .1 ASTM C 144-11, Standard Specification for Aggregate for Masonry Mortar.
 - .2 ASTM C 150/C 150M-12, Standard Specification for Portland Cement.
 - .3 ASTM C 207-06(2011), Standard Specification for Hydrated Lime for Masonry Purposes.
 - .4 ASTM C 568/C 568M-10, Standard Specification for Limestone Dimension Stone.
 - .5 ASTM C 615/C 615M-11, Standard Specification for Granite Dimension Stone.
 - .6 ASTM C 629/C 629M-10, Standard Specification for Slate Dimension Stone.
 - .7 ASTM C 847-14, Standard Specification for Metal Lath.
 - .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - .4 CSA Group
 - .1 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .2 CSA O151-09(R2014), Canadian Softwood Plywood.
 - .3 CAN/CSA-Z809-08(R2013), Sustainable Forest Management.
 - .5 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001 (V4-0)-2013, FSC Principle and Criteria for Forest Stewardship.
 - .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
 - .7 South Coast Air Quality Management District (SCAQMD)
 - .1 SCAQMD Rule 1168-A2011, Adhesive and Sealant Applications.
 - .8 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2010-2014 Standard.
 - .9 Terrazzo Tile and Marble Association of Canada (TTMAC)
 - .1 Tile Specification Guide 09 30 00 2013, Tile Installation Manual.
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- .2 Tile Maintenance Guide 2000.
- .10 Tile Council of America (TCA), Inc.
 - .1 2014 Handbook for Ceramic, Glass and Stone Tile Installation.

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 stone flooring and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 The drawings must show special pattern, dimensions, as well as joint location and details.
- .3 Samples:
 - .1 Submit one (1) 300 x 300 mm size panel c/w approved grout colour; mounted to 19 mm thick plywood backer.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit 2 copies of TTMAC maintenance recommendations to Departmental Representative in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide specific warning of maintenance practices or materials that may damage or disfigure finished work.
- .3 Submit product data and WHMIS MSDS sheets for floor sealer products.
- .4 Where more than one manufacturer's products are part of single tile assembly, arrange for each manufacturer to submit written statement compatibility with respect to other manufacturers' materials.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Materials:
 - .1 Provide extra stock in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Extra Stock: 4 m² or 2 %, whichever is greater, of each type and colour of tile; marked to identify:
 - .1 Manufacturer's name.
 - .2 Product's name.
 - .3 Product colour and pattern.
 - .3 Package tile products in original containers, to prevent damage.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer's Qualifications: skilled, trained and experienced in tile work and registered as members of Terrazzo Tile and Marble Association of Canada.
 - .2 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.
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1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, 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.
- .4 Waste Management and Disposal:
 - .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Package Waste Management: recover packaging waste for reuse and manufacturer reuse of packaging materials such as pallets, crates, boards and other packaging material, in accordance with Section 01 74 19 – WASTE MANAGEMENT AND DISPOSAL.

1.8 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Do not install tiles at temperatures less than 12 degrees C or above 38 degrees C.
 - .2 Maintain temperatures at or above 12 degrees C until cementitious materials have fully cured.
 - .3 Do not apply epoxy mortar and grouts at temperatures below 20 degrees C or above 35 degrees C.

PART 2 - PRODUCTS

2.1 TILE MATERIALS

- .1 Stone Tile : granite, to ASTM C 615/C 615M, as follows:
 - .1 Mass absorption rate (ASTM C97) : 0,1015 metric
 - .2 Volumetric weight (ASTM C97) : 2 867.3 kg/m³
 - .3 Flexural strength (ASTM C880) : 20,2 MPa
 - .4 Dimensions : cut to measure, dimensions as indicated in drawings. Provide 4 different dimensions. Provide 2 mm joints.
 - .5 Thickness: 12 mm
 - .6 Colour and finish: Cambrian Black, without resin or stain, polished mat finish.
 - .7 Quarry: St-Nazaire in Quebec
 - .8 Reference product: Polycor, colour Cambrian Black, distributed by Ciot.

2.2 MORTAR MATERIALS

- .1 Portland cement: to ASTM C 150/C 150M, Type I.
 - .2 Dry-Set Portland cement mortar: to ANSI A118.1.
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- .3 Polymer-modified very smooth cement-glue, superior quality for large format heavy tiles ayant les caractéristiques suivantes :
 - .1 Shear strength, tiles on plywood (ANSI A118.11)
 - .2 Cement-glue for large format heavy tiles (ANSI A118.15H): successful
 - .3 Adherence to plywood (ISO 1307) : P1 > 0,5 MPa
 - .4 Life span of mixture: 4 hours at 23°C and 50 % humidity
- .4 Accelerated curing mortar screed for slope, to be used in the elevator pit, aggregate-free, with the following properties :
 - .1 Compressive strength (CAN/CSA-A5 (ASTM C109) :
 - .1 1 day >13,8 MPa
 - .2 7 days > 18,6 MPa
 - .2 Flexural strength CAN/CSA-A23.2-8C (ASTM C348) : at 28 days > 5 MPa
- .5 Polymer-modified, two-component flexible cementitious mortar, with the following properties :
 - .1 Tensile strength (ASTM C307) : at 28 days > 5 MPa
 - .2 Water vapour permeability (ASTM E96) : 4,8 perms

2.3 GROUT MATERIALS

- .1 All-in-one grout, fast-drying, polymer-modified, with fine aggregates and ultra-superior quality, shrinkage-free for narrow joints, to ISO 13007 and with the following properties:
 - .1 Stain resistant, sans efflorescence (free of Portland cement)
 - .2 Compressive strength (ANSI A118.7) : 20,7 to 37,9 MPa at 28 days
 - .3 Water absorption (ANSI A118.7) : < 5 % (50 % relative humidity to immersion)
 - .4 Flexural strength (ANSI A118.7) : 6,90 to 9,66 MPa at 28 days
- .2 Water: clean, cold and drinkable.

2.4 TILE SEALANT

- .1 Protection sealant for granite tiles, such as standard Lithofin PSI or type recommended by granite tile distributor.

2.5 ACCESSORIES

- .1 Floor moulding for tiling, rounded shape, stainless steel, type 304 brushed finish, 25 mm x 6 mm.

2.6 MIXES

- .1 Follow 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 stone flooring installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
- .2 Verify substrate surfaces are clean, dimensionally stable, cured and free of contaminants such as oil, sealers and curing compounds.
- .3 Beginning of installation implies acceptance of existing conditions.
- .4 Report in writing any unsuitable conditions to Departmental Representative. Proceed with work only after written instruction is received from Departmental Representative.

3.2 MANUFACTURER'S INSTRUCTIONS

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

3.3 PREPARATION

- .1 Protect surrounding work from damage or disfiguration.
- .2 Clean surfaces which are to receive tile finish to ensure removal of grease, oil or dust film.
- .3 Securely screw or staple underlay to subfloor, smooth face up. Space sheets 6 mm apart.
- .4 Apply latex cementitious levelling coat wherever slight substrate irregularity exists.
 - .1 Limit levelling coat thickness to less than 8 mm where thin-set tile methods are to be used.
- .5 Follow manufacturer's written recommendations.
- .6 Granite is a natural material composed of a wide variety of chemical and mineral elements that can cause unpredictable reactions. As a result, determine compatibility of all materials before doing the work and perform a product test to ensure that there is no discoloration and stain formation. Submit and wait for Departmental Representative's written acceptance before proceeding with work.

3.4 INSTALLATION

- .1 Install materials to requirements of TTMAC Tile Installation Manual - Specification Guide 09300 as scheduled below.
 - .2 Fit tile units around corners, fitments, fixtures, drains and other built-in objects to maintain uniform joint appearance.
 - .3 Make cut edges smooth, even and free from chipping. Do not split tile.
 - .4 Lay out tiles as indicated so that perimeter and cut tiles are no less than half size.
 - .5 Set tiles in place while bond coat is wet and tacky, prior to skinning over. Slide tile back and forth to ensure a proper bond and level surface. Avoid slippage.
 - .6 Clean backs of tiles and back butter tiles to ensure a 95% bond coverage.
 - .7 Clean excess mortar from surface prior to final set.
 - .8 Sound tiles after setting materials have cured and replace hollow sounding tile before grouting.
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2021-01-19

Page 6

- .9 Keep 2/3 of depth of grout joints free of setting material.

3.5 JOINTS DE FRACTIONNEMENT

- .1 Not Used.

3.6 GROUTING

- .1 Allow proper setting time prior to grouting. Sound tiles after setting materials have cured and replace hollow sounding tile before grouting.
- .2 Preseal tiles requiring protection from grout staining.
- .3 Force grout into joints to ensure dense finish.
- .4 Remove excess and polish with clean cloths.

3.7 TOLERANCES

- .1 Level tiles to a tolerance of 0.5 mm per joint.

3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .1 Apply floor sealer in accordance with manufacturer's instructions.

3.9 SEALANT APPLICATION

- .1 Apply a sealant to protect the granite, as recommended by manufacturer.

3.10 PROTECTION

- .1 Protect finished areas from traffic until setting materials have sufficiently cured.
- .2 Protect grouted areas from traffic for 24 hours after grouting.
- .3 Provide protective covering until Completion of Contract.
- .4 Protect wall tiles and bases from impact, vibration, heavy hammering on adjacent and opposite walls for at least 14 days after installation.

END OF SECTION

2021-01-19

Page 1

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 01 74 19 – Waste Management and Disposal.
- .2 Section 05 50 00 – Metal Fabrications.
- .3 Section 06 40 00 – Architectural Woodwork.
- .4 Section 08 80 50 – Glazing.
- .5 Section 09 91 99 – Painting for Minor Works.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM F 1066-04(2010)e1, Standard Specification for Vinyl Composition Floor Tile.
 - .2 ASTM F 1344-12e1, Standard Specification for Rubber Floor Tile.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-25.20-95, Surface Sealer for Floors.
 - .2 CAN/CGSB-25.21-95, Detergent-Resistant Floor Polish.
- .3 South Coast Air Quality Management District (SCAQMD)
 - .1 SCAQMD Rule 1168-A2011, Adhesive and Sealant 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 resilient tile flooring and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit duplicate tile in size specified, 300 mm long base.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Materials:
 - .1 Provide maintenance materials of resilient tile flooring, base and adhesive in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Provide 2 m² of each colour, pattern and type flooring material required for this project for maintenance use.
 - .3 Extra materials from same production run as installed materials.
 - .4 Identify each container of floor tile and each container of adhesive.
 - .5 Deliver to Departmental Representative, upon completion of the work of this section.
 - .6 Store where directed by Departmental Representative.

2021-01-19

Page 2

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect specified materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Waste Management and Disposal:
 - .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Package Waste Management: recover packaging waste for reuse and manufacturer reuse of packaging materials such as pallets, crates, boards and other packaging material, in accordance with Section 01 74 19 – WASTE MANAGEMENT AND DISPOSAL.

1.6 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees C for 48 hours before, during and for 48 hours after installation.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Vinyl composition tile, type CVC, to be used generally and in elevator mechanical rooms, to ASTM F 1066, Class 2 - through pattern tile with the following properties:
 - .1 Dimensional stability (ASTM F2199) : < 0,024 inches per linear foot
 - .2 Static load resistance @ 125 psi (ASTM F970) : < 0,005 inch
 - .3 Smoke evolution: (ASTM E662) : 450 or less
 - .4 Dimensions: 305 x 305 mm
 - .5 Thickness: 3,2 mm
 - .6 Surface: smooth finish
 - .7 Pattern: through colour pattern wear layer
 - .8 Colour: provide 2 colours for the project.
- .2 Uniform vinyl tile, type CV1, uniform, to be used in elevator no. 2 cab floor, to ASTM F1700, class 1 and with the following properties:
 - .1 Dimensional stability (ASTM F2199) : < 0,024 inches per linear foot
 - .2 Static load resistance @ 125 psi (ASTM F970) : < 0,005 inch
 - .3 Smoke evolution: (ASTM E662) : 450 or less
 - .4 Dimensions: 305 x 305 mm
 - .5 Thickness: 3,2 mm
 - .6 Surface: smooth finish
 - .7 Pattern: through colour pattern wear layer
 - .8 Colour: provide 2 colours for the project.

- .3 Weld seam: for vinyl tile type CV1, in black colour, type recommended by manufacturer.
- .4 Floor finish moulding, type M.F.P. to be used at the junction of two materials and in locations indicated in drawings, vinyl type, suitable model and dimensions, wheel reduction type, transition, reducers or adapters. Provide 3 colours selected by Departmental Representative.
- .5 Resilient base: to vinyl, for cove base and thickened, 102 mm roll height. Provide 3 colours selected by Departmental Representative.
- .6 Primers and adhesives: waterproof, recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.
- .7 Primers and adhesives for cove base adhesives, type recommended by base manufacturer.
 - .1 Adhesive: maximum VOC limit 50 g/L to SCAQMD Rule 1168.
- .8 Sub-floor filler and leveller: white premix latex requiring water only to produce cementitious paste as recommended by flooring manufacturer for use with their product.
- .9 Sealer: type recommended by flooring manufacturer.
- .10 Floor finish, wax: type recommended by flooring manufacturer.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's recommendations and specifications, including any available technical bulletins, handling, storage and execution instructions of all products, and as indicated in technical specifications.

3.2 EXAMINATION

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

- .1 Remove existing resilient flooring.
 - .2 Proceed with shot blasting or blastrac. Remove or treat old adhesives to prevent residual, old flooring adhesives from bleeding through to new flooring and/or interfering with the bonding of new adhesives.
 - .3 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.
 - .4 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
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2021-01-19

Page 4

- .5 Prime or seal concrete slab or plywood sub-floor to flooring manufacturer's printed instructions.

3.4 TILE APPLICATION

- .1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.
- .2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.
- .3 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width.
- .4 Install flooring to square grid pattern with joints aligned.
- .5 As installation progresses, and after installation, roll flooring in 2 directions except resilient tile or as recommended by manufacturer with 45 kg minimum roller to ensure full adhesion.
- .6 Cut tile and fit neatly around fixed objects.
- .7 Install feature strips and floor markings where indicated. Fit joints tightly.
- .8 Install flooring in pan type floor access covers. Maintain floor pattern.
- .9 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.
- .10 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.
- .11 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.5 BASE APPLICATION

- .1 Lay out base to keep number of joints at minimum. Base joints at maximum length available or at internal or premoulded corners.
 - .2 Clean substrate and prime with one coat of adhesive.
 - .3 Apply adhesive to back of base.
 - .4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.
 - .5 Install straight and level to variation of 1:1000.
 - .6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.
 - .7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles, minimum 300 mm each leg. Wrap around toeless base at external corners.
 - .8 Install toeless type base before installation of carpet on floors.
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3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
 - .1 Clean flooring and base surfaces to flooring manufacturer's printed instructions.
- .3 Remove excess adhesive from floor, base and wall surfaces without damage.
- .4 Clean, seal and wax floor and base surface to flooring manufacturer's instructions. In carpeted areas clean, seal and wax base surface before carpet installation.

3.7 PROTECTION

- .1 Protect new floors from time of final set of adhesive until final waxing.
- .2 Prohibit traffic on floor for 48 hours after installation.
- .3 Use only water-based coating for linoleum.

END OF SECTION

PART 1 - GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 01 74 19 – Waste management and disposal.
- .2 Section 04 20 00.08 – Masonry for minor works.
- .3 Section 05 50 00 – Metal fabrications.
- .4 Section 09 21 99 – Partitions for minor works.

1.2 REFERENCE STANDARDS

- .1 Green Seal Environmental Standards (GS)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
 - .2 Maintenance Repainting Manual - current edition.
- .4 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.

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 paint and coating products and include product characteristics, performance criteria, physical size, finish and limitations. Identify each product in relation to the system in which it is used and provide the following information:
 - .1 The paint system designation.
 - .2 The product type and application its used for.
 - .3 The number of the relevant CGSB standard.
 - .4 Manufacturer's product number.
 - .5 The number (s) of the color (s).
 - .6 Manufacturer's Material Safety Data Sheets.
 - .7 The maximum VOC accepted: 0 (interior painting only)
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.

- .3 Submit duplicate 200 x 300 mm sample panels of each paint with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards.
 - .1 Use a 3 mm steel plate for paints applied to metal substrates. Use a 10mm plywood panel, beautiful on one side, for paints applied to wood, and a 50mm concrete block for paints applied to concrete or concrete masonry. Use 12.7 mm gypsum board for paints applied to drywall and other smooth surfaces.
- .4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .5 Regional Materials: submit evidence that project incorporates required percentage 10 of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.
- .6 Low-Emitting Materials:
 - .1 Submit listing of paints and coatings used in building, comply with VOC and chemical component limits or restriction requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Provide and maintain dry, temperature controlled, secure storage.
 - .2 Store painting materials and supplies away from heat generating devices.
 - .3 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.
 - .4 The storage temperature must never be lower than the minimum temperature recommended by the manufacturer.
- .4 Fire Safety Requirements:
 - .1 Supply 9 kg fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada (NFC) requirements.
- .5 Waste Management and Disposal:
 - .1 Waste Management and Disposal
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

- .2 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

1.5 REPLACEMENT MATERIAL

- .1 Provide the following replacement materials:
 - .1 Provide a four-liter container of each type and color of primer, primer paint and finishing paint. Identify the color and type of paint according to the color list and paint system.
- .2 Deliver spare equipment and store it at the location indicated by the Departmental Representative.

1.6 PAINT MANUFACTURER

- .1 The Departmental Representative will present his color choices from one or more manufacturers of his choice. The Contractor shall therefore, if the manufacturer chosen by the Departmental Representative is not the same as that submitted by the Contractor (insofar as the products submitted are approved by the Departmental Representative), custom manufacture the colors chosen by the Departmental Representative and submit samples for approval by the Departmental Representative, including the finish chosen by the latter.

1.7 COLORS AND SHINE CHOICE

- .1 All colors and gloss choices of paint, stain and varnish will be made by the Departmental Representative for all painted, stained or varnished elements of the project. The quantities, locations and color cuts will be entirely at the discretion of the Departmental Representative. A list of colors choice and location will be issued during the work by the latter.
- .2 The Contractor must take into account that each room may be painted in four (3) different colors (base color and accent colors) for the walls, the ceiling may also be a different color from those of the walls and doors and frames of a different color.
- .3 In 3-coat paint systems, the second coat should be tinted slightly lighter than the last, so that the different coats can be distinguished.

1.8 FACTORY-APPLIED FINISHED ELEMENTS

- .1 Unless otherwise specified on the job site or in the drawings and / or in the finish list, do not paint elements whose existing finish has been applied at the factory, such as exterior windows, aluminum entrances, lighting fixtures, stainless steel elements, pre-painted elements, pre-painted steel furniture, etc.

1.9 QUALITY ASSURANCE

- .1 Keep purchase contract, invoices, and other documents used to prove that the products and materials used for the execution of the work under the contract comply with the requirements of this section. These documents must be produced at the request of the Departmental Representative.
 - .2 The products used, either primers products, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, and others, must appear on the latest version of the MPI List of Approved Products, and all products composing the chosen paint system must come from the same manufacturer.
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- .3 Comply with the most recent MPI requirements for interior paint coating repair work, including cleaning and preparation of surfaces as well as the application of primer paint.
- .4 Quality standard: the surfaces examined must, under the final lighting provided, meet the following requirements.
 - .1 Walls: no defect should be visible from a distance of 1000 mm, at an angle of 90° to the surface.
 - .2 Ceilings: no defect should be visible from the floor when viewing the ceiling from an angle of 45°, with lighting provided by the final light source.
 - .3 The color and gloss of the last coat must be uniform over the entire surface.

1.10 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
 - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
 - .2 Co-ordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
 - .3 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.
 - .2 Test concrete, masonry and plaster surfaces for alkalinity as required.
 - .3 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.
- .3 Additional application requirements:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
 - .2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.
- .4 Interior application :
 - .1 Apply paint only if the ambient temperature can be maintained within limits recommended by the manufacturer.
 - .2 The temperature of the substrate and the ambient temperature must be within the limits prescribed in the relevant standard and by the manufacturer, to the satisfaction of the Departmental Representative.
 - .3 The substrate temperature and the ambient temperature must be at least 5°C in the case of paints with alkyd resins, and at least 7°C in the case of emulsion paints (latex). The relative humidity must not exceed 85%.
 - .4 Use temporary heating when there are no permanent means to maintain the minimum recommended temperature.
 - .5 Paint only in areas where the ambient air is free from suspended particles generated by construction work and likely to alter painted surfaces.
 - .6 Apply paint only to dry, sufficiently hardened, and properly prepared surfaces.
 - .7 Surfaces to be painted must be illuminated with at least 270 lx.
 - .8 Protect against stains and splashes all fixtures, equipment, furniture, plumbing fixtures and piping having a permanent finish: glass surface, enameled cast iron, polished brass, nickel, copper, aluminum or stainless steel. Remove, during painting, the switch and outlet plates and all surface applied hardware is installed.

- .9 In particular, protect prefinished metal decks before applying paint to underlying structural elements.
- .10 Concrete block walls and concrete slabs must have cured at least twenty-eight (28) days by the time the paint is applied.
- .11 Install protective sheets and cover the work that needs to be protected to prevent the paint from falling or damaging any surface that is likely to be soiled by the paint work.
- .5 Exterior application :
 - .1 Apply paint only when favorable weather conditions are expected, for the entire period of paint application, in accordance with the manufacturer's recommendations.
 - .2 If the surface that is to be painted is not protected, do not apply paint under the following conditions:
 - .1 The substrate temperature and the ambient temperature are below 5°C in the case of paints with alkyd resins, and below 7°C in the case of emulsion (latex) paints, or when the temperature is expected to drop to 0°C before the paint has had time to dry completely.
 - .2 The temperature of the substrate and the ambient temperature are expected to be outside the limits prescribed in the relevant standard and by the manufacturer.
 - .3 The surface temperature is above 50°C, unless the paint is designed for high temperature application.
 - .4 Snow or rain is expected before the paint has time to dry completely; fog, drizzle, rain or snow conditions prevail on the site; the relative humidity is above 85%.
 - .5 The surface to be painted is damp, wet or frosted.
 - .6 The previous coat is not dry.
- .6 Provide shelter when paint is applied in cold or wet weather, and maintain as required. Heat the substrates and ambient air to meet the temperature and humidity conditions recommended by the manufacturer. Protect surfaces until paint is dry or weather conditions are suitable.
- .7 Paint only in areas where the ambient air is free from suspended particles generated by construction work or blown by the wind and likely to alter painted surfaces.
- .8 Organize work so that painting of surfaces exposed to direct sunlight is completed early in the morning.
- .9 Remove paint from areas that have been exposed to freezing, excessive humidity, rain, snow or condensation. Prepare these surfaces again and repaint them.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 All products composing the chosen paint system must come from the same manufacturer among SHERWIN WILLIAMS, BENJAMIN MOORE & CO and SICO.
 - .2 Comply with the most recent MPI requirements for paint coatings, including those for surface preparation and application of primer or paint.
 - .3 The products used must appear on the List of approved products presented in the MPI - Architectural Painting Specification Manual.
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- .4 Mixing and tinting:
 - .1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written recommendations. Obtain written approval from Departmental Representative for tinting of painting materials.
 - .2 Use and add thinner in accordance with paint manufacturer's recommendations.
 - .1 Do not use kerosene or similar organic solvents to thin water-based paints.
 - .3 Thin paint for spraying in accordance with paint manufacturer's written recommendations.
 - .4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

PART 3 - EXECUTION

3.1 GENERAL

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheets.
- .2 Perform preparation and operations for interior painting in accordance with MPI - Architectural Painting Specifications Manual and MPI - Maintenance Repainting Manual except where specified otherwise.

3.2 EXAMINATION

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

3.3 PREPARATION

- .1 Protection of in-place conditions:
 - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative. If the surfaces in question are damaged, clean and repair them according to the instructions of the Departmental Representative.
 - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
 - .3 Protect factory finished products and equipment.
- .2 Surface Preparation:
 - .1 Any existing damaged surface must be repaired before being painted; any surface should be free of foreign material, loose paint, dirt, stains, grease or any material that does not offer a perfect bond with the paint. **Wash and lightly sand all existing surfaces to be painted. Remove the trademarks still in place on the materials.** Clean all writes on the surfaces of ducts, ducts or other paint surfaces.

- .2 Gypsum surfaces finish must be primed and painted in accordance with GA-214-96, "Recommended Levels of Gypsum Board Finish" in effect.
 - .1 Level 4 (matt paint and eggshell): No marks or ridges. Ready to receive a primer followed by wall covering, matt or velvety paint.
 - .1 Joints and interior angles: Two separate coats of compound on a level 2 finish. Tape embedded in compound and any excess removed immediately so as to leave a thin layer of compound on the tape.
 - .2 Accessories and fasteners: Three separate layers of compound.
 - .3 Surface: Joints filled and smoothed again. Apply primer before painting.
 - .2 Level 5 (satin, semi-gloss, gloss paint): Surface completely coated with a thin layer of joint compound, resulting in a smooth surface ready to receive a primer before painting
 - .1 Joints and interior angles: Two separate coats of compound on a level 2 finish. Tape embedded in compound and any excess removed immediately so as to leave a thin layer of compound on the tape.
 - .2 Accessories and fixings: Three separate layers of compound.
 - .3 Surface: Surface completely coated with a thin layer of joint compound, resulting in a smooth surface ready to receive a primer before painting
- .3 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
- .4 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
- .5 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.
- .6 Clean and prepare surfaces in accordance with MPI - Architectural Painting Specification Manual and MPI - Maintenance Repainting Manual specific requirements and coating manufacturer's recommendations and in accordance to the following standards:
 - .1 Touch-up factory primed surfaces on structural steel with a product conforming to CAN / CGSB-1.40-M89, according to CGSB 85-GP-14M.
 - .2 Prepare galvanized and zinc-plated steel surfaces in accordance with CGSB 85-GP-16M.
 - .3 Prepare masonry, stucco and concrete surfaces in accordance with CGSB 85-GP-31M.
 - .4 Prepare concrete floors in accordance with CGSB 85-GP-32M. Treat new concrete floors with muriatic acid; rinse with clean water and allow to dry completely.
 - .5 Prepare pipes and fittings in accordance with CGSB 85-GP-20M.
 - .6 Prepare plaster and plaster and gypsum board surfaces in accordance with CGSB 85-GP-33M. Fill small cracks with a leveling product.
- .7 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .8 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
 - .2 Apply wood filler to nail holes and cracks.
 - .3 Tint filler to match stains for stained woodwork.
- .9 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .10 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.

- .11 Touch up of shop primers with primer as specified.

3.4 APPLICATION

- .1 Paint only after prepared surfaces has been accepted by Departmental Representative.
 - .2 Use method of application approved by Departmental Representative.
 - .1 Conform to manufacturer's application recommendations.
 - .3 Apply coats of paint in continuous film of uniform thickness.
 - .1 Repaint thin spots or bare areas before next coat of paint is applied.
 - .4 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
 - .5 Sand and dust between coats to remove visible defects.
 - .6 Walls and ceilings paint can be applied with a roller, but cutting with a brush will be required everywhere. The paint for exposed steel and concrete framework ceilings may be applied with a gun after having protected all adjacent structures. Perfectly tape out changes in colors or paint finishes.
 - .7 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
 - .8 Finish inside of cupboards and cabinets as specified for outside surfaces.
 - .9 Finish closets and alcoves as specified for adjoining rooms.
 - .10 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.
 - .11 All materials must be applied adequately following the manufacturer's directions for use as printed on the container; any dilution required should be made as prescribed and only with the type of diluent recommended by the manufacturer.
 - .12 All materials must be carefully applied and cut so as to dry evenly and give the specified color and finish, free from drips, shiny spots, irregularities or brush marks.
 - .13 Adequate ventilation must be provided at all times so that humidity cannot rise above the dew point on the coldest wall. The contractor is responsible for maintaining temperatures, ventilation and ambient conditions.
 - .14 After inspection by the Departmental Representative, repaint without any additional cost the works whose quality has been judged by the latter to be unsatisfactory.
 - .15 Provide enough material for a minimum application of three coats of paint on each surface. Regardless of the number of coats specified, apply as many coats as needed for full coverage and uniform appearance. Apply additional coats of paint, until the shade and intensity of the color requested and approved as a sample is obtained. Each coat must be dry before applying the subsequent coat.
 - .16 Thoroughly protect adjacent surfaces against splashes, etc., with polyethylene, masking tape or other suitable materials.
 - .17 Make sure that no door sound damper strip are already attached to the jamb or cross member of the frame; remove them and put them back in place after painting.
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- .18 Procedures to be followed for painting and / or staining and / or varnishing doors and frames coordinated with section 08 00 01 - List of doors and frames. The contractor-painter must follow the following steps for doors and frames:
 - .1 The hardware installer hangs door in frame using hinges.
 - .2 The painter applies the primer and the first coat of finish on the doors and frames while protecting the visible parts of the hinges.
 - .3 The hardware installer completes the hardware installation prescribed for every door as well as their adjustment and operation.
 - .4 The painter applies his final coat of finish to the doors and frames after covering the hardware.
 - .5 The painter must pay particular attention not to apply paint on the hardware nor on the sound damper strips of the frames.

3.5 MECHANICAL/ELECTRICAL EQUIPMENT:

- .1 Paint conduits, piping, hangers, ductwork and other mechanical and electrical equipment exposed in finished areas, to match adjacent surfaces, except as indicated.
- .2 Do not paint over nameplates.
- .3 Keep sprinkler heads free of paint.
- .4 Before installing, paint both sides and edges of mounting plywood panels, intended to receive wall mounted pieces of equipment.
- .5 Paint fire protection piping red.
- .6 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
- .7 Paint natural gas piping [yellow].
- .8 Paint both sides and edges of backboards for telephone and electrical equipment before installation.
 - .1 Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .9 Do not paint the interior of mechanical equipment cabinets.

3.6 FINISH

- .1 System 1: Paint all wall and gypsum wall details as follows:
 - .1 New surface:
 - .1 1 coat of interior latex primer sealer: zero VOC formula.
 - .2 2 coats of Sherwin-Williams Promar 200HP Series B20-1900 100% acrylic interior eggshell, zero VOC latex paint or equivalent approved by Departmental Representative.
 - .2 Existing painted surface:
 - .1 Wash and sand lightly, apply 1 coat of interior latex-based primer sealer.
 - .2 2 coats of matte finish, zero VOC latex paint such as Sherwin-Williams Promar 400 B30W4651 or equivalent approved by Departmental Representative.

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- .2 System 2: Paint all gypsum ceilings and ceiling details as follows:
- .1 New surface:
 - .1 1 coat of interior latex primer sealer: zero VOC formula.
 - .2 2 coats of matte finish, zero VOC latex paint such as Sherwin-Williams Promar 400 B30W4651 or equivalent approved by Departmental Representative.
 - .3 2 coats of Sherwin-Williams Promar 200HP Series B20-1900 100% acrylic interior eggshell, zero VOC latex paint or equivalent approved by Departmental Representative.
 - .2 Existing painted surface:
 - .1 Wash and sand lightly, apply 1 coat of interior latex-based primer sealer.
 - .2 2 coats of 100% acrylic interior latex paint, zero VOC eggshell such as, Sherwin-Williams Promar 200HP B20-1900 series or equivalent approved by Departmental Representative.
- .3 System 3: Paint rigid ventilation ducts and surface electrical ducts as follows:
- .1 Step 1 (SSPC-SP1): Clean, degrease and decontaminate with a manufacturer recommended cleaner and rinse well. Repeat the process as needed, until a sound, clean surface is obtained that is free of all contaminants
 - .2 1 coat of galvanized metal latex primer: low VOC primer.
 - .3 2 coats of 100% acrylic latex paint, semi-gloss finish, zero VOC Sherwin-Williams PROIndustrial DTM B66W1251 or equivalent approved by Departmental Representative.
- .4 System 4: Paint interior zinc-plated metal surfaces as follows:
- .1 Step 1 (SSPC-SP1): Clean, degrease and decontaminate with a manufacturer recommended cleaner and rinse well. Repeat the process as needed, until a sound, clean surface is obtained that is free of all contaminants
 - .2 1 coat of interior / exterior industrial primer-sealer : low VOC primer.
 - .3 2 coats of semi-gloss finish enamel paint, ACRYLIC URETHANE water based, zero VOC Sherwin-Williams PROIndustrial urethane alkyd water-based B53-1051 or equivalent approved by Departmental Representative
- .5 System 5: Paint copper pipes and fittings as follows:
- .1 Preparation: in accordance with CGSB 85-GP-20M.
 - .2 2 coats of 100% acrylic latex finish semi-gloss, zero VOC Sherwin-Williams PROIndustrial DTM B66W1151 certified GreenGuard Gold-LEED V4.1 or equivalent approved by Departmental Representative.
- .6 System 6: Paint the concrete blocks and / or poured concrete walls as follows:
- .1 New surface:
 - .1 1 Step 1 (SSPC-SP13): The concrete and / or mortar must have cured for a minimum of 28 days before the application of the finish coating. Dry blast cleaning, wet blast cleaning, vacuum assisted blasting, as described in ASTM D 4259-18, to remove contaminants, laitance and brittle concrete, exposing voids below the surface and producing a sound concrete surface with adequate profile and porosity. Fill bubbling, air pockets and other voids with cement patch compound. Rinse well to reach a final pH between 6.0 and 9.0. Allow to dry completely before painting.
 - .2 Apply a coat of pore sealant primer.
 - .3 2 coats of 100% acrylic latex paint, eggshell, zero VOC formula such as Sherwin-Williams PROIndustrial acrylic B66-650 or equivalent approved by Departmental Representative.
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- .2 Existing painted surface:
 - .1 1 Step 1 (SSPC-SP13): The concrete and / or mortar must have cured for a minimum of 28 days before the application of the finish coating. Dry blast cleaning, wet blast cleaning, vacuum assisted blasting, as described in ASTM D 4259-18, to remove contaminants, laitance and brittle concrete, exposing voids below the surface and producing a sound concrete surface with adequate profile and porosity. Fill bubbling, air pockets and other voids with cement patch compound. Rinse well to reach a final pH between 6.0 and 9.0. Allow to dry completely before painting.
 - .2 1 coat of interior based primer sealer (stain block and undercoat) such as Sherwin-Williams PrepRite ProBlock B51-600 or equivalent approved by Departmental Representative.
 - .3 2 coats of epoxy pre-catalyzed single-copy latex paint, eggshell such as Sherwin-Williams PROIndustrial Pre-Catalyzed K46-1150 or equivalent approved by Departmental Representative.

3.7 TOUCH-UPS AND CLEANING

- .1 Remove from the building, every evening, all impregnated linens and waste; it will be forbidden to allow them to accumulate.
- .2 When work is finished, remove stains and spills from glass and surfaces that do not need to be painted, floors, walls, hardware, equipment, accessories and others.
- .3 Clean the site and leave it in a perfectly clean state.
- .4 Remove the masking papers.

3.8 EXISTING CONDITIONS

- .1 Examine existing substrates to determine if their condition may compromise the preparation of surfaces to be painted. Prior to commencing work, report to Departmental Representative, if applicable, any unsatisfactory or adverse damages, defects or conditions found.
- .2 Control moisture content of surfaces to be painted and report results to Departmental Representative. Do not start work until surface conditions are acceptable, as recommended by the manufacturer.
- .3 Maximum permissible humidity level:
 - .1 Plaster and drywall: 12%.
 - .2 Masonry / concrete: 12%.
 - .3 Concrete blocks / bricks: 12%.

3.9 APPLICATION ON EXISTING PAINTED SURFACES

- .1 Paint all walls, columns, doors, door frames and windows, and any other items already painted, as follows, unless otherwise specified:
 - .1 Wash and sand lightly, apply 1 coat of interior solvent-based primer sealer.
 - .2 1 to 2 coats of finishing paint according to the systems described above.

3.10 MIXING AND TINTING:

- .1 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.
- .2 Paint applied by spray gun to be thinned according to manufacturer's instructions. If there are no instructions on the container, obtain written instructions from the manufacturer and give a copy to the Departmental Representative.
- .3 Do not use kerosene or similar organic solvents to thin water-based paints.

3.11 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Place paint and primer defined as hazardous or toxic waste, including tubes and containers, in containers or areas designated for hazardous waste.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Contents of Division 14
 - .1 Section 14 00 00 – Additional General Conditions
 - .2 Section 14 20 06.1 – Elevators 1, 2, 3, 4
 - .3 Section 14 20 06.2 – Elevator 2s
 - .4 Section 14 20 06.3 – Elevator 5
 - .5 Section 14 90 00 – Elevator & freight elevator maintenance
- .2 Related sections
 - .1 Section 01 11 01 – Summary of work
 - .2 Section 01 14 00 - Work restrictions.
 - .3 Section 01 32 16.19 - Construction Progress Schedules - Bar (GANTT) Charts.
 - .4 Section 01 33 00 - Submittal Procedures.
 - .5 Section 01 35 29.06 - Health and Safety Requirements.
 - .6 Section 01 35 43 – Environmental Protection.
 - .7 Section 01 41 00 – Regulatory requirements
 - .8 Section 01 51 00 – Temporary utilities.
 - .9 Section 01 52 00 – Construction facilities.
 - .10 Section 01 56 00 – Temporary barriers and enclosures.
 - .11 Section 01 61 00 - Common Product Requirements.
 - .12 Section 01 73 00 – Execution.
 - .13 Section 01 74 00 – Cleaning.
 - .14 Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
 - .15 Section 01 77 00 - Closeout procedures.
 - .16 Section 01 78 00 - Closeout Submittals.
 - .17 Section 01 79 00 – Demonstration and training
 - .18 Section 01 79 00.13 – Demonstration and training for building commissioning
 - .19 Section 01 91 13 - General Commissioning requirements.
 - .20 Section 01 91 13.13 – Commissioning Plan
 - .21 Section 01 91 13.16 – Commissioning Forms.
 - .22 Section 01 92 00 – Facility operation

1.2 REFERENCES

- .1 American National Standards Institute (ANSI).
 - .1 ANSI/NEMA MG 1-2003, Motors and Generators.
- .2 Canadian Standards Association (CSA International).
 - .1 ASTM A17.1-2010/CSA B44-2010, Safety Code for Elevators and Escalators.
 - .2 CAN/CSA-B651-18, Barrier-Free Design.
 - .3 CAN/CSA-B355-09
 - .4 CAN/CSA C22.10, Quebec Electrical Code
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

- .1 Material Safety Data Sheets (MSDS).
- .4 National Building Code (NBC).
 - .1 National Building Code of Canada 2015.

1.3 PERFORMANCE REQUIREMENTS

- .1 The Contractor shall consider that the specifications are performance specifications. It includes among others the performance to be achieved, constraints and criteria to be followed, to observe the spatial requirements and quality standards that must be met.
- .2 The Contractor shall take into account in its tender that the plans and specifications represent performance to be achieved, and if some visible or hidden works not shown on the plans and / or described in the specifications are necessary for the successful completion of the work, he will be required to execute them without additional cost to the Departmental Representative.
- .3 In all cases where the singular is used in the specifications, it is understood that the same applies to the plural reference when necessary to adequately complete the installation.
- .4 In all cases where the term <supply> is used, it is understood that this also means the complete installation by the Contractor.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: submit manufacturer's printed product literature, specifications and data sheet.
 - .1 Submit WHMIS MSDS in accordance with Section 02 81 01 - Hazardous Materials.
- .3 Shop Drawings:
 - .1 Submit shop drawings to indicate project layout, including details and the following information:
 - .1 Size and location of machine and controller.
 - .2 Not used
 - .3 Not used
 - .4 Not used
 - .5 Not used
 - .6 Not used
 - .7 Not used
 - .8 Not used
 - .9 Not used
 - .10 Not used
 - .11 Not used
 - .12 Shop drawings submitted stamp by qualified professional engineer registered in Province of Quebec.
 - .13 Include on general arrangement drawings:
 - .1 Complete project references;
 - .2 All Code requirements;
 - .3 Agreement and dimensions of equipments in machine room;

- .4 Not used
 - .5 Not used
 - .6 Not used
 - .7 Signalling equipment, including cab and floor call buttons, position indicator, direction indicators and any other apparent devices;
 - .8 Not used
 - .9 Not used
 - .14 Provide wiring diagrams.
 - .2 The Contractor shall submit (4) copies of shop drawings (4 paper formats, as well as Autocad drawings file), for examination by Departmental Representative, within a reasonable time and in a logical sequence so as not to delay the works.
 - .3 The Contractor shall make the changes to shop drawings required by the Departmental Representative and must resubmit unless noted otherwise. Otherwise, the Contractor shall ensure that its changes are clearly identified on the new documents submitted
 - .4 Any changes to a drawing should be clearly identified with a cloud and a revision number.
 - .4 Samples:
 - .1 Submit two samples, complete with colour schemes, 150 x 150 mm in size, illustrating: floor material, car interior, car ceiling, car door, hoistway entrance door and frame finishes.
 - .5 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
 - .6 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .7 Instructions: submit manufacturers installation instructions.
 - .8 Manufacturers Field Services: submit copies of manufacturers field reports.
 - .9 Closeout Submittals:
 - .1 Submit the following in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Project Record Documents:
 - .1 Record actual locations of equipment, names of equipment manufacturers and suppliers, concealed conduit and boxes, concealed devices, disconnects.
 - .3 Operation and Maintenance Data:
 - .1 Include description of elevator system's method of operation and control including group supervisory control system, motor control system, door operation, signals, firefighter's service, emergency power operation, and special or non-standard features provided.
 - .2 Provide parts catalogues with complete list of equipment replacement parts with equipment description and identifying numbers.
 - .3 Legible schematic wiring diagrams covering electrical equipment installed, including changes made in final work, with symbols listed corresponding to identity or markings on both machine room and hoistway apparatus.
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- .4 Instruct Departmental Representative in maintenance of special finishes.

1.5 QUALITY ASSURANCE

- .1 Qualifications:
- .1 Installer Qualifications: company or person experienced in performing work of this section specializing in installation of work similar to that required for this project.
- .2 Health and Safety
- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle components in accordance with Section 01 61 00 - Common Product Requirements and in accordance with manufacturer's written instructions.
- .2 Packing, Shipping, Handling and Unloading:
- .1 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- .3 Storage and Protection:
- .1 Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
- .4 Waste Management and Disposal:
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).
- .4 Separate for reuse and recycling and place in designated containers Metal and Plastic waste in accordance with Waste Management Plan (WMP).
- .5 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Refer to the plans for storage areas, outside of the elevator machine room affected by the work.

1.7 WARRANTY

- .1 For the Work of Section 14 00 00 and related, the warranty period of 12 months will begin at the partial substantial work completion of each modernized elevator group.

1.8 EXTENDED WARRANTY

- .1 For the Work of Section 14 00 00 and related, the warranty period of 12 months of the first modernized elevator groups is extended until the end of the 12 months warranty period of the last modernized elevator group to achieve a common end date of the warranty.

- .2 For the Work of Section 14 00 00 and related, the warranty period of 12 months is extended to 36 months and must cover the elements which have the following defects:
 - .1 Blistering, spalling or peeling of paint due to improper surface preparation or material application.
 - .2 Opening of joints due to improper design or use of ineffective fastening devices.
 - .3 Separation, cracking or splitting of plastic laminate due to improper application to core material, or to method of fabrication which gives rise to areas of high stress concentration or which restricts normal expansion or contraction of plastic laminate.

1.9 MAINTENANCE SERVICE

- .1 Provide full maintenance service of all elevators (1-2-3-4-5-2s) as per requirements of Section 14 90 00.
- .2 Full maintenance service includes the following periods:
 - .1 Interim period, before and during the equipment modernization. The interim period will begin one week before the start of the modernization work on the first elevator group (group 1).
 - .2 The warranty period and extended warranty periods. The extended warranty periods will end 12 months following the modernization of the last modernized elevator group.

1.10 EXECUTION TIMELINE

- .1 Plan and include all costs and work in accordance with the sequences and timeframes as specified in section 01 14 00 - Work restrictions
- .2 During the entire project, always have on site the main material for the following modernization group ie for the next three elevators.

1.11 SPECIFICATIONS OWNERSHIP

- .1 All copies of plans and specifications provided by Departmental Representative are his property. They should not be used for another job and can not be copied or revised in any manner whatsoever without written authorization.

1.12 DIMENSIONS

- .1 Supply and install all the equipments to suit the dimensions specified in the specifications and the various plans.
- .2 The *Contractor* has the responsibility to check the on site dimensions as well as the site conditions.

1.13 DOCUMENT REVIEW

- .1 The Contractor shall review the project tender documents to fully assess the scope of work to be performed and the quality of materials required.
 - .2 An on site visit by the contractor is required to asses the existing conditions and work requirements and to obtain all information or clarification for the proper execution of the work.
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- .3 If the Contractor detects any errors or omissions in the specifications, the latter shall inform the Departmental Representative. Any additional costs due to a lack that will not be identified will be defrayed by the Contractor.

1.14 ELEMENTS

- .1 Unless amendment is approved, the main elements of vertical transport equipment used in this project must be new current production genuine parts.
- .2 Control devices must come from a single manufacturer.
- .3 All control devices installed in this contract shall be of the same generation or 100% compatible with each other.
- .4 The proposed systems shall have been installed in at least three buildings of similar size and be in operation for at least two years.
- .5 The Contractor shall confirm the items when submitting shop drawings.

1.15 ACCEPTABLE MATERIALS OR PRODUCTS

- .1 Acceptable materials or products: When materials or products are prescribed by their trademark, see the Instructions to Tenderers to know how to proceed for approval of materials or replacement products. Replacement product must be approved by addendum in accordance with the Instructions to Tenderers.

1.16 ACCESS TO INFORMATION STATEMENT

- .1 Before the final acceptance, submit in accordance with Section 01 78 00 Closeout Submittals to the Departmental Representative all the information relating to programming and controller components of the project.
- .2 Provide fully non-proprietary versions of all control equipment including:
 - .1 The Contractor shall submit, 10 after the award of the contract, a letter attesting that the proposed material is fully non-proprietary.
 - .2 All required diagnostics are "on board".
 - .3 All programming and diagrams required for long-term maintenance are provided with the controller.
 - .4 The controller will not shut down or alter its functionality in any way after a pre-determined increment of time or use.
 - .5 Any elevator contractor should be allowed to purchase parts, supplies, diagrams, support, or training directly from the factory at the same cost level as the original installer. A published price list shall be supplied with the controller.
 - .6 Parts including circuit boards should be available for direct purchase from the factory in numbers and not on an one-for-one "exchange only" basis.
 - .7 Provide a written warranty from the manufacturer of the control equipment stating that software and firmware updates will be provided free of charge to the Owner for the entire useful life of the equipment.
- .3 Provide 3 copies of the final version of the controllers program on CD-ROM as well as the access codes associated to it. Also provide all the tools (programming console, access codes, cable, and operation manual etc.) to access the controller's programming internal coded modules. The elevator installer or supplier shall in no case insert locks or password restricting access to the programming or operation of equipment. If the contract is terminated, provide the Owner with a hard copy of the access codes and access tools of

devices or components requiring such codes or tools for their commissioning, programming or other purposes.

- .4 The Contractor agrees to the following: In the event of termination of maintenance service with the installer of the equipment, the Contractor and the supplier shall undertake to provide expertise on demand for equipment repair and adjustment and replacement parts within 48 hours, for a period of 15 years following the installation of equipment, with pay for labor and parts to the market price. This applies to parts having a right of property <patent> and / or not available elsewhere than at the original manufacturer <installer> equipment.
- .5 The Contractor agrees to the following: In the event of termination of business or bankruptcy of the installer of the equipment or its supplier, the latter shall provide, with compensation, all information relating to programming and components of control devices of the project.

1.17 WORK NOTIFICATION

- .1 The Contractor shall after the end of Work, report them to the RBQ (Régie du Bâtiment du Québec) within the time they prescribed. A copy must also be sent to Departmental Representative.

1.18 SUPPLIERS LIST

- .1 The Contractor shall submit with the Bid all the names of suppliers and products and proposed models for the main components, including motors, control equipment, door systems and signalling devices.

1.19 TRADEMARKS

- .1 Trademarks are not allowed on equipment apparent to the public.
- .2 Identify clearly within the controller cabinet in the control room, the name of the elevator company that has completed the installation of the equipment.

1.20 PLANS AND SPECIFICATIONS ON SITE

- .1 Throughout the construction period, keep on site, for reference by mechanics, an updated and approved by Departmental Representative copy of the plans and specifications.

1.21 COORDINATION

- .1 Coordinate the work with the Departmental Representative and other trades in accordance with the project schedule.
 - .2 Store new materials in areas designated by Departmental Representative.
 - .3 Provide all the workspaces protection to ensure the safety of workers, technicians, occupants and the public.
 - .4 Coordinate work with other trades to minimize the impact of these activities on the property. The work must minimize disruption of building activities. In some cases, the Departmental Representative may request that certain tasks be done at a specific time and at no additional cost.
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1.22 PREVENTIVE MEASURES

- .1 The Contractor shall perform and comply with the procedures described below, for all the work of this project.
 - .1 The Contractor shall perform the work using methods that minimize dust generation during construction / renovation;
 - .2 Contractor, in addition to solid wall, shall seal unused doors with adhesive tape to partition the work area;
 - .3 The Contractor shall seal the exhaust vents and air supply in the areas of construction / renovation. A strict protocol must be adopted on this subject considering the activities of the Owner involving the presence of several laboratories called clean rooms;
 - .4 When construction workers must use public areas of the building, they shall clean themselves on the work site, and be sure to remove most of the dirt and dust on their clothes and shoes.
 - .5 When the contractor circulate in the building, he is responsible for cleaning his dirt.

1.23 SAFETY MESURES

- .1 This article states the minimum standard and does not limit in any ways the responsibilities and obligations of the Contractor. In case of conflict between the security measures set out below and the established practices of the Departmental Representative, the established practices of the Departmental Representative have precedence. The Departmental Representative may at its sole discretion, impose additional standards of safety.
 - .1 The Contractor shall not use the materials, tools and equipment belonging to the Departmental Representative without the consent of the latter.
 - .2 Departmental Representative may, at its discretion and according to his instructions, suspend or terminate the work of the Contractor for reasons of security without liability to Departmental Representative or any compensation for the Contractor. The instructions and stop work shall be recorded by the Contractor and the Departmental Representative, they will agree on the date and method of resumption.
 - .3 The Contractor shall provide and install quality warning signs and temporary solid walls partition at the two (2) lower levels and the upper level delimiting the workspace when the work is done in public areas or hamper public traffic. Temporary partitions must have solid walls and be high enough to cover the space between the floor and ceiling. Access door must be closed with a padlock.
 - .4 The Contractor shall provide and install quality warning signs and temporary partitions (barricades) with a minimum height of 42 inches for the protection of public areas for work done at any other floor.
 - .5 The Contractor shall submit, for approval by the Departmental Representative, the workspaces perimeter for each elevator. It is understood that these workspaces must be relatively small in public areas or when hindering public traffic areas.
 - .6 The Contractor shall provide and install adequate protections to prevent fall of equipment, tools and other over the entire length of the elevator hoistway.
 - .7 The Contractor has the responsibility to inform the Departmental Representative of any hazardous or unsafe conditions, and in the shortest possible time.

1.24 SECURITY MESURES - HOT WORK

- .1 The Contractor must follow the procedures outlined in the building orientation guide.

1.25 SECURITY MESURES – CONFINED SPACE

- .1 The Contractor must evaluate each of the existing confined spaces on its work site depending on the nature of its interventions and as a function of his work (welding, gas, paint, etc.). The evaluation forms used must contain at least the information required in the form FEL 104. The contractor shall transmit the risk assessment forms to Departmental Representative at least 5 days before the date set for entry into these confined spaces. He should include all costs for the measures to be taken, monitored and strictly enforced in order to meet safety requirements for confined spaces.

1.26 SITE CLEANLINESS AND SAFETY

- .1 Throughout the duration of the work, protect and keep clean the machine room and equipment therein, the elevator cab and the public areas.
- .2 Prior to Commissioning and in order to obtain acceptance with and / or without reserve, public areas, the elevator hoistway and machine room shall be cleaned and closed at the satisfaction of the Departmental Ministerial.

1.27 OPENING AND ACCESS TO WORK

- .1 The Contractor is responsible for the following:
 - .1 All openings or leveling compounds necessary for the performance of this contract is to be performed by the Contractor.
 - .2 Any opening in wall or ceiling, necessary for the execution of the work is to be performed by the Contractor.
 - .3 The Contractor shall obstruct and return to the original state components wholly or partly demolished.

1.28 CONTRACTOR FAILURE

- .1 In the event of the Contractor inability to do correctly the work described in the specifications, or correct operating problems, the Departmental Representative reserves the right to perform the work by others at the expense of the Contractor.
- .2 Should any problem causing a serious delay on the original schedule, the Departmental Representative will give a written 10 days notice to the Contractor to avail the clause above.

1.29 MANUALS

- .1 Prior to the commissioning of first modernized elevators group, submit in accordance with Section 01 78 00 - Closeout Submittals the operation and maintenance manuals.
 - .2 Provide a minimum of three (3) copies of the manuals bound in binders with dividers and tables of contents as well as a Portable Document Format (PDF) version on CD-ROM and USB key.
 - .3 Include in these manuals, a technical description of all system components and approved shop drawings.
 - .4 Include a complete list of spare parts to drawing and identification number.
 - .5 Provide the parts list including their average useful life and addresses of suppliers.
-

- .6 Include a detailed description of special systems such as fire recall and emergency power.
- .7 Not Used
- .8 Include in the maintenance manual a schedule of routine work required as part of preventive maintenance.

1.30 ELECTRIC DIAGRAMS

- .1 Prior to commissioning, submit in accordance with Section 01 78 00 - Closeout Submittals copies of the as-built wiring and schematic diagrams.
- .2 Provide a minimum of three (3) printed copies of the diagrams as well as Portable Document Format (PDF) and CAO (in AutoCAD format) version on CD-ROM.
- .3 Display plasticized copies of the electrical diagrams, approved by an engineer, in the machine room.

1.31 TECHNICAL FORMATION

- .1 Prior to commissioning, organize with the Departmental Representative training sessions covering the equipment operation.
- .2 These training sessions should cover the operation of the above systems:
 - .1 Not Used
 - .2 Not Used
 - .3 Not Used
 - .4 Emergency Recall
 - .5 Emergency power
 - .6 Various switches and other.

1.32 TEST DATA FORMS

- .1 Prior to commissioning, submit in accordance with Section 01 91 13.16– Commissioning Forms, the test data forms.
- .2 Perform all tests required by Section 8 of the ASTM A17.1-2010/CSA B44-2010 Code and or any other test requested by the competent authorities.
- .3 Provide the Departmental Representative the test certificates issued by the competent authorities.

1.33 ASSISTANCE FOR INSPECTIONS

- .1 During the supervision and coordination of the work by the Departmental Representative throughout the project, provide good collaboration to ensure satisfactory execution.
 - .2 An inspection of the elevator will be made by the Departmental Representative to verify compliance with the specifications requirements.
 - .3 Provide a team of trained mechanics to help the Departmental Representative in the course of these inspections.
-

- .4 Arrange to perform the required emergency manoeuvre and emergency power operation tests in the course of these inspections in collaboration with the project electrician.
- .5 Provide the Departmental Representative a complete set of keys for the tests to be done during his inspection.
- .6 In the event that the said works are not corrected by the date agreed in writing by the Contractor, all costs related to a second inspection will be at the Contractor expense.

1.34 ACCEPTANCE PROCESS

- .1 Prior to Commissioning and in order to obtain acceptance with and / or without reserve, public areas, the elevator hoistway and machine room shall be cleaned and closed at the satisfaction of the Departmental Ministerial.
- .2 Inform in writing the Departmental Representative, one (1) week in advance, of the proposed date for the elevator inspection.
- .3 Prior to the inspection of the Departmental Representative, provide the test data forms.
- .4 Plan a second execution of the tests along with the Departmental Representative during the inspection of the elevator.
- .5 The Contractor shall perform, at its expense, all testing and provide the necessary support team for assistance during inspections of the Departmental Representative.
- .6 An inspection of the elevator will be made by the Departmental Representative to verify compliance with the specifications requirements.
- .7 Following the issuance of the list of deficiencies, the Contractor will have a maximum of 30 days to correct the deficiencies.
- .8 The final acceptance will be done after the correction of all deficiencies issued by the Departmental Representative and before the warranty period of the equipment.

1.35 BREAK-IN PERIOD

- .1 Plan a 5 days break-in period before the shutdown for modernization of another elevator. This period will be used to identify anomalies and fix problems that may arise. All elevators in the group shall be operational during the break-in period.

1.36 BARRIER-FREE

- .1 Provide all requirements for Barrier-Free operation listed in Appendix E of the CAN/CSA-B44-07 Code and CAN/CSA B651-12 standard.

Part 2 Products**2.1 NOT USED**

- .1 Not Used.
-

2021-01-19

Page 12

Part 3 Execution**3.1 NOT USED**

.1 Not Used.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Related sections
 - .1 Section 14 00 00 – Additional General Conditions

1.2 SYSTEM DESCRIPTION

- .1 Modernize the existing elevators as described in the following tables and the requirements of this section:
 - .1 (1) existing elevator (no 1) hydraulic type with inground cylinder.
 - .2 (1) existing elevator (no 2) hydraulic type with inground cylinder.
 - .3 (1) existing elevator (no 3) hydraulic type with inground cylinder.
 - .4 (1) existing elevator (no 4) hydraulic type with inground cylinder.
- .2 The following requirements must be met for all elevators described in this section:
 - .1 Barrier-Free in accordance with CAN/CSA B651-18, Barrier-Free Design.
 - .2 Bilingual Markings:
 - .1 Provide identification and instructions on operating panels and on signal equipment in English and French except where design is such that inference is obvious and readily understood.
 - .3 Retain existing car speed and capacity.
 - .4 Provide equipment to suit the existing hoistway and machine room dimensions.
 - .5 Check all dimensions on site.
 - .6 Design and modernize elevator in accordance with ASTM A17.1-2010/CSA B44-2010, local codes and regulations.

.3 Existing system – Elevators #1, 2, 3, 4

System BEFORE modernization:

Unit number :	1, 2, 3, 4
Designation :	Passengers
Installation date :	1992
Floor served :	Elev 1, 2, 3 : 3 stop : 1, 2, 3 Elev 4 : 4 stop : 1, 2, 3, 4
Nominal speed :	125 fpm
Capacity :	Elev 1, 3, 4: 2500 lb Elev 2 : 4000 lb
Machine manufacturer :	Otis
Machine type :	Hydraulic - submersible, inground cylinder
Motor manufacturer :	Leroy Sommer
Controller manufacturer :	Otis
Controller type :	Relay
Dispatch type :	Simplex
Door type :	Elev 1, 3, 4 : Center opening one speed Elev 4 : Side Opening 2 speed
Door dimensions :	Elev 1, 3, 4 : 42" X 84" Elev 2 : 48" X 84"
Door fire rating :	ULC 1h1/2

Car equipment description**Fixture**

Position indicator	Digital
Car lantern	Provided
Arrival gong	
Floor gong	
Voice synthesizer	Not Provided
Button - height	Conform
Button - model	Otis
Braille	Provided
Independant service	Provided
Emergency In-car Operation	Not Provided
Communication system	Provided (intercom)

Equipment

Emergency light	Provided
Door protection	Infrared
Handrail	3 sides
Handrail - height	Conform
Door operator	Otis
Interlock	Otis
Car guides	Roller
Inspection unit	Not Conform
Refuge area	Provided

Hall equipment description**Fixture**

Position indicator	Digital
Hall lantern	
Gong	
Button - height	Conform
Button - model	Otis
Braille	
Emergency Recall	Not Provided
Operation	
Emergency power	Provided (elev 3, 4)
Battery backup	Provided (elev 1, 2)

Equipment

Interlock	Otis
Door track	Otis
Door closer	Enrolling
Door fire pin	Bottom & Top
Mechanical access	Provided (lev 1, 2)
Electrical access	Provided

1.3 PERFORMANCE REQUIREMENTS

- .1 Codes and Regulations
 - .1 Design, supply and install all equipment in accordance with the latest editions of the ASTM A17.1-2010/CSA B44-2010 Code (update included), CAN/CSA-B651-18 Code and any other federal, provincial and municipal regulations applicable for this type of installation, including the National building Code of Canada and the Quebec Electrical Code.
 - .2 Driving Force
 - .1 Equipment driving force must comply with existing systems. In the case of non-compliance of the driving forces the Contractor shall assume all costs associated with this change (electrical, air conditioning, etc.).
 - .3 Controller
 - .1 Provide Simplex Collective Selective microprocessor controls.
 - .2 Elevator controller systems must not be equipped with a programmable logic controller and of a generic type.
 - .4 Hall Calls
 - .1 Elevators to answer hall calls during working day; within following times:
 - .1 38% of calls within 10 seconds maximum.
 - .2 63% of calls within 20 seconds maximum.
 - .3 80% of calls within 30 seconds maximum.
 - .4 88% of calls within 40 seconds maximum.
 - .5 93% of calls within 50 seconds maximum.
 - .6 95% of calls within 60 seconds maximum.
 - .5 Call Sequence
 - .1 Provide a control system managing car and hall calls in ways to minimize overall average waiting time.
 - .2 Upon arrival at destination floor, the call must be canceled.
 - .3 Do not permit registration of car calls behind the running position of an elevator.
 - .4 Cancel all car calls in situation of excessive car calls according to cab occupation.
 - .6 Direction Sequence
 - .1 The elevator starts when one or more car or hall push buttons are activated, other than the one where the elevator stands. The cab stops at the first call from cab or hall depending on the travelling direction.
 - .2 The elevator should answer all car and hall calls; it should stop at every called floor, in numerical order, depending on the travelling direction. The call should have been made some time before the elevator gets to this floor.
 - .3 If no order from the cab has been made, the cab travelling in up direction to answer calls for down direction should stop at the top floor where a call has been registered, reverse elevator direction, and answer all floors requested, in decreasing numerical order. The opposite should occur when elevator is travelling down to answer up calls.
 - .4 The elevator answering a car call will be designated to answer the hall call at this level in the opposite direction given this elevator has not been assigned more call in its direction of travel.
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- .7 Parking
 - .1 Not Used
 - .8 Fault recovery
 - .1 Recall an elevator to the nearest floor and open door when an operation fault is detected within the system.
 - .9 Pre-opening
 - .1 Provide advance opening operation of the car doors.
 - .2 Ensure that the door will initiate the opening cycle at a maximum of 75mm from the landing floor.
 - .10 Speed Control System
 - .1 Ensure that the average acceleration is not less than 0.60 meter per square seconds and not exceeding 1.1 meter per square second.
 - .2 Ensure that the rate of change in acceleration does not exceed 1.8 meter per cubic second.
 - .3 Ensure that the car stop and start smoothly.
 - .11 Door Operation
 - .1 Provide smooth door open and close cycle.
 - .2 The doors shall open automatically when the car arrive at a landing floor.
 - .3 The doors shall reopen when the door protective devices are activated.
 - .4 Arrange that when the door protective devices are activated for more than 20 seconds continuously, a nudging buzzer signal be activated
 - .5 Arrange that and the door closes at reduced torque and speed when the door protective devices are activated for more than 20 seconds.
 - .6 The door speed must be reduced in half when the doors are closing and the reopening device has been rendered inoperative by the fire recall.
 - .12 Performance levels
 - .1 Design and adjust the equipment to meet the following performance levels:
 - .1 Operating time shall be as follows. Measure from the time doors closing cycle begins until doors are three quarters opened at next floor, assuming a maximum floor height of 4000mm.
 - .1 Up: 14.5 seconds
 - .2 Down: 14.5 seconds
 - .2 Door open and close time equal to values shown below.
 - .1 Open: 3.0 seconds
 - .2 Close: 4.0 seconds
 - .3 Door dwell time in response to a car or hall calls equal to values shown below.
 - .1 Car call : 2.0 seconds
 - .2 Hall call : 3.0 seconds
 - .4 Speed variation shall not exceed 5% of nominal value.
 - .5 Door noise level shall not exceed +6 dBA higher than ambient noise.
 - .6 Car running noise level shall not exceed +6 dBA higher than ambient noise.
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- .7 Machine room noise level shall not exceed 75 dBa, as measured when one elevator is running.
 - .13 Levelling
 - .1 Ensure automatic levelling of the car at reduced speed in both up and down directions.
 - .2 The automatic levelling will be made with an accuracy of 6 mm unrelated to the car load.
 - .3 The levelling of the car sill compared to hall sill should not exceed +/- 6mm in either direction as long as the car is in the levelling zone.
 - .14 Independent service
 - .1 Provide in-car independent service operation.
 - .2 Cancel door protective device operation.
 - .3 Cancel hall button operation.
 - .4 Cancel hall lanterns operation.
 - .5 When the car is parked doors must remain open.
 - .6 Elevator will be control only from inside the car.
 - .7 Elevator may respond to car calls only once the full closing of the door, by maintaining a constant pressure button "CLOSE" or the button corresponding to the desired level.
 - .8 Arrange that the doors will reopen if the door "CLOSE" button is released prior to elevator motion.
 - .15 Emergency Operation
 - .1 Provide Emergency Recall Operation - Phase I in accordance with ASTM A17.1-2010/CSA B44-2010 Code.
 - .2 Provide Emergency In-car Operation - Phase II in accordance with ASTM A17.1-2010/CSA B44-2010 Code.
 - .16 Emergency Power Operation on battery lowering system – Elevators 1 & 2
 - .1 Provide lower level as elevator stop level.
 - .2 The system must allow the opening of the main hydraulic valve for a controlled descent of the elevator to the lower level.
 - .3 Once the car is parked, the system must open the car doors.
 - .4 The opening of the car doors must be possible at all times from inside the car.
 - .17 Emergency Power Operation – Elevators 3 & 4
 - .1 Emergency power will be available for all elevators.
 - .2 Provide Emergency Power Operation in accordance with ASTM A17.1-2010/CSA B44-2010 Code and as describe below.
 - .1 Two signals indicating the normal and emergency power connecting dry contact relay will link the transfer switch and the controller. A pre-transfer signal will be given by these signals
 - .2 A normally close circuit will be opened when normal alimentation is lost. When it's open, recall the elevators sequentially (1 elevator per group) to the recall level and open the door.
 - .3 Not used
 - .4 Once the sequence recall is complete, elevators must run automatically on emergency power as follows:
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- .1 Elevator No 3: elevator will remain available on emergency power for public use.
 - .2 Elevator No 4: elevator will remain available on emergency power for public use.
 - .5 Management of the recall sequence will be provided by the elevator controller.
 - .6 Not used
- .18 Car intercommunication system
 - .1 Provide connection to the existing bilateral intercommunication system.
- .19 Access control
 - .1 Not used

Part 2 Products

2.1 MACHINE – HYDRAULIC SYSTEM

- .1 Remove existing hydraulic machine
 - .2 Supply and install a hydraulic power unit located in the machine room, meeting the requirements of ASTM A17.1-2010/CSA B44-2010 code and according to the following requirements:
 - .3 Supply and install a power unit, dry unit type, designed and manufactured for the use of hydraulic elevator.
 - .4 Provide AC motor specially designed for 80 starts per hour duty.
 - .5 Supply and install a motor with maximum temperature of 50°C and minimum class B insulation.
 - .6 Motor start-up shall be made by an electronic soft-start.
 - .7 The oil tank must be a minimum 11 gauge.
 - .8 Supply and install a pulsation free screw type of pump directly coupled with the motor design for silent operation.
 - .9 Supply and install a uniform flow, pulsation free pump.
 - .10 Supply and install a manual shutoff valve between the pump and the hydraulic cylinder located near the unit.
 - .11 Supply and install a relief valve located between the pump and the check valve. It must be installed so it can not be isolated from the hydraulic system.
 - .12 Supply and install a check valve capable of holding the car with its rated load when the pump stops.
 - .13 Supply and install a manual lowering valve located on the control valve to allow lowering the car at a maximum speed of 0.10 m/s. This valve must be marked to indicate the down direction.
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- .14 Supply and install a pressure gauge with shut-off valve on the cylinder side of the check valve or magnetic valves speed control system.
- .15 Supply and install a flow restrictor.
- .16 Supply and install a graduated glass tube type oil level gauge.
- .17 Supply and install a self-cleaning filter system inserted on the hydraulic line in the pit.
- .18 Supply and install a speed control system controlled by magnetic valves regulators.
- .19 Provide new hydraulic fluid, with a flash point of at least 190°C specifically designed for this duty.
- .20 Install a protection against tank oil overheating. If oil overheats, park the car at the nearest lower floor until temperature return to normal.
- .21 Supply and install dripping oil tray under the pump to collect leakage.
- .22 Paint all metal non machined surfaces.
- .23 Identify hydraulic components and install a plate detailing the adjustments to the hydraulic system as required by ASTM A17.1-2010/CSA B44-2010 code.

2.2 HYDRAULIC OIL

- .1 Perform complete change of existing hydraulic oil.
 - .1 Perform an analysis of PCB congeners (full test for 41 types of PCBs) by a specialized laboratory on a sample to determine the presence of such contaminants in the existing hydraulic oil to measure and assess the environmental risk of the existing facility.
 - .2 Dispose of existing hydraulic oil according to the environmental laws of the Province of Quebec.
- .2 Provide new hydraulic fluid, with a flash point of at least 190°C specifically designed for this duty.

2.3 HYDRAULIC LINE

- .1 Remove existing hydraulic line.
- .2 Supply and install hydraulic pipes between the cylinder and the power unit with a minimum diameter of 50 mm.
- .3 Supply and install vitaulics joints.
- .4 Provide spacings for hydraulic pipe supports according to table 8.4.11.3 of ASTM A17.1-2010 / CSA B44-2010 code for the seismic condition.
- .5 Provide permanent fixings for hydraulic pipe supports.

2.4 MAGNETIC VALVES SPEED CONTROL SYSTEM

- .1 Remove existing equipments
-

- .2 Supply and install a speed control system controlled by magnetic valves regulators.
- .3 Provide manual lowering valve, a check valve, pressure gauge and pressure gauge connection, safety valves, safety restraint valve, level and tank stop valves.
- .4 Provide each valve with its own adjustment device.
- .5 The system must allow the fluid to be pumped directly into the cylinders at the required pressure and at a sufficient rate so as to move the load at the rated speed.
- .6 Ensure a smooth and uniform accelerations and decelerations.
- .7 Ensure the voltage of the module according to existing power line.
- .8 Make any required changes to the conduits for the installation module.
- .9 Do not make splice. Replace existing wiring between the module and the controller.
- .10 Ensure that the average acceleration is not less 0.6 m per square second and not exceeding 1.1 m per square second.
- .11 Perform any required adaptation work.

2.5 LOW-LEVEL OIL CONTROL

- .1 Supply and install a low-level oil control to recall the elevator to lowest level when car is travelling up and is running short of oil.
- .2 The system will send an alarm to the controller.

2.6 OIL HEATER

- .1 Supply and install a hydraulic oil heater to be connected on a 120V, 30A disconnect switch.
- .2 The system shall be equipped with a thermostat to control the temperature of the hydraulic oil at a set value.

2.7 OIL COOLER

- .1 Not Used

2.8 CYLINDER AND PLUNGER - EXISTING

- .1 Remove existing cylinder and plunger:
 - .1 Secure the car at the upper part of the hoistway.
 - .2 Remove plunger.
 - .3 Remove the cylinder from the ground (if necessary, use water or other technique to release the sand that lies at the bottom).
- .2 The contractor must include an allocation of 15 000 \$ in its bid for the pumping of residual liquids.

- .3 Pumping residual liquids due to the work of this division and clearing debris will be done by the contractor at the expense of the Departmental Representative. A margin of 10% profit and administration are allowed on pumping costs. Submit supporting documents.
- .4 In the case of presence of residual liquid not due to the work of this division, the cleaning work will be done by the contractor at the expense of the Departmental Representative. A margin of 10% profit and administration are allowed on pumping costs. Submit supporting documents.
- .5 In case of additional drilling is required, the contractor shall have the responsibility and costs will be paid by the Departmental Representative. The Departmental Representative reserves the right to expertise to evaluate and accept the extra costs.
- .6 Remove existing cathodic protection.

2.9 CYLINDER AND PLUNGER - NEW

- .1 Supply and install a new plunger.
 - .1 Provide a plunger with diameter and thickness to comply with the requirements of CAN/CSA-B44-10 code for the car travel and rated load.
 - .2 Fabricate the plunger with steel tubes, perfectly bored and having an outside finish surface of 0.0008 mm.
 - .3 Inner plunger must be made of adjustable soft steel.
 - .4 Provide a locking ring on the plunger to hold it inside the cylinder at all times.
 - .5 Do not install follower guides on the plunger.
- .2 Supply and install a new cylinder (including head) with a safety wall diameter and thickness in accordance with the regulations 302.3g of ANSI A17.1 standard and the requirements of article 3.18.3.4 of ASTM A17.1-2010/CSA B44-2010 code.
 - .1 Provide a device in the cylinders to adjust from outside the tension of package and inner pistons using a conventional key without having to do any disassemble the cylinder.
 - .2 Provide the cylinder head with a new gland with self-adjusting seal or packing.
- .3 Install the cylinder and plunger assembly plumb to minimize the friction at the head joint.
- .4 When it is necessary to weld the cylinder and pressure piping, first prepare the joints, and then solder in the approved manner. The work must be done by properly qualified welders.
- .5 Engineer reserves the right to submit welds to radiographic or other non-destructive process. In the case of negative testing result the Contractor shall carry out corrective work and assume the costs associated with this test and the following.

2.10 CYLINDER PROTECTION AGAINST CORROSION

- .1 Determine when the existing cylinder is removed from the hole, if the size of the existing hole allows the installation of a rigid PVC casing.
 - .2 If the size of the existing hole allows the installation of a rigid PVC casing, the article < Rigid PVC casing > applies.
 - .3 If the size of the existing hole do not allows the installation of a rigid PVC casing, the article < Flexible liner - Alternative > applies.
-

- .4 Rigid PVC casing
 - .1 Supply and install a PVC casing designed to protect the cylinder against corrosion or other deterioration phenomenon.
 - .2 Supply and install PVC casing with appropriate diameter for the new cylinder.
 - .3 Supply and install PVC casing sealed at both ends to protect the cylinder.
 - .4 Provide a vent at the top of the PVC casing to allow moisture removal.
- .5 Flexible liner - Alternative
 - .1 Applies only if size of the existing hole does not allow adequate installation of a rigid PVC casing.
 - .2 Provide a flexible protective liner, JACK-IT[™] Hydraulic Jack Liner by Laird Plastics, with appropriate diameter for the new cylinder designed to protect the cylinder against corrosion or other deterioration phenomenon.

2.11 CYLINDER BASE

- .1 Supply and install a new structural base for the cylinder and buffer made of steel elements. Paint the assembly with two primers coat and a black anti rust paint.
- .2 Enlarge the hole at the base of the cylinder (on the floor) if necessary to install the new cylinder.
- .3 Redo the pit floor finishes around the cylinder with quick setting cement.
- .4 Make a new concrete base between the cylinder supports with quick setting cement.
- .5 The Contractor is responsible for providing adequate seal between the floor, the concrete base and cylinder.
- .6 Clean and scrub the floor to remove any traces of oil.

2.12 OIL RETURN

- .1 Supply and install a pump oil return fitted with a filter connected to the head of cylinder.
- .2 Ensure the pump is properly anchored to prevent it from being moved or overturned by an accumulation of water in the pit.
- .3 Ensure the pump includes a water detection device to stop pumping in case of water infiltration in the pit.

2.13 SAFETY STOP FOR MAINTENANCE

- .1 Supply and install a complete safety stop system for maintenance in the elevator pit including the following requirements and elements:
 - .2 Design the maintenance safety stop system to allow safe access to the workspace in the pit. The access maneuver must be capable of being performed by a single elevator mechanic.
 - .3 Provide and install the connection and programming of this maneuver to the elevator controller.
 - .1 When the posts are in place in the fixed bases, only allow movement of the car using the inspection device.

- .4 Supply and install two posts meeting the following requirements:
 - .1 The length of the posts must allow their handling by a single mechanic.
 - .2 The posts must be able to support the weight of the car.
 - .3 Provide the lower end with a key of at least 50 mm in length allowing the post to be properly positioned in its fixed support.
 - .4 Provide the upper end of the post with a 12mm thick plate which will serve as a support for the lower car frame.
 - .5 Paint the posts yellow
 - .6 When the car rests on the posts, access to the pit must be restricted.
- .5 Supply and install two fixed bases meeting the following requirements:
 - .1 Provide bases composed of a minimum 450mm high tube to ensure the stability of the posts and a minimum 10mm thick base plate.
 - .2 Provide the fixed bases with a keyway allowing the correct positioning of the post in its fixed support.
 - .3 Equip each fixed base with a switch to send a signal to the controller when the posts are in place in the fixed bases. The switch used must be a robust model of the same type as the limit switches installed in the duct.
 - .4 Position the fixed bases on each side of the shock absorbers.
 - .5 Permanently fix the bases on the floor of the pit.
 - .6 Paint with a water-based polyurethane paint (odorless).
- .6 Provide and install an inspection device in the pit that meets the following requirements:
 - .1 Provide and install near the access ladder a portable device, yellow, for maneuvering at inspection speed with constant pressure buttons. Provide the following buttons:
 - .1 Up
 - .2 Make active
 - .3 Down
 - .4 Start / stop
 - .5 Normal / inspection
 - .6 Emergency stop (mushroom type)
 - .2 Provide a sufficient length of mobile wiring to maneuver from the landing.
 - .3 Provide a fixed location, easily accessible, on one of the walls to store the portable device and wind up the mobile wiring
 - .4 Provide for the connection of the portable device to the controller.
 - .5 Provide a interlock between the two inspection devices (cabin roof and mechanical room). When one device is active, the second device cannot take control of the elevator.
 - .6 Supply and install all the wiring required to connect this device to the controller.

2.14 CONTROLLER CABINET

- .1 House the controller in a metal cabinet with hinged doors.
 - .2 Controller cabinet shall be NEMA Type 1.
 - .3 The controller cabinet shall be made with material limiting propagation of sound in the control room.
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- .4 Provide in the controller cabinet, two fans to ensure proper ventilation of the cabinet.
- .5 Provide the controller cabinet, lighting compact fluorescent type and an electrical outlet service unit.
- .6 Coordinate cabinet size according to available space.
- .7 Provide dimensions and layout of control devices at the beginning of the project for approval.

2.15 CONTROLLER

- .1 Supply and install generic non-proprietary controller compatible with hydraulic system.
 - .2 Motor start-up shall be made by an electronic soft-start.
 - .3 Install a low-level oil control to recall the elevator to lowest level when car is travelling up and is running short of oil. Design control so that the oil tank is filled before the car can be returned to service.
 - .4 Design the controller to recall the elevator to lowest level when car is travelling up and there is a failure due to relay, a valve, or to a lack of oil.
 - .5 Ensure redundancy of safety systems and power circuits as required by ASTM A17.1-2010/CSA B44-2010 code.
 - .6 Upon detection of a system failure or malfunction, the elevator will be stopped at the nearest floor and open its doors until a reset is done by a technician.
 - .7 Provide a system that can normally operate in an ambient temperature range of 3°C to 40°C.
 - .8 Insulate external signals, such as the hall and car calls, using optical devices. Do not use electro-mechanical relay for these circuits.
 - .9 Provide a digital position indicator in the controller.
 - .10 Provide a protection device against phase reversal and phase loss.
 - .11 Provide a separate power supply for each printed circuit board.
 - .12 Provide a ground connected in parallel to the building ground for each printed circuit board.
 - .13 Do not install electronic boards near heat dissipating resistance.
 - .14 Electro-mechanical relays used shall have a minimal lifespan of 25 years.
 - .15 Make all connections to properly permanently identified terminals.
 - .16 Properly identify relays, contactors, fuses and other components.
 - .17 Provide an errors recording device with a capacity of 30 days reading.
 - .18 Provide a digital clock with multiple programmable alarms.
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- .19 Provide, permanently in the controller, all necessary tools (communication port for access) to view programming, fault identification and history.
- .20 Provide with the maintenance manuals, the controller programming and all related software.
- .21 Identify the applicable elevator code inside the cabinet.
- .22 Identify the controller using a number.

2.16 CONTROLLER – GROUP DISPATCH

- .1 Not Used.

2.17 CONTROLLER – INSPECTION AND TEST PANEL

- .1 Supply and install an inspection and test panel as required by ASTM A17.1-2010/CSA B44-2010 Code (art 2.7.6.5) including among others the following items:
 - .1 Stop switch.
 - .2 Visualisation panel as required in article 2.7.6.4.1 of the ASTM A17.1-2010/CSA B44-2010 code providing the following information: position, direction of travel, operating status (stop/run), door status (opened/closed), door unlocking zone, speed and operating mode (automatic / independent / recall).
 - .3 Auxiliary power source (4 hours autonomy) for the visualisation panel.
 - .4 «CAR DOOR BYPASS» and «HOISTWAY DOOR BYPASS» switches.
 - .5 Devices for the manual reset of the detection means for ascending car overspeed protection and protection against unintended car movement
- .2 House the device in the controller cabinet

2.18 CONTROLLER – COMMUNICATION MODULE

- .1 Not Used.

2.19 CONTROLLER – ACCESS CONTROL

- .1 Not Used.

2.20 PROTECTION AGAINST ELECTROMAGNETIC FIELDS

- .1 Provide adequate immunity of electronic components against interference and influences due to the surrounding electromagnetic fields to eliminate any source of interference. The equipment shall comply with the standard EN12016 Part 2.

2.21 NOISE CONTROL

- .1 All rollers and guides shall be designed and adjusted for silent operation.
 - .2 The door operation mechanisms shall incorporate resilient bumper in order to eliminate the impact sound when doors reach the end of their opening and closing movement.
 - .3 Provide two flexible type connections to prevent contact between sections of metal pipes.
 - .4 Mount the pump on anti-vibration pads to reduce noise transmission to the power unit and the building structure.
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- .5 The pump/tank unit of the hydraulic circuit must be mounted on neoprene vibration isolators selected for deflection under load of 12.7 mm.
- .6 Provide two (2) double wall muffler on the hydraulic fluid lines of adequate size to reduce the pulsations to a minimum. Install a muffler near the power unit and the other near the cylinder and plunger.
- .7 Piping must be insulated from the building structure incorporating at all support brackets, neoprene sleeves, medium density, 12.7 mm, or equivalent.
- .8 Adequate restraints must be provided to limit the potential side movement of the pipe when starting or stopping the pump movement. The valves must be properly adjusted to avoid waterhammer in the pipe network.
- .9 Ensure hydraulic lines do not come into direct contact with the building structure.

2.22 POSITION TRANSDUCER

- .1 Remove existing equipment.
- .2 Supply and install an electronic device to transmit position of the elevator cab to the controller.
- .3 Ensure automatic levelling of the car at reduced speed in both up and down directions.
- .4 A levelling device with automatic correction in both directions must allow the car to remain level with the floor as long as the car is in the levelling zone.
- .5 Ensure a minimum accuracy of at least 5 mm at any position in the hoistway.
- .6 Ensure at least a reference reading at all levels.
- .7 Strobe devices are acceptable to the extent that the position of the car is controlled at all 5 mm.
- .8 Do not use electro-mechanical switches.

2.23 ELECTRIC WIRING - GENERAL

- .1 Remove existing equipment
 - .2 Supply and install all the wiring to interconnect the elevator components.
 - .3 Supply insulated multi-stranded ETT-type wiring having a 60°C flame-retardant and moisture-resisting outer cover.
 - .4 Supply and install metal conduits (EMT) ducts or flexible conduits as needed to install all the wiring inside the machine rooms, hoistway or other spaces reserved for the installation of elevator equipment.
 - .5 Supply and install wire protection when wiring comes into contact with a sharp surface that can damage the wire protective envelop.
 - .6 Provide (10%) additional spare conductors, as a minimum in each cable.
 - .7 Provide colour or number-coded conductors in multi-conductor cables.
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- .8 Terminate cables on terminal blocks having identifying numbers.
- .9 Make no splices.
- .10 Spare wiring shall be properly identify, insulated and terminated on terminal blocks
- .11 All wiring must be CSA rated.
- .12 Ensure adequate protection of the traveling cable to avoid any contact against hoistway walls and structure.
- .13 Ensure that all circuits are properly grounded.
- .14 Install anti-shorts at wiring entry points within main control and junction box.
- .15 Supply, install and identify junction box for the communication systems, cameras, card readers and others.

2.24 ELECTRIC WIRING – TRAVELING CABLE

- .1 Remove existing equipment
- .2 Supply and install traveling cable between the car and controller.
- .3 Supply and install traveling cable between the car and controller with the required wires needed by the elevator plus the following connectors: 6 shielded pairs 18 AWG, 3 twisted & shielded pairs for communication, 18 shielded pairs 22 AWG for the card reader, 1 coax cable (with RGU6 connector) at the center of the traveling cable for a camera, 2 shield pairs 20 AWG for camera and 15% spares of each cable type.

2.25 HOISTWAY SWITCHES

- .1 Remove existing equipment.
- .2 Supply and install hoistway switches for a reliable and smooth operation without significant noise.
- .3 Properly doll the switches following the adjustments..
- .4 Supply and install stop switches (mushroom type) in the pit connected in series. Install a first stop switch near the ladder at 460mm above the floor level and a second stop switch near the ladder at 1200mm above the pit floor if the pit is deeper than 1700mm.

2.26 BUFFERS

- .1 Retain existing equipment.
- .2 Clean, brush and paint with a black epoxy paint all the non-machined metal surfaces.
- .3 Perform all tests required by codes and present the result list to the Departmental Representative.

2.27 PIT

- .1 Paint the pit floor with water-based polyurethane (odorless) paint.
-

- .2 Paint all pit equipments on a minimum height of 914mm with water-based polyurethane (odorless) paint.
- .3 Paint the refuge area (600mm x 1220mm) with black and yellow line on the pit floor.
- .4 In any area in the pit, outside the refuge space, where the vertical clearance is less than 600 mm shall be clearly marked on the pit floor as specified by section 2.4.1.6 of ASTM A17.1-2010/CSA B44-2010 code.

2.28 HOISTWAY

- .1 Chamfer any surfaces which project more than 100 mm inside the hoistway with steel sheets to obtain a bevel of 75deg with respect to the horizontal, as required by ASTM A17.1-2010/CSA B44-2010 code.

2.29 GUIDE RAILS

- .1 Retain existing equipment.
- .2 Check and correct the tightness of all rail anchors and bolts of all rail joints.
- .3 Clean and brush the machined guide rail surfaces to ensure adequate rolling surface without irregularity and paint in black all non machined surfaces.
- .4 Clean rails along the entire height of the hoistway to eliminate any presence of oil.

2.30 RIDE QUALITY

- .1 The variation between the car guide rails should not exceed ± 1 mm on a vertical distance of 30 m.
- .2 Clean and brush the machined surfaces of the rails to ensure a smooth ride.
- .3 Check the rail joints and polish all horizontal deflections.

2.31 GUIDES: CAR

- .1 Retain existing equipment.

2.32 FASCIAS PLATES

- .1 Retain existing equipment.
- .2 Properly identify with large 100mm markings each floor on fascia plates.

2.33 CAR PLATFORM AND FRAME

- .1 Retain existing equipment.

2.34 PLATFORM GUARDS - TOE GUARD

- .1 Supply and install a platform guard (toe guard) with a straight vertical face extending below the floor surface of the platform for a minimum of 21" as required by section 2.15.9 of ASTM A17.1-2010/CSA B44-2010 code.
- .2 Paint the plate in yellow.

2.35 INSPECTION UNIT

- .1 Supply and install an inspection unit on the car top for the operation in inspection speed with constant pressure control.
- .2 The device shall include a Stop Switch, a Transfer Switch, Up and Down push buttons and Fire Signal light.
- .3 Supply and install a 100 W protected light.
- .4 The device shall be permanently located on top of the car and readily accessible to maintenance technician.

2.36 CAB

- .1 Remove existing cab finishes.
- .2 Remove existing metallic cab shell.
- .3 Supply and install a 16 gauge metal cab shell.
 - .1 Ensure solid construction of the cab shell using external profiles in sufficient numbers.
 - .2 Interior walls: panels made of sheet steel, attached to the car frame and platform.
- .4 Supply and install a new sub floor made of two (2) plywood sheets (marine grade) 19 mm thick, fully fireproofed, secured in place (glued & screwed every 150mm) using mechanical flush fasteners.
- .5 Supply and install a roof made of reinforced steel sheet to support the weight of the equipment and the two mechanics.
- .6 Supply and install a metal guard rails at all edges (on the 3 sides without door) of the roof as required ASTM A17.1-2010/CSA B44-2010 code. Position the guard to optimize space on the roof of the cab.
- .7 The cab shall meet ASTM A17.1-2010/CSA B44-2010 code requirements.
- .8 Wall:
 - .1 See plans for new finishes to supply and install. All stainless steel finishes shown on plan will be no4 finish.
 - .2 Cover the front wall with stainless steel 20ga, no4 finish. Polishing shall be vertical.
 - .3 Provide the necessary ventilation opening.
- .9 Ceiling:
 - .1 See plans for new finishes to supply and install. All stainless steel finishes shown on plan will be no4 finish.
 - .2 Include an emergency exit in the ceiling.
 - .3 Ensure that no anchor or fastener exceeds the car roof.
 - .4 Supply and install a two-speed electric air exhaust fan, with a capacity of 200 liters per seconds and producing no more than 55 dBA at low speed.
- .10 Lighting system:
 - .1 See plans for lightning to supply and install on the walls and ceiling of the cab.

- .2 Supply and install a Tivol brand lighting system (www.tivolighting.com) as described below:
 - LED band : TPL-LB-I-30-12volt
 - Transformer : EMECH601512
 - Channels (extrusions) : ALTN-CHAN-SLV-6.5
 - ALTN-LNS-OPL-6.5
 - ALTN-EC-01
 - ALTN-EC-02
- .3 The lighting system must be sufficient to provide a consistent light intensity of 215 lx, measured at 0.75m above the floor.
- .11 Floor:
 - .1 See plans for new finishes to supply and install.
- .12 Door:
 - .1 Supply and install a stainless steel 24ga, no4 finish car door. Polishing shall be vertical.
 - .2 Supply and install an extruded nickel silver cab door sill with non-slip wearing surface.
 - .3 Supply and install door nylon gib.
 - .4 Supply and install all equipment required for a durable and efficient system operation.

2.37 CAR DOOR EQUIPMENT

- .1 Remove existing equipment.
 - .2 Supply and install heavy duty type closed-loop variable speed and torque control door operator rated at speed of 910 mm per second.
 - .3 Supply and install a car door clutch.
 - .4 Supply and install car interlock.
 - .5 Supply and install a door lock to restrict the opening of the car door from the inside when it is outside the unlocking zone as required by article 2.12.5 of ASTM A17.1-2010/CSA B44-2010.
 - .6 Supply and install all equipment doors needed for a durable and efficient system operation.
 - .7 Supply and install a new suspension rail fitted with rubber bumpers. Rail shall be easy to replace.
 - .8 Supply and install two suspension rollers per door panel with a minimum diameter of 75 mm.
 - .9 The suspension rollers shall be made of material designed to retain lubricant and be equipped with cleaning felt.
 - .10 Provide on the edge of the door panels, a rubber bumper to eliminate the slap at the time of closing.
-

2.38 HALL DOOR EQUIPMENT

- .1 Remove existing hall door equipment (suspension rollers / pickup rollers / interlock / door closer).
- .2 Supply and install all door equipments needed for a durable and efficient system operation.
- .3 Supply and install door equipment compatible with existing equipment retained.
- .4 Supply and install two suspension rollers per door panel with a minimum diameter of 75 mm. The suspension rollers shall be made of material designed to retain lubricant and be equipped with cleaning felt.
- .5 Supply and install complete new hall door interlock systems (interlock and opening mechanism) at all floors.
- .6 Supply and install a ground connected on all interlocks.
- .7 Supply and install new door closer at all floors.
- .8 Retain existing hall door suspension rails. They shall be thoroughly cleaned, re-polished and lubricated to ensure smooth and quiet door operation.
- .9 Elevator 1 & 3 : Retain existing hall door panel and entrance frame and do the following work:
 - .1 Replace damaged door astragals;
 - .2 Replace the lower door guides;
 - .3 Add fire retaining metal guides at the lower and upper part of the doors.
- .10 Elevator 4 :
 - .1 Level 1 : Supply and install new stainless steel no4 finish hall door panels. Polishing shall be vertical.
 - .1 Remove existing door panel.
 - .2 Supply and install door astragals;
 - .3 Supply and install lower door guides;
 - .4 Supply and install fire retaining metal guides at the lower and upper part of the doors.
 - .5 Supply and install on the edge of the door panels, a rubber bumper to eliminate the slap at the time of closing.
 - .2 Level 2, 3 & 4 : Retain existing hall door panel and entrance frame and do the following work:
 - .1 Replace damaged door astragals;
 - .2 Replace the lower door guides;
 - .3 Add fire retaining metal guides at the lower and upper part of the doors.
- .11 Elevator 2 :
 - .1 Remove existing door panel.
 - .2 Supply and install stainless steel no4 finish hall door panels and frames at all floors. Polishing shall be vertical.
 - .1 Supply and install door astragals;
 - .2 Supply and install lower door guides;

- .3 Supply and install fire retaining metal guides at the lower and upper part of the doors.
- .4 Supply and install on the edge of the door panels, a rubber bumper to eliminate the slap at the time of closing.
- .3 Protection of landing entrance frames
 - .1 Supply and install, at all levels, protective frames in 18 gauge stainless steel finish no4 at the elevator landing entrances on all surfaces (vertical and horizontal).
 - .2 The protective frames must cover the interior face of the entrance with a 3 inch return on the front wall. Submit drawings for approval.
- .12 Correctly align the hall door panels.
- .13 Clean the existing sills.
- .14 Provide on the edge of the door panels, a rubber bumper to eliminate the slap at the time of closing.

2.39 HOISTWAY DOOR UNLOCKING DEVICES

- .1 Supply and install a hoistway door unlocking devices at all floors as required by section 2.12.6 of ASTM A17.1-2010/CSA B44-2010 code.

2.40 HOISTWAY ACCESS SWITCHES

- .1 Supply and install a hoistway access switches at the bottom & top floor as required by section 2.12.7 of ASTM A17.1-2010/CSA B44-2010 code.
- .2 Install the switch in the hall station.

2.41 HALL CALL STATIONS

- .1 Remove existing equipment.
 - .2 Supply and install Tactile Compact 2 Dupar US91BB (steel/steel) red LED illuminated call stations (or replacement product approved by addendum in accordance with the Instructions to Tenderers) at each floor
 - .1 Each button will become a high intensity when the button is pressed (one intensity model).
 - .3 Provide in the main floor call station the following items:
 - .1 Visual signal, LED type, for Phase I Emergency Recall Operation;
 - .2 A three-position key-operated switch (group 3) labeled "FIRE RECALL" and its positions marked "RESET – OFF – ON" (in that order). The letters shall be a minimum of 5mm high in red.
 - .3 Visual signal for Emergency Power Operation labeled "EMERGENCY POWER". The letters shall be a minimum of 5mm high in red.
 - .4 Provide a hoistway access switch as required by code. Insert the switch in the hall station.
 - .5 The LED lights used in call stations shall have a useful life of at least 100 000 hours.
 - .6 Provide all plates in stainless steel no4 finish.
-

- .7 Engrave all required markings, in French & English language, directly on the plates, as per ASTM A17.1-2010/CSA B44-2010 code.

2.42 HALL POSITION INDICATOR

- .1 Supply and install a digital position indicator at main floor. Characters shall be 50mm high.
- .2 Provide no.4 finished stainless steel plates of sufficient size to cover existing openings.

2.43 HALL DIRECTION LANTERN

- .1 Supply and install a direction lantern, raised arrow type, with electronic gong at each floor for each elevator.
- .2 When the car is within a certain distance of a floor where it should stop, the direction lantern must illuminate with tone sounds to indicate the direction of the car.
- .3 The lantern must remain illuminated until the car leaves the floor.
- .4 In Up direction, the tone must ring once, and in the Down direction, the tone must ring twice.
- .5 Include an adjustable gong tone device.
- .6 Provide No. 4 finished stainless steel plates of sufficient size to cover existing openings.

2.44 CAR OPERATING PANEL - MAIN

- .1 Supply and install one (1) car operating panel, mounted on invisible hinge, in stainless steel finish No. 4 integrated in the car front return as per requirements of ASTM A17.1-2010/CSA B44-2010 code and the following requirements:
 - .1 Dupar US91BB (steel/steel) Tactile Compact 2, red LED illuminated push button (or replacement product approved by addendum in accordance with the Instructions to Tenderers) with integrated Braille tag corresponding to floors served.
 - .2 Each button will become a high intensity when the button is pressed (one intensity model).
 - .3 Door open button labeled "OPEN" and door closer button labeled "CLOSE".
 - .4 Alarm button, with a raised ring,
 - .5 Emergency button, with a raised ring, with a phone symbol labeled "PUSH TO CALL" above and "HELP" below button. The button light will remain permanently on a low intensity (white) and become a high intensity (red) when the button is pressed (model with two colors (white / red) and two intensities).
 - .6 Not Used
 - .7 Visual signal for Phase I Emergency Recall Operation;
 - .8 Visual signal for Emergency Power Operation;
 - .9 A red LED light <hidden legend> indicating the activation of the independent service operation marked independent service.
- .2 Supply and install a firefighters' operation cabinet (as per section 2.27.3.3.7 of ASTM A17.1-2010/CSA B44-2010 code), at the top of the car operating panel, with the following items:

- .1 A three-position key-operated switch (group 3) labeled "FIRE OPERATION" and its positions marked "OFF – HOLD – ON" (in that order). The letters shall be a minimum of 5mm high in red. It shall become effective only when Phase I Emergency Recall Operation is in effect and the car has been returned to the recall level.
- .2 A button labeled "CALL CANCEL" which shall be effective during Phase II Emergency In-Car Operation. When activated, all registered calls shall be canceled and a traveling car shall stop at or before the next available landing.
- .3 Door open and close buttons;
- .4 A "RUN" / "STOP" switch
- .5 Visual signal for Phase I Emergency Recall Operation;
- .6 A descriptive plate with marking shown in figure 2.27.7.2 of ASTM A17.1-2010/CSA B44-2010 code.
- .7 The cabinet door access key must be the same as phase II switch.
- .8 The cabinet door must lock automatically when the door is closed.
- .3 Supply and install a service cabinet at the bottom of the car operating panel, locked by a key switch with the following items:
 - .1 Stop key switch with marking <STOP / RUN>
 - .2 Independent service key switch;
 - .3 Light switch;
 - .4 Emergency light test switch;
 - .5 Fan key switch;
 - .6 Hoistway access key switch.
 - .7 A key switch on door panel
- .4 The LED lights used in car operation panel shall have a useful life of at least 100 000 hours.
- .5 Engrave all required markings directly on the plates.
- .6 Provide all plates in stainless steel no4 finish.
- .7 Supply and install a digital position indicator on the car operating panel. Characters shall be 50mm high. The unit must have direction arrow.

2.45 CAR INTERCOMMUNICATION SYSTEM

- .1 Retain and reinstall the existing car intercommunication system
 - .2 Connect the emergency call button and the visual indicator of the car operating panel.
 - .3 Provide the location as well as the holes on the car operating panel.
 - .4 Supply and install a plate labelled "PRESS TO CALL" above & "EMERGENCY" below with embedded Braille inscription.
 - .5 Supply and install a plate labelled "COMMUNICATION ESTABLISHED WHEN LIGHT ON" indicating that communication is established.
 - .6 Install these plates near the call button of the existing communication system on the car operating panel.
-

2.46 VOICE SYNTHESIZER

- .1 Supply and install a voice synthesizer in each car.
- .2 The system will announce the floor of arrival before opening the doors.
- .3 The system must be able to store 40 customized messages (8 seconds each) for a total or 5 minutes of capacity.
- .4 The speaker system shall be at least 0.5 Watts and 8 Ohm type.
- .5 The microphone for recording messages must be 1 K Ohm type with minimum sensitivity of 64 dB.
- .6 The device must be easily programmable. The memory access must be code protected.
- .7 Install the system so that the message is clear and noise free anywhere in the cab.

2.47 CAR EMERGENCY LIGHT

- .1 Supply and install an emergency lighting unit, in the car operating panel, with autonomy of 4 hours, designed for this application.
- .2 The unit will produce an instant lighting when normal power is lost.
- .3 The emergency lighting unit must provide a general brightness of 22 lux in the cab at a distance of 1200 mm.
- .4 Supply and install a sealed rechargeable battery and powered by the normal current.

2.48 DOOR PROTECTION DEVICE

- .1 Supply and install multibeam infrared door protection device.
- .2 The detection field shall start at a maximum of 150 mm from the floor and extend up to a maximum of 300 mm from the top of the entrance.
- .3 The system must remain operational until a failure of 10% of the infrared rays. A light shall indicate the device failure. In case of failure, deactivate the nudging except for emergency recall.
- .4 The door shall reopen completely when the door protection devices are activated.
- .5 Arrange that when the door protective devices are activated for more than 20 seconds continuously, a nudging buzzer signal be activated

2.49 ENGRAVING

- .1 Identify the elevator at main floor with a number 75mm in height. This number should be engraved on a stainless steel plate.
 - .2 Identify the elevator with engraving on the car operating station.
 - .3 Identify all equipment parts located in machine room.
 - .4 Identify the refuge areas on the car top.
-

- .5 Supply and install Arabic numerals and Braille markings designating levels on the two doorframes hall entrance. The bottom of the numbers shall be at 1525 mm from floor. At the main floor, a star shall be supply in addition to the identification requested.
- .6 Provide all other inscriptions required by authorities.
- .7 All engraving shall be in French & English language.
- .8 All inscriptions should be engraved to a minimum depth of 0.25 mm on the metal surfaces of the fixtures.

2.50 KEYS

- .1 Provide a minimum of 6 sets of keys clearly identified for the operation of the emergency recall and special emergency service key switches.
- .2 The various switches and keys shall meet the requirements of the Elevator Code.
- .3 Any item referring to locks / keys " FIRE OPERATION " for "fire recall" phase I and II: These locks / keys group 3 must be provided by the contractor and will be of the universal model recognized as the "FEO-K1" .

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install hoistway, machine room, and other elevator materials and components in accordance with ASTM A17.1-2010/CSA B44-2010, local codes, regulations and manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

- .1 Verification requirements include:
 - .1 Materials and resources.
 - .2 Storage and collection of recyclables.
 - .3 Construction waste management.
 - .4 Resource reuse.
 - .5 Recycled content.
 - .6 Local/regional materials.
 - .7 Certified wood.
 - .8 Low-emitting materials.

3.4 SITE TESTS

- .1 Perform and meet tests required by ASTM A17.1-2010/CSA B44-2010.
-

- .1 Submit test data forms in accordance with Section 01 91 13 16 - Commissioning Forms before requesting an inspection by the Departmental Representative.
- .2 Perform real time testing of Emergency Operation (Emergency Recall Operation - Phase I & Emergency In-car Operation - Phase II) and emergency power operation with Departmental Representative.
- .2 Supply instruments and execute specific tests.
- .3 Furnish test and approval certificates issued by jurisdictional authorities.
- .4 At agreed time during twelve month warranty period, and with building normally occupied using normal building traffic, conduct tests to verify performance. Furnish event recording of hall call registrations, time initiated, and response time throughout entire normal working day.

3.5 CLEANING

- .1 Remove protective coverings from finished surfaces and components.
- .2 Clean surfaces and components ready for inspection.

3.6 ADJUSTMENTS

- .1 Adjust door opening and closing times to suit handicapped users in accordance with Departmental Representative instructions.
- .2 Adjust control system to cause elevators to answer hall calls during working day within performance criteria specified.
- .3 Adjust for smooth acceleration and deceleration of car as so not to cause passenger discomfort.
- .4 Adjust automatic floor levelling feature at each floor.

3.7 SCHEDULE OF WORK

- .1 The work shall be coordinated with Departmental Representative.

3.8 SEQUENCE OF WORK

- .1 Schedule the modernization sequence in accordance with Section 01 14 00 - Work restrictions.
- .2 Schedule a maximum of 6 weeks per elevator for modernization works.
- .3 The final sequence of work must be submitted before the start of work for approval by Departmental Representative.

3.9 DISMANTLEMENT

- .1 Coordinate equipment dismantlement with Departmental Representative.
 - .2 Machine Room: Dismantle the machine, the control cabinets, wiring, and any other replaced or no longer needed equipment.
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- .3 Hoistway: Dismantle cab finish, mobile and fixed wiring, hoistway switches, landing door equipment, and any other replaced or no longer needed equipment.
- .4 Following dismantlement, dispose of equipment in accordance with Section 01 74 19.

3.10 INSERTING AND REMOVING EQUIPMENT

- .1 The Contractor is responsible for the insertion and removal of the equipment described in this section.
- .2 The contractor is responsible for providing all equipment necessary for insertion, handling and installation of the equipment in the machine room or in the hoistway.
- .3 Access to the machine room is from the corridors and stairways of the building.
- .4 The Contractor is responsible to verify the paths and provide equipment to meet the dimensions of access constraints.
- .5 No new opening will be made in the machine room.

3.11 WELDING WORK

- .1 If welding works are required on the site, obtain all necessary approvals by Departmental Representative before performing the works.
- .2 All site welds must be made by a qualified welder and identified with his identification mark.

3.12 TOUCH UP WORK

- .1 Ensure that all exposed metal surfaces are painted.
- .2 At the end of the work, retouch and repair all finished surfaces assembled at the factory, where the finish is altered or damaged.
- .3 Repair or replace any damaged item, without charge, before the substantial completion of work.

3.13 LIFTING WORKS

- .1 If the car finishes are altered for the purposes of lifting work, they shall be repaired at the end of the work at the expense of the contractor.
- .2 Supply and install a temporary hoist beam suitable for car loads.
 - .1 Temporary hoist beam can be installed either on top of the car rails (once cut to the right height), bolted into the side of the rail or any other recognized method.
 - .2 Provide a drawing, sealed by engineer, showing the installation of the beam.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Related sections
 - .1 Section 14 00 00 – Additional General Conditions

1.2 SYSTEM DESCRIPTION

- .1 Modernize the existing elevators as described in the following tables and the requirements of this section:
 - .1 (1) existing elevator (no 2s) hydraulic type with above ground cylinder.
- .2 The following requirements must be met for all elevators described in this section:
 - .1 Barrier-Free in accordance with CAN/CSA B651-18, Barrier-Free Design.
 - .2 Bilingual Markings:
 - .1 Provide identification and instructions on operating panels and on signal equipment in English and French except where design is such that inference is obvious and readily understood.
 - .3 Retain existing car speed and capacity.
 - .4 Provide equipment to suit the existing hoistway and machine room dimensions.
 - .5 Check all dimensions on site.
 - .6 Design and modernize elevator in accordance with ASTM A17.1-2010/CSA B44-2010, local codes and regulations.

.3 Existing system – Elevator #2s

System BEFORE modernization:

Unit number :	2s
Designation :	Passengers
Installation date :	2005
Floor served :	3 stop : 1, 2, 3
Nominal speed :	100 fpm
Capacity :	2000 lb
Machine manufacturer :	Otis
Machine type :	Hydraulic - submersible, above ground cylinder
Motor manufacturer :	US Motor
Controller manufacturer :	Otis
Controller type :	Relay
Dispatch type :	Simplex
Door type :	Side Opening 1 speed
Door dimensions :	36" X 84"
Door fire rating :	ULC 1h1/2

Car equipment descriptionFixture

Position indicator	Digital
Car lantern	Provided
Arrival gong	
Floor gong	
Voice synthesizer	Not Provided
Button - height	Conform
Button - model	Otis
Braille	Provided
Independant service	Provided
Emergency In-car Operation	Provided
Communication system	Provided (intercom)

Equipment

Emergency light	Provided
Door protection	Infrared
Handrail	3 sides
Handrail - height	Conform
Door operator	Otis
Interlock	Otis
Car guides	Roller
Inspection unit	Conform
Refuge area	Provided

Hall equipment descriptionFixture

Position indicator	Digital
Hall lantern	
Gong	
Button - height	Conform
Button - model	Otis
Braille	
Emergency Recall	Provided
Operation	
Emergency power	Not Provided
Battery backup	Provided

Equipment

Interlock	Otis
Door track	Otis
Door closer	Enrolling
Door fire pin	Bottom & Top
Mechanical access	Provided (lev 1, 2)
Electrical access	Provided

1.3 PERFORMANCE REQUIREMENTS**.1 Codes and Regulations**

- .1 Design, supply and install all equipment in accordance with the latest editions of the ASTM A17.1-2010/CSA B44-2010 Code (update included), CAN/CSA-B651-18 Code and any other federal, provincial and municipal regulations applicable for this type of installation, including the National building Code of Canada and the Quebec Electrical Code.

Part 2 Products**2.1 CAR DOOR EQUIPMENT**

- .1 Render operational the door lock to restrict the opening of the car door from the inside when it is outside the unlocking zone as required by article 2.12.5 of ASTM A17.1-2010/CSA B44-2010.

2.2 HOISTWAY ACCESS SWITCHES

- .1 Render operational the hoistway access switches in order to restart the elevator following the use of the car roof access switch.

2.3 RIDE QUALITY

- .1 Eliminate the abnormal vibration of the car when it arrives at the extreme landings and when using the pit access switches.

2.4 CAR INTERCOMMUNICATION SYSTEM

- .1 Supply and install a plate labelled "PRESS TO CALL" above & "EMERGENCY" below with embedded Braille inscription.
- .2 Supply and install a plate labelled "COMMUNICATION ESTABLISHED WHEN LIGHT ON" indicating that communication is established.
- .3 Install these plates near the call button of the existing communication system on the car operating panel.
- .4 Cover the existing inscriptions and remove the existing red indicator light on the control panel in the car.

2.5 CAB

- .1 Supply and install a metal guard rails at all edges (on the 3 sides without door) of the roof as required ASTM A17.1-2010/CSA B44-2010 code. Position the guard to optimize space on the roof of the cab.

2.6 SAFETY STOP FOR MAINTENANCE

- .1 Supply and install a complete safety stop system for maintenance in the elevator pit including the following requirements and elements:

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- .2 Design the maintenance safety stop system to allow safe access to the workspace in the pit. The access maneuver must be capable of being performed by a single elevator mechanic.
 - .3 Provide and install the connection and programming of this maneuver to the elevator controller.
 - .1 When the posts are in place in the fixed bases, only allow movement of the car using the inspection device.
 - .4 Supply and install two posts meeting the following requirements:
 - .1 The length of the posts must allow their handling by a single mechanic.
 - .2 The posts must be able to support the weight of the car.
 - .3 Provide the lower end with a key of at least 50 mm in length allowing the post to be properly positioned in its fixed support.
 - .4 Provide the upper end of the post with a 12mm thick plate which will serve as a support for the lower car frame.
 - .5 Paint the posts yellow
 - .6 When the car rests on the posts, access to the pit must be restricted.
 - .5 Supply and install two fixed bases meeting the following requirements:
 - .1 Provide bases composed of a minimum 450mm high tube to ensure the stability of the posts and a minimum 10mm thick base plate.
 - .2 Provide the fixed bases with a keyway allowing the correct positioning of the post in its fixed support.
 - .3 Equip each fixed base with a switch to send a signal to the controller when the posts are in place in the fixed bases. The switch used must be a robust model of the same type as the limit switches installed in the duct.
 - .4 Position the fixed bases on each side of the shock absorbers.
 - .5 Permanently fix the bases on the floor of the pit.
 - .6 Paint with a water-based polyurethane paint (odorless).
 - .6 Provide and install an inspection device in the pit that meets the following requirements:
 - .1 Provide and install near the access ladder a portable device, yellow, for maneuvering at inspection speed with constant pressure buttons. Provide the following buttons:
 - .1 Up
 - .2 Make active
 - .3 Down
 - .4 Start / stop
 - .5 Normal / inspection
 - .6 Emergency stop (mushroom type)
 - .2 Provide a sufficient length of mobile wiring to maneuver from the landing.
 - .3 Provide a fixed location, easily accessible, on one of the walls to store the portable device and wind up the mobile wiring
 - .4 Provide for the connection of the portable device to the controller.
 - .5 Provide an interlock between the two inspection devices (cabin roof and mechanical room). When one device is active, the second device cannot take control of the elevator.
 - .6 Supply and install all the wiring required to connect this device to the controller.
-

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

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

3.2 INSTALLATION

- .1 Install hoistway, machine room, and other elevator materials and components in accordance with ASTM A17.1-2010/CSA B44-2010, local codes, regulations and manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

- .1 Verification requirements include:
 - .1 Materials and resources.
 - .2 Storage and collection of recyclables.
 - .3 Construction waste management.
 - .4 Resource reuse.
 - .5 Recycled content.
 - .6 Local/regional materials.
 - .7 Certified wood.
 - .8 Low-emitting materials.

3.4 SITE TESTS

- .1 Perform and meet tests required by ASTM A17.1-2010/CSA B44-2010.
 - .1 Submit test data forms in accordance with Section 01 91 13 16 - Commissioning Forms before requesting an inspection by the Departmental Representative.
 - .2 Perform real time testing of Emergency Operation (Emergency Recall Operation - Phase I & Emergency In-car Operation - Phase II) and emergency power operation with Departmental Representative.
- .2 Supply instruments and execute specific tests.
- .3 Furnish test and approval certificates issued by jurisdictional authorities.
- .4 At agreed time during twelve month warranty period, and with building normally occupied using normal building traffic, conduct tests to verify performance. Furnish event recording of hall call registrations, time initiated, and response time throughout entire normal working day.

3.5 CLEANING

- .1 Remove protective coverings from finished surfaces and components.
- .2 Clean surfaces and components ready for inspection.

3.6 ADJUSTMENTS

- .1 Adjust door opening and closing times to suit handicapped users in accordance with Departmental Representative instructions.

2021-01-19

Page 6

- .2 Adjust control system to cause elevators to answer hall calls during working day within performance criteria specified.
- .3 Adjust for smooth acceleration and deceleration of car as so not to cause passenger discomfort.
- .4 Adjust automatic floor levelling feature at each floor.

3.7 SCHEDULE OF WORK

- .1 The work shall be coordinated with Departmental Representative.

3.8 SEQUENCE OF WORK

- .1 Schedule the modernization sequence in accordance with Section 01 14 00 - Work restrictions.
- .2 Schedule a maximum of 2 weeks per elevator for modernization works.
- .3 The final sequence of work must be submitted before the start of work for approval by Departmental Representative.

3.9 DISMANTLEMENT

- .1 Coordinate equipment dismantlement with Departmental Representative.
- .2 Following dismantlement, dispose of equipment in accordance with Section 01 74 21.

3.10 INSERTING AND REMOVING EQUIPMENT

- .1 The Contractor is responsible for the insertion and removal of the equipment described in this section.
- .2 The contractor is responsible for providing all equipment necessary for insertion, handling and installation of the equipment in the machine room or in the hoistway.
- .3 Access to the machine room is from the corridors and stairways of the building.
- .4 The Contractor is responsible to verify the paths and provide equipment to meet the dimensions of access constraints.
- .5 No new opening will be made in the machine room.

3.11 WELDING WORK

- .1 If welding works are required on the site, obtain all necessary approvals by Departmental Representative before performing the works.
- .2 All site welds must be made by a qualified welder and identified with his identification mark.

3.12 TOUCH UP WORK

- .1 Ensure that all exposed metal surfaces are painted.
-

- .2 At the end of the work, retouch and repair all finished surfaces assembled at the factory, where the finish is altered or damaged.
- .3 Repair or replace any damaged item, without charge, before the substantial completion of work.

3.13 LIFTING WORKS

- .1 If the car finishes are altered for the purposes of lifting work, they shall be repaired at the end of the work at the expense of the contractor.
- .2 Supply and install a temporary hoist beam suitable for car loads.
 - .1 Temporary hoist beam can be installed either on top of the car rails (once cut to the right height), bolted into the side of the rail or any other recognized method.
 - .2 Provide a drawing, sealed by engineer, showing the installation of the beam.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Related sections
 - .1 Section 14 00 00 – Additional General Conditions

1.2 SYSTEM DESCRIPTION

- .1 Modernize the existing elevators as described in the following tables and the requirements of this section:
 - .1 (1) existing elevator (no 5) hydraulic type with above ground cylinder.
- .2 The following requirements must be met for all elevators described in this section:
 - .1 Barrier-Free in accordance with CAN/CSA B651-18, Barrier-Free Design.
 - .2 Bilingual Markings:
 - .1 Provide identification and instructions on operating panels and on signal equipment in English and French except where design is such that inference is obvious and readily understood.
 - .3 Retain existing car speed and capacity.
 - .4 Provide equipment to suit the existing hoistway and machine room dimensions.
 - .5 Check all dimensions on site.
 - .6 Design and modernize elevator in accordance with ASTM A17.1-2010/CSA B44-2010, local codes and regulations.

.3 Existing system – Elevator #5

System BEFORE modernization:

Unit number :	5
Designation :	Passengers
Installation date :	2014
Floor served :	2 stop : 1, CC
Nominal speed :	100 fpm
Capacity :	3500 lb
Machine manufacturer :	ITI
Machine type :	Hydraulic - submersible, above ground cylinder
Motor manufacturer :	Imperial
Controller manufacturer :	JRT
Controller type :	Microprocessor (automate CJ1M)
Dispatch type :	Simplex
Door type :	Side Opening 2 speed
Door dimensions :	42" X 84"
Door fire rating :	ULC 1h1/2

Car equipment description**Fixture**

Position indicator	Digital
Car lantern	Provided
Arrival gong	
Floor gong	
Voice synthesizer	Not Provided
Button - height	Conform
Button - model	Dupar
Braille	Provided
Independant service	Provided
Emergency In-car Operation	Provided
Communication system	Provided (intercom)

Equipment

Emergency light	Provided
Door protection	Infrared
Handrail	2 sides
Handrail - height	Conform
Door operator	GAL
Interlock	GAL
Car guides	Roller
Inspection unit	Conform
Refuge area	Provided

Hall equipment description**Fixture**

Position indicator	Digital
Hall lantern	
Gong	
Button - height	Conform
Button - model	Dupar
Braille	
Emergency Recall	Provided
Operation	
Emergency power	Not Provided
Battery backup	Provided

Equipment

Interlock	GAL
Door track	GAL
Door closer	
Door fire pin	Bottom & Top
Mechanical access	Provided
Electrical access	

1.3 PERFORMANCE REQUIREMENTS**.1 Codes and Regulations**

- .1 Design, supply and install all equipment in accordance with the latest editions of the ASTM A17.1-2010/CSA B44-2010 Code (update included), CAN/CSA-B651-18 Code and any other federal, provincial and municipal regulations applicable for this type of installation, including the National building Code of Canada and the Quebec Electrical Code.

Part 2 Products**2.1 MACHINE**

- .1 Supply and install a device to prevent overturning or displacement of the tank as required by article 8.4.11.6 of the ASTM A17.1-2010 / CSA B44-2010 code.

2.2 CONTROLLER

- .1 Change the controller's programmable logic controller battery to prevent loss of volatile memory in the event of a power failure.

2.3 HALL DOOR EQUIPMENT

- .1 Supply and install an auxiliary release device on the lower landing door.

2.4 CAR INTERCOMMUNICATION SYSTEM

- .1 Supply and install a plate labelled "PRESS TO CALL" above & "EMERGENCY" below with embedded Braille inscription.
- .2 Supply and install a plate labelled "COMMUNICATION ESTABLISHED WHEN LIGHT ON" indicating that communication is established.
- .3 Install these plates near the call button of the existing communication system on the car operating panel.
- .4 Cover the existing inscriptions and remove the existing red indicator light on the control panel in the car.

2.5 CAB

- .1 Supply and install a metal guard rails at all edges (on the 3 sides without door) of the roof as required ASTM A17.1-2010/CSA B44-2010 code. Position the guard to optimize space on the roof of the cab.
- .2 Render operational the emergency car lighting.
- .3 Render operational the car alarm button.
- .4 Render operational the access switch to car inspection mode - elevator continues to operate when switch is activated.
- .5 Repair the down arrow of the front entry car lantern.
-

2.6 SAFETY STOP FOR MAINTENANCE

- .1 Supply and install a complete safety stop system for maintenance in the elevator pit including the following requirements and elements:
 - .2 Design the maintenance safety stop system to allow safe access to the workspace in the pit. The access maneuver must be capable of being performed by a single elevator mechanic.
 - .3 Provide and install the connection and programming of this maneuver to the elevator controller.
 - .1 When the posts are in place in the fixed bases, only allow movement of the car using the inspection device.
 - .4 Supply and install two posts meeting the following requirements:
 - .1 The length of the posts must allow their handling by a single mechanic.
 - .2 The posts must be able to support the weight of the car.
 - .3 Provide the lower end with a key of at least 50 mm in length allowing the post to be properly positioned in its fixed support.
 - .4 Provide the upper end of the post with a 12mm thick plate which will serve as a support for the lower car frame.
 - .5 Paint the posts yellow
 - .6 When the car rests on the posts, access to the pit must be restricted.
 - .5 Supply and install two fixed bases meeting the following requirements:
 - .1 Provide bases composed of a minimum 450mm high tube to ensure the stability of the posts and a minimum 10mm thick base plate.
 - .2 Provide the fixed bases with a keyway allowing the correct positioning of the post in its fixed support.
 - .3 Equip each fixed base with a switch to send a signal to the controller when the posts are in place in the fixed bases. The switch used must be a robust model of the same type as the limit switches installed in the duct.
 - .4 Position the fixed bases on each side of the shock absorbers.
 - .5 Permanently fix the bases on the floor of the pit.
 - .6 Paint with a water-based polyurethane paint (odorless).
 - .6 Provide and install an inspection device in the pit that meets the following requirements:
 - .1 Provide and install near the access ladder a portable device, yellow, for maneuvering at inspection speed with constant pressure buttons. Provide the following buttons:
 - .1 Up
 - .2 Make active
 - .3 Down
 - .4 Start / stop
 - .5 Normal / inspection
 - .6 Emergency stop (mushroom type)
 - .2 Provide a sufficient length of mobile wiring to maneuver from the landing.
 - .3 Provide a fixed location, easily accessible, on one of the walls to store the portable device and wind up the mobile wiring
 - .4 Provide for the connection of the portable device to the controller.
-

- .5 Provide an interlock between the two inspection devices (cabin roof and mechanical room). When one device is active, the second device cannot take control of the elevator.
- .6 Supply and install all the wiring required to connect this device to the controller.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install hoistway, machine room, and other elevator materials and components in accordance with ASTM A17.1-2010/CSA B44-2010, local codes, regulations and manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

- .1 Verification requirements include:
 - .1 Materials and resources.
 - .2 Storage and collection of recyclables.
 - .3 Construction waste management.
 - .4 Resource reuse.
 - .5 Recycled content.
 - .6 Local/regional materials.
 - .7 Certified wood.
 - .8 Low-emitting materials.

3.4 SITE TESTS

- .1 Perform and meet tests required by ASTM A17.1-2010/CSA B44-2010.
 - .1 Submit test data forms in accordance with Section 01 91 13 16 - Commissioning Forms before requesting an inspection by the Departmental Representative.
 - .2 Perform real time testing of Emergency Operation (Emergency Recall Operation - Phase I & Emergency In-car Operation - Phase II) and emergency power operation with Departmental Representative.
- .2 Supply instruments and execute specific tests.
- .3 Furnish test and approval certificates issued by jurisdictional authorities.
- .4 At agreed time during twelve month warranty period, and with building normally occupied using normal building traffic, conduct tests to verify performance. Furnish event recording of hall call registrations, time initiated, and response time throughout entire normal working day.

3.5 CLEANING

- .1 Remove protective coverings from finished surfaces and components.
-

- .2 Clean surfaces and components ready for inspection.

3.6 ADJUSTMENTS

- .1 Adjust door opening and closing times to suit handicapped users in accordance with Departmental Representative instructions.
- .2 Adjust control system to cause elevators to answer hall calls during working day within performance criteria specified.
- .3 Adjust for smooth acceleration and deceleration of car as so not to cause passenger discomfort.
- .4 Adjust automatic floor levelling feature at each floor.

3.7 SCHEDULE OF WORK

- .1 The work shall be coordinated with Departmental Representative.

3.8 SEQUENCE OF WORK

- .1 Schedule the modernization sequence in accordance with Section 01 14 00 - Work restrictions.
- .2 Schedule a maximum of 2 weeks per elevator for modernization works.
- .3 The final sequence of work must be submitted before the start of work for approval by Departmental Representative.

3.9 DISMANTLEMENT

- .1 Coordinate equipment dismantlement with Departmental Representative.
- .2 Following dismantlement, dispose of equipment in accordance with Section 01 74 21.

3.10 INSERTING AND REMOVING EQUIPMENT

- .1 The Contractor is responsible for the insertion and removal of the equipment described in this section.
- .2 The contractor is responsible for providing all equipment necessary for insertion, handling and installation of the equipment in the machine room or in the hoistway.
- .3 Access to the machine room is from the corridors and stairways of the building.
- .4 The Contractor is responsible to verify the paths and provide equipment to meet the dimensions of access constraints.
- .5 No new opening will be made in the machine room.

3.11 WELDING WORK

- .1 If welding works are required on the site, obtain all necessary approvals by Departmental Representative before performing the works.
-

- .2 All site welds must be made by a qualified welder and identified with his identification mark.

3.12 TOUCH UP WORK

- .1 Ensure that all exposed metal surfaces are painted.
- .2 At the end of the work, retouch and repair all finished surfaces assembled at the factory, where the finish is altered or damaged.
- .3 Repair or replace any damaged item, without charge, before the substantial completion of work.

3.13 LIFTING WORKS

- .1 If the car finishes are altered for the purposes of lifting work, they shall be repaired at the end of the work at the expense of the contractor.
- .2 Supply and install a temporary hoist beam suitable for car loads.
 - .1 Temporary hoist beam can be installed either on top of the car rails (once cut to the right height), bolted into the side of the rail or any other recognized method.
 - .2 Provide a drawing, sealed by engineer, showing the installation of the beam.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Related sections
 - .1 Section 14 00 00 – Additional General Conditions
 - .2 Section 14 20 06 – Elevators 1, 2, 3, 4, 5, 2s

1.2 DESCRIPTION

- .1 The Contractor agrees to provide skilled labor, adequate equipment supervision, tools, instruments, materials and parts required for a complete elevator maintenance service according to the specifications and the terms and conditions set out in this document.
- .2 The full maintenance service includes periodic preventive inspections, callback and repair service in case of breakdowns including parts and labor for repairs or preventive replacements.
- .3 All work causing a shutdown of a complete elevator group shall be performed outside regular hours with the approval of Departmental Representative and without additional fees.
- .4 The requirements of the specifications herein and the specifications from the manufacturer shall be considered only as a minimum to be achieved and shall not limit the responsibility and warranty of the *Contractor*.
- .5 Execute all the works in conformity with the rules of the art and to the safety requirements generally recognized for this type of installation.
- .6 In every case where the singular is used in the specifications, it is implied that the plural applies when necessities to complete adequately the installation.

1.3 DEFINITIONS

- .1 The term *Verify / Examine* implies to clean, lubricate, calibrate, adjust, repair or replace parts as needed.
- .2 The term *Clean* implies to remove any dust, carbon dust, rust, oil, grease, etc located on any equipment, part of equipment or working zone.
- .3 The term 'regular hours' means the time frame from Monday to Friday between 8 am and 17 pm except industry holidays.

1.4 CODES AND REGULATIONS

- .1 Execute all required work in accordance with the latest editions of the ASTM A17.1-2010/CSA B44-2010 Code (update included), CAN/CSA-B651-12 Code and any other federal, provincial and municipal regulations applicable for this type of installation, including the National building Code of Canada and the Quebec Electrical Code.
 - .2 Execute all work in compliance with the labor standards applicable for this type of installation.
-

- .3 Inform Departmental Representative of any changes to these requirements occurring during the term of the contract and work to be done to meet them included or not in this contract.

1.5 SPECIFICATIONS INTENTIONS

- .1 The purpose of the specifications is to describe the procedures and requirements of maintenance to ensure proper operation of elevators. The Contractor agrees to comply with the specifications.
- .2 Preventive maintenance described in the specifications must be executed to ensure equipment higher life expectancy, in addition to minimize the unplanned operating stops.

1.6 WORK NOT INCLUDED

- .1 For all work not included herein, the Contractor shall obtain the written approval of Departmental Representative before performing the work.
- .2 Work not included under this contract are defined as follows:
 - .1 Work to be performed outside the hours prescribed and approved in writing by Departmental Representative.
 - .2 Work made necessary due to vandalism and approved in writing by Departmental Representative.
- .3 Departmental Representative reserves the right in the case of emergency repairs, to do the emergency repair work in overtime.
 - .1 Emergency repair:
 - .1 The Contractor shall, in all cases of emergency repair, notify the Departmental Representative and evaluate opportunities with him to complete the repairs in overtime. The evaluation of the work period required in overtime time will be indicated to Departmental Representative.
 - .2 The Contractor shall complete the repairs in overtime after obtaining written approval of Departmental Representative.
 - .3 Emergency repairs carried out in extra time at the request of Departmental Representative, shall be paid as follows: The Contractor will absorb the number of hours worked at the regular rate and Departmental Representative will only pay an additional amount for premium hours.

1.7 SITE VISIT

- .1 The *Contractor* acknowledges having examined the site before submitting its bid and, therefore, may not claim any errors or omissions on the nature and extent of its commitments and obligations

1.8 OWNERSHIP OF EQUIPMENT

- .1 The *Contractor* shall be responsible for any good belonging to Departmental Representative, when these possessions are under the care or control of the *Contractor*. The *Contractor* shall be responsible for any loss or damage resulting from his negligence or that of his employees.
-

- .2 All existing equipment, including any replacement parts installed under the contract or any other components that extra payment was made for, are the exclusive property of Departmental Representative.

1.9 CONTRACTOR'S PERSONNEL

- .1 The Contractor shall provide skilled workers with valid elevator mechanic skills cards and confined space skills cards and a minimum of five years experience, able to work with promptness and efficiency in a manner that conforms to rules Art and the Departmental Representative satisfactory.
- .2 Departmental Representative may require from the Contractor to replace any employee he considers incompetent, negligent or otherwise undesirable. A verbal notice is sufficient for the exercise of this right.
- .3 Unless otherwise noted, if the staff of the Departmental Representative staff or the building occupant goes on strike, the *Contractor's* employees must continue the work. If the *Contractor's* employees were unable to perform the work, the owner, in its sole discretion, will decide what measures to take.
- .4 The contractor has the responsibility to train its employees, at its expenses, even when training is necessary to meet the specific needs of this contract.
- .5 The *Contractor's* employees assigned to this contract shall wear a uniform with the company's name on it.
- .6 The *Contractor's* employees assigned to this contract shall be able to speak French and English.

1.10 RESPECT OF THE EMPLOYMENT LAWS

- .1 The *Contractor*, as an employer must pay any all subscription according to the Canada Pension Plan, the Industrial Accidents Act, laws concerning taxation, the Unemployment Insurance Act and other mandatory contributions under federal, provincial or municipal law.
- .2 Departmental Representative has the right to terminate this contract at any time if the contractor or its subcontractors are not complying with the work health and safety commission.
- .3 Departmental Representative may deduct any amount due to the contractor until it or its subcontractors pay fully all contributions above.

1.11 SAFETY MEASURES

- .1 This article states the minimum standard and does not limit in any ways the responsibilities and obligations of the Contractor. In case of conflict between the security measures set out below and the established practices of the Departmental Representative, the established practices of the Departmental Representative have precedence. The Departmental Representative may at its sole discretion, impose additional standards of safety.
- .2 The particular instructions and the orders given by Departmental Representative on the workplace also have precedence on any safety measures expressed in the present.
 - .1 Smoking is prohibited in the building.

- .2 The Contractor shall not use the materials, tools and equipment belonging to the Departmental Representative without the consent of the latter.
- .3 Departmental Representative may, at its discretion and according to his instructions, suspend or terminate the work of the Contractor for reasons of security without liability to Departmental Representative or any compensation for the Contractor. The instructions and stop work shall be recorded by the Contractor and the Departmental Representative, they will agree on the date and method of resumption.
- .4 The Contractor shall provide and install quality warning signs and temporary partitions (barricades) with a minimum height of 42 inches for the protection of public areas for work when hindering public traffic areas.
- .5 The Contractor shall ensure that its employees are aware of the building fire fighting equipment and safety measures.
- .6 The Contractor shall ensure that its employees have at their disposal the equipment and safety clothing required for the execution of their functions.
- .7 The Contractor has the responsibility to inform the Departmental Representative of any hazardous or unsafe conditions, and in the shortest possible time.
- .3 The Contractor is, at all times, responsible for ensuring the safety of its employees and any person and all movable and immovable property near the work and shall at all times comply with all standards, code and law on health and safety.
- .4 The Contractor must follow the procedures outlined in the building orientation guide.

1.12 SECURITY MESURES - HOT WORK

- .1 The Contractor must follow the procedures outlined in the building orientation guide.

1.13 SECURITY MESURES – CONFINED SPACE

- .1 The contractor must carry out his work in accordance with the instructions established in section 01 35 29.06 Health and safety.
- .2 The contractor is responsible for developing the safe work procedures required according to article 1.32 of section 01 35 29.06 Health and safety. The contractor must write up the procedures and have them approved by the Ministerial Representative, before the start of maintenance work.
- .3 The contractor shall transmit the risk assessment forms to Departmental Representative at least 5 days before the date set for entry into these confined spaces. He should include all costs for the measures to be taken, monitored and strictly enforced in order to meet safety requirements for confined spaces.

1.14 RESPONSIBILITY

- .1 The Contractor assumes all the risks and responsibilities which relates to the execution of the present contract including its appendices and has to take all the necessary measures to avoid any damages to Departmental Representative or third party goods. For that purpose, the Contractor makes a commitment to guarantee and to indemnify Departmental Representative against any damages, losses, complaints or expenses resulting from the present contract, including the expenses and judicial and extrajudicial fees engaged by Departmental Representative and to take sides for him.
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1.15 CESSION

- .1 The present contract is non-transferable by the Contractor and cannot be given in subcontracting, in all or in part, without the preliminary written assent of the other sides. The fact for the Contractor to give up the present contract or to give it in subcontracting does not relieve him of its obligations at the end of the present contract.
- .2 The Contractor declares that he did not sell or given up the universality, a part or a particular category of his current or future debts and he makes a commitment to inform Departmental Representative of any sale or possible transfer of his debts within ten (10) days of the aforementioned sale or transfer.
- .3 If the Contractor does not inform Departmental Representative according to the disposition which precede and in which Departmental Representative becomes responsible for the payment to the transferee of sums of money already paid to the Contractor, the Contractor and the signatory of the present contract shall be jointly responsible for the repayment to Departmental Representative of any sum paid to the Contractor.

1.16 QUALITY INSURANCE

- .1 Departmental Representative reserves the right at the end of the present contract to verify or mandate someone to verify the work made during the course of the contract.
 - .2 In every case, the Contractor recognizes that at the end of the present contract he is responsible for the quality of the works made during the course of the contract.
 - .3 The Contractor shall maintain and supply on reasonable request the appropriate documentation which demonstrates the respect for the present contract.
 - .4 Departmental Representative can, at any time during the term of this contract, inspect or make inspect the works by his consultants, verify the operations of the Contractor and have access to areas and necessary documentation for the verification of any subject relative to this contract. The Contractor has to foresee the availability of his staff assigned to the contract.
 - .5 If Departmental Representative deposits a note in regards to the quality of the works or the executed services, the Contractor has to, within a few hours, supply to Departmental Representative a written report describing the badly executed works and the measures taken to avoid a recurrence.
 - .6 The Contractor agrees that the requirements of quality insurance of this contract also apply to his subcontractors.
 - .7 The Contractor has to demonstrate, on request, and to the satisfaction of Departmental Representative the following:
 - .1 The existence and the respect of a work quality control program.
 - .2 The applicable manufacturing standards at the equipment installation time;
 - .3 The Contractor shall perform periodic verifications of the services supplied to Departmental Representative, according to the calendar foreseen by the quality control program aiming at verifying the efficiency of the works. The frequency of the verifications can be straightened according to the results of the previous verifications or be negotiated between sides at needs.
-

- .8 The Contractor shall assist to monthly meetings with Departmental Representative to evaluate the maintenance quality as well as to verify with him the breakdowns listing and maintenance registers.

1.17 REPLACEMENT PARTS

- .1 Except approved modification, the replacement parts used on the vertical transport system within the course of this contract shall be authentic parts of current production.
- .2 If the *Contractor* judges that he would have a better replacement part, he shall submit it to Departmental Representative for approval. This new piece will be the responsibility (parts and labor) of the Contractor.

1.18 PROCEDURES

- .1 The *Contractor* shall submit to Departmental Representative a list of the mechanics and their supervisor that are qualified to perform the maintenance preventive on the equipments. This list shall include their experience, as well as any other relevant information in regard to their work.
- .2 The maintenance preventive shall be performed during regular hours. At his arrival on site, the mechanic shall register with the person in charge of the building.
- .3 Any work causing a shutdown of a complete elevator group shall be performed outside regular hours with the approval of Departmental Representative and without additional fees.
- .4 At any given time, Departmental Representative shall be informed, at least 5 days in advance, of any major works which would require the shutdown of a unit.
- .5 At any given time, Departmental Representative shall be informed, at least 24 hours in advance, of any deliveries which must be made at loading dock.
- .6 No work generating noise of more than 70 dBa or generating strong smells will be tolerated during regular hours. Those works shall be done outside regular hours without any fees to Departmental Representative. Only Departmental Representative shall be the judge of the tolerated works.
- .7 No demand for overtime work will be accepted without prior written authorization of Departmental Representative.

1.19 CLEANLINESS AND DAMAGES

- .1 At any given time, the machine room, hoistway, car top or any other areas directly related to the operation of the elevator shall be clean and free of any obstacle.
- .2 Oil leaks and the abnormal accumulations of dust shall be quickly cleaned and their causes determined for immediate necessary corrections.
- .3 When work must be executed on landing floors, the mechanic shall make sure to protect the floor or any other surfaces not to soil the area. The mechanic shall make sure to leave the area in the same state of cleanliness at the time of his arrival.
- .4 Departmental Representative reserves the right to demand to the *Contractor* the costs required to correct the damages or the stains caused by the *Contractor*.
-

1.20 MAINTENANCE LOGBOOK

- .1 Keep in the machine room a clean and up to date maintenance logbook. This register shall include, for each of the visits, the date and arrival time, the purpose and brief description of work done, the detail of the testing and checking. Always keep the activities of the last five years in the register.
- .2 Include in the maintenance logbook a schedule of the routine works required within the course of the preventive maintenance.
- .3 Submit to Departmental Representative a detailed monthly report on the service calls and other work on the equipments. Participate in a meeting, as needed, with Departmental Representative to discuss the report and the activities which relates to the maintenance. The monthly report shall include at least the following information:
 - Date;
 - Building / Location;
 - Elevator Number;
 - Time of the call;
 - Time of arrival;
 - Time spent on the call;
 - Description of the problem by the client;
 - Problem Description and Action taken to resolve it by the mechanic;
 - Name of the mechanic.

1.21 ANNUAL TESTS

- .1 Perform all the tests prescribed in Section 8.11.2 and 8.11.3 of ASTM A17.1-2010/CSA B44-2010 code. The annual tests shall be conducted 30 days before the contract expires.
- .2 Provide Departmental Representative a copy of the certificates of annuals tests.

Part 2 PREVENTIVE & CORRECTIVE MAINTENANCE**2.1 MAINTENANCE SERVICES**

- .1 Contractor Responsibility
 - .1 Responsibility of the Contractor, without limitation, applies to the following components:
 - .1 Controller including all the relays, semiconductors, resistances, condensers, transformers, contacts, conductors, control potentiometers, computer components and traveling cable.
 - .2 Selector and dispatch equipment including selector steel tape and the mechanical and electric driving equipment.
 - .3 Hoistway equipments including platform and counterweights, buffers, guide rails, superior and inferior terminal stopping devices.
 - .4 Hall and car fixtures including pushbutton, key-operated switches and direction & position lantern indicator.
 - .5 Hall door equipments including interlocks, door suspension, door guides and door closing devices as well as all the safety open door devices.
 - .6 Car door equipments including door operator, door suspension, door guides, keys, motors, coupling arms, cams and contacts.
 - .7 Platform equipments including the frame, weight detector, safeties, shoe or roller guides.

- .8 Not Used
- .9 Not Used
- .10 Not Used
- .11 Not Used
- .12 Pumps and hydraulic motor, hydraulic cylinder and plunger if out of ground installation, hydraulic liquids, valves unit, filters, mufflers, cathodic protection system, vitaulic joint and gasketsm, oil cooler and oil heater.
- .13 Motor and motor generator including motor winding, rotating parts, commutator, brushes, brush holders and bearings.
- .14 Auxiliary brake system.
- .15 Cab fan and emergency lighting system.
- .16 Communication system between cab, machine room and security desk.
- .17 Not Used
- .18 Not Used
- .2 The *Contractor* is not responsible for following components:
 - .1 Hoistway enclosure including doors and hall barriers, door frame and hall door sill;
 - .2 Any damages due to vandalism acknowledged by Departmental Representative.
- .2 Vandalism
 - .1 Work related to damage caused by acts of vandalism must be recognized by Departmental Representative.
 - .2 Charge in addition to the contract, only the vandalized parts and limited profit margin and administration 15% of the cost of parts.
 - .3 Working time for this work is included in the contract.

2.2 CALLBACK AND REPAIR SERVICE

- .1 The Contractor shall maintain and provide a callback and repair services in case of breakdown as prescribes in this section.
- .2 Callback services
 - .1 Provide a telephone service line monitoring for incoming calls at all times.
 - .2 Include callback services during regular working hours.
 - .3 The technicians responsible of the building shall permanently be equipped with a telecommunication device so that the *Contractor* can contact and assign him to the service call.
 - .4 Any emergency work started at regular time shall be completely completed free of charge if Departmental Representative requires it.
 - .5 The *Contractor* shall maintain a record of all calls, including the date, time, nature of call, work performed and additional work required.
 - .6 Major repair that would normally take more than 8 hours/team (eg. A motor rewinding, replacement of hoistropes) may be made during regular business hours.
- .3 Emergency callback services
 - .1 Include all fees for emergency callback services in the cases described below.
 - .2 Provide 24 hours emergency callback services in case of, but not limited to, a person trapped in an elevator, simplex elevator is out of service or more than one car in a group is out of service.

.4 Response Time

- .1 Ensure a maximum response time, for the arrival of a technician on site, after a service call of Departmental Representative, as described in the table below:

Type of call	Maximum response time
<u>Callback services:</u>	
During regular hours	45 minutes
Outside regular hours	90 minutes
<u>Emergency callback services:</u>	
During regular hours - Emergency	30 minutes
Outside regular hours - Emergency	45 minutes

2.3 TOOLS AND MATERIAL**.1 Parts on site**

- .1 Maintain, inside a metal cabinet located in the machine room, an inventory of minor replacement parts such as:
- .1 Light bulbs for the car and hall pushbuttons;
 - .2 A complete car and hall pushbuttons unit;
 - .3 Fuses and relays of each type used in the controller;
 - .4 Commutator brushes for DC motor;
 - .5 Roller guides for hall and car door;
 - .6 Four (4) liters of geared machine oil;
 - .7 Five (5) gallon of hydraulic oil;
 - .8 One (1) gallon of multi-purpose lubricant;
 - .9 Products and cleaning cloths;
 - .10 100 watts light bulbs for the replacement of the top of car and pit lighting.
 - .11 Not Used

.2 Parts locally

- .1 Maintain locally an inventory of major replacement parts available within 48 hours such as:
- .1 A complete set of car roller or shoe guide;
 - .2 A complete set of hall and car door suspension;
 - .3 A complete door operator unit;
 - .4 Microprocessor boards or PLC;
 - .5 Ventilators;
 - .6 Transformers;
 - .7 Brake pads;
 - .8 Door detector unit;
 - .9 Relays and controller parts;
 - .10 Valves.

.3 Available Tools

- .1 Maintain locally a set of tools and of instruments such as multimeter, tachometer, chain block, oscilloscope, testing weights, pressure manometers, welding equipments and cleaning kit.

- .2 Maintain locally any electronic tools necessary for the programming of the controllers.

2.4 PREVENTIVE MAINTENANCE

.1 Object

- .1 The preventive maintenance program consists of a series of activities based on a mixed program of frequency of use and period. If the use of the vertical transport systems is higher than at the time of the contract signature; the periodic maintenance interventions shall be increased.

.2 Maintenance activities

- .1 The Contractor shall rapidly correct all excessive wear, breakdown or lack of adjustment of any elevator components detected during a maintenance activity.

.3 Inspection frequency

- .1 The Contractor shall perform preventive maintenance activities identified in the specifications while respecting the frequency and schedule shown in table below (the number of minutes allocated in the table for the activities is considered a minimum per unit and does not include repairs and service calls).

Period	Maintenance Activity		Hydraulic Elevators
Free	Monthly		0.75 hr per period
Free	Quarterly		0.75 hr per period
Free	Biannual		1.25 hr per period
September	Annual		3 hr per period
TOTAL (per unit):			17.5 hr

- .2 Maintenance activities shall always be coordinated with Departmental Representative.

.4 Monthly activities

- .1 Perform the following tasks on each elevator once a month:
- .2 Ride each car on its entire travel in both up and down directions and check and correct the following:
- .1 Ride comfort and vibrations;
 - .2 Unusual noise;
 - .3 Door operation and pre-opening;
 - .4 Pushbutton and indicators operation;
 - .5 Car safety features, including alarm button, and stop switch;
 - .6 Door protective devices operation;
 - .7 Fan and door noise levels.
 - .8 Leveling of the car (acceptable maximum: 6 mm).
- .3 Hall and car doors; Check and correct the following:
- .1 The positive locks, the mechanical locks and the door contacts;

- .2 Door reopening device;
 - .3 Hoistway access switch;
 - .4 The eccentrics and door retaining devices;
 - .5 The lower door guides;
 - .6 The roller guides;
 - .7 Clutch, cams and assembly;
 - .8 The suspensions;
 - .9 The door panels attachments;
 - .10 The door closer;
 - .11 Guard parts.
 - .4 In the hoistway; Check and correct the following:
 - .1 Unusual noise;
 - .2 Cleanliness;
 - .3 Abnormal vibrations;
 - .4 Clean the pit floor;
 - .5 Pit light;
 - .6 Clean and lubricate the pit equipments (pulley, buffers and others).
 - .5 In the cab and car top; Check and correct the following:
 - .1 Clean door mechanisms;
 - .2 Check the door operator;
 - .3 Check the emergency lighting system;
 - .4 Check the door closing force (maximum acceptable: 30 lbs);
 - .5 Check and replace as necessary the light on the inspection unit;
 - .6 Check car and counterweights guides.
 - .7 Make sure the fan is running 24/24 hours and cleaned monthly.
 - .6 In the machine room; Check and correct the following:
 - .1 Unusual noise;
 - .2 Cleanliness;
 - .3 Abnormal vibrations;
 - .4 Oil leak.
 - .7 Not Used
 - .8 In the machine room / Power unit; Check and correct the following:
 - .1 Oil leakage on the power unit;
 - .2 Oil levels in the tank with car at lowest and highest travel point;
 - .3 Oil temperature & color to detect impurity;
 - .4 Condition and tension of drive belts;
 - .5 Power unit operation;
 - .6 Bearings and operation, pump bearing noise;
 - .7 Valves;
 - .8 Wiring connection.
 - .9 In the machine room / Controller; Check and correct the following:
 - .1 Over heated or failed parts in the controller;
 - .2 Wiring connection and insulation;
 - .3 Relay, drive and other components.
 - .10 Not Used
-

.5 Quarterly activities

- .1 Perform the following tasks on each elevator every three months:
- .2 In the hoistway; Check and correct the following:
 - .1 Compensation pulley switch;
 - .2 Compensation pulley bearing;
 - .3 Clean the compensation ropes;
 - .4 Check the buffers.
- .3 Hall and car doors and car top; Check and correct the following:
 - .1 Clean and lubricate, if required, the hoistropes and speed governor ropes;
 - .2 Check the hoistropes tension (maximum acceptable variation: 10 %).
 - .3 Check, clean and lubricate if required, the door tracks, suspension, guides and eccentric of the car doors;
 - .4 Verify and repair if required, the door eccentrics and door retaining devices as well as the clutch, and mobile cams of the hall doors;
 - .5 Check and clean the hall doors;
 - .6 Check, clean and lubricate if required the doors operation mechanisms;
 - .7 Check the car and counterweight roller guides tension.

.6 Biannual activities

- .1 Perform the following tasks on each elevator every six months:
 - .1 Check, clean and lubricate if required, the door tracks, suspension, guides, locks, closing device and eccentric of the hall doors;
 - .2 Clean the machine room floor;
 - .3 Clean the dust the controller and change the dust filters;
 - .4 Clean the carbon dust on the machine room equipment;
 - .5 Clean the car top;
 - .6 Check and test the superior and inferior terminal stopping devices including the slowdown switches;
 - .7 Check and repair the hoistropes fasteners, check the hoistropes and speed governor rope diameter and presence of rust to ensure safety.
 - .8 Check, clean and lubricate the car and counterweight safety devices.
 - .9 Check packing of the cylinder head to detect leaks;
 - .10 Test the communication system and submit a report to Departmental Representative.

.7 Annual activities

- .1 Perform the following tasks on each elevator every year:
 - .1 Perform all the performance level testing as describe in the specifications;
 - .2 Perform all the testing prescribe at Section 8 of the ASTM A17.1-2010/CSA B44-2010 code;
 - .3 Check the connection in the controller;
 - .4 Check the overload relay in the controller;
 - .5 Check travelling cables condition;
 - .6 Disassemble and clean all the components of the machine brake and performed the testing prescribe at Section 8 of the ASTM A17.1-2010/CSA B44-2010 code.
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- .7 Check and clean all the components of the auxiliary brake (rope brake) and performed the testing prescribe at Section 8 of the ASTM A17.1-2010/CSA B44-2010 code.
- .8 Check the relief valve setting as required by article 8.11.3.2.1 of ASTM A17.1-2010/CSA B44-2010 code.
- .9 Check the cylinders as required by article 8.11.3.2.2 of ASTM A17.1-2010/CSA B44-2010 code.
- .10 Provide assistance to Departmental Representative for testing of the emergency power system and repair if necessary.
- .11 Perform real time testing of Emergency Operation (Emergency Recall Operation - Phase I & Emergency In-car Operation - Phase II) and emergency power operation with Departmental Representative.
- .12 Include all fees for assistance to Departmental Representative for testing of the emergency power system and fire alarm system including verification of smoke detector in the hoistway.

2.5 MANEUVERS

- .1 The Contractor shall maintain operation and performance levels as described in the related sections.

2.6 CRITERIAS AND METHODOLOGY

.1 Hoistropes

- .1 A yearly detailed report shall be submitted to Departmental Representative on the condition of the hoistropes.
- .2 Replace the entire set of ropes if one of the following conditions appears:
 - .1 The rope diameter is lower than what is allowed for the corresponding nominal diameter as per the following table:

Nominal	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"
Minimum	11/32"	13/32"	15/32"	17/32"	37/64"	41/64"	45/64"

- .2 In absence of corrosion, if the number of broken wires per rope lay exceed the following values:

Rope construction	Uniformly distributed broken wires	Broken wires predominate in one or two strands
6 x 19 6 x 21 6 x 25	24	8
8 x 19 8 x 21 8 x 25	32	10

- .3 In presence of corrosion, if the number of broken wires per rope lay exceed 50% of the value shown in article 2.6.1.2.2 or if a 50% reduction of the diameter gap of the article 2.6.1.2.1.
- .3 The length of a rope lay is determined as follow:

Nominal	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"
Length	2-1/2"	2-7/8"	3-1/4"	3-5/8"	4-1/16"	4-1/2"	4-7/8"

.2 Governor ropes

- .1 A yearly detailed report shall be submitted to Departmental Representative on the condition of the governor ropes.

- .2 Replace the ropes if one of the following conditions appears:
 - .1 The rope diameter is lower than what is allowed in article 2.6.1.2.1.
 - .2 In absence of corrosion, if the number of broken wires per rope lay exceed 75% of the maximum allowed in article 2.6.1.2.2.
 - .3 In presence of corrosion, if the number of broken wires per rope lay exceed the maximum allowed in article 2.6.1.2.3.
 - .3 Rotating elements balancing
 - .1 Foresee that the machine and the motor are perfectly balanced and aligned in order to limit to 1/1000" the vibrations at the end of the motor.
 - .2 Limit the horizontal play and the gear play to a maximum of 5/1000" at balance load.
 - .4 Commutator segments depth
 - .1 Maintain a depth of 1/32" to 3/64" for the commutator segments.
 - .5 Commutator brushes
 - .1 Replace the entire set of commutator brushes if worn out more than 60% of the original length.
 - .2 Adjust the commutator brush holder in order to maintain a pressure force of four (4) pound per square inch.
 - .6 Methodology
 - .1 **Car speed (seconds):** Measured in feet/minute and at constant speed. A variation of 5% is acceptable.
 - .2 **Operating times (seconds):** Measured from the time doors closing cycle begins until doors are three quarters opened at next floor, assuming a maximum floor height of 13 feet. A variation of 5% is acceptable.
 - .3 **Door opening / closing times (seconds):** Measured from the time doors start to open / close until the doors are fully opened / close.
 - .4 **Doors dwell times (seconds):** Measured from the time doors are fully opened until the door closing cycle starts. A variation of 10% is acceptable.
 - .5 **Doors nudging times (seconds):** Measured from the time doors are fully opened until the reopening device has been rendered inoperative and sound signal activated. A variation of 10% is acceptable.
 - .6 **Noise level ambient:** Measure in dBa within the cab when parked at typical landing with fan on at low speed, using scale A of an ANSI type 2 sound level meters.
 - .7 **Noise level door motion:** Measure within the cab during a complete door cycle, using scale A of an ANSI type 2 sound level meter. A variation of 10% is acceptable.
 - .8 **Noise level running:** Measure within the cab from bottom to top of hoistway, using scale A of an ANSI type 2 sound level meter. A variation of 10% is acceptable.
 - .9 **Leveling distance:** Measured in mm, this is the distance between car sill and landing sill at the moment the doors are fully opened.
 - .10 **Pre-opening distance:** Measured in mm, this is the distance between car sill and landing sill at the moment the doors start to open.
 - .11 **Door force:** Door closing force is measured in pounds.
 - .12 **Starts / Stops:** Acceleration / deceleration are rated (N) normal, (L) light, (M) medium or (H) high
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2021-01-19

Page 15

- .13 **Ride comfort:** Lateral acceleration are rated (N) normal, (L) light, (M) medium or (H) high

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- Shop Drawings:
 - .2 Indicate on drawings:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
 - .3 Shop drawings and product data accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
 - .5 Certification of compliance to applicable codes.
- .3 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

1.2 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.
 - .1 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
 - .2 Operation data to include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .6 Valves schedule and flow diagram.
 - .7 Colour coding chart.
 - .3 Maintenance data to include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
 - .4 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified.
 - .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

- .5 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
 - .2 Make changes as required and re-submit as directed by Departmental Representative.
- .6 Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .7 Site records:
 - .1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of prints as required for each phase of work. Mark changes as work progresses and as changes occur.
 - .2 Transfer information to reproducibles, revising reproducibles to show work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection.
- .8 As-Built drawings:
 - .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
 - .3 Submit to Departmental Representative for approval and make corrections as directed.
 - .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
 - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .9 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Furnish spare parts as follows:
 - .1 One set of packing for each pump.
 - .2 One casing joint gasket for each size pump.
 - .3 One glass for each gauge glass.
- .3 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.
- .4 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 FIELD QUALITY CONTROL

- .1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .2 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.3 DEMONSTRATION

- .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
 - .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
 - .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
 - .4 Instruction duration time requirements as specified in appropriate sections.
 - .5 Departmental Representative will record these demonstrations on video tape for future reference.
-

END OF SECTION

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 National Fire Prevention Association (NFPA)
 - .1 NFPA 13, Standard for the Installation of Sprinkler Systems.
- .2 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN4 S543, Standard for Internal Lug Quick Connect Couplings for Fire Hose.

PART 2 PRODUCTS**2.1 DESIGN REQUIREMENTS**

- .1 Include with each system materials, accessories, and equipment inside and outside building to provide each system complete and ready for use.
- .2 Locate sprinkler heads in consistent pattern with ceiling grid, lights, and air supply diffusers.
- .3 Devices and equipment for fire protection service: ULC approved for use in wet pipe sprinkler systems.
- .4 Location of Sprinkler Heads:
 - .1 Uniformly space sprinklers on branch.
- .5 Water Distribution:
 - .1 Make distribution uniform throughout the area in which sprinkler heads will open.

2.2 ABOVE GROUND PIPING SYSTEMS

- .1 Provide fittings for changes in direction of piping and for connections.
 - .1 Make changes in piping sizes through tapered reducing pipe fittings, bushings will not be permitted.
- .2 Perform welding in shop; field welding will not be permitted.
- .3 Conceal piping in areas with suspended ceiling.

2.3 SPRINKLER HEADS

- .1 General: to NFPA 13 and ULC listed for fire services.
- .2 Sprinkler Head Type:
 - .1 Type A: upright bronze.
 - .2 Type B: pendant chrome link and lever type.
 - .3 Type D: recessed type as existing.
 - .4 Type F: side wall type.
- .3 Provide nominal 1.2 cm orifice sprinkler heads.
 - .1 Provide polished stainless steel ceiling plates sprinklers below suspended ceilings.
 - .2 Provide corrosion-resistant sprinkler heads and sprinkler head guards in accordance with NFPA 13.
 - .3 Ceiling cups: not permitted.
 - .4 Intermediate trigger temperature extinguisher heads in elevator machinery rooms.

PART 3 EXECUTION**3.1 MANUFACTURER'S INSTRUCTIONS**

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

3.2 INSTALLATION

- .1 Install, inspect and test to acceptance in accordance with NFPA 13 and NFPA 25.

3.3 PIPE INSTALLATION

- .1 Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings.
- .2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.
- .3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.
- .4 Inspect piping before placing into position.

3.4 CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL**1.1 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Indicate on drawings:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
 - .2 Shop drawings and product data accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
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 - .6 Valves schedule and flow diagram.
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 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
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 - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
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- .6 Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .7 Site records:
 - .1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of prints as required for each phase of work. Mark changes as work progresses and as changes occur.
 - .2 Transfer information to reproducibles, revising reproducibles to show work as actually installed.
 - .3 Use different colour waterproof ink for each service.
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- .8 As-built drawings:
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 - .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
 - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .9 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Furnish spare parts as follows:
 - .1 One set of packing for each pump.
 - .2 One casing joint gasket for each size pump.
 - .3 One glass for each gauge glass.
- .3 Provide one set of special tools required to service equipment as recommended by manufacturers.
- .4 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 FIELD QUALITY CONTROL

- .1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 -ACTION AND INFORMATIONAL SUBMITTALS.
- .2 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.3 DEMONSTRATION

- .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
 - .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
 - .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
 - .4 Instruction duration time requirements as specified in appropriate sections.
 - .5 Departmental Representative will record these demonstrations on video tape for future reference.
-

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.5 PROTECTION

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).

PART 2 PRODUCTS**2.1 SUMP PUMP SUBMERSIBLE**

- .1 Characteristics: See table
- .2 DN 50 nominal diameter discharge pipe.
- .3 CSA approved installations: pump with cast iron body covered with epoxy coating, with stainless steel shaft, non-lockable bronze impeller and mechanical shaft seal.
- .4 Motor: hermetically sealed, with automatic overload protection.
- .5 Control: three level control ball floats (mercury free) normally open with SJOW cable.
- .6 Control panel
 - .1 An EEMAC 1 box.
 - .2 A main selector.
 - .3 A set of fuses.
 - .4 A magnetic starter.
 - .5 Primary / secondary fuses.
 - .6 A terminal block for 3 fleets.
 - .7 A three-position selector ("manual-stop-auto").
 - .8 A light (alarm).
 - .9 A light (on).
 - .10 A light (step).
 - .11 Proof of operation (current donut) via dry contact
 - .12 A high level alarm and alarm contact.
 - .1 Sound 85 DB
 - .2 A silence button
 - .3 A dry contact for remote alarm

PART 3 EXECUTION**3.1 MANUFACTURER'S INSTRUCTIONS**

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

3.2 INSTALLATION

- .1 Make piping and electrical connections to pump and motor assembly and controls as indicated.
 - .2 Ensure pump and motor assembly do not support piping.
-

3.3 FIELD QUALITY CONTROL

- .1 Site Tests/Inspection:
 - .1 Check power supply.
 - .2 Check starter protective devices.
- .2 Start-up, check for proper and safe operation.
- .3 Check settings and operation of hand-off-auto selector switch, operating, safety and limit controls, audible and visual alarms, over-temperature and other protective devices.

3.4 TRAINING

- .1 In accordance with Section 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS: Training of O&M Personnel, supplemented as specified.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 ASTM International (ASTM)
 - .1 ASTM B32, Standard Specification for Solder Metal.
 - .2 ASTM B306, Standard Specification for Copper Drainage Tube (DWV).
 - .3 ASTM C564, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- .2 CSA Group (CSA)
 - .1 CAN/CSA-B70, Cast Iron Soil Pipe, Fittings and Means of Joining.
 - .2 CAN/CSA-B125.3, Plumbing Fittings.
- .3 Green Seal Environmental Standards (GSES)
 - .1 Standard GS-36, Commercial Adhesives.
- .4 National Research Council Canada (NRC)
 - .1 National Plumbing Code of Canada (NPC).
- .5 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1168, Adhesive and Sealant Applications.

PART 2 PRODUCTS**2.1 COPPER TUBE AND FITTINGS**

- .1 Above ground sanitary and vent Type DWV to: ASTM B306.
 - .1 Fittings.
 - .1 Cast brass: to CAN/CSA-B125.3.
 - .2 Wrought copper: to CAN/CSA-B125.3.
 - .2 Solder: tin-lead.

2.2 CAST IRON PIPING AND FITTINGS

- .1 Buried sanitary and vent minimum NPS 3, to: CAN/CSA-B70, with one layer of protective coating.
 - .1 Joints:
 - .1 Mechanical joints:
 - .1 Neoprene or butyl rubber compression gaskets: to CAN/CSA-B70.ASTM C564 or
 - .2 Stainless steel clamps.
 - .2 Hub and spigot:
 - .1 Caulking lead: to CSA B67.
 - .2 Cold caulking compounds.
- .2 Above ground sanitary and vent: to CAN/CSA-B70.
 - .1 Joints:
 - .1 Hub and spigot:
 - .1 Caulking lead: to CSA B67.
 - .2 Mechanical joints:
 - .1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

PART 3 EXECUTION**3.1 APPLICATION**

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

3.2 TESTING

- .1 Pressure test buried systems before backfilling.
- .2 Hydraulically test to verify grades and freedom from obstructions.

3.3 PERFORMANCE VERIFICATION

- .1 Cleanouts:
 - .1 Verify that cleanout rods can probe as far as the next cleanout, at least.

3.4 CLEANING

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

END OF SECTION

PART 1 GENERAL**1.1 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Indicate on drawings:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
 - .2 Shop drawings and product data accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
 - .5 Certification of compliance to applicable codes.
 - .3 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

1.2 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.
 - .1 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
 - .2 Operation data to include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .6 Valves schedule and flow diagram.
 - .7 Colour coding chart.
 - .3 Maintenance data to include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
 - .4 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified.
 - .4 Testing, adjusting and balancing reports as specified.

- .5 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
 - .2 Make changes as required and re-submit as directed by Departmental Representative.
- .6 Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .7 Site records:
 - .1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of prints as required for each phase of work. Mark changes as work progresses and as changes occur.
 - .2 Transfer information to reproducibles, revising reproducibles to show work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection.
- .8 As-built drawings:
 - .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
 - .3 Submit to Departmental Representative for approval and make corrections as directed.
 - .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
 - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .9 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 DELIVERY, STORAGE AND HANDLING

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

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 FIELD QUALITY CONTROL

- .1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

3.3 DEMONSTRATION

- .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.5 PROTECTION

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.
- .2 Green Seal Environmental Standards (GSES)
 - .1 Standard GS-11, Environmental Standard for Paints and Coatings.
- .3 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113, Architectural Coatings.
 - .2 SCAQMD Rule 1168, Adhesive and Sealant Applications.

PART 2 PRODUCTS**2.1 MATERIAL**

- .1 Sealants:
 - .1 Sealants: maximum VOC limit to SCAQMD Rule 1168 and to GSES GS-36.
- .2 Sealants: maximum VOC limit to SCAQMD Rule 1168 and to GSES GS-36.
- .3 Adhesives: maximum VOC limit to SCAQMD Rule 1168 and to GSES GS-36.

PART 3 EXECUTION**3.1 APPLICATION**

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

3.2 CONNECTIONS TO EQUIPMENT

- .1 In accordance with manufacturer's instructions unless otherwise indicated.
- .2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.
- .3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

3.3 CLEARANCES

- .1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.

3.4 DIELECTRIC COUPLINGS

- .1 General: compatible with system, to suit pressure rating of system.
 - .2 Locations: where dissimilar metals are joined.
-

.3 NPS 2 and under: isolating unions or bronze valves.

.4 Over NPS 2: isolating flanges.

3.5 PIPEWORK INSTALLATION

.1 Screwed fittings jointed with Teflon tape.

.2 Protect openings against entry of foreign material.

.3 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.

.4 Assemble piping using fittings manufactured to ANSI standards.

.5 Saddle type branch fittings may be used on mains if branch line is no larger than half size of main.

.1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.

.6 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

.7 Install concealed pipework to minimize furring space, maximize headroom, conserve space.

.8 Slope piping, except where indicated, in direction of flow for positive drainage and venting.

.9 Install, except where indicated, to permit separate thermal insulation of each pipe.

.10 Ream pipes, remove scale and other foreign material before assembly.

.11 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.

.12 Provide for thermal expansion as indicated.

.13 Valves:

.1 Install in accessible locations.

.2 Remove interior parts before soldering.

.3 Install with stems above horizontal position unless indicated.

.4 Valves accessible for maintenance without removing adjacent piping.

3.6 SLEEVES

.1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated.

.2 Material: schedule 40 black steel pipe.

.3 Construction: use annular fins continuously welded at mid-point at foundation walls and where sleeves extend above finished floors.

.4 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Installation:

.1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.

.2 Other floors: terminate 25 mm above finished floor.

.3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.

- .6 Sealing:
 - .1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.
 - .2 Elsewhere:
 - .1 Provide space for fire stopping.
 - .2 Maintain the fire-resistance rating integrity of the fire separation.
 - .3 Sleeves installed for future use: fill with lime plaster or other easily removable filler.
 - .4 Ensure no contact between copper pipe or tube and sleeve.

3.7 ESCUTCHEONS

- .1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.
- .2 Construction: one piece type with set screws.
 - .1 Chrome or nickel plated brass or type 302 stainless steel.
- .3 Sizes: outside diameter to cover opening or sleeve.
 - .1 Inside diameter to fit around pipe or outside of insulation if so provided.

3.8 CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 ASTM International (ASTM)
 - .1 ASTM A125, Standard Specification for Steel Springs, Helical, Heat-Treated.
 - .2 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM A563, Standard Specification for Carbon and Alloy Steel Nuts.
- .2 Factory Mutual (FM)
- .3 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
 - .1 MSS SP58, Pipe Hangers and Supports - Materials, Design and Manufacture.
 - .2 MSS SP69, Pipe Hangers and Supports - Selection and Application.
 - .3 MSS SP89, Pipe Hangers and Supports - Fabrication and Installation Practices.
- .4 National Research Council Canada (NRC)
 - .1 National Plumbing Code of Canada 2015 (NPC).
- .5 Underwriter's Laboratories of Canada (ULC)

PART 2 PRODUCTS**2.1 SYSTEM DESCRIPTION**

- .1 Design Requirements:
 - .1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
 - .2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP58.
 - .3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
 - .4 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
 - .5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.
- .2 Performance Requirements:
 - .1 Design supports, platforms, catwalks, hangers to withstand seismic events as specified.

2.2 GENERAL

- .1 Fabricate hangers, supports and sway braces in accordance with MSS SP58. ANSI B31.1 and
 - .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.
-

2.3 PIPE HANGERS

- .1 Finishes:
 - .1 Pipe hangers and supports: galvanized after manufacture.
 - .2 Use hot dipped galvanizing process.
- .2 Upper attachment structural: suspension from lower flange of I-Beam:
 - .1 Cold piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut carbon steel retaining clip.
 - .1 Rod: 9 mm UL listed.
- .3 Upper attachment structural: suspension from upper flange of I-Beam:
 - .1 Cold piping NPS 2 maximum: ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed.
- .4 Upper attachment to concrete:
 - .1 Ceiling: carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.
 - .2 Concrete inserts: wedge shaped body with knockout protector plate UL listed, FM approved and to MSS SP69.
- .5 Hanger rods: threaded rod material to MSS SP58:
 - .1 Ensure that hanger rods are subject to tensile loading only.
 - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
 - .3 Do not use 22 mm or 28 mm rod.
- .6 Pipe attachments: material to MSS SP58:
 - .1 Attachments for steel piping: carbon steel black.
 - .2 Attachments for copper piping: copper plated black steel.
 - .3 Use insulation shields for hot pipework.
 - .4 Oversize pipe hangers and supports.
- .7 U-bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A563.

2.4 INSULATION PROTECTION SHIELDS

- .1 Insulated cold piping:
 - .1 64 kg/m³ density insulation plus insulation protection shield to: MSS SP69, galvanized sheet carbon steel. Length designed for maximum 3 m span.
- .2 Insulated hot piping:
 - .1 Curved plate 300 mm long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP69.

2.5 EQUIPMENT SUPPORTS

- .1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of Section. Submit calculations with shop drawings.

2.6 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

- .1 Provide templates to ensure accurate location of anchor bolts.
-

PART 3 EXECUTION**3.1 MANUFACTURER'S INSTRUCTIONS**

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

3.2 INSTALLATION

- .1 Install in accordance with:
 - .1 Manufacturer's instructions and recommendations.
- .2 Vibration Control Devices:
 - .1 Install on piping systems at pumps, boilers, chillers, cooling towers, and as indicated.
- .3 Clamps on riser piping:
 - .1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.
 - .2 Bolt-tightening torques to industry standards.
 - .3 Steel pipes: install below coupling or shear lugs welded to pipe.
 - .4 Cast iron pipes: install below joint.
- .4 Clevis plates:
 - .1 Attach to concrete with 4 minimum concrete inserts, one at each corner.
- .5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.
- .6 Use approved constant support type hangers where:
 - .1 Vertical movement of pipework is 13 mm or more,
 - .2 Transfer of load to adjacent hangers or connected equipment is not permitted.
- .7 Use variable support spring hangers where:
 - .1 Transfer of load to adjacent piping or to connected equipment is not critical.
 - .2 Variation in supporting effect does not exceed 25 % of total load.

3.3 HANGER SPACING

- .1 Plumbing piping: to Provincial Code.
 - .2 Fire protection: to applicable fire code.
 - .3 Gas and fuel oil piping: up to NPS 1/2: every 1.8 m.
 - .4 Copper piping: up to NPS 1/2: every 1.5 m.
 - .5 Flexible joint roll groove pipe: in accordance with table below for steel, but not less than one hanger at joints. Table listings for straight runs without concentrated loads and where full linear movement is not required.
-

- .6 Within 300 mm of each elbow.

Maximum Pipe Size: NPS	Maximum Spacing Steel	Maximum Spacing Copper
up to 1-1/4	2.4 m	1.8 m
1-1/2	3.0 m	2.4 m
2	3.0 m	2.4 m
2-1/2	3.7 m	3.0 m
3	3.7 m	3.0 m
3-1/2	3.7 m	3.3 m
4	3.7 m	3.6 m
5	4.3 m	
6	4.3 m	
8	4.3 m	
10	4.9 m	
12	4.9 m	

- .7 Pipework greater than NPS 12: to MSS SP69.

3.4 HANGER INSTALLATION

- .1 Install hanger so that rod is vertical under operating conditions.
- .2 Adjust hangers to equalize load.
- .3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

3.5 HORIZONTAL MOVEMENT

- .1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
- .2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.6 FINAL ADJUSTMENT

- .1 Adjust hangers and supports:
 - .1 Ensure that rod is vertical under operating conditions.
 - .2 Equalize loads.
- .2 Adjustable clevis:
 - .1 Tighten hanger load nut securely to ensure proper hanger performance.
 - .2 Tighten upper nut after adjustment.
- .3 C-clamps:
 - .1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
- .4 Beam clamps:
 - .1 Hammer jaw firmly against underside of beam.

3.7 CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS)
- .2 National Fire Protection Association (NFPA)
 - .1 NFPA 13-2002, Standard for the Installation of Sprinkler Systems.
- .3 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).

PART 2 PRODUCTS**2.1 GENERAL**

- .1 Size and shape of bases type and performance of vibration isolation as indicated.

2.2 ELASTOMERIC MOUNTS

- .1 Type M1 - colour coded; neoprene in shear; maximum durometer of 60; threaded insert and two bolt-down holes; ribbed top and bottom surfaces.

2.3 HANGERS

- .1 Colour coded springs, rust resistant, painted box type hangers. Arrange to permit hanger box or rod to move through a 30 degrees arc without metal to metal contact.
- .2 Type H1 - neoprene - in-shear, moulded with rod isolation bushing which passes through hanger box.
- .3 Type H2 - stable spring, elastomeric washer, cup with moulded isolation bushing which passes through hanger box.
- .4 Type H3 - stable spring, elastomeric element, cup with moulded isolation bushing which passes through hanger box.
- .5 Type H4 - stable spring, elastomeric element with precompression washer and nut with deflection indicator.
- .6 Performance: as indicated.

2.4 SEISMIC CONTROL MEASURES

- .1 General:
 - .1 Following systems and/or equipment to remain operational during and after earthquakes.
 - .2 Seismic control systems to work in every direction.
 - .3 Fasteners and attachment points to resist same maximum load as seismic restraint.
 - .4 Drilled or power driven anchors and fasteners not permitted.
 - .5 No equipment, equipment supports or mounts to fail before failure of structure.
-

- .6 Supports of cast iron or threaded pipe not permitted.
- .7 Seismic control measures not to interfere with integrity of fire stopping. Coordinate with Section 07 84 00 - Fire Stopping.
- .2 Static equipment:
 - .1 Anchor equipment to equipment supports. Anchor equipment supports to structure.
 - .2 Seismic restraints:
 - .1 Cushioning action gentle and steady.
 - .2 Never reach metal-like stiffness.
- .3 Vibration isolated equipment:
 - .1 Seismic control measures not to jeopardize noise and vibration isolation systems. Provide 6 to 9 mm clearance during normal operation of equipment and systems between seismic restraint and equipment.
 - .2 Incorporate seismic restraints into vibration isolation system to resist complete isolator unloading.
 - .3 As indicated.
- .4 Piping systems:
 - .1 Fire protection systems: to NFPA 13.
 - .2 Piping systems: hangers longer than 305 mm; brace at each hanger.
 - .3 Compatible with requirements for anchoring and guiding of piping systems.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Seismic control measures to meet requirements of NBC.
 - .2 Install vibration isolation equipment in accordance with manufacturers instructions and adjust mountings to level equipment.
 - .3 Ensure piping, ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduit and ducting passage through walls and floors do not transmit vibrations.
 - .4 Unless indicated otherwise, support piping connected to isolated equipment with spring mounts or spring hangers with 25 mm minimum static deflection as follows:
 - .1 Up to NPS4: first 3 points of support. NPS5 to NPS8: first 4 points of support. NPS10 and Over: first 6 points of support.
 - .2 First point of support: static deflection of twice deflection of isolated equipment, but not more than 50 mm.
 - .5 Where isolation is bolted to floor use vibration isolation rubber washers.
 - .6 Block and shim level bases so that ductwork and piping connections can be made to rigid system at operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.
-

3.3 CLEANING

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

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.
 - .2 CAN/CGSB-24.3, Identification of Piping Systems.
- .2 National Fire Protection Association (NFPA)
 - .1 NFPA 13, Standard for the Installation of Sprinkler Systems.

PART 2 PRODUCTS

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

- .1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.
- .2 Lettering and numbers raised or recessed.
- .3 Information to include, as appropriate:
 - .1 Equipment: manufacturer's name, model, size, serial number, capacity.
 - .2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

- .1 Colours:
 - .1 Hazardous: red letters, white background.
 - .2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).
- .2 Construction:
 - .1 3 mm thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.
- .3 Sizes:
 - .1 Conform to following table:

Size # mm	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

- .2 Use maximum of 25 letters/numbers per line.

- .4 Locations:
 - .1 Equipment in Mechanical Rooms: use size # 9.
- .5 Identification for PSPC Preventive Maintenance Support System (PMSS):
 - .1 Use arrangement of Main identifier, Source identifier, Destination identifier.
 - .2 Equipment in Mechanical Room:
 - .1 Main identifier: size #9.
 - .2 Source and Destination identifiers: size #6.
 - .3 Terminal cabinets, control panels: size #5.
 - .3 Equipment elsewhere: sizes as appropriate.

2.3 EXISTING IDENTIFICATION SYSTEMS

- .1 Apply existing identification system to new work.
- .2 Where existing identification system does not cover for new work, use identification system specified this section.
- .3 Before starting work, obtain written approval of identification system from Departmental Representative.

2.4 PIPING SYSTEMS GOVERNED BY CODES

- .1 Identification:
 - .1 Sprinklers: to NFPA 13.

2.5 IDENTIFICATION OF PIPING SYSTEMS

- .1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.
- .2 Pictograms:
 - .1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.
- .3 Legend:
 - .1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.
- .4 Arrows showing direction of flow:
 - .1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.
 - .2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.
 - .3 Use double-headed arrows where flow is reversible.
- .5 Extent of background colour marking:
 - .1 To full circumference of pipe or insulation.
 - .2 Length to accommodate pictogram, full length of legend and arrows.
- .6 Materials for background colour marking, legend, arrows:
 - .1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.
 - .2 Other pipes: pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.

.7 Colours and Legends:

.1 Where not listed, obtain direction from Departmental Representative.

.2 Colours for legends, arrows: to following table:

Background colour:	Legend, arrows:
Yellow	BLACK
Green	WHITE
Red	WHITE

.3 Background colour marking and legends for piping systems:

Contents	Background colour marking	Legend
Steam condensate (gravity)	Yellow	ST.COND.RET (GRAVITY)
Refrigeration suction	Yellow	REF. SUCTION
Refrigeration liquid	Yellow	REF. LIQUID
Refrigeration hot gas	Yellow	REF. HOT GAS
Fire protection water	Red	FIRE PROT. WTR
Sprinklers	Red	SPRINKLERS

2.6 VALVES, CONTROLLERS

.1 Brass tags with 12 mm stamped identification data filled with black paint.

.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

PART 3 EXECUTION**3.1 MANUFACTURER'S INSTRUCTIONS**

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

3.2 INSTALLATION

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Identify systems and equipment.

3.3 NAMEPLATES

.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

.3 Protection:

.1 Do not paint, insulate or cover.

3.4 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

- .1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
- .2 Adjacent to each change in direction.
- .3 At least once in each small room through which piping or ductwork passes.
- .4 On both sides of visual obstruction or where run is difficult to follow.
- .5 On both sides of separations such as walls, floors, partitions.
- .6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.
- .7 At beginning and end points of each run and at each piece of equipment in run.
- .8 At point immediately upstream of major manually operated or automatically controlled valves, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.
- .9 Identification easily and accurately readable from usual operating areas and from access points.
 - .1 Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 VALVES, CONTROLLERS

- .1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.
- .2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Departmental Representative. Provide one copy (reduced in size if required) in each operating and maintenance manual.
- .3 Number valves in each system consecutively.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 00 - 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 REFERENCE STANDARDS

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
 - .1 ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).
- .2 ASTM International (ASTM)
 - .1 ASTM B209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.
 - .2 ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
 - .3 ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - .4 ASTM C449/C449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - .5 ASTM C533, Calcium Silicate Block and Pipe Thermal Insulation.
 - .6 ASTM C547, Mineral Fiber Pipe Insulation.
 - .7 ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 - .8 ASTM C921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
 - .2 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).
- .5 Manufacturer's Trade Associations
 - .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).
- .6 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
 - .2 CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .3 CAN/ULC-S702, Thermal Insulation, Mineral Fibre, for Buildings
 - .4 CAN/ULC-S702.2, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

1.2 DEFINITIONS

- .1 For purposes of this section:
 - .1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
 - .2 "EXPOSED" - will mean "not concealed" as specified.
- .2 TIAC ss:
 - .1 CRF: Code Rectangular Finish.
 - .2 CPF: Code Piping Finish.

PART 2 PRODUCTS**2.1 FIRE AND SMOKE RATING**

- .1 In accordance with CAN/ULC-S102.
 - .1 Maximum flame spread rating: 25.
 - .2 Maximum smoke developed rating: 50.

2.2 INSULATION

- .1 Mineral fibre specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.
- .3 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.
 - .1 Mineral fibre: to CAN/ULC-S702.
 - .2 Jacket: to CGSB 51-GP-52Ma.
 - .3 Maximum "k" factor: to ASTM C547.
- .4 TIAC Code A-6: flexible unicellular tubular elastomer.
 - .1 Insulation: with vapour retarder jacket.
 - .2 Jacket: to CGSB 51-GP-52Ma.
 - .3 Certified by manufacturer: free of potential stress corrosion cracking corrodants.

2.3 ACCESSORIES

- .1 Tape: aluminum, self-adhesive, reinforced, at least 50 mm wide.
- .2 Contact adhesive: quick setting.
- .3 Glue for canvas shirts: washable.
- .4 Tie wire: stainless steel 1.5 mm in diameter.
- .5 Retaining straps: stainless steel 0.5 mm thick, 19 mm wide.

2.4 CEMENT

- .1 Thermal insulating and finishing cement:
 - .1 Air drying on mineral wool, to ASTM C449/C449M.

2.5 VAPOUR RETARDER LAP ADHESIVE

- .1 Water based, fire retardant type, compatible with insulation.

2.6 INDOOR VAPOUR RETARDER FINISH

- .1 Vinyl emulsion type acrylic, compatible with insulation.

2.7 OUTDOOR VAPOUR RETARDER FINISH

- .1 Vinyl emulsion type acrylic, compatible with insulation.
 - .2 Reinforcing fabric: fibrous glass, untreated 305 g/m².
-

2.8 JACKETS

- .1 Polyvinyl Chloride (PVC):
 - .1 One-piece moulded type and sheet to CAN/CGSB-51.53 with pre-formed shapes as required.
 - .2 Minimum service temperatures: -20 degrees C.
 - .3 Maximum service temperature: 65 degrees C.
 - .4 Moisture vapour transmission: 0.02 perm.
 - .5 Fastenings:
 - .1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
 - .2 Tacks.
 - .3 Pressure sensitive vinyl tape of matching colour.
- .2 Aluminum:
 - .1 To ASTM B209.
 - .2 Thickness: 0.50 mm sheet.
 - .3 Finish: stucco embossed.
 - .4 Joining: longitudinal and circumferential slip joints with 50 mm laps.
 - .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
 - .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PRE-INSTALLATION REQUIREMENT

- .1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.
- .2 Surfaces clean, dry, free from foreign material.

3.3 INSTALLATION

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturers instructions and this specification.
- .3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
 - .1 Install hangers, supports outside vapour retarder jacket.
- .5 Supports, Hangers:
 - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.4 INSTALLATION OF ELASTOMERIC INSULATION

- .1 Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.
 - .2 Provide vapour retarder as recommended by manufacturer.
-

3.5 PIPING INSULATION SCHEDULES

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 TIAC Code: A-3.
 - .1 Seals: VR lap seal adhesive, VR lagging adhesive.
 - .2 Installation: TIAC Code: 1501-C.
- .3 TIAC Code: A-6.
 - .1 Seals: lap seal adhesive, lagging adhesive.
 - .2 Installation: TIAC Code.
- .4 Thickness of insulation as listed in following table.
 - .1 Run-outs to individual units and equipment not exceeding 4000 mm long.
 - .2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp degrees C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)	
Refrigerant suction liquid hot gas	4 - 13	A-6	25	25
Cooling Coil cond. drain		A-3	25	25

- .5 Finishes:
 - .1 Exposed indoors: PVC jacket.
 - .2 Concealed, indoors: canvas on valves, fittings. No further finish.
 - .3 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.
 - .4 Outdoors: water-proof aluminum jacket.
 - .5 Finish attachments: SS bands, at 150 mm on centre.
 - .6 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 00 - 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 REFERENCE STANDARDS

- .1 ASME
 - .1 ASME B16.22, Wrought Copper and Copper Alloy Solder - Joint Pressure Fittings.
 - .2 ASME B16.24, Cast Copper Pipe Flanges and Flanged Fittings: Class 150, 300, 600, 900, 1500 and 2500.
 - .3 ASME B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
 - .4 ASME B31.5, Refrigeration Piping and Heat Transfer Components.
- .2 ASTM International (ASTM)
 - .1 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, and Threaded Rod 60,000 PSI Tensile Strength.
 - .2 ASTM B280, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
- .3 CSA Group (CSA)
 - .1 CSA B52, B52 Package, Mechanical Refrigeration Code.
- .4 Environment Canada (EC)
 - .1 EPS 1/RA/1, Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

PART 2 PRODUCTS

2.1 TUBING

- .1 Processed for refrigeration installations, deoxidized, dehydrated and sealed.
 - .1 Hard copper: to ASTM B280, type ACR.
 - .2 Annealed copper: to ASTM B280, with minimum wall thickness as per CSA B52 and ASME B31.5.

2.2 FITTINGS

- .1 Service: design pressure 2070 kPa and temperature 121 degrees C.
- .2 Brazed:
 - .1 Fittings: wrought copper to ASME B16.22.
 - .2 Joints: silver solder, 15% Ag-80% Cu-5%P or copper-phosphorous, 95% Cu-5%P and non-corrosive flux.
- .3 Flanged:
 - .1 Bronze or brass, to ASME B16.24, Class 150 and Class 300.
 - .2 Gaskets: suitable for service.
 - .3 Bolts, nuts and washers: to ASTM A307, heavy series.
- .4 Flared:
 - .1 Bronze or brass, for refrigeration, to ASME B16.26.

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 refrigerant piping 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 MANUFACTURER'S INSTRUCTIONS

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

3.3 GENERAL

- .1 Install in accordance with CSA B52, EPS1/RA/1 and ASME B31.5 Section 23 05 05 - Installation of Pipework.

3.4 BRAZING PROCEDURES

- .1 Bleed inert gas into pipe during brazing.
- .2 Remove valve internal parts, solenoid valve coils, sight glass.
- .3 Do not apply heat near expansion valve and bulb.

3.5 PIPING INSTALLATION

- .1 General:
 - .1 Hard drawn copper tubing: do not bend. Minimize use of fittings.
- .2 Hot gas lines:
 - .1 Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.
 - .2 Provide trap at base of risers greater than 2400 mm high and at each 7600 mm thereafter.
 - .3 Provide inverted deep trap at top of risers.
 - .4 Provide double risers for compressors having capacity modulation.
 - .1 Large riser: install traps as specified.
 - .2 Small riser: size for 5.1 m³/s at minimum load. Connect upstream of traps on large riser.

3.6 PRESSURE AND LEAK TESTING

- .1 Close valves on factory charged equipment and other equipment not designed for test pressures.
 - .2 Leak test to CSA B52 before evacuation to 2 MPa and 1 MPa on high and low sides respectively.
 - .3 Test procedure: build pressure up to 35 kPa with refrigerant gas on high and low sides. Supplement with nitrogen to required test pressure. Test for leaks with electronic or halide detector. Repair leaks and repeat tests.
-

3.7 FIELD QUALITY CONTROL

- .1 Site Tests/Inspection:
 - .1 Close service valves on factory charged equipment.
 - .2 Ambient temperatures to be at least 13 degrees C for at least 12 hours before and during dehydration.
 - .3 Use copper lines of largest practical size to reduce evacuation time.
 - .4 Use two-stage vacuum pump with gas ballast on 2nd stage capable of pulling 5 Pa absolute and filled with dehydrated oil.
 - .5 Measure system pressure with vacuum gauge. Take readings with valve between vacuum pump and system closed.
 - .6 Triple evacuate system components containing gases other than correct refrigerant or having lost holding charge as follows:
 - .1 Twice to 14 Pa absolute and hold for 4 hours.
 - .2 Break vacuum with refrigerant to 14 kPa.
 - .3 Final to 5 Pa absolute and hold for at least 12 hours.
 - .4 Isolate pump from system, record vacuum and time readings until stabilization of vacuum.
 - .5 Submit test results to Departmental Representative.
 - .7 Charging:
 - .1 Charge system through filter-drier and charging valve on high side. Low side charging not permitted.
 - .2 With compressors off, charge only amount necessary for proper operation of system. If system pressures equalize before system is fully charged, close charging valve and start up. With unit operating, add remainder of charge to system.
 - .3 Re-purge charging line if refrigerant container is changed during charging process.
 - .8 Checks:
 - .1 Make checks and measurements as per manufacturer's operation and maintenance instructions.
 - .2 Record and report measurements to Departmental Representative.
 - .9 Manufacturer's Field Services:
 - .1 Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its products and submit written reports, in acceptable format, to verify compliance of Work with Contract.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
 - .2 Twice during progress of Work at 25 % and 60 % complete.
 - .3 Upon completion of the Work, after cleaning is carried out.
 - .4 Obtain reports, within 3 days of review, and submit, immediately, to Departmental Representative.
-

3.8 DEMONSTRATION

- .1 Instructions:
 - .1 Post instructions in frame with glass cover in accordance with Section 01 78 00 - Closeout Submittals and CSA B52.

3.9 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

- .1 Canadian Standards Association (CSA) / CSA International
 - .1 CSA B52, Mechanical Refrigeration Code.
- .2 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Underwriters Laboratories of Canada (ULC)
 - .1 CAN / ULC S102, Standard Test Method Surface Burning Characteristics of Construction Materials and Assemblies.
- .4 National Electrical Manufacturers Association (NEMA)
 - .1 NEMA MG 1, Motors and Generators.

1.2 MAINTENANCE

- .1 Materials / replacement materials
 - .1 Provide spare parts information sheets for each piece of equipment prescribed, once detail drawings have been approved.
 - .2 The sheets must include a list of parts and supplies which must be replaced at regular intervals according to the manufacturer's recommendations, with indication of the source of supply.

PART 2 PRODUCTS

2.1 GENERAL

- .1 Direct expansion ductless bi-block air type heat pump systems with commercial quality variable speed compressor.
- .2 System consisting of an air-cooled condensing unit connected to a terminal unit by refrigeration piping. Regulation and control integrated into the system, controlled by microprocessor.
- .3 Systems operating with R410A refrigerant.
- .4 The units must be certified to operate at low temperature by the manufacturer.
- .5 The system will be AHRI certified and CSA approved

2.2 CONDENSING UNIT

- .1 Unit complete with :
 - .1 a steel casing covered with an anti-corrosion paint;
 - .2 a condensing coil with copper tubes and aluminum fins;
 - .3 one polymer propeller fan and direct drive motor;
 - .4 a protective grid;
 - .5 a high efficiency rotary compressor;
 - .6 a frequency converter for the compressor;
 - .7 service valves and charging valves;
 - .8 a silencer;
-

- .9 a suction accumulator;
 - .10 an electronic expansion valve;
 - .11 a trigger device;
 - .12 one set for low outdoor temperature operation down to -40°C ;
 - .13 a windbreak shelter in front and behind the condenser;
 - .14 starters and controls for the correct operation of the unit;
 - .15 a charge of refrigerant and oil.
- .2 Wall mounted evaporator
- .1 Evaporator with plastic cover complete with :
 - .1 a drain, wall mounting plate;
 - .2 a quiet, statically and dynamically balanced three (3) speed centrifugal fan;
 - .3 a motorized damper for air sweeping;
 - .4 a direct expansion cooling coil with copper tubes and aluminum fins;
 - .5 a condensate pan;
 - .6 a control microprocessor.
 - .2 A controller with :
 - .1 temperature display;
 - .2 automatic restart after power failure;
 - .3 emergency mode of operation;
 - .4 mode, fan speed and temperature control;
 - .5 wall control by microprocessor;
 - .6 5-event daily programming timer, occupied / unoccupied mode;
 - .7 alarm output and operating condition.
 - .3 BACnet communication and integration module

2.3 PERFORMANCE

- .1 2.63 kW of cooling for an air inlet temperature to the evaporator of 19.4°C wet bulb and 26.6°C dry bulb and a maximum outside temperature of 23.9°C wet bulb and 35°C of dry bulb.
- .2 Single electrical connection: 208-230 / 1 ph / 60 Hz to the condenser and connection to the evaporator via the condenser.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: Comply with manufacturer's written requirements, recommendations and specifications, including any available technical bulletin, product handling, storage and installation instructions, and data sheet indications techniques.

3.2 GENERAL

- .1 Mount devices on support bases as indicated and in accordance with manufacturer's recommendations.
 - .2 Provide the necessary clearances for repair and maintenance, in accordance with the manufacturer's recommendations.
 - .3 The manufacturer's representative on the site must approve the installation and start-up of the devices and give the necessary instructions to the operators.
-

3.3 ADJUSTING

- .1 Lubricate bearings with oil or grease, according to manufacturer's recommendations.

3.4 CLEANING

- .1 Proceed in accordance with Section 01 74 00 - 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 REFERENCE STANDARDS**

- .1 CSA Group
 - .1 CSA C22.1-18, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.
- .2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.2 DEFINITIONS

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.3 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 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 Quebec, Canada.
 - .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
 - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .4 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.
 - .5 Submit number of copies size drawings.
 - .6 If changes are required, notify Departmental Representative of these changes before they are made.
 - .4 Certificates:
 - .1 Provide CSA certified material and equipment.
 - .2 Where CSA certified material and equipment is not available, submit such equipment to for approval before delivery to site.
 - .3 Submit test results of installed electrical systems and instrumentation.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.
 - .5 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.
-

1.4 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 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
 - .2 Operating instructions to include following:
 - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
 - .3 Safety precautions.
 - .4 Procedures to be followed in event of equipment failure.
 - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
 - .3 Post instructions where directed.

1.5 DELIVERY, STORAGE AND HANDLING

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

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates for control items in French.

2.2 MATERIALS AND EQUIPMENT

- .1 Provide equipment in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Equipment to be CSA certified. Where CSA certified equipment and material are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .3 Factory assemble control panels and component assemblies.
-

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

2.4 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of Departmental Representative.
- .2 Decal signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.6 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates as follows:
 - .1 Nameplates: lamicoid 3 mm, black face, white core, lettering accurately aligned and engraved into core.
 - .2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

- .2 Wording on nameplates to be approved by Departmental Representative prior to manufacture.
- .3 Allow for minimum of twenty-five (25) letters per nameplate.
- .4 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .5 The nameplates of safety switch, starters and contactors must indicate the controlled device and the voltage.
- .6 The nameplates of terminal boxes and pull boxes must indicate the network and the voltage.

2.7 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

2.8 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

Type	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Other Security Systems	Red	Yellow

2.9 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint indoor switchgear and distribution enclosures light gray.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

3.3 NAMEPLATES AND LABELS

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.4 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete.
- .2 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.5 LOCATION OF OUTLETS

- .1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.
- .2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.
- .4 Locate light switches on latch side of doors.
 - .1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

3.6 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
 - .1 Local switches: 1000 mm.
 - .2 Wall receptacles:
 - .1 General: 400 mm.
 - .2 In mechanical rooms: 1400 mm.
 - .3 Telephone and interphone outlets: 400 mm.

3.7 COORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.8 FIELD QUALITY CONTROL

- .1 Conduct following tests.
 - .1 Power distribution system including phasing, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
 - .5 Systems: fire alarm.
 - .6 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
 - .2 Carry out tests in presence of Departmental Representative.
 - .3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
-

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

3.9 SYSTEM STARTUP

- .1 Instruct operating personnel in operation, care and maintenance of systems, system equipment and components.

3.10 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA S350 M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

1.2 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .3 Remove and Salvage: Detach items from existing construction and deliver them to Departmental Representative ready for reuse.
- .4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.
- .6 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Action Submittals: Provide in accordance with Section 01 33 00- Submittal Procedures before starting work of this Section:
 - .1 Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with other Sections.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.
- .2 Scheduling: Account for Departmental Representative's continued occupancy requirements during selective demolition and schedule staged occupancy and worksite activities as a defined Activity in Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart.

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements: Perform work of this Section in accordance with:
 - .1 Federal Workers' Compensation Service.
 - .2 Government of Canada, Labour Program: Workplace Safety.
-

1.6 SITE CONDITIONS

- .1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition at time of site examination before tendering.
- .2 Existing Hazardous Substances: Departmental Representative performed a hazardous substances assessment and it is not expected that hazardous substances will be encountered in Work.
- .3 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in Work; immediately notify Departmental Representative if materials suspected of containing hazardous substances are encountered and perform following activities:
 - .1 Refer to Section 01 41 00 - Regulatory Requirements for directives associated with specific material types.
 - .2 Hazardous substances will be as defined in Hazardous Products Act.
 - .3 Stop work in area of suspected hazardous substances.
 - .4 Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.
 - .5 Hazardous substances will be removed by Departmental Representative under a separate contract or as a change to Work.
 - .6 Proceed only after written instructions have been received from Departmental Representative.

1.7 SALVAGE AND DEBRIS MATERIALS

- .1 Demolished items become Contractor's property and will be removed from Project site; except for items indicated as being reused, salvaged, or otherwise indicated to remain Departmental Representative's property.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 General Patching and Repair Materials: Refer to Section 02 41 00.08 – Demolition – Minor Works for listing of patching and repair materials incidental to removal or demolition of components associated with work of this Section.
- .2 Electrical Repair Materials: Use only new materials, CSA or ULC labelled as appropriate and matching components remaining after work associated with components identified for removal or demolition are completed.
- .3 Fire stopping Repair Materials: Use fire stopping materials compatible with existing fire stopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect the work of this Section before tendering the Bid; Departmental Representative will not consider claims for extras for work or materials necessary for proper execution and completion of the contract that could have been determined by a site visit.
-

3.2 PREPARATION

- .1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
 - .1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
 - .2 Notify Departmental Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
 - .3 Prevent debris from blocking drainage inlets.
 - .4 Protect mechanical systems that will remain in operation.
- .2 Protection of Building Occupants: Sequence demolition work so that interference with the use of the building by the Departmental Representative and users is minimized and as follows:
 - .1 Prevent debris from endangering safe access to and egress from occupied buildings.
 - .2 Notify Departmental Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 EXECUTION

- .1 Demolition and removal: Coordinate requirements of this Section with information contained in 02 41 00.08 – Demolition – Minor Works and as follows:
 - .1 Disconnect electrical circuits and panel feeders; maintain electrical service and main distribution panel as is, ready for subsequent Work.
 - .2 Remove existing luminaires, electrical devices and equipment including associated conduits, boxes, wiring, and similar items [unless specifically noted otherwise].
 - .3 Perform demolition work in a neat and workmanlike manner:
 - .1 Remove tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
 - .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.
 - .4 Remove existing conduits, boxes, cabling and wiring associated with removed luminaires, electrical devices and equipment.
 - .5 Seal open ends of conduit with silicone sealant and leave in place where they are inaccessible or cannot be removed without damaging adjacent construction.

3.4 CLOSEOUT ACTIVITIES

- .1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) except where explicitly noted otherwise for materials being salvaged for re use in new construction.
- .2 Hazardous Substances Disposal: Arrange for disposal of hazardous substances in accordance with requirements of Section 02 81 00- Hazardous Materials.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CAN/CSA-C22.2 No.18-98 (R2003), Outlet Boxes, Conduit Boxes and Fittings.
 - .2 CAN/CSA-C22.2 No.65-03 (R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMJ-J-543-ANCE-03).
- .2 National Electrical Manufacturers Association (NEMA)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 CLOSEOUT SUBMITTALS

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

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wire and box connectors from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse of crates, packaging materials as specified in Construction Waste Management Plan.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.
 - .2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
 - .3 Clamps or connectors for flexible conduit, and armoured cable, as required to: CAN/CSA-C22.2 No.18.
-

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 INSTALLATION

- .1 Remove insulation carefully from ends of conductors cables and:
 - .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
 - .2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.
 - .3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

PART 1 GENERAL**1.1 PRODUCT DATA**

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

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Packaging Waste Management: remove for reuse of crates and packaging materials in accordance with Construction Waste Management.

PART 2 PRODUCTS**2.1 BUILDING WIRES**

- .1 Conductors shall be copper with cross-linked polyethylene type RW90 - 40° or TW75 insulation as specified, good for 600 Vac. Conductors shall be solid for sizes 12 and 10 and stranded for other sizes.
- .2 Unless specifically indicated otherwise materials used for the manufacture of the conductors shall be copper throughout, and insulation conductors must carry the appropriate CSA designation. Except otherwise specified, sizes are in accordance with copper conductor.
- .3 Conductor application
 - .1 Distribution and branch circuits
 - .1 RW90 indoor and above ground outside;
 - .2 RWU90 outdoor and buried;
 - .3 Size No. 12 AWG minimum.
 - .2 Control circuits
 - .1 TW75 indoor;
 - .2 TWU75 outdoor and buried;
 - .3 Size No. 14 AWG minimum;
 - .4 Stranded type.
 - .3 Grounding conductor in same conduit with other conductors
 - .1 TW75 or RW90 (green) indoor;
 - .2 TWU75 or RWU90 (green) outdoor or buried;
 - .3 Size 12 AW minimum.
- .4 Fire alarm circuits, according to article "Detection and Fire Alarm".
- .5 The following information shall be permanently marked, at regular intervals, on extra-low voltage conductors.
 - .1 The size followed by a blank for copper conductors.
 - .2 The conductor insulation type.
 - .3 The name of the manufacturer.
 - .4 FT-1 or FT-6 category, where applicable

2.2 ARMoured CABLES

- .1 Conductors: insulated, copper, size as indicated.
 - .2 Type: AC90.
-

- .3 Armour: interlocking type fabricated from aluminum strip.
- .4 Connectors: anti short connectors.
- .5 Application: in hanged ceilings, dry walls and dry location. For connection of lighting fixtures and switches, from a junction box on a horizontal distance not exceeding 3 m (10').

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

- .1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).
- .2 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.
- .3 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

3.3 INSTALLATION OF BUILDING WIRES

- .1 Install wiring as follows:
 - .1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
 - .2 In surface and lighting fixture raceways in accordance with Section 26.

3.4 INSTALLATION OF ARMOURED CABLES

- .1 Group cables wherever possible on channels.

END OF SECTION

PART 1 GENERAL**1.1 ACTION AND INFORMATIONAL SUBMITTALS**

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

1.2 DELIVERY, STORAGE AND HANDLING

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

PART 2 PRODUCTS**2.1 SUPPORT CHANNELS**

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, suspended and surface mounted set in poured concrete walls and ceilings.

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 hangers and supports installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Secure equipment to poured concrete with expandable inserts.
 - .2 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
 - .3 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.
-

- .4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .5 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
 - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
 - .3 Beam clamps to secure conduit to exposed steel work.
- .6 For surface mounting of two or more conduits use channels on centre spacing.
- .7 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .8 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .9 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .10 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative.
- .11 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

PART 1 GENERAL**1.1 ACTION AND INFORMATIONAL SUBMITTALS**

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

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for recycling and reuse in accordance with Section 01 74 19 - Waste Management and Disposal.

PART 2 PRODUCTS**2.1 JUNCTION AND PULL BOXES**

- .1 Construction: welded steel enclosure.
- .2 Covers Flush Mounted: 25 mm minimum extension all around.
- .3 Covers Surface Mounted: screw-on turned edge covers.

PART 3 EXECUTION**3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION**

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.
- .3 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.2 IDENTIFICATION

- .1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.
- .2 Identification Labels: size 2 indicating voltage, phase and system name or as indicated.

END OF SECTION

PART 1 GENERAL**1.1 ACTION AND INFORMATIONAL SUBMITTALS**

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

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for recycling and reuse in accordance with Section Construction Waste Management and Disposal.

PART 2 PRODUCTS**2.1 OUTLET AND CONDUIT BOXES GENERAL**

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm square or larger outlet boxes as required.
- .3 Gang boxes where wiring devices are grouped.
- .4 Blank cover plates for boxes without wiring devices.
- .5 347 V outlet boxes for 347 V switching devices.
- .6 Combination boxes with barriers where outlets for more than one system are grouped.
- .7 Outlet boxes for telecommunication shall be single gang for a maximum of four (4) cables and double gang for five (5) to eight (8) cables. When boxes are used, they shall have a minimum depth of 64 mm, two (2) gangs.

2.2 GALVANIZED STEEL OUTLET BOXES

- .1 One-piece electro-galvanized construction.
- .2 Single or multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
- .3 102 mm square or octagonal outlet boxes for lighting fixture outlets.
- .4 Extension and plaster rings for flush mounting devices in finished tile walls.

2.3 CONDUIT BOXES

- .1 Cast FD or FS aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of devices.
-

2.4 BOITES EXTERIEURES

- .1 Weatherproof designed for covers with four screws and for surface mounting.

2.5 FITTINGS - GENERAL

- .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

PART 3 EXECUTION**3.1 INSTALLATION**

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.
- .5 Vacuum clean interior of outlet boxes before installation of wiring devices.
- .6 Identify systems for outlet boxes as required.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 CSA Group (CSA)
 - .1 CAN/CSA C22.2 No. 18-98 (R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
 - .2 CSA C22.2 No. 56-2017, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .3 CSA C22.2 No. 83-M1985 (R2017), Electrical Metallic Tubing.
 - .4 CSA C22.2 No. 211.2-2006 (R2016), Rigid PVC (Unplasticized) Conduit.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheets.
 - .1 Submit cable manufacturing data.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling and reuse in accordance with Construction Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

PART 2 PRODUCTS**2.1 CABLES AND REELS**

- .1 Provide cables on reels or coils.
 - .1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.
- .2 Each coil or reel of cable to contain only one continuous cable without splices.
- .3 Identify cables for exclusively dc applications.

2.2 CONDUITS

- .1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83.
 - .2 Rigid pvc conduit: to CSA C22.2 No. 211.2.
 - .3 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal, aluminum.
 - .4 Application :
 - .1 Electric metallic tubing (EMT)
 - .1 For utilization and distribution panel feeders;
 - .2 For branch circuits and auxiliary systems;
 - .3 In suspended ceilings, masonry and dry walls.
 - .2 PVC conduits
 - .1 For outdoor installation on roofs;
-

- .2 For underground installation and in corrosive environments.
- .3 Flexible and watertight PVC covered metallic conduits
- .1 For connection to motors and other equipment generating vibration.

2.3 CONDUIT FASTENINGS

- .1 One hole malleable iron straps to secure surface conduits 53 mm and smaller.
 - .1 Two hole steel straps for conduits larger than 53 mm.
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits on centre.
- .4 Threaded rods, 6 mm diameter, to support suspended channels.

2.4 CONDUIT FITTINGS

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.
- .2 Ensure factory "ells" where 90 degrees bends for 27 mm and larger conduits.
- .3 Watertight connectors and couplings for EMT.
 - .1 Set-screws are not acceptable.

2.5 FISH CORD

- .1 Polypropylene.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
 - .2 Conceal conduits except in mechanical and electrical service rooms.
 - .3 Minimum conduit size for lighting and power circuits: 21 mm.
 - .4 Bend conduit cold:
 - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
 - .5 Mechanically bend steel conduit over 21 mm diameter.
 - .6 Install fish cord in empty conduits.
 - .7 Remove and replace blocked conduit sections.
 - .1 Do not use liquids to clean out conduits.
 - .8 Dry conduits out before installing wire.
-

3.3 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
- .3 Run conduits in flanged portion of structural steel.
- .4 Group conduits wherever possible on suspended or surface channels.
- .5 Do not pass conduits through structural members except as indicated.
- .6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONCEALED CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Do not install horizontal runs in masonry walls.
- .3 Do not install conduits in terrazzo or concrete toppings.

3.5 CLEANING

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

END OF SECTION

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 CSA Group (CSA)
 - .1 CSA C22.2 No.42-10, General Use Receptacles, Attachment Plugs and Similar Devices.
 - .2 CAN/CSA C22.2 No.42.1 (R2013), Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
 - .3 CSA C22.2 No.55 (R2015), Special Use Switches.
 - .4 CSA C22.2 No.111-2018, General-Use Snap Switches (Bi-national standard, with UL 20).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 CLOSEOUT SUBMITTALS

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

1.4 DELIVERY, STORAGE AND HANDLING

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

PART 2 PRODUCTS**2.1 SWITCHES**

- .1 15 A, 120 V, single pole switches to: CSA C22.2 No.111.
 - .2 Manually-operated general purpose AC switches with following features:
 - .1 Terminal holes approved for No. 10 AWG wire.
 - .2 Silver alloy contacts.
 - .3 Urea or melamine moulding for parts subject to carbon tracking.
 - .4 Suitable for back and side wiring.
 - .5 Ivory toggle.
 - .3 Switches of one manufacturer throughout project.
-

2.2 RECEPTACLES

- .1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA C22.2 No.42 with following features:
 - .1 Ivory urea moulded housing.
 - .2 Suitable for No. 10 AWG for back and side wiring.
 - .3 Break-off links for use as split receptacles.
 - .4 Eight back wired entrances, four side wiring screws.
 - .5 Triple wipe contacts and rivetted grounding contacts.
- .2 Other receptacles with ampacity and voltage as indicated.
- .3 Receptacles of one manufacturer throughout project.

2.3 COVER PLATES

- .1 Cover plates for wiring devices to: CSA C22.2 No.42.1.
- .2 Stainless steel, vertically brushed cover plates for wiring devices mounted in flush-mounted outlet box.
- .3 Cast cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

2.4 SOURCE QUALITY CONTROL

- .1 Cover plates from one manufacturer throughout project.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Switches:
 - .1 Install single throw switches with handle in "UP" position when switch closed.
 - .2 Mount toggle switches at height in accordance with Section 26 05 00 - Common Work Results for Electrical.
 - .3 Use switches with red levers on emergency circuits.
- .2 Receptacles:
 - .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
 - .2 Use red receptacles on emergency circuits.
 - .3 Install ground fault circuit interrupter (GFCI) in the elevator pit and mechanical room.

- .3 Cover plates:
 - .1 Install suitable common cover plates where wiring devices are grouped.
 - .2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.3 IDENTIFICATION

- .1 Each switch and power outlet must be identified using 1-size nameplates
- .2 Nameplates must be installed above switch plates and power sockets.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
- .3 Repair damage to adjacent materials caused by wiring device installation.

END OF SECTION

PART 1 GENERAL**1.1 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide fuse performance data characteristics for each fuse type and size above. Performance data to include: average melting time-current characteristics.

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Ship fuses in original containers.
- .2 Do not ship fuses installed in switchboard.
- .3 Store fuses in original containers in moisture free location.

PART 2 PRODUCTS**2.1 FUSES - GENERAL**

- .1 Fuse type references L1, L2, J1, R1, etc. have been adopted for use in this specification.
- .2 Fuses: product of one manufacturer.
- .3 Fuses conform to CSA C22.2 No. 106.

2.2 FUSE TYPES

- .1 Class J fuses.
 - .1 Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.
 - .2 Type J2, fast acting.
 - .3 High rupturing capacity (HRC) fuses 200kA RMS symmetrical.

PART 3 EXECUTION**3.1 INSTALLATION**

- .1 Install fuses in mounting devices immediately before energizing circuit.
- .2 Ensure correct fuses fitted to physically matched mounting devices.
- .3 Ensure correct fuses fitted to assigned electrical circuit.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 CSA Group (CSA)
 - .1 CSA C22.2 No. 5-2016, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 DELIVERY, STORAGE AND HANDLING

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

PART 2 PRODUCTS**2.1 BREAKERS GENERAL**

- .1 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation.
- .2 Common-trip breakers: with single handle for multi-pole applications.
- .3 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
 - .1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.
- .4 When breakers are supplied in existing panels, supply a model of the same manufacturer's that has rupture capacity equal or superior to the existing breakers in this panel. Refer to the panels details and drawings. Those breakers shall be new except otherwise noted.
- .5 Authentication of new breakers (not counterfeited)
 - .1 Except otherwise noted, all breakers installed in panels (new or existing) shall be new and obtained exclusively from a distributor authorized by manufacturer.
 - .2 Submit with breaker shop drawings, a copy of the purchase order to the distributor. Quantities, models and sizes shown on the purchase order shall correspond to those indicated on the shop drawings.

- .3 Retain all packing slips of material delivered to the job site and provide one copy to the Engineer. All packing slips shall bear one signature attesting receiving by the Contractor.
- .4 In case of default to the requirement of this article, the Engineer may request a verification by the manufacturer of breakers. Costs related to this verification will be at Contractor's expense.

2.2 THERMAL MAGNETIC BREAKERS

- .1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Install circuit breakers as indicated.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 CSA Group (CSA)
 - .1 CAN/CSA C22.2 No.144-M91 (R2015), Ground Fault Circuit Interrupters.
- .2 National Electrical Manufacturers Association (NEMA)
 - .1 NEMA PG 2.2-2014, Application Guide for Ground Fault Protection Devices for Equipment.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 CLOSEOUT SUBMITTALS

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

1.4 DELIVERY, STORAGE AND HANDLING

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

PART 2 PRODUCTS**2.1 MATERIALS**

- .1 Equipment and components for ground fault circuit interrupters (GFCI): to CAN/CSA C22.2 No.144.
- .2 Components comprising ground fault protective system to be of same manufacturer.

2.2 GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLE

- .1 Ground fault circuit interrupter receptacle, to circuit of 15 A, 120 V and including the following:
 - .1 Heavy commercial grade.
 - .2 Ground fault detection, from semiconductors.
 - .3 "Test" and "reset" buttons .
 - .4 CSA Enclosure 1, surface or flush mounted with stainless steel cover plate.
- .2 Receptacles for elevator pit and mechanical room must be ground fault circuit interrupter type.

- .3 Use ivory-colour for receptacles connected on normal circuits.
- .4 Use red-colour for receptacles connected on emergency circuits.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Do not ground neutral on load side of ground fault relay.
- .2 Pass phase conductors including neutral through zero sequence transformers.
- .3 Connect supply and load wiring to equipment in accordance with manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Arrange for field testing of ground fault equipment by Contractor before commissioning service.
- .3 Demonstrate simulated ground fault tests.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 CSA Group
 - .1 CAN/CSA-C22.2 No.4-2016, Enclosed and Dead-Front Switches (Tri-National Standard, with ANCE NMX-J-162-2004 and UL 98).
 - .2 CSA C22.2 No.39-13, Fuseholder Assemblies.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 DELIVERY, STORAGE AND HANDLING

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

PART 2 PRODUCTS**2.1 DISCONNECT SWITCHES**

- .1 Fusible, disconnect switch in CSA enclosure to CAN/CSA-C22.2 No.4 size as indicated.
 - .2 Provision for padlocking in on switch position by 3 locks.
 - .3 Mechanically interlocked door to prevent opening when handle in ON position.
 - .4 Fuses: size as indicated, in accordance with Section 26 28 13.01 - Fuses - Low Voltage.
 - .5 Fuseholders: to CSA C22.2 No.39 suitable without adaptors, for type and size of fuse indicated.
 - .6 Quick-make, quick-break action.
 - .7 ON-OFF switch position indication on switch enclosure cover.
 - .8 Safety switches for elevator controllers shall be fitted with one type C auxiliary contact. Connect this contact to the elevator controller with two (2) No. 14 AWG conductor inside a 16 mm conduit.
-

2.2 MAINTENANCE SWITCHES

- .1 Without fuse in a NEMA type 3R enclosure.
- .2 Complete with facility to lock the lever in the "closed" or "open" position.
- .3 Heavy duty construction.
- .4 Application: air conditioning unit outdoors.

2.3 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Indicate name of load controlled on size 4 nameplate.

PART 3 EXECUTION**3.1 INSTALLATION**

- .1 Install disconnect switches complete with fuses if applicable.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 Illuminating Engineering Society (IES)
 - .1 Photometric tests in accordance with IES LM-79 *Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products*.
 - .2 Light depreciation determined according to IES LM-80 *Approved Method: Measuring Lumen Maintenance of LED Light Sources*.
 - .3 Long-term light depreciation determined according to IES TM-21 *Projecting Long Term Lumen Maintenance of LED Light Sources*.
- .2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)
 - .1 ANSI/IEEE C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
- .3 UL 8750 *Light Emitting Diode Equipment for Use in Lighting Products*.
- .4 UL 1310 Class 2 Power Units or equivalent CSA.
- .5 FCC Title 47 CFR Part 18 *Electronic Code of Federal Regulations – Telecommunication – Industrial, Scientific, and Medical Equipment*.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Identify the type of fixture on each technical data.
 - .3 Fixtures must adapt to the ceilings of the architectural drawings. Before installation, ensure that the fixtures are compatible with the types and space available in the ceiling.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
 - .3 Divert unused metal materials from landfill to metal recycling facility.
 - .4 Disposal and recycling of fluorescent lamps as per local regulations.
 - .5 Disposal of old PCB filled ballasts.
-

PART 2 PRODUCTS**2.1 LIGHT EMITTING DIODE DEVICES (LED)**

- .1 All LED devices and their components must, at minimal meet all reference standards listed above.
- .2 Each fixture must be equipped with a compatible factory installed driver.
- .3 Supply units shall be equipped with colour connectors determined in accordance with the standard requirements ANSI C82.11.
- .4 Caractéristiques techniques des blocs d'alimentation :
 - .1 120 V \pm 5 %, 60 Hz .
 - .2 Power factor: 90 % minimum.
 - .3 Total harmonic distortion: 20 % maximum.
 - .4 Class A nominal sound volume.
 - .5 Operation ambient temperature: 10 to 40 °C, 90 % R.H.
 - .6 The housing temperature: 0 at 62 °C, 90 % R.H.
 - .7 Must tolerate without damage a condition of open circuit or short circuit without use of fuses or other external protection devices.
 - .8 Must not contain any PCB.
- .5 Minimum 5-year warranty, parts and labor, for the device. This includes, without limitation, diodes, connectors, driver and all other components necessary for the proper functioning of the device.

PART 3 EXECUTION**3.1 INSTALLATION**

- .1 Locate and install luminaires as indicated.
 - .2 Connect fixtures to lighting circuits as shown.
 - .3 Install lighting fixtures after all other works, which may damage or soil them have been finished.
 - .4 All others division's drawings shall be examined when installing lighting fixtures.
 - .5 Where there are no suspended ceilings, hang lighting fixtures with appropriate length rods and install them between pipes, ducts, girders or other obstacles in such a manner as not to obstruct the light flux from the fixture.
 - .6 Check the nature of the ceiling when installing recessed fixtures and use proper anchors. Plaster rings shall be installed in plaster or gypsum ceilings.
 - .7 When a fixture is surface mounted, the outlet box shall be of a type, which will be completely covered by the fixture after its installation.
 - .8 Consult the architect's suspended ceiling drawings for the exact location of the lighting fixtures and consult the Engineer if discrepancies are noted.
 - .9 Wait until the equipment in electrical and mechanical rooms is installed before installing lighting fixtures. Take into account the location of all obstacles when installing lighting fixtures.
 - .10 Fixtures installed from an inclined surface shall be suspended with adjustable rods and ball joints unless noted otherwise.
-

- .11 Lighting fixtures weighting 7 kg. (15 lbs) and more which are anchored to exterior walls shall be anchored to the building structure.
- .12 Permanent lighting fixtures shall be used for temporary lighting with proper authorization only.
- .13 Lighting fixtures installed on acoustic tiles shall be suspended from the metallic "T" ceiling grid using metal supports supplied by the lighting fixture supplier.
- .14 Lighting fixtures, diffusers and lamps shall be cleaned, at the end of the work, to remove any construction dust which may have accumulated.

3.2 CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 National Research Council Canada (NRC)
 - .1 National Building Code of Canada (NBC).
- .2 Treasury Board of Canada (TBS), Occupational Safety and Health (OSH)
 - .1 Fire Protection Standard.
- .3 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524-2014, Standard for the Installation of Fire Alarm Systems.
 - .2 CAN/ULC-S529-2016, Smoke Detectors for Fire Alarm Systems.
 - .3 CAN/ULC-S537-2013, Standard for the Verification of Fire Alarm Systems.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for fire alarm system for incorporation into manual.
- .3 Include:
 - .1 Technical data - illustrated parts lists with parts catalogue numbers.
 - .2 Copy of approved shop drawings with corrections completed and marks removed except review stamps.
 - .3 List of recommended spare parts for system.

1.4 DELIVERY, STORAGE AND HANDLING

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

PART 2 PRODUCTS**2.1 EXISTING SYSTEM**

- .1 Existing fire alarm signalling system is addressable, two (2) stages signalling system. Fire alarm control unit (FACU) is XLS-V and is manufactured by Siemens. Existing detection circuits are connected on DCLB circuits. New components shall be fully compatible and ULC cross-listed with existing equipment.

2.2 ADDRESSABLE INTERFACE MODULE (MIA)

- .1 Addressable interface module shall provide supervision of devices with short-circuiting contacts.
- .2 Existing model: HTRI-S of Siemens.

2.3 ADDRESSABLE RELAY MODULE (MRA)

- .1 Control relays used to interface the fire alarm system with other systems shall have 2 A minimum, 120 Vac/24 Vdc dry type C contacts.
- .2 Existing model: HTRI-R of Siemens.

2.4 WIRING

- .1 Twisted copper conductors: rated 300 V.
- .2 To initiating circuits: 18 AWG minimum, and in accordance with manufacturer's requirements.
- .3 Cable type FAS105:
 - .1 In suspended ceilings, drywalls, and dry areas.
 - .2 For the connection of fire alarm detection devices.

2.5 AUTOMATIC ALARM INITIATING DEVICES

- .1 Addressable variable-sensitivity smoke detectors.
 - .1 Photo-electric type.
 - .2 Electronics to communicate detector's status to addressable module/transponder.
 - .3 Detector address to be set on detector head in field.
 - .4 Ability to annunciate minimum of 2 levels of detector contamination automatically with trouble condition at control panel.
 - .5 All hidden detectors must have a remote LED indicator.
 - .6 Existing model: HFP-11 of Siemens.

PART 3 EXECUTION**3.1 INSTALLATION**

- .1 Install systems in accordance with CAN/ULC-S524.
 - .2 Locate and install detectors and connect to alarm circuit wiring.
 - .3 Install the addressable relay modules used to control elevator recall.
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- .4 Install monitoring modules for emergency and pre-transfer signals of the emergency network transfer switch.
- .5 Splices are not permitted.

3.2 OPERATING SEQUENCES

- .1 Addressable relay modules for performing elevator recalls will be activated according to the following alarm conditions:
 - .1 Elevator shaft recall: This relay module is activated when there is detection of smoke in the elevator shaft.
 - .2 Elevator mechanical room recall: This relay module is activated when there is a detection of smoke in the elevator machinery room. Since the mechanical room of the elevator is located on the same level as the main recall, the recall must be done at the alternate landing.
 - .3 Alternative recall: This relay module is activated when there is a detection of smoke in the elevator hall on the main level.
 - .4 General recall: This relay module is activated when the panel activates the general alarm signal.
- .2 The relay and supervision modules for the emergency control sequence of elevators 3 and 4 must operate as follows:
 - .1 The MRA-Emergency Mode relay module will be activated when the MIA-Emergency Mode supervision module detects a power failure and the emergency power supply is switched.
 - .2 The MRA-Pre-transfer signal relay module will be activated during the time that the MIA-Pre-transfer signal supervision module monitors the activation of the transfer switch prior signal, which must prevent switching to the normal power supply for at least 20 seconds.
 - .3 The operation of the modules must comply with article 6.14.2 of standard CSA-C282-15 | Emergency power supply for buildings.
 - .4 Coordinate with the elevator contractor for the connection of the relay module contacts to the controller.
- .3 The operating sequences described above are not restrictive; contractors must follow the standards and codes in force.

3.3 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and CAN/ULC-S537.
- .2 Fire alarm system:
 - .1 Test such device and alarm circuit to ensure manual stations, smoke detectors transmit alarm to control panel and actuate first stage alarm.
 - .2 Check annunciator panels to ensure zones are shown correctly.
 - .3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of systems.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
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3.5 PROTECTION

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

3.6 CLOSEOUT ACTIVITIES

- .1 Provide on-site lectures and demonstration by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

END OF SECTION

