

CONSTRUCTION SPECIFICATIONS

UPGRADED NORMS FOR BLANC-SABLON'S TERMINAL
BLANC-SABLON (QUÉBEC)
AIRPORT ROAD, G0G 1W0

April 12, 2017 (Issued for submission)

Project number : R.075371.001

Les

A R C H I T E C T E S

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1 GENERAL

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END OF SECTION

SPECIFICATIONS AND DRAWINGS

SECTION	SUBJECT	PAGE
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DIVISION 00 - REQUIREMENTS RELATING TO THE SUPPLIES AND THE CONTRACTS

00 01 07	SEALS PAGE.....	1
00 01 10	TABLE OF CONTENTS.....	2

DIVISION 1 - GENERAL REQUIREMENTS

01 11 00	GENERAL INFORMATION ON WORKS	5
01 14 00	WORK RESTRICTIONS	2
01 21 00	ALLOWANCES	2
01 29 83	PAYMENT PROCEDURES FOR TESTING LABORATORY SERVICES.....	1
01 31 19	PROJECT MEETINGS	2
01 32 16.07	CONSTRUCTION PROGRESS SCHEDULE – BAR (GANTT) CHART	3
01 33 00	SUBMITTAL PROCEDURES	4
01 35 13.13	SPECIAL PROCEDURES FOR AIRPORT FACILITIES	1
01 35 29.06	HEALTH AND SAFETY REQUIREMENTS	4
01 35 43	ENVIRONMENTAL PROCEDURES	4
01 41 00	REGULATORY REQUIREMENTS	1
01 45 00	QUALITY CONTROL	3
01 51 00	TEMPORARY UTILITIES	3
01 52 00	CONSTRUCTION FACILITIES	4
01 56 00	TEMPORARY BARRIERS AND ENCLOSURES	2
01 61 00	COMMON PRODUCT REQUIREMENTS	4
01 71 00	EXAMINATION AND PREPARATION	2
01 73 00	EXECUTION	2
01 74 11	CLEANING	2
01 74 21	CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL	10
01 77 00	CLOSEOUT PROCEDURES	2
01 78 00	CLOSEOUT SUBMITTALS	7
01 79 00	DEMONSTRATION AND TRAINING	2
01 91 13	GENERAL COMMISSIONING (CX) REQUIREMENTS	9
01 91 31	COMMISSIONING (CX) PLAN	9
01 91 33	COMMISSIONING FORMS	2
01 91 41	COMMISSIONING TRAINING	3

DIVISION 2 - EXISTING CONDITIONS

02 41 99	DEMOLITION FOR MINOR WORKS	3
----------	----------------------------------	---

DIVISION 5 - METALS

05 41 00	SKELETON STEEL COLUMNS SUBMITTED TO OVERCHARGES DUE TO WING	6
05 50 00	METAL FABRICATIONS	6

DIVISION 6 - WOOD, PLASTICS AND COMPOSITES

06 08 99	ROUGH CARPENTRY FOR MINOR WORKS	6
06 40 00	ARCHITECTURAL WOODWORK	9

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

07 21 16	BLANKET AND BATT INSULATIONS	3
07 21 29.03	SPRAYED INSULATIONS – POLYURETHANE FOAM.....	5
07 25 00	AIR BARRIER	4
07 27 10	AIR/VAPOR BARRIER MEMBRANE AND INTRA-MUROS FLEXIBLE FLASHINGS	5
07 46 13	PREFORMED METAL SIDING.....	8
07 61 13	SHEET METAL ROOFING	7
07 62 00	SHEET METAL FLASHING AND TRIM	6
07 84 00	FIRE STOPPING	7
07 92 00	JOINT SEALANTS.....	13
07 95 13	EXPANSION JOINT COVER ASSEMBLIES	4

DIVISION 8 - OPENINGS

08 06 71	DOOR HARDWARE LIST	17
08 11 00	METAL DOORS AND FRAMES	10
08 11 16	ALUMINUM DOORS AND FRAMES	9
08 33 13	COILING DOORS	5
08 36 13.02	METAL SECTIONAL ROLL-UP DOORS.....	7
08 42 29	AUTOMATIC ENTRANCES	12
08 50 00	WINDOWS	8
08 70 05	CABINET AND MISCELLANEOUS HARDWARE	4
08 71 00	DOOR HARDWARE	7
08 80 50	GLAZING	7
08 87 53	SECURITY FILMS	5

DIVISION 9 – FINISHES

09 00 00	FINISHES TABLE	2
09 21 16	GYPSUM BOARD ASSEMBLIES AND CONCRETE PANELS	9
09 22 16	NON-STRUCTURAL METAL FRAMING	5
09 30 13	CERAMIC TILING	9
09 51 13	ACOUSTICAL PANEL CEILINGS	4
09 53 00.01	ACOUSTICAL SUSPENSION	5
09 65 19	RESILIENT TILE FLOORING	7
09 91 13.01	EXTERIOR RE-PAINTING	11
09 91 23.01	INTERIOR RE-PAINTING	12

DIVISION 10 - SPECIALTIES

10 26 00.01	WALL AND CORNER GUARDS	4
10 44 16.19	PORTABLE FIRE EXTINGUISHER.....	1

DIVISION 12 - FURNISHINGS

12 48 16	FOOT GRILL	4
12 50 00	FURNITURE	4

DIVISION 21 – FIRE SUPPRESSION

21 00 11	EXISTING ADDITIONAL REQUIREMENTS	1
21 05 01	MECHANICAL CONCERNING RESULTS	4
21 05 02	MECHANICAL – ADDITIONAL GENERAL STIPULATIONS	8

DIVISION 22 - PLUMBING

22 00 03	PLUMBING	1
22 11 16	DOMESTIC WATER PIPING.....	6
22 13 17	DRAINAGE WASTE AND VENT PIPING – CAST IRON AND COPPER	4

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING

23 00 07	VENTILATION – GENERAL REQUIREMENTS	3
23 01 31	AIR DUCT CLEANING FOR HVAC SYSTEMS.....	5
23 05 05	INSTALLATION OF PIPEWORK	3
23 05 29	HANGERS AND SUPPORTS FOR HVCA PIPING AND EQUIPMENT.....	6
23 05 48	VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT	4
23 05 49	SEISMIC RESTRAINT SYSTEMS (SRS) – TYPE P2 BUILDINGS	5
23 05 53	MECHANICAL IDENTIFICATION.....	5
23 05 93	TESTING, ADJUSTING AND BALANCING	4
23 07 13	DUCT INSULATION.....	6
23 07 15	THERMAL INSULATION FOR PIPING	9
23 31 13.01	METAL DUCTS – LOW PRESSURE TO 500 PA.....	6
23 33 00	AIR DUCT ACCESSORIES	3
23 33 14	DAMPERS - BALANCING	2
23 33 16	DAMPERS – FIRE AND SMOKE	2
23 33 46	FLEXIBLE DUCTS	3
23 34 00	HVAC FANS.....	3
23 37 13	DIFFUSERS, REGISTERS AND GRILLES	2
23 37 20	LOUVRES, INTAKES AND OTHER VENTS	2
23 51 00	BREECHING, CHIMNEYS AND STACKS	4
23 52 00	HOT WATER PACKAGED BOILERS.....	4
23 82 33.02	ELECTRIC BASEBOARD HEATERS.....	3
23 82 39.01	SUSPENDED UNIT HEATERS	3
23 84 13	HUMIDIFIERS	1

DIVISION 26 – ELECTRICAL

26 05 00	ELECTRICITY - GENERAL REQUIREMENTS REGARDING WORK RESULTS	6
26 05 15	ELECTRICAL - SHORT CIRCUIT COORDINATION AND ARC FLASH FAULT STUDY	4
26 05 20	WIRE AND BOX CONNECTORS 0-1000 V	2
26 05 21	WIRES AND CABLES (0-1000 V)	7
26 05 28	GROUNDING – SECONDARY	3
26 05 29	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS.....	2
26 05 31	SPLITTERS, JUNCTION, PULL BOXES AND CABINETS.....	2
26 05 32	OUTLET BOXES, CONDUIT BOXES AND FITTINGS	3
26 05 34	CONDUITS, CONDUIT FASTENINGS AND CONDUIT FITTINGS	5
26 10 00	SEISMIC MOUNTING ELECTRICAL.....	4
26 24 16.01	PANELBOARDS BREAKER TYPE	3
26 27 26	WIRING DEVICES	7
26 28 16.02	MOULDED CASE CIRCUIT BREAKERS	2
26 28 23	DISCONNECT SWITCHES FUSED AND NON-FUSED UP TO 1 000 V	2
26 50 00	LIGHTING	7
26 52 00	EMERGENCY LIGHTING	3
26 53 00	EXIT SIGNS	2

DIVISION 33 – UTILITIES

33 56 13	ABOVEGROUND FUEL STORAGE TANKS.....	4
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DRAWINGS LIST

DIVISION A - ARCHITECTURE - ARCHITECTURE

Q131Q605A00_Plan implantation - implantation plan
Q131Q605A01_Plan démolition - demolition plan
Plan démolition plafond réfléché – ceiling demolition plan
Q131Q605A02_Démolition élévations extérieures - exterior elevations demolition
Q131Q605A03_Plan de réaménagement - redevelopment plan
Q131Q605A04_Plan de toiture et détails - roof plan and details
Q131Q605A05_Élevations extérieures - exterior elevations
Q131Q605A06_Détails en plan -plan details
Q131Q605A07_Coupes vestibules – halls sections
Q131Q605A08_Coupe transversale et détails – cross section and details
Q131Q605A09_Coupe transversale et détails – cross section and details
Q131Q605A09A_ Coupes et détails – sections and details
Q131Q605A10_Plan de plafond réfléché - ceiling plan
Q131Q605A11_Plan revêtement de sol - flooring plan
Q131Q605A12_Mobilier intégré - integrated furniture
Q131Q605A13_Mobilier intégré - integrated furniture
Q131Q605A14_Portes et cadres – doors and frames
Q131Q605A15_Phasing fonctionnel – functional phasing

DIVISION S – STRUCTURE – STRUCTURE

- Q131Q605S01 _ Notes plan de démolition/ Notes and plan view demolition
- Q131Q605S02 _ Coupe type et démolition / Typical section and demolition
- Q131Q605S03 _ Plan des fondations et coupe type / plan view foundations and typical section
- Q131Q605S04 _ Plan du rez-de-chaussée et détail type / Plan view ground floor and typical detail
- Q131Q605S05 _ Coupes et détails / Section and details
- Q131Q605S06 _ Plan de la toiture et coupe type/Roof plan and typical section
- Q131Q605S07 _ Coupe et détails / Section and details.

DIVISION M – MÉCANIQUE - MECHANICAL

- Q131Q605M01 _Plomberie – Démantèlement / plumbing dismantling
- Q131Q605M02 _Plomberie – Réaménagement / plumbing proposed
- Q131Q605M03 _Plomberie – Réaménagement vue en plan et détails / Plumbing proposed plan view and details
- Q131Q605M04 _Chauffage – Démantèlement et réaménagement / plan view foundations and typical section
- Q131Q605M05 _Chauffage – Liste des équipements et tableaux / Heating equipments selections
- Q131Q605M06 _Ventilation – Démantèlement / ventilation dismantling
- Q131Q605M07 _Ventilation – Réaménagement / ventilation proposed
- Q131Q605M08 _Ventilation – Détails et tableaux / ventilation details and equipments selection
- Q131Q605M09 _Contrôle – Schémas et séquences d'opérations / regulation diagrams and operations process

DIVISION E – ELECTRICITÉ - ELECTRICITY

- Q131Q605E001 _Électricité – Tableaux et liste d'équipements/ Tables and equipment listing
- Q131Q605E002 _Électricité – Panneaux de distribution existants / distribution panels
- Q131Q605E003 _Électricité – Nouveaux panneaux de distribution / new distribution panels
- Q131Q605E004 _Électricité – Nouveaux panneaux de distribution sur l'urgence /
new distribution panels on emergency
- Q131Q605E005 _Électricité – Éclairage / lighting
- Q131Q605E006 _Électricité – Services / services
- Q131Q605E007 _Électricité – Chauffage et forces motrices / heating and driving forces
- Q131Q605E008 _Électricité – Chauffage et forces motrices / heating and driving forces
Salle électrique et mécanique / electrical and mechanical rooms
Vues agrandies / enlarged views
- Q131Q605E009 _Électricité – Contrôle d'accès / access control
- Q131Q605E010 _Électricité – Système d'alarme-incendie / fire alarm system
- Q131Q605E011 _Électricité – Schémas unifilaires / single line diagrams

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 14 00 Works restrictions
- .2 Section 01 56 00 Temporary barriers and enclosure

1.2 WORK BY OTHERS

- .1 All the furniture of premises # 18 and # 19 identified on blueprints, the outside signs and inside directional signs are supplied and installed by the departmental representative. The contractor is responsible for coordinating the work by others for attachment backing, outlets, fittings, etc...

1.3 SCOPE OF WORK - ELECTRICITY

- .1 Architecture: Works as described hereunder are not exhaustive. Works are described more specifically in documents, plans and drawings.
 - .1 Provide and install all necessary equipment to perform the following works:
 - .1 Roof repair and external walls
 - .2 Interior refitting
 - .3 Replacement ceilings and floors finishes
 - .4 Replacement integrated furniture
- .2 Electricity: Works as described hereunder are not exhaustive. Works are described more specifically in documents, plans and drawings. All components or accessories necessary for a full and complete installation must be provided and installed, even if not specifically described to on documents.
 - .1 Provide, install and connect all necessary equipment to perform the following works:
 - .1 Do the dismantling of all the equipment like showed on the drawing.
 - .2 Supply and install the new distribution like showed on the drawing and schedule.
 - .3 Supply and install the special inlets and outlets like showed on the drawing and schedule.
 - .4 Supply and install the interior and exterior lighting fixtures like showed on the drawing and schedule .
 - .5 Supply and install the heating fixtures like showed on the drawing and schedule.
 - .6 Supply and install outlets and wiring for communication system like showed on the drawing and schedule.
 - .7 Supply and install door control system like showed on the drawing and schedule.
- .3 Mechanical: Works as described hereunder are not exhaustive. Works are described more specifically in documents, plans and drawings. All components or accessories necessary for a full and complete installation must be provided and installed, even if not specifically described to on documents.
 - .1 Supply, install and connect all necessary equipment to perform the following works:
 - .1 Dismantle all the equipment as shown on drawings.
 - .2 Supply and install new hot and cold water piping as shown on drawings and specifications.
 - .3 Supply and install a new domestic water inlet as shown on plans and specifications.

- .4 Supply and install a new humidifier as shown on plans and specifications.
 - .5 Supply and install new floor drains as shown on plans and specifications.
 - .6 Supply and install a new fuel oil tank as shown on plans and specifications.
 - .7 Supply and install a new chimney as shown on plans and specifications.
 - .8 Supply and install a new oil boiler and its control panel as shown on drawings and specifications.
 - .9 Supply and install a new hot water pump as shown on drawings and specifications.
 - .10 Supply and install a new heating coil as shown on drawings and specifications.
 - .11 Supply and install new ventilation ducts and ventilation accessories as shown on drawings and specifications.
 - .12 Clean existing ventilation ducts as shown on drawings and specifications.
 - .13 Supply and install new fans as shown on drawings and specifications.
 - .14 Supply, install and program all control systems as shown on drawings and specifications.
- .4 Structure: The works described below are not limited. These works are defined more specifically in the documents and drawings.
- .1 Dismantling of all structural, interior and exterior elements as shown on the plans and specifications
 - .2 Dismantle and reinstall the semi-rigid rail sections, as shown on the plans and specifications.
 - .3 Provide and install the structure for the extension of three (3) canopies (reinforced concrete and steel), including excavation, MG 20 granular foundation and MG 112 filler, as shown on the plans and specifications;
 - .4 Provide and install the roof structure over the transshipment door, as shown on the plans and specifications;
 - .5 Provide and install the structure of the new roof of the building, as shown on the plans and specifications;
 - .6 Provide and install the interior and exterior concrete slate, including the excavation, MG 20 foundation and leveling, as shown on the plans and specifications;
 - .7 Provide, install or modify the structure of exterior wall for the redesign of new openings, as shown on the plans and specifications;
 - .8 Provide and install the new elements of the exterior layout, such as protective posts and sidewalks, including MG 20, as shown on the plans and specifications.

1.4 WORKS EXECUTION

- .1 Executing the work according phases, so that the Departmental Representative could use the premises continuously during the works. Keeping temporary and safe accesses on the premises for the public while the work progress condition prevents from covering the usual accesses.
- .2 Coordinating the work progress schedule according to the occupancy of the premises.
- .3 Work sequences (by phase see plan A-15 functional phasing)
 - .1 The building will remain occupied and functional by the Departmental Representative for all the duration of the work completion. All the activities of the terminal must be maintained without interruption.
 - .2 Building occupancy
 - 1 The premises are occupied from 7 A.M. to 8 P.M. except premise #11 which is occupied 24/7 without interruption.

.3 Outside entrances

- .1 The construction work of the 3 outside vestibules must be made in 3 stages in order to maintain a functional access on each of the façade, on the parking side and on the runway side

Stage 1

- Construction of outside vestibule # 3

Stage 2

- Construction of outside vestibule # 4

Stage 3

- Construction of outside vestibule # 1

.4 Temporary work required for the continuation of the activities (interior design)

- .1 Refer to blueprint page A15 for the localization of temporary work that will be executed in 5 functional stages.

.5 Replacement of exterior doors and windows

1. Will be carry out as they advanced

.6 Roof, walls and insulation

- .1 The disassembling and the installation should be made by section in order to insure the full tightness of the premises during the work. If required, according to the work process, the contractor will have to plan for temporary tightness of the roof and outside walls.
- .2 The replacement work for the metal roof and insulation will be make after the installation of the exits/ mechanical equipments on the roof.
- .3 Protections for all outside access doors will have to be insured in order protect all works/users from debris during roof work.

.7 Interior work (functional phasing see blueprint A15)

- .1 Work will have to be performed at night from 8 P.M. to 5 A.M. A joint inspection of the CATSA search room will have to be performed with an officer at the end of each work shift.
- .2 Plan for specific coordination for premise # 11 because the occupancy is 24/7 so the interventions must be rationalized so as to disturb the least possible and to ensure the safety of the departmental representative. All systems must be functional at all time for this premise. Plan for short time interventions on limited sectors of work.
- .3 All systems must be functional every morning:
- .1 Electricity
 - .2 Heating
 - .3 Lighting
 - .4 Computers
 - .5 Telephony and other services
- .4 The premises clean, dust and material free and that, every morning, the furniture that had been moved to perform the work must be put back in place. The protection plastic for the computer equipment will be removed.
- .5 The contractor will have to demobilize every day because no material or tool or equipment will be tolerated in the premises except machinery room # 8 and

- electrical room # 9.
- .6 Ceilings
 - 1 The suspended ceilings that will be disassembled by section for passage of the mechanics will have to be temporarily fixed / supported to ensure the safety of users at all time. Plan for the required fixings; no element that are not adequately fixed will tolerated.
 - 2 Plan for appropriate temporary installations when services will have to be interrupted.
- .4 Construct Work in stages to provide for continuous public usage.
- .5 Maintain fire access/control;

1.5 CONTRACTOR USE OF PREMISES

- .1 Limit use of premises for Work, for storage, and for access, to allow:
 - .1 Ministerial representative occupancy.
 - .2 Public usage.
 - .3 All interventions of the contractor must be coordinated the Departmental representative.
- .2 Co-ordinate use of premises under direction of Ministerial representative.
- .3 .The contractor cannot circulate on the runway side without the permission of the Departmental representative.
- .4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Ministerial representative.
- .6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.6 MINISTERIAL REPRESENTATIVE OCCUPANCY

- .1 No subject

1.7 PARTIAL OWNER OCCUPANCY

- .1 No subject

1.8 PRE-ORDERED PRODUCTS AND PRE-BID WORK

- .1 No subject

1.9 PRE-PURCHASED EQUIPMENT

- .1 No subject

1.10 MINISTERIAL REPRÉSENTATIVE FURNISHED ITEMS

- .1 No subject

1.11 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

- .1 Execute work with least possible interference or disturbance to occupants, public and normal use of premises. Arrange with Ministerial representative to facilitate execution of work.

1.12 EXISTING SERVICES

- .1 Notify, Ministerial 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 Ministerial representative 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 pedestrian, vehicular traffic and tenant operations.
- .3 Provide alternative routes for personnel, pedestrian and vehicular traffic.
- .4 Establish location and extent of service lines in area of work before starting Work. Notify Ministerial representative of findings.
- .5 Submit schedule to and obtain approval from Ministerial representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .6 Provide temporary services when directed by Ministerial representative to maintain critical building.
- .7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .8 Where unknown services are encountered, immediately advise Ministerial representative and confirm findings in writing.
- .9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .10 Record locations of maintained, re-routed and abandoned service lines.
- .11 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.13 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 11 01 General information of work
- .2 Section 01 35 13.13 Special procedures for airport facilities

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 Ministerial 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 . The contractor is responsible for providing the temporary sanitary facilities for his employees and other contractors. The use of the washroom is forbidden at all time.
- .5 without object.
- .6 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, occupants public and normal use of premises. Arrange with Ministerial representative to facilitate execution of work.

1.5 EXISTING SERVICES

- .1 Notify, Ministerial 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 Ministerial 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, pedestrian and vehicular traffic.
- .4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures .

1.6 SPECIAL REQUIREMENTS

- .1 Occupied areas Monday to Sundays from 07:00 to 20:00 hours only.
- .2 Carry out noise generating Work from 20:00 to 05:00 hours.

- .3 Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedule - Schedule - Bar (GANTT) Chart.
- .4 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .5 Keep within limits of work and avenues of ingress and egress.
- .6 Ingress and egress of Contractor vehicles at site is limited and will be decided with the Departmental representative. The contractor will have to inform the Departmental representative to park in "city area"
- .7 Deliver materials outside of peak traffic hours 20:00 to 07:00 unless otherwise approved by Ministerial Representative.
- .8 A copy of key will be transmitted to the contractor by the Ministerial Representative in order to reach the building during the night-works.

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.
 - .5 The contractor will have to take a SGS training given by the Department before performing the work in controlled area.
- .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 Ministerial Representative at least 14 days before service is needed. For requests submitted within time noted above, costs of security escort will be paid for by Ministerial Representative. Cost incurred by late request will be Contractor's responsibility. Contractor is responsible to coordinate his requests for escort.
 - .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.

END OF SECTION

1 GENERAL

1.1 REFERENCE STANDARDS

- .1 Section 08 11 00 Metal doors and frames
- .2 Section 08 11 16 Aluminum doors and frames
- .3 Section 08 71 00 Door Hardware
- .4 Section 09 21 16 Gypsum board assemblies
- .5 Section 09 30 13 Ceramic Tiling
- .6 Section 09 65 19 Resilient tile flooring

1.2 CASH ALLOWANCES

- .1 Include in Contract Price specified cash allowances.
- .2 Cash allowances, unless otherwise specified, cover net cost to Contractor and subcontractor]of services, products, construction machinery and equipment, freight, handling, unloading, storage installation and other authorized expenses incurred in performing Work.
- .3 Contract Price, and not cash allowance, includes Contractor's and profit in connection with such cash allowance.
- .4 Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.
- .5 Where costs under a cash allowance exceed amount of allowance, Contractor will be compensated for excess incurred and substantiated plus allowance for overhead and profit as set out in Contract Documents.
- .6 Include progress payments on accounts of work authorized under cash allowances in [Consultant's] monthly certificate for payment.
- .7 Prepare schedule jointly with Ministerial representative and Contractor to show when items called for under cash allowances must be authorized by Ministerial representative for ordering purposes so that progress of Work will not be delayed.
- .8 Amount of each allowance, for Work specified in respective specification Sections is as follows:
 - .1 Section 07 21 16 Blanket insulation include allowance of 25% for the replacement (dismantling, supply and installation) of insulating wool of the walls of preserved envelope (part of envelope of 1994).
 - .2 Section 08 71 00 Door hardware include allowance of \$ 2 000,00 for purchase and installation of hardware for aluminium doors (to be considered by section 08 11 16).
 - .3 Section 08 71 00 Door hardware include allowance of \$ 4 000,00 for purchase and installation of hardware for the steel doors (to be considered by Contractor section 08 11 00).
 - .4 Section 09 21 16 Gypsum board assemblies include allowance of \$ 4 000,00 for purchase and installation of interior systems.
 - .5 Section 09 30 13 Ceramic tiling include allowance of \$ 2 000,00 for purchase and installation of product associated with the tilings with ceramics and installation with

- .6 levelling
Section 09 65 19 Resilient tile flooring include allowance of \$ 4 000,00 for purchase and installation of products associated with floor coverings and installation with levelling

1.3 CONTINGENCY ALLOWANCE

- .1 Include in Contract Price contingency allowance of \$ 5 000,00.
- .2 Do not include in Contract Price, additional contingency allowances for products, installation, overhead or profit.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Ministerial representative are specified for work of the foundations and concrete.

1.2 APPOINTMENT AND PAYMENT

- .1 Ministerial Representative will appoint and pay for services of testing laboratory except follows:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
 - .4 Mill tests and certificates of compliance.
 - .5 Tests specified to be carried out by Contractor under supervision of Ministerial Representative].
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Ministerial Representative to verify acceptability of corrected work.

1.3 CONTRACTOR'S RESPONSIBILITIES

- .1 Provide labour, equipment and facilities to:
 - .1 Provide access to Work for inspection and testing.
 - .2 Facilitate inspections and tests.
 - .3 Make good Work disturbed by inspection and test.
 - .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .2 Notify Ministerial Representative 48 hours minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Ministerial Representative.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 32 16.07 Construction progress schedule – bar (ganttt) chart.

1.2 ADMINISTRATIVE

- .1 Schedule and administer project meetings throughout the progress of the work at the call of Ministerial Representative.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting [four] days in advance of meeting date to Ministerial Representative.
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within 3 days after meetings and transmit to meeting participants and, affected parties not in attendance Ministerial Representative.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.3 PRECONSTRUCTION MEETING

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Senior representatives of Ministerial Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 10 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
 - .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
 - .5 Delivery schedule of specified equipment in accordance with Section 01 61 00 Common product requirements.
 - .6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures .
 - .7 Proposed changes, change orders, procedures, approvals required, mark-up

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

1.4 PROGRESS MEETINGS

- .1 During course of Work and 2 weeks prior to project completion, schedule progress meetings.
- .2 Contractor, major Subcontractors involved in Work and Ministerial Representative and Owner are to be in attendance.
- .3 Notify parties minimum 7days prior to meetings.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.
- .5 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for affect on construction schedule and on completion date.
 - .12 Other business.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 11 00 General information of work
- .2 Section 01 14 00 Work restrictions

1.2 DEFINITIONS

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
- .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: overall system operated by Ministerial Representative to enable monitoring of project work in relation to established milestones.

1.3 REQUIREMENTS

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Ministerial Representative within 14 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 Ministerial Representative within 5 working days of receipt of acceptance of Master Plan.

1.5 PROJECT MILESTONES

- .1 Project milestones form interim targets for Project Schedule.
 - .1 Excavation completed within 30 working days of Award of Contract date.
 - .2 Substructure completed within 30 working days of Award of Contract date.
 - .3 Superstructure completed within 30 working days of Award of Contract date.
 - .4 Building closed-in and weatherproofed within 60 working days of Award of Contract date.
 - .5 Interior finishing and fitting, mechanical, and electrical work completed within 90 working days of Award of Contract date.
 - .6 Interim Certificate Substantial Completion within 150 working days after the start date of work.

1.6 MASTER PLAN

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Ministerial Representative will review and return revised schedules within 5 working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.7 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Award.
 - .2 Shop Drawings, Samples.
 - .3 Permits.
 - .4 Mobilization.
 - .5 Excavation.
 - .6 Backfill.
 - .7 Building footings.
 - .8 Slab on grade.
 - .9 Structural Steel.
 - .10 Siding and Roofing.
 - .11 Interior Architecture (Walls, Floors and Ceiling).
 - .12 Plumbing.
 - .13 Lighting.
 - .14 Electrical.
 - .15 Piping.
 - .16 Controls.
 - .17 Heating, Ventilating, and Air Conditioning.

- .18 Millwork.
- .19 Fire Systems.
- .20 Testing and Commissioning.
- .21 Supplied equipment long delivery items.
- .22 Ministerial representative supplied equipment required dates.

1.8 PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.9 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 45 00 Quality control.
- .2 Section 01 61 00 Common product requirements.
- .3 Section 01 78 00 Closeout submittals

1.2 REFERENCE STANDARDS

- .1 Without object.

1.3 ADMINISTRATIVE

- .1 Submit to Ministerial Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Ministerial Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Ministerial 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 Ministerial Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Ministerial Representative 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 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 Ministerial Representative's review of each submission.
- .5 Adjustments made on shop drawings by Ministerial Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Ministerial Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Ministerial Representative may require, consistent with Contract Documents. When resubmitting, notify Ministerial Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After Ministerial Representative's review, distribute copies.
- .10 Submit 1 electronic copy of shop drawings for each requirement requested in specification Sections and as Ministerial Representative may reasonably request.
- .11 Submit 1 electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Ministerial Representative 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 Ministerial Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .13 Submit 1 electronic copy of certificates for requirements requested in specification Sections and as requested by Ministerial Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit 1 electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Ministerial Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit 1 electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Ministerial Representative.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Submit 1 electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Ministerial Representative.
- .18 Delete information not applicable to project.
- .19 Supplement standard information to provide details applicable to project.
- .20 If upon review by Ministerial Representative, no errors or omissions are discovered or if only minor corrections are made, [transparency] [copies] will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .21 The review of shop drawings by Public Works and Government Services Canada (PSPC) is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that PSPC 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 Ministerial Representative's business address.
- .3 Notify Ministerial Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Ministerial Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Ministerial Representative prior to proceeding with Work.
- .6 Make changes in samples which Ministerial Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.6 MOCK-UPS

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

1.7 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement and as directed by Departmental Representative.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 2 locations.
 - .1 Viewpoints and their location as determined by Ministerial Representative.
- .4 Frequency of photographic documentation: as directed by Ministerial Representative.
 - .1 Upon completion of: excavation, foundation, framing and services before concealment, of Work, and as directed by Ministerial Representative.

1.8 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 01 11 01 General information of work.
- .2 Section 01 14 00 Work restrictions.
- .3 Section 01 52 00 Construction facilities
- .4 Section 01 56 00 Temporary barriers and enclosures

1.02 GENERAL PROTECTION

- .1 Do not disrupt airport business except as permitted by Ministerial Representative.
- .2 Provide temporary protection for safe handling of public, personnel, pedestrians and vehicular traffic: to Section 01 56 00 - Temporary Barriers and Enclosures.
- .3 Provide barricades and lights where directed by Ministerial Representative.

1.03 MOVEMENT OF EQUIPMENT AND PERSONNEL

- .1 In areas of airport not closed to aircraft traffic:
 - .1 Obtain Ministerial Representative's approval on scheduling of Work.
 - .2 Control movements of equipment and personnel as directed by Ministerial Representative.
 - .3 Provide qualified field personnel at locations designated by Ministerial Representative to relay signals from airport traffic control tower to equipment and personnel wishing to cross live traffic areas.

1.04 UNSERVICEABLE AREAS

- .1 Without object

1.05 TRENCHING

- .1 Obtain Ministerial Representative's written permission to undertake trenching on pavements open to aircraft traffic which cannot be completed, backfilled and sealed within 1 working day.

1.06 AIRPORT FACILITIES

- .1 Ministerial Representative will stake or indicate location of underground facilities such as cables, pipes, ducts and other services and utilities.
- .2 Notify Ministerial Representative of work areas 48 hours minimum in advance of operations to allow sufficient time for underground facilities and service to be located.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 41 00 Regulatory requirements.

1.2 REFERENCE STANDARDS

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Province of Quebec
 - .1 An Act Respecting Occupational Health and Safety, R.S.Q., c.S-2.1 (current edition) - Updated 2005.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
 - .3 Without object.
- .3 Submit 1 copy of Contractor's authorized representative's work site health and safety inspection reports to Ministerial Representative and or authority having jurisdiction, weekly.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 Health and safety requirements, 01 35 43 Environmental procedures.
- .7 Ministerial Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 4 days after receipt of plan. Revise plan as appropriate and resubmit plan to Ministerial Representative within 4 days after receipt of comments from Ministerial Representative.
- .8 Ministerial Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Ministerial Representative.

1.4 FILING OF NOTICE

- .1 File Notice of Project with Provincial authorities prior to beginning of Work.
- .2 Contractor shall be responsible and assume the Principal Contractor role for each work zone

location and not the entire complex. Contractor shall provide a written acknowledgement of this responsibility with 3 weeks of contract award. Contractor to submit written acknowledgement to CNESST along with Ouverture de Chantier Notice.

- .3 Work zone locations include:
 - .1 Terminal

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

1.5 SAFETY ASSESSMENT

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

1.6 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Ministerial Representative prior to commencement of Work.

1.7 REGULATORY REQUIREMENTS

- .1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

1.8 PROJECT/SITE CONDITIONS

- .1 Work at site will involve contact with:
 - .1 winds.
 - .2 fog.

1.9 GENERAL REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Ministerial representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.10 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Without object.
- .3 Contractor shall be the Principal Contractor as described in the Quebec Act Respecting Health and Safety code for the Construction for only their scope and areas of work as defined and described this project specification.
- .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 Health and Safety Plan.

1.11 COMPLIANCE REQUIREMENTS

- .1 Comply with R.S.Q., c. S-2.1, an Act respecting Health and Safety, and c. S-2.1, r.4 Safety Code for the Construction Industry.
- .2 Comply with Occupational Health and Safety Regulations, 1996.
- .3 Without object
- .4 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.12 UNFORSEEN HAZARDS

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

1.13 HEALTH AND SAFETY CO-ORDINATOR

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
 - .1 Have site-related working experience specific to activities associated.
 - .2 Have working knowledge of occupational safety and health regulations.
 - .3 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 site to perform Work.
 - .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
 - .5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.14 POSTING OF DOCUMENTS

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

1.15 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Ministerial Representative.
- .2 Provide Ministerial Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Ministerial Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.16 WORK STOPPAGE

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 35 29.06 Health and safety requirements
- .2 Section 01 74 11 Cleaning.
- .3 Section 01 7421 Construction/demolition waste management and disposal

1.2 REFERENCE STANDARDS

- .1 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 manufacturer's instructions, printed product literature and data sheets for 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 and 01 35 43 - Environmental Procedures.
- .3 Without object:
 - .1 Without object.
- .4 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review [and approval] by Ministerial Representative.
- .5 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.
- .6 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .7 Include in Environmental Protection Plan:
 - .1 Name of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Name and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
 - .3 Name and qualifications of person 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 Waste Water Management Plan identifying methods and procedures for management and] discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.
- .14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.
- .15 Pesticide treatment plan to be included and updated, as required.

1.5 FIRES

- .1 Fires and burning of rubbish on site [permitted only when approved by Ministerial Representative is not permitted.
- .2 Without object
- .3 without object.

1.6 DRAINAGE

- .1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include 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, EPA.
- .2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.
- .3 Provide temporary drainage and pumping required to keep excavations and site free from water.

- .4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.7 SITE CLEARING AND PLANT PROTECTION

- .1 Protect trees and plants on site and adjacent properties as indicated.
- .2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of [2] m minimum.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
 - .1 Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.
- .5 Without object.

1.8 WORK ADJACENT TO WATERWAYS

- .1 Without object

1.9 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 Ministerial Representative.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.10 HISTORICAL/ ARCHAEOLOGICAL CONTROL

- .1 Without object

1.11 NOTIFICATION

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

2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

3 EXECUTION

3.1 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Bury rubbish and waste materials on site where directed after receipt of written approval from Ministerial Representative.
- .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 11 - Cleaning.
- .5 Waste Management: separate waste materials, when applicable, for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 35 29.06 Health and safety requirements
- .2 Section 01 35 43 Environmental procedures
- .3 Section 02 31 99 Demolition form minor works

1.2 REFERENCES AND CODES

- .1 Perform Work in accordance with National Building Code of Canada 2010 (NBC 2010) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.
 - .3 SOR-2008, Regulation on storage systems of petroleum products and allied petroleum products.

1.3 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 Ministerial Representative..
- .2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Ministerial Representative.
- .3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Ministerial Representative.

1.4 BUILDING SMOKING ENVIRONMENT

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

1.5 NATIONAL PARKS ACT

- .1 Without object .

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 29 83 Payment rocedures for testing laboratory services
- .2 Section 01 33 00 Submittal procedures
- .3 Section 01 73 00 Exécution
- .4 Section 01 78 00 Closeout submittals.

1.2 REFERENCE STANDARDS

- .1 Without object

1.3 INSPECTION

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

1.4 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Ministerial Representative for purpose of inspecting and/or testing portions of Work. [Cost of such services will be borne by Ministerial Representative.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Ministerial Representative at no cost to Ministerial Representative. Pay costs for retesting and reinspection.

1.5 ACCESS TO WORK

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

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

1.6 PROCEDURES

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

1.7 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Ministerial Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Ministerial Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Ministerial Representative.

1.8 REPORTS

- .1 Submit 4 copies of inspection and test reports to Ministerial Representative.
- .2 Provide copies to subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

1.9 TESTS AND MIX DESIGNS

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

1.10 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Ministerial Representative as specified in specific Section.
- .3 Prepare mock-ups for Ministerial Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, Ministerial Representative will assist in preparing schedule fixing dates for

preparation.

- .6 Remove mock-up at conclusion of Work or when acceptable to Ministerial Representative.
- .7 Mock-ups may remain as part of Work.
- .8 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.11 MILL TESTS

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

1.12 EQUIPMENT AND SYSTEMS

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 14 00 Work restrictions
- .2 Section 01 35 13.13 Special procedures for airport facilities.
- .3 Section 01 52 00 Construction facilities.

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

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

1.7 TEMPORARY HEATING AND VENTILATION

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.
- .3 Provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.

- .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .4 Maintain temperatures of minimum 21 degrees C in areas where construction is in progress.
- .5 Ventilating:
 - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.
 - .5 Ventilate temporary sanitary facilities.
 - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .6 Permanent heating system of building, [to] [not to] be used when available. Be responsible for damage to heating system if use is permitted.
- .7 On completion of Work for which permanent heating system is used, replace filters.
- .8 Ensure Date of Substantial Performance and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Ministerial Representative.
- .9 Pay costs for maintaining temporary heat, when using permanent heating system. Ministerial Representative will pay utility charges when temporary heat source is existing building equipment.
- .10 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform with applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct-fired combustion units to outside.
- .11 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.8 TEMPORARY POWER AND LIGHT

- .1 Ministerial Representative will pay for temporary power during construction for temporary lighting and operating of power tools, to a maximum supply of 230 volts 30 amps.
- .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] [DCC Representative] [Consultant].
- .4 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.
- .5 Maximum power supply is available and will be provided for construction use at no cost. Connect to existing power supply in accordance with Canadian Electrical Code [and provide meters and switching.

- .6 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Ministerial Representative provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.

1.9 TEMPORARY COMMUNICATION FACILITIES

- .1 Provide and pay for temporary telephone, fax, data hook up, lines equipment necessary for own use and use of Ministerial Representative.

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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 11 01 General information of work
- .2 Section 01 14 00 Work restrictions
- .3 Section 01 35 13.13 Special procedures for airport facilities
- .4 Section 01 56 00 Temporary barriers and enclosures.

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 Canadian Standards Association (CSA International)
 - .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, ladders, swing staging, platforms necessary to the completion of the work and to ensure maintenance of it.

1.6 HOISTING

- .1 Provide, operate and maintain hoists, cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
- .2 Hoists (cranes) to be operated by qualified operator.

1.7 ELEVATORS

- .1 Without object
- .2 Without object.

1.8 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .3 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.9 CONSTRUCTION PARKING

- .1 Parking will be permitted on site provided it does not disrupt performance of Work.
- .2 Provide and maintain adequate access to project site.
- .3 Clean runways and taxi areas where used by Contractor's equipment.

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 Provide office heated to 21 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

1.12 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 Provide temporary sanitary facilities for work force in accordance with governing regulations and

ordinances.

- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.
- .3 When permanent water and drain connections are completed, provide temporary water closets and urinals complete with temporary enclosures, inside building. Permanent facilities may be used on approval of Ministerial Representative.

1.14 CONSTRUCTION SIGNAGE

- .1 Provide and erect project sign, within 3 weeks of signing Contract, in a location designated by Ministerial.
- .2 Construction sign 1.2 m x 2.4 m, of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.
- .3 Indicate on sign, name of Owner, and Contractor, of design style established by Ministerial Representative.
- .4 No other signs or advertisements, other than warning signs, are permitted on site.
- .5 Provide project identification site sign comprising framing, and one 1200 x 2400 mm signboard as detailed and as described below.
 - .1 Foundations: concrete block.
 - .2 Framework and battens: SPF, pressure treated minimum 89 x 89 mm.
 - .3 Signboard: 19 mm Medium Density Overlaid Douglas Fir Plywood to CSA O121.
 - .4 Paint: alkyd enamel to CAN/CGSB-1.59 over exterior alkyd primer to CAN/CGSB 1.189.
 - .5 Fasteners: hot-dip galvanized steel nails and carriage bolts.
 - .6 Vinyl sign face: printed project identification, self adhesive, vinyl film overlay, supplied by Ministerial Representative.
- .6 Locate project identification sign as directed by Ministerial Representative and construct as follows:
 - .1 Build concrete foundation, erect framework, and attach signboard to framing.
 - .2 Paint surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.
 - .3 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.
- .7 Direct requests for approval to erect Ministerial Representative/Contractor signboard to Ministerial Representative. For consideration general appearance of Ministerial Representative/Contractor signboard must conform to project identification site sign. Wording in both official languages.
- .8 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .9 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 Ministerial Representative.

1.15 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise

specifically directed by Ministerial Representative.

- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

1.16 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 11 01 General information of work
- .2 Section 01 14 00 Work restrictions
- .3 Section 01 52 00 Construction facilities

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 Canadian Standards Association (CSA International)
 - .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.
- .3 Take account of the particularity sequence traffic area works (Tarmac)

1.4 HOARDING

- .1 Erect temporary site enclosure using new 1.2 m high snow fence wired to rolled steel "T" bar fence posts spaced at 2.4 m on centre. Provide one lockable truck gate and for the pedestrians. Maintain fence in good repair.
- .2 Build plywood public site enclosure (roof and sides), for pedestrians, with relevant signs and electrical lighting as required by law, and provide maintenance. To envisage these passages for all the entries of the building. Contractor is responsible to make check, sign and seal, with his expenses, the design of these passages by an engineer skill to exert in Canada and to make the transmission to Ministerial Representative.
- .3 Paint public side of site enclosure in selected colours with one coat primer to CAN/CGSB 1.189 and one coat exterior paint to CGSB 1.59. Maintain public side of enclosure in clean condition.
- .4 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.5 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 and as indicated.

1.6 WEATHER ENCLOSURES

- .1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3 Design enclosures to withstand wind pressure and snow loading.

1.7 DUST TIGHT SCREENS

- .1 Provide dust tight screens or [insulated] partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.

1.8 ACCESS TO SITE

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
- .2 Controlled area side tracks (Tarmac)

1.9 PUBLIC TRAFFIC FLOW

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

1.10 FIRE ROUTES

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

1.11 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

1.12 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 Ministerial Representative locations and installation schedule 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

1.13 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 Submittal procedures.

1.2 REFERENCE STANDARDS

- .1 Within text of each specifications section, reference may be made to reference standards.
- .3 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .4 If there is question as to whether products or systems are in conformance with applicable standards, Ministerial Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .5 Cost for such testing will be born by Ministerial Representative 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 Ministerial Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.4 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 Ministerial Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Ministerial Representative at commencement of Work and should it

subsequently appear that Work may be delayed for such reason, Ministerial Representative 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 materials, 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 Ministerial Representative.
- .9 Touch-up damaged factory finished surfaces to Ministerial Representative'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 Ministerial Representative. 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 Ministerial Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Ministerial Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Ministerial Representative 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 Ministerial Representative if required Work is such as to make it impractical to produce required results.

- .2 Do not employ anyone unskilled in their required duties. Ministerial Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Ministerial Representative, 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 Ministerial Representative if there is interference. Install as directed by Ministerial Representative.

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 Ministerial Representative 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 Ministerial Representative.

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

and for the pedestriansEND OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 73 00 Execution

1.2 REFERENCE STANDARDS

- .1 Documents of the project owner showing the limits of the property and the existing surveying control points.

1.3 QUALIFICATIONS OF SURVEYOR

- .1 Without object.

1.4 SURVEY REFERENCE POINTS

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

1.5 SURVEY REQUIREMENTS

- .1 Establish 2 permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
- .2 Establish lines and levels, locate and lay out, by instrumentation.
- .3 Stake for grading, fill and topsoil placement and landscaping features.
- .4 Stake slopes.
- .5 Establish pipe invert elevations.
- .6 Stake batter boards for foundations.
- .7 Establish foundation, column locations and floor elevations.
- .8 Establish lines and levels for mechanical and electrical work.

1.6 EXISTING SERVICES

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Ministerial Representative of findings.
- .2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Ministerial Representative.

1.7 LOCATION OF EQUIPMENT AND FIXTURES

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

1.8 RECORDS

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.
- .3 Record locations of maintained, re-routed and abandoned service lines.

1.9 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit name and address of Surveyor to Ministerial Representative.
- .2 On request of Ministerial Representative, submit documentation to verify accuracy of field engineering work.
- .3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform with Contract Documents.

1.10 SUBSURFACE CONDITIONS

- .1 Promptly notify Consultant in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.
- .2 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 Submittal procedures
- .2 Section 07 84 00 Fire stopping

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.

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

1.6 WASTE MANAGEMENT AND DISPOSAL

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

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 01 14 00 Work restrictions
- .2 Section 01 74 21 Construction/demolition waste management and disposal
- .3 Section 01 77 00 Closeout procedures

1.02 REFERENCE STANDARDS

- .1 Without object.

1.03 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, [including] [other than] that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Ministerial Representative. Do not burn waste materials on site, unless approved by Ministerial Representative.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only or remove from site.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7 Dispose of waste materials and debris at designated dumping areas on Crown property, off site.
- .8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
- .13 General cleaning to do every day considering the occupation of the premises.

1.04 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris [other than] [including] that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Ministerial Representative. Do not burn waste materials on site, unless approved by Ministerial Representative.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls and doors.
- .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 in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

END OF SECTION

1 GENERAL

1.1 WASTE MANAGEMENT GOALS

- .1 Prior to start of Work conduct meeting with Ministerial Representative to review and discuss PSPC's waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be project generated.
- .2 PSPC's waste management goal: to divert a minimum 75 percent of total Project Waste from landfill sites. Prior to project completion provide Ministerial Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced. The overall waste diversion goal for this project is 25 percent.
- .3 Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.
- .4 Protect environment and prevent environmental pollution damage.

1.2 RELATED REQUIREMENTS

- .1 Section 01 11 01 General information of work
- .2 Section 01 74 11 Cleaning.

1.3 REFERENCE STANDARDS

- .1 Canadian Construction Association (CCA)
 - .1 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.
- .2 Public Works and Government Services Canada (PSPC)
 - .1 2002 National Construction, Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.
 - .2 CRD Waste Management Market Research Report (available from PSPC's Environmental Services).
 - .3 Sustainable Development Strategy 2007-2009: Target 2.1 Environmentally Sustainable Use of Natural Resources.
 - .1 Real Property projects over \$1 million and in communities where industrial recycling is supported, implementation of CRD waste management practices will be completed, with waste materials being reused or recycled.
 - .2 Contractually ensure resources used in construction or maintenance are consumed and recovered in a sustainable manner.

1.4 DEFINITIONS

- .1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the Ministerial Representative.
- .2 Class III: non-hazardous waste - construction renovation and demolition waste.
- .3 Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities
- .4 Cost/Revenue Analysis Workplan (CRAW): based on information from Waste Reduction

Workplan, and intended as financial tracking tool for determining economic status of waste management practices (Schedule E).

- .5 Inert Fill: inert waste - exclusively asphalt and concrete.
- .6 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.
- .7 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .8 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .9 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .10 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items including pallets or unused products to vendors.
- .11 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .12 Separate Condition: refers to waste sorted into individual types.
- .13 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.
- .14 Waste Audit (WA): detailed inventory of estimated quantities of waste materials that will be generated during construction, demolition, deconstruction and/or renovation. Involves quantifying by volume/weight amounts of materials and wastes that will be reused, recycled or landfilled. Refer to Schedule A.
- .15 Waste Diversion Report: detailed report of final results, quantifying cumulative weights and percentages of waste materials reused, recycled and landfilled over course of project. Measures success against Waste Reduction Workplan (WRW) goals and identifies lessons learned.
- .16 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating required submittal and reporting requirements.
- .17 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials generated by project. Specifies diversion goals, implementation and reporting procedures, anticipated results and responsibilities. Waste Reduction Workplan (Schedule B) information acquired from Waste Audit.

1.5 DOCUMENTS

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

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare and submit following prior to [project start-up]:
 - .1 1 electronic copy of completed Waste Audit (WA): Schedule A.
 - .2 1 electronic copy of completed Waste Reduction Workplan (WRW): Schedule B.
 - .3 1 electronic copy of Waste Source Separation Program (WSSP).
- .3 Prepare and submit on basis, throughout project or at intervals agreed to by Ministerial Representative the following:
 - .1 Receipts, scale tickets, waybills, and/or waste disposal receipts that show quantities and types of materials reused, recycled, or disposed of.
 - .2 Updated Waste Materials Tracking form (Schedule D).
 - .3 Written monthly summary report detailing cumulative amounts of waste materials reused, recycled and landfilled, and brief status of ongoing waste management activities.
- .4 Submit prior to final payment the following:
 - .1 Waste Diversion Report, indicating final quantities [in tones] by material types salvaged for reuse, recycling or disposal in landfill and recycling centres, re-use depots, landfills and other waste processors that received waste materials (See Schedule C).
 - .2 Provide receipts, scale tickets, waybills, waste disposal receipts that confirm quantities and types of materials reused, recycled or disposed of and destination.

1.7 WASTE AUDIT (WA)

- .1 Ministerial Representative will prepare WA prior to project start-up. WA will be provided with bid documentation (see Schedule A).
- .2 WA provides detailed inventory, estimated quantities and types of waste materials that will be generated as well as their potential to be reused and/or recycled and project's waste diversion goals and objectives.
- .3 After award of contract, contractor to review WA and confirm that anticipated quantities of waste generated are accurate and goals achievable.
- .4 If after review, contractor determines that indicated quantities or opportunities in WA are not accurate or achievable, contractor to provide written details of discrepancies and revised quantities for areas of concern. Contractor to meet with Ministerial Representative to review and justify revisions.
- .5 Post on-site WA where contractor and sub-contractors are able to review content.

1.8 WASTE REDUCTION WORKPLAN (WRW)

- .1 Prepare and submit WRW (Schedule B) at least 10 days prior to project start-up.
- .2 WRW identifies strategies to optimize diversion through reduction, reuse, and recycling of materials and comply with applicable regulations, based on information acquired from WA.
- .3 WRW should include but not limited to:
 - .1 Applicable regulations.
 - .2 Specific goals for waste reduction, identify existing barriers and develop strategies to overcome them.
 - .3 Destination of materials identified.
 - .4 Deconstruction/disassembly techniques and schedules.

- .5 Methods to collect, separate, and reduce generated wastes.
 - .6 Location of waste bins on-site.
 - .7 Security of on-site stock piles and waste bins.
 - .8 Protection of personnel, sub-contractors.
 - .9 Clear labelling of storage areas.
 - .10 Training plan for contractor and sub-contractors.
 - .11 Methods to track and report results reliably (Schedule D).
 - .12 Details on materials handling and removal procedures.
 - .13 Recycler and reclaimer requirements.
 - .14 Quantities of materials to be salvaged for reuse or recycled and materials sent to landfill.
 - .15 Requirements for monitoring on-site wastes management activities.
- .4 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
- .5 Post WRW or summary where workers at site are able to review content.
- .6 Monitor and report on waste reduction by documenting total volume (in tonnes) and cost of actual waste removed from project (Schedule D).

1.9 COST/REVENUE ANALYSIS WORKPLAN (CRAW)

- .1 Prepare CRAW (see Schedule E) and include the following:
 - .1 Cost of current waste management practices.
 - .2 Implementation cost of waste diversion program.
 - .3 Savings and benefits resulting from waste diversion program.

1.10 WASTE SOURCE SEPARATION PROGRAM (WSSP)

- .1 As part of Waste Reduction Workplan, prepare WSSP prior to project start-up.
- .2 WSSP will detail methodology and planned on-site activities for separation of reusable and recyclable materials from waste intended for landfill.
- .3 Provide list and drawings of locations that will be made available for sorting, collection, handling and storage of anticipated quantities of reusable and recyclable materials.
- .4 Provide sufficient on-site facilities and containers for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
- .5 Locate containers to facilitate deposit of materials without hindering daily operations.
- .6 Provide training for sub-contractors and workers in handling and separation of materials for reuse and/or recycling.
- .7 Locate separated materials in areas which minimizes material damage.
- .8 Clearly and securely label containers to identify types/conditions of materials accepted and assist sub-contractors and workers in separating materials accordingly.
- .9 Monitor on-site waste management activities by conducting periodic site inspections to verify: state of signage, contamination levels, bin locations and condition, personnel participation, use of waste tracking forms and collection of waybills, receipts and invoices.
- .10 On-site sale of salvaged materials is not permitted unless authorized in writing by Ministerial Representative and provided that site safety regulations and security requirements are adhered to.

1.11 USE OF SITE AND FACILITIES

- .1 Execute Work with minimal interference and disturbance to normal use of premises.
- .2 Maintain security measures established by facility provide temporary security measures approved by Ministerial Representative.

1.12 WASTE PROCESSING SITES

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

1.13 QUALITY ASSURANCE

- .1 After award of Contract, a mandatory site examination will be held for this Project for Contractor responsible for construction, renovation demolition/deconstruction waste management.
 - .1 Date, time and location will be arranged by Ministerial Representative.
- .2 Waste Management Meeting: Waste Management Co-ordinator is to provide an update on status of waste diversion and management activities at each meeting. Written monthly Waste Diversion Report summary to be provided by Waste Management Coordinator (refer Waste Materials Tracking form in Schedule D).

1.14 STORAGE, HANDLING AND PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Ministerial Representative.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Protect structural components not removed and salvaged materials from movement or damage.
- .6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Ministerial Representative.
- .7 Protect surface drainage, mechanical and electrical from damage and blockage.
- .8 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
- .9 Separate and store materials produced during project in designated areas.
- .10 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
 - .1 On-site source separation is recommended.
 - .2 Remove co-mingled materials to off site processing facility for separation.
 - .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.
 - .4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

1.15 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil, paint thinner into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:
 - .1 Number and size of bins.
 - .2 Waste type of each bin.
 - .3 Total tonnage generated.
 - .4 Tonnage reused or recycled.
 - .5 Reused or recycled waste destination.
- .4 Remove materials on-site as Work progresses.
- .5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in the waste audit.

1.16 SCHEDULING

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

2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

3 EXECUTION

3.1 APPLICATION

- .1 Do Work in compliance with WRW and WSSP.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
 - .2 Source separate materials to be reused/recycled into specified sort areas.

3.3 DIVERSION OF MATERIALS

- .1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Ministerial Representative, and consistent with applicable fire regulations.
 - .1 Mark containers or stockpile areas.
 - .2 Provide instruction on disposal practices.
- .2 On-site sale of recyclable materials is not permitted except on indications opposite of the Ministerial Representative.

3.4 WASTE DIVERSION REPORT

- .1 At completion of Project, prepare written Waste Diversion Report indicating quantities of materials reused, recycled or disposed of as well as the following:
 - .1 Identify final diversion results and measure success against goals from Waste Reduction Workplan.
 - .2 Compare final quantities/percentages diverted with initial projections in Waste Audit and Waste Reduction Workplan and explain variances.
 - .1 Supporting documentation.
 - .2 Waybills and tracking forms.
 - .3 Description of issues, resolutions and lessons learned.

3.5 WASTE AUDIT (WA) (Annexe A)

.1 Schedule A - Waste Audit (WA)						
(1)	(2)	(3)	(4)	(5)	(6) %	(7) %
Material Category	Material Quantity Unit	Estimate d Waste %	Total Quantity of Waste (unit)	Generati on Point	Recycled	Reused
Wood and Plastics						
Material Description						
Off-cuts						
Warped						
Pallet						
Forms						
Plastic						
Packaging						
Cardboard						
Packaging						
Other						
Doors and						
Windows						
Material Description						
Painted						
Frames						
Glass						
Wood						
Metal						
Other						

3.6 WASTE REDUCTION WORKPLAN (WRW) (Annexe B)

.1 Schedule B						
(1)	(2)	(3)	(4)	Actual	(5)	Actual (6)
Material	Person(s)	Total Quantity of Waste (unit)	Reused Amount (units) Project		Recycled Amount (unit) Project	Material(s) Destination

Wood and Plastics

Material

Description

Chutes

Warped

Pallet

Forms

Plastic

Packaging

Card-board

Packaging

Other

Doors and Windows

Material

Description

Painted

Frames

Glass

Wood

Metal

Other

3.7 FINAL REPORT ON WASTE REDIRECTOIN (ANNEX D)

FINAL REPORT ON WAST REDIRECTION form for construction, renovation and PSPS

Project name					
Type of project (construction, renovation or demolition)					
Area (m²)					
Site address					
Name and phone number of the resource person					
Date					

Material	Real weight redirected (tons)		Final destination and use of the redirected materials	Total weight buried (tons)	TOTAL WEIGHT (ton)	Redirection rate
	Reused	Recycled				
Masonry and pavement					0	#DIV/0!
Walls and ceilings					0	#DIV/0!
Metals					0	#DIV/0!
Mechanics						
HVAC					0	#DIV/0!
Plumbing					0	#DIV/0!
Plumbing fixtures					0	#DIV/0!
Others					0	#DIV/0!
Doors and windows					0	#DIV/0!
Wood					0	#DIV/0!
Cabinetwork and wood working					0	#DIV/0!
Floor coveringl					0	#DIV/0!
Electricity						
Wiring					0	#DIV/0!
Lighting					0	#DIV/0!
Others					0	#DIV/0!
Roofing					0	#DIV/0!
Specialities and various elements					0	#DIV/0!
Cardboard					0	#DIV/0!
Other packages					0	#DIV/0!
Mixed recycling					0	#DIV/0!
General waste					0	#DIV/0!
Others					0	#DIV/0!
0	0	0		0	0	#DIV/0!

3.8 COST/REVENUE ANALYSIS WORKPLAN (CRAW) (Annexe E)

.1 Schedule E - Cost/Revenue Analysis Workplan (CRAW)

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

3.9 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Schedule G - Government Chief Responsibility for the Environment:

Province Address General Fax
Inquires

Québec Ministère de l'environnement 418-643-3127 418-646-5974
et de la faune
Siège social
150, boul, René-Lévesque Est
Québec QC
G1R 4Y1

Conseil de la conservation 418-643-3818
et de l'environnement
800, place d'Youville
19^e étage
Québec QC
G1R 3P4

3.10 SCHEDULES

- .1 Following Schedules are attached to this Specification:
- .1 Waste Audit - Schedule A.
 - .2 Waste Reduction Workplan Form - Schedule B .
 - .3 Waste Diversion Report Form - Schedule C (non applicable).
 - .4 Waste Materials Tracking Form - Schedule D.
 - .5 Cost/Revenue Analysis Workplan - Schedule E. (non applicable)

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 78 00 Closeout submittals
- .2 Section 01 79 00 Demonstration and training.
- .3 Section 01 91 13 General commissioning (cx) requirements
- .4 Section 01 91 31 Commissioning (CX) plan
- .5 Section 01 91 33 Commissioning forms
- .6 Section 01 91 41 Commissioning : Training
- .7 Section 01 91 51 Building Management Manual (BMM)

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 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Ministerial Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Ministerial Representative inspection.
 - .2 Ministerial Representative Inspection:
 - .1 Ministerial 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 boiler Inspection Branch, Fire Commissioner, 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 final Commissioning Report submitted to Ministerial 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 Ministerial Representative, and Contractor.
 - .2 When Work incomplete according to Ministerial Representative, complete

- outstanding items and request re-inspection.
- .5 Declaration of Substantial Performance: when Ministerial 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 Ministerial Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
 - .2 When Work deemed incomplete by Ministerial 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 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 45 00 Quality control
- .2 Section 01 77 00 Closeout procedures
- .3 Section 01 79 00 Demonstration and training.

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 ADMINISTRATIVE REQUIREMENTS

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

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Two (2) weeks prior to Substantial Performance of the Work, submit to the Ministerial Representative, 1 final copies of operating and maintenance manuals in French and 1 electronic copy.
- .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.

1.5 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf [219 x 279] mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings.

- .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
 - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in dxf format on CD.

1.6 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of 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.
 - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
- .6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.7 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, [in addition to requirements in General Conditions, at site for Ministerial Representative one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, 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 Ministerial Representative.

1.8 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- .1 Record information on set of blue line opaque drawings, provided by Ministerial Representative.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 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, inspection certifications, field test records, required by individual specifications sections.
- .7 Provide digital photos, if requested, for site records.

1.9 FINAL SURVEY

- .1 Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.10 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.
 - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
 - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide [Contractor's] [Design-Builder's] co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control.
- .15 Underground, and Aboveground storage tank inspection documentation, registration, forms, decommissioning and removal in accordance with CEPA SOR/2008-197.
- .16 Additional requirements: as specified in individual specification sections.

1.11 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.

1.12 MAINTENANCE MATERIALS

- .1 Spare Parts:
 - .1 Provide spare parts, in quantities specified in individual specification sections.

- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to site, place and store.
- .4 Receive and catalogue items.
 - .1 Submit inventory listing to Ministerial Representative.
 - .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.
- .2 Extra Stock Materials:
 - .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Ministerial Representative.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit prior to final payment.
- .3 Special Tools:
 - .1 Provide special tools, in quantities specified in individual specification section.
 - .2 Provide items with tags identifying their associated function and equipment.
 - .3 Deliver to site; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Ministerial Representative.
 - .2 Include approved listings in Maintenance Manual.

1.13 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 Ministerial Representative.

1.14 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 Ministerial Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Ministerial Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Ministerial Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder

as follows:

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within [ten] days after completion of applicable item of work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by Ministerial Representative.
- .9 Include information contained in warranty management plan as follows:
- .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
 - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and 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 Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.
 - .5 Procedure and status of tagging of equipment covered by extended warranties.
 - .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.
- .1 Failure to respond will be cause for the Ministerial Representative to proceed with action against Contractor.

1.15 WARRANTY TAGS

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

- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate following information on tag:
 - .1 Type of product/material.
 - .2 Model number.
 - .3 Serial number.
 - .4 Contract number.
 - .5 Warranty period.
 - .6 Inspector's signature.
 - .7 Construction Contractor.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 Submittal procedures
- .2 Section 01 78 00 Closeout submittals
- .3 Section 01 91 13 General commissioning (cx) requirements
- .4 Section 01 91 31 Commissioning (CX) plan
- .5 Section 01 91 33 Commissioning forms
- .6 Section 01 91 41 Commissioning : Training

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two (2) weeks prior to date of final inspection, substantial performance.
- .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 – General Commissioning (cx) Requirements.
 - .4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational.
- .4 Demonstration and Instructions:
 - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the equipment designated 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 The formations should be transmitted in format DVD so that Representative Ministerial can visualize them where necessary.
- .5 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment or system as follows:
 - .1 Section 23 00 05 - Heating Plant: 2 hours of instruction.
 - .2 Section 23 00 05 - Cooling and Ventilation System: 2 hours of instruction.
 - .3 Section 23 00 05 - Control System: 1 hour of instruction.

1.3 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 (2) weeks prior to designated dates, for Ministerial 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.

1.4 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.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

- .1 Section Includes:
 - .1 General requirements relating to commissioning of project's components and systems, specifying general requirements to PV of components, equipment, sub-systems, systems, and integrated systems.
- .2 Acronyms:
 - .1 AFD - Alternate Forms of Delivery, service provider.
 - .2 BMM - Building Management Manual.
 - .3 Cx - Commissioning.
 - .4 EMCS - Energy Monitoring and Control Systems.
 - .5 O&M - Operation and Maintenance.
 - .6 PI - Product Information.
 - .7 PV - Performance Verification.
 - .8 TAB - Testing, Adjusting and Balancing.

1.2 GENERAL

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

1.3 COMMISSIONING OVERVIEW

- .1 Section 01 91 31 - Commissioning (Cx) Plan.
- .2 For Cx responsibilities refer to Section 01 91 31 - Commissioning (Cx) 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.

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|---|----|---|
| | .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. |
| 1.4 NON-CONFORMANCE
TO PERFORMANCE
VERIFICATION
REQUIREMENTS | .1 | Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the 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. |
| 1.5 PRE-CX REVIEW | .1 | Before Construction:
.1 Review contract documents, confirm by writing to Departmental Representative.
.1 Adequacy of provisions for Cx.
.2 Aspects of design and installation pertinent to success of Cx. |
| | .2 | During Construction:
.1 Co-ordinate provision, location and installation of provisions for Cx. |
| | .3 | Before start of Cx:
.1 Have completed Cx 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 |

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- 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.
- 1.6 CONFLICTS**
- .1 Report conflicts between requirements of this section and other sections to Departmental Representative before start-up and obtain clarification.
- .2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.
- 1.7 ACTION AND INFORMATIONAL SUBMITTALS**
- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Submit 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 8 weeks prior to start of Cx.
- .3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 8 weeks prior to start of Cx.
- .4 Provide additional documentation relating to Cx process required by Departmental Representative.
- 1.8 COMMISSIONING DOCUMENTATION**
- .1 Departmental Representative to review and approve Cx documentation.
- .2 Provide completed and approved Cx documentation to Departmental Representative.
- 1.9 COMMISSIONING SCHEDULE**
- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
- .2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
- .1 Approval of Cx reports.
- .2 Verification of reported results.
- .3 Repairs, retesting, re-commissioning, re-verification.
- .4 Training.
- 1.10 COMMISSIONING**
- .1 Convene Cx meetings following project meetings: Section

MEETINGS	01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart 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. Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart. 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.
1.11 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.
1.12 WITNESSING OF STARTING AND TESTING	.1 Provide 14 days notice prior to commencement.
	.2 Departmental Representative to witness of start-up and testing.
	.3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.
1.13 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.

1.14 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 Departmental Representative.

.2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative.

.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.

1.15 START-UP

.1 Assemble start-up documentation and submit to Departmental

DOCUMENTATION		Representative for approval before commencement of commissioning.
	.2	Start-up documentation to include: <ul style="list-style-type: none">.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.
1.16 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.
1.17 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.
1.18 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.
1.19 INSTRUMENTS / EQUIPMENT	.1	Submit to Departmental Representative for review and approval: <ul style="list-style-type: none">.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: <ul style="list-style-type: none">.1 2-way radios..2 Ladders..3 Equipment as required to complete work.

1.20 COMMISSIONING PERFORMANCE VERIFICATION	.1	Carry out Cx: .1 Under actual accepted simulated 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.
1.21 WITNESSING COMMISSIONING	.1	Departmental Representative to witness activities and verify results.
1.22 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.
1.23 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.
1.24 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 formule.
1.25 EXTENT OF VERIFICATION	.1	Laboratory areas: .1 Provide manpower and instrumentation to verify up to 100 % of reported results.
	.2	Elsewhere: .1 Provide manpower and instrumentation to verify up to 30 % of reported results, unless specified otherwise in other sections.

	.3	Number and location to be at discretion of Departmental Representative.
	.4	Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.
	.5	Review and repeat commissioning of systems if inconsistencies found in more than 20% of reported results.
	.6	Perform additional commissioning until results are acceptable to Departmental Representative.
1.26 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.
1.27 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.
1.28 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.
1.29 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.
1.30 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.

1.31 TRAINING	.1	In accordance with Section 01 91 31 - Commissioning (CX) - Plan.
1.32 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS	.1	Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.
1.33 OCCUPANCY	.1	Cooperate fully with Departmental Representative during stages of acceptance and occupancy of facility.
1.34 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.
1.35 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.
1.36 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 1 - GENERAL

1.1 SUMMARY

- .1 Section Includes:
 - .1 Description of overall structure of Cx Plan and roles and responsibilities of Cx team.
 - .2 Related Requirements listing.
 - .1 Section 01 91 13 – General commissioning (CX) requirements.

1.2 REFERENCES

- .1 American Water Works Association (AWWA)
- .2 Public Works and Government Services Canada (PWGSC)
 - .1 PWGSC - Commissioning Guidelines CP.4 – last edition.
- .3 Underwriters' Laboratories of Canada (ULC)

1.3 GENERAL

- .1 Provide a fully functional facility:
 - .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 Facility user and 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 design 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.

	<ul style="list-style-type: none">.4 Acronyms:<ul style="list-style-type: none">.1 Cx - Commissioning..2 BMM - Building Management Manual..3 EMCS - Energy Monitoring and Control Systems..4 MSDS - Material Safety Data Sheets..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:<ul style="list-style-type: none">.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.
1.4 DEVELOPMENT OF 100% CX PLAN	<ul style="list-style-type: none">.1 Cx Plan to be 95% completed before added into Project Specifications..2 Cx Plan to be 100% completed within [8]weeks of award of contract to take into account:<ul style="list-style-type: none">.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..3 Submit completed Cx Plan to [Departmental Representative] [DCC Representative][Consultant] and obtain written approval.
1.5 REFINEMENT OF CX PLAN	<ul style="list-style-type: none">.1 During construction phase, revise, refine and update Cx Plan to include:<ul style="list-style-type: none">.1 Changes resulting from Client program modifications..2 Approved design and construction changes..2 Revise, refine and update every 6 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.
1.6 COMPOSITION, ROLES AND RESPONSIBILITIES OF	<ul style="list-style-type: none">.1 Departmental Representative to maintain overall responsibility for project and is sole point of contact between members of commissioning team.

CX TEAM

- .2 Project Manager will select Cx Team consisting of following members:
 - .1 PWGSC Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress.
 - .2 PWGSC 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, sub-contractors, 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 PWGSC 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.

1.7 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 Specialist Cx agency:
 - .1 Possessing specialist qualifications and installations providing environments essential to client's program but are outside scope or expertise of Cx specialists on this project.
- .5 Client: responsible for intrusion and access security systems.
- .6 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.
- .7 Provide names of participants to Departmental Representative and details of instruments and procedures to be followed for Cx 3 months prior to starting date of Cx for review and approval.

1.8 EXTENT OF CX

- .1 Cx Structural and Architectural Systems:
 - .1 Architectural and structural:
 - .1 Doors, windows, related hardware:
 - .1 new door and window hardware.
- .2 Commission mechanical systems and associated equipment:
 - .1 Plumbing systems:
 - .1 Domestic CWS and HWS.
 - .2 Regular sanitary waste systems.
 - .2 HVAC and exhaust systems:
 - .1 HVAC systems.
 - .2 General exhaust systems.
 - .3 Exhaust systems and related systems.
- .3 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.
- .4 Fire exit emergency signage.
- .3 Other systems and equipment:
 - .1 Access security and safety systems as follows.

**1.9 DELIVERABLES
RELATING TO O&M
PERSPECTIVES**

- .1 General requirements:
 - .1 Compile English and 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 MSDS data sheets.
 - .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

**1.10 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 Cx Specifications.
 - .2 Startup, pre-Cx activities and documentation for systems, and equipment.
 - .3 Completed installation checklists (ICL).
 - .4 Completed product information (PI) report forms.
 - .5 Completed performance verification (PV) report forms.
 - .6 Results of Performance Verification Tests and Inspections.
 - .7 Description of Cx activities and documentation.
 - .8 Description of Cx of integrated systems and documentation.
 - .9 Tests of following witnessed by PWGSC Design Quality Review Team.
 - .10 Tests performed by Owner/User.
 - .11 Training Plans.
 - .12 Cx Reports.

**1.11 PRE-CX
ACTIVITIES AND
RELATED
DOCUMENTATION**

- .13 Prescribed activities during warranty period.
- .4 Departmental Representative to witness and certify tests and reports of results provided to Departmental Representative.
- .5 Departmental Representative to participate.
- .1 Items listed in this Cx Plan include the following:
 - .1 Pre-Start-Up inspections: by Departmental Representative prior to permission to start up and rectification of deficiencies to Departmental Representative's satisfaction.
 - .2 Departmental Representative to use approved check lists.
 - .3 Departmental Representative 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 Departmental Representative will monitor some of these inspections and tests.
 - .7 Include completed documentation in Cx report.
- .2 Pre-Cx activities - ARCHITECTURAL AND STRUCTURAL:
 - .1 Exterior walls: conduct thermographic surveys to ensure appropriate level of tightness after exterior envelope has been completed. Permanent HVAC systems are able to provide appropriate negative or positive pressure, a temperature of at 20 degrees C can be maintained between inside and outside and wind speed is less than 10 kph.
- .3 Pre-Cx activities - MECHANICAL:
 - .1 Plumbing systems:
 - .1 "Bump" each item of equipment in its "stand-alone" mode.
 - .2 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.
 - .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 Departmental Representative.
 - .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
 - .1 Include equipment and systems identified above.
 - .2 Reports of test results to be witnessed and certified by Departmental Representative before verification.
 - .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 Lighting systems:
 - .1 Emergency lighting systems:
 - .1 Tests to include verification of lighting levels and coverage, initially by disrupting normal power.
 - .3 Low voltage systems: these include:
 - .1 Communications.
 - .4 Security, surveillance and intrusion systems: to include verification by RCMP.
- 1.12 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 Departmental Representative to monitor some these start-up activities.
 - .1 Rectify start-up deficiencies to satisfaction of Departmental Representative.
- 1.13 CX ACTIVITIES AND RELATED DOCUMENTATION**
- .1 Perform Cx by specified Cx agency using procedures developed by Departmental Representative and approved by Departmental Representative.
 - .2 Departmental Representative to monitor Cx activities.
 - .3 Upon satisfactory completion, Cx agency performing tests to prepare Cx Report using approved PV forms.
 - .4 Departmental Representative 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.

**1.14 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.

1.15 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 Design criteria, design intents.
 - .2 Pre-TAB review: 28 days after contract award, and before construction starts.
 - .3 Cx agents' credentials: 60 days before start of Cx.
 - .4 Cx procedures: 3 months after award of contract.
 - .5 Cx Report format: 3months after contract award.
 - .6 Discussion of heating/cooling loads for Cx: [3] months before start-up.
 - .7 Submission of list of instrumentation with relevant certificates: 21 days before start of Cx.
 - .8 Notification of intention to start TAB: 21 days before start of TAB.
 - .9 TAB: after successful start-up, correction of deficiencies and verification of normal and safe operation.
 - .10 Notification of intention to start Cx: 14 days before start of Cx.
 - .11 Identification of deferred Cx.
 - .12 Implementation of training plans.
 - .16 Cx reports: immediately upon successful completion of Cx.
- .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.

1.16 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.

1.17 ACTIVITIES

- .1 Cx activities must be completed before issuance of Interim

**DURING WARRANTY
PERIOD**

Certificate, it is anticipated that certain Cx activities may be necessary during Warranty Period, including:

- .1 Fine tuning of HVAC systems.

1.18 FINAL SETTINGS

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

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 Departmental Representative 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 Departmental Representative. 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 Departmental Representative's approval.

**1.4 SAMPLES OF
COMMISSIONING FORMS**

- .1 Departmental Representative 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 Departmental Representative develop appropriate verification forms and submit to [Departmental Representative] [DCC Representative] [Consultant] for approval prior to use.
 - .1 Additional commissioning forms to be in same format as provided by Departmental Representative.

**1.6 COMMISSIONING
FORMS**

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

1.7 LANGUAGE

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

END OF SECTION

PART 1 - GENERAL

- 1.1 TRAINEES**
- .1 Trainees: personnel selected for operating and maintaining this facility. Includes Property 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 Departmental Representative 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 Property 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.

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.

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- | | | |
|-------------------------------------|----|---|
| | .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 3 months prior to commencement of scheduled training. |
| | .2 | On-Site training videos: <ul style="list-style-type: none">.1 Videotape training sessions for use during future training..2 To be performed after systems are fully commissioned..3 Organize into several short modules to permit incorporation of changes. |
| | .3 | Production methods to be professional high quality. |

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 14 00 Word restrictions
- .2 Section 01 35 29.06 Health and safety requirements
- .3 Section 01 56 00 temporary barriers and enclosures
- .4 Section 01 74 21 Construction/demolition waste management and disposal

1.2 REFERENCE STANDARDS

- .1 CSA International
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .2 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2010 (NBC).
 - .2 National Fire Code of Canada 2010 (NFC).
- .3 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures and 01 74 21 - Construction/Demolition Waste Management Disposal.
- .2 Submit demolition drawings:
 - .1 Submit for review and approval by Ministerial Representative shoring and underpinning drawings stamped and signed by professional engineer registered or licensed in Canada, showing proposed method.
- .3 Sustainable Design Submittals:
 - .1 not used.
 - .2 Construction Waste Management:
 - .1 Submit project [Waste Management Plan] [Waste Reduction Workplan] highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.
 - .3 Erosion and Sedimentation Control: submit erosion and sedimentation control plan in accordance with EPA 832/R92-005 authorities having jurisdiction.

1.4 SITE CONDITIONS

- .1 Review "Designated Substance Report" and take precautions to protect environment.
- .2 If material resembling spray or trowel-applied asbestos or other designated substance [listed as hazardous] be encountered, stop work, take preventative measures, and notify Ministerial Representative immediately.
 - .1 Proceed only after receipt of written instructions have been received from Ministerial Representative.

- .3 Notify Ministerial Representative before disrupting [building] access or services.

2 PRODUCTS

2.1 NOT USED

- .1 Not used.

3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- .1 Temporary Erosion and Sedimentation Control:
 - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to: requirements of authorities having jurisdiction.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during demolition.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal after completion of demolition work..
- .2 Protection of In-Place Conditions:
 - .1 Prevent movement, settlement, or damage to adjacent [structures,] [utilities,] [and landscaping features] [and parts of building] to remain in place. Provide bracing and shoring required.
 - .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 .
- .3 Demolition/Removal:
 - .1 Remove items as indicated.
 - .2 Removal of Pavements, Curbs and Gutters:
 - .1 Square up adjacent surfaces to remain in place by saw cutting or other method

- approved by Ministerial Representative.
- .2 Protect adjacent joints and load transfer devices.
- .3 Protect underlying and adjacent granular materials.
- .3 Remove parts of existing building to permit new construction.
- .4 Trim edges of partially demolished building elements to tolerances as defined by Ministerial Representative to suit future use.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Refer to demolition drawings and specifications for items to be salvaged for reuse.
- .4 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 07 21 16 Blanket insulation
- .2 Section 07 25 00 Air-guard
- .3 Section 07 27 10 Air/vapor barrier and intra-muros flexible flashings
- .4 Section 09 21 16 Gypsum board and concrete panels assemblies.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM A 123/A 123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A 653/A 653M-09a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .3 ASTM A 792/A 792M-09a, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-[99], Ready-Mixed Organic Zinc-Rich Coating.
- .3 CSA International
 - .1 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
 - .2 CSA W55.3-08, Certification of Companies for Resistance Welding of Steel and Aluminum.
 - .3 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding), Metric.
 - .4 CAN/CSA S136-07, North American Specification for the Design of Cold Formed Steel Structural Members.
- .4 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI 50M-06, Lightweight Steel Framing Manual.
 - .2 CSSBI Fact Sheet #3 June 1994, Care and Maintenance of Prefinished Sheet Steel Building Products.
 - .3 CSSBI Technical Bulletin Vol. 7, No. 2 February 2004, Changing Standard Thicknesses for Canadian Lightweight Steel Framing Applications.
 - .4 CSSBI S5-04, Guide Specification for Wind Bearing Steel Studs.
- .5 Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.

1.3 CALCULATION REQUIREMENTS

- .1 The structure details and fastenings must be calculated according to the requirements of CAN/CSA-S136.
- .2 Conceive the structure, its connexions and anchors so that they withstand, within the specified acceptable limits, their own weight, the weight of the windows, the sidings, the minimal design overstressings and combinations of overstressings imposed by earthquakes, wind pressure and suction and the pressure inside.

- .3 Conceive the structure on loads due to the wind, including suctions, impacts and gusts of wind, according to the applicable codes without being below 1.2 kPa however.
- .4 The maximum deflection allowed for the structure elements is 1/720 of the span for the masonry covering walls structures, and 1/360 of the span for soffits. Under no circumstances the acceptable height according to the deflection should be higher than the acceptable height in relation to the strength.
- .5 Calculate the bracing in order to prevent the rotation and the translation of the elements around their secondary axis. Take into account the side effects of the action-effects attributable to the torsion between the bracing lines. The distance between the bracings must however not be higher than 1220 mm center-to-center.
- .6 Calculate the fastenings of the bottom ends of the stud walls so that they can accommodate the deflection of the floors and the roof and thus avoid axially challenging the stud walls.
- .7 Calculate the fastenings of the bottom ends of the structure of the parapets so that they resist pulling out.
- .8 Follow the spacings and depths of the studs shown on the drawings. Conceive studs with a thickness sufficient to resist anticipated loads and stresses. Notwithstanding what precedes, the thickness of the base metal required for the structure elements is:
 - .1 1.150 mm (gauge 18) of thickness of base metal for the outside walls structures;
 - .2 1.444 mm (gauge 16) of thickness of base metal for the parapets structures
 - .3 The minimal acceptable thickness for the exposed steel (without zinc covering) provided for this project must be at least 95% of the design thickness required above.

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 structural metal studs 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 Canada.
 - .2 Indicate design loads, member sizes, materials, design thickness exclusive of coatings, coating specifications, connection and bracing details, screw sizes and spacing, and anchors.
 - .3 Indicate locations, dimensions, openings and requirements of related work.
 - .4 Indicate welds by welding symbols as defined in CSA W59.
- .4 Samples:
 - .1 not used.
- .5 Certificates: prior to beginning Work, submit: 2 certified copies of mill reports covering material properties.

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, labeled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect structural metal studs so as to protect them from breaking and impacts.
 - .3 Protect steel studs during transportation, site storage and installation in accordance with CSSBI Sheet Steel Facts #3.
 - .4 Handle and protect galvanized materials from damage to zinc coating.
 - .5 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of as specified in Construction Waste Management Plan and Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 WARRANTY

- .1 For the work of the present section, the 12 month warranty period stipulated in the general conditions is extended by 5 years.
- .2 Provide a written and signed document, on behalf of Canada, certifying that the work in the present section will meet all the established performance requirements under normal conditions usage, for a period of five (5) years.

2 PRODUCTS

2.1 MATERIALS

- .1 Steel: to CAN/CSA S136, fabricated from ASTM A 653/A 653M, Grade A to D steel.
- .2 Zinc coated steel sheet: quality to ASTM A 653/A 653M, with Z275 designation coating.
- .3 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.
- .4 Screws: pan head, self-drilling, self-tapping sheet metal screws, 5 mm longer than twice the steel thickness, corrosion protected with minimum zinc coating thickness of 0.008 mm, and answering the minimal CSSBI requirements
- .5 Anchors: concrete expansion anchors or other suitable drilled type fasteners.
- .6 Bolts, nuts, washers: hot dipped galvanized steel to ASTM A 123/A 123M, 600 g/m² zinc coating.
- .7 Touch up primer: zinc rich, to CAN/CGSB-1.181, MPI #18.
- .8 Flashing: 47 mm thick closed cells polyethylene foam, with width adapted to the one of the tracks used to fill in void between low and substrate tracks boards.

2.2 STEEL STUD DESIGNATIONS

- .1 Steel studs designation according to the colour code in CSSBI 50M document.

2.3 METAL FRAMING

- .1 Steel studs: to CAN/CSA S136, fabricated from zinc coated steel, depth as indicated.
 - .1 Minimum steel thickness : according section 1.03 calculation requirements
- .2 Stud tracks: fabricated from same material and finish as steel studs, depth to suit.
 - .1 Bottom track: single piece.
 - .2 Top track: two (2) pieces, sliding or slots and bolts type allowing for the movement the studs.
 - .3 Spacers: neoprene, of appropriate dimensions.
- .3 Bridging: fabricated from same material and finish as studs, 38 x 12 x 1.09 mm minimum thickness, with a width of at least 1.22 m thick (gauge 18)
- .4 Angle clips: fabricated from same material and finish as studs, 38 x 38 mm x depth of steel stud, 1.22 mm minimum thickness.
- .5 Tension straps and accessories: as recommended by manufacturer.
- .6 Structure elements of the soffits, galvanized steel, Z275 zinc coating.
 - .1 Profile bearings: 38 mm depth, at least 1.4 mm (gauge 16) thickness of base metal..
 - .2 Head piece type spacers, 22 mm depth, at least 0.9 mm (gauge 20 structural) thickness of base metal.
 - .3 Suspender wires are not allowed, use rigid studs to suspend the structures.

2.4 SOURCE QUALITY CONTROL

- .1 Ensure mill reports covering material properties are reviewed by Ministerial Representative

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: before installing the bearing structure, 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 Ministerial Representative.
 - .2 Inform Ministerial Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 GENERAL

- .1 Weld in accordance with CSA W59.
- .2 Certification of companies: to CSA W47.1 for fusion welding and CSA W55.3 for resistance

welding.

- .3 Do structural metal stud framing work to CSSBI S5.

3.3 ERECTION

- .1 Erect components to requirements of reviewed shop drawings.
- .2 Install a flashing under the bottom tracks of the exterior walls.
- .3 Anchor tracks securely to structure at 600 mm on centre maximum, unless lesser spacing prescribed on shop drawings.
- .4 Erect studs plumb, aligned and securely attached with 2 screws minimum or welded in accordance with manufacturer's recommendations and shop drawings.
- .5 Seat studs into bottom tracks and single piece top track, 2 piece telescoping top track.
- .6 If the sliding system is used, install bending profiles of at least 50 mm long at the top of the walls to allow for the work in bending of the elements.
- .1 Nest top track into deflection channel minimum of 30 mm and maximum of 40 mm.
- .2 Do not fasten tracks together.
- .3 Stagger joints.
- .7 Install studs at not more than 50 mm from abutting walls, openings, and each side of corners and terminations with dissimilar materials.
- .8 Brace steel studs with horizontal internal bridging at 1220 mm maximum.
- .1 Fasten bridging to steel clips fastened to steel studs with screws or by welding.
- .9 Frame openings in stud walls to adequately carry loads by use of additional framing members and bracing as detailed on shop drawings.
- .10 Touch up welds with coat of zinc rich primer.

3.4 ERECTION TOLERANCES

- .1 Plumb: not to exceed 1/500th of member length.
- .2 Camber: not to exceed 1/1000th of member length.
- .3 Spacing: not more than +/- 3 mm from design spacing.
- .4 Gap between end of stud and track web: not more than 4 mm.

3.5 CUTOUTS

- .1 Maximum size of cutouts for services as follows:

Member Depth	Across Member Depth	Along Member Length	Centre to Centre Spacing (mm)
92	40 max.	105 max.	600 min.
102	40 max.	105 max.	600 min.
152	65 max.	115 max.	600 min.

- .2 Limit distance from centerline of last unreinforced cutout to end of member to less than 300 mm.

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 06 08 99 Rough carpentry for minor works.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM A 53/A 53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A 269-08, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 CSA International
 - .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA S16-09, Design of Steel Structures.
 - .4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .5 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding), Metric.
- .3 Environmental Choice Program
 - .1 CCD-047-98(R2005), Architectural Surface Coatings.
 - .2 CCD-048-98(R2006), Surface Coatings - Recycled Water-borne.
- .4 Green Seal Environmental Standards (GS)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .6 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
- .7 American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM)
 - .1 ANSI/NAAMM MBG 531-00, Metal Bar Grating Manual.
- .8 Canadian General Standard Board (CGSB)
 - .1 . CAN/CGSB-1.40-97, construction steel alkyd resins, anticorrosive priming coat paint
 - .2 . CAN/CGSB-1.181-99, ready-mixed organic zinc-rich coating
- .9 National Association of Architectural Metal Manufactures (NAAMM)
 - .1 AMP 510-92, Metal Stair Manual.
- .10
 - .1 .
- .11 The Society for Protective Coatings (SSPC)

- .1 Systems and Specifications Manual, Volume 2, 2008 Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, pipe, tubing, bolts and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements, 01 35 43 - Environmental Procedures.
 - .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 Canada.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements 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 and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2 PRODUCTS

2.1 DESCRIPTION

- .1 Design requirements

- .2 Metal stairs' steps, guards and landings as well as all the connections must be design to resist the dynamic loads to which they can be subjected to vertically and horizontally, in compliance with the requirements of the National Building Cod (NBC).
- .3 Details design and the realization of the stairs must be in compliance with the requirements of the NAAMM Metal Stairs Manual.

2.2 MATERIALS

- .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 300W at least 3.2 mm thick.
- .2 Steel pipe: to ASTM A 53/A 53M [standard weight] [extra strong] [double extra strong], [black] [galvanized] finish.
- .3 Welding materials: to [CSA W59].
- .4 Welding electrodes: to CSA W48 Series.
- .5 Bolts and anchor bolts: to ASTM A 307.
- .6 Threaded bars and nuts in compliance with ASTM A-307 standard
- .7 Caul plates folded according to blueprints, 316 grade, polished 180 grits, 2.7 mm thick. All stainless parts have to receive a passivating treatment after manufacturing in compliance with ASTM A967 standard.

2.3 FABRICATION

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

2.4 CONNECTION

- .1 The stairs must be connected in compliance with the requirement of the NAAMM Metal Stairs Manual
- .2 Connections must as often as possible be welded; otherwise, they must be bolted. Exposed bolts must be hidden in counter sunk holes then cut flush with the nuts. Exposed attaching hardware must be of the same material, same colour and finish as the surfaces they are installed.
- .3 Connections must be adjusted precisely; exposed parts must be flush.
 - .1 Joints and miters must be well tight.
 - .2 Risers must be all of the same height.
- .4 Profiles exposed welded joints and ends must be carefully grinded or filed.
- .5 Stairs must be joined at the shop, in element as long and as complete as possible.

2.5 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating [600] g/m² to CAN/CSA-G164.
- .2 Shop coat primer: MPI- INT, EXT, 5.1A MPI- INT, EXT 5.1B in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11.
- .3 Zinc primer: zinc rich, ready mix to MPI-INT, EXT, 5.2C in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11.

2.6 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.
 - .3 Wood.

2.7 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. Do not paint when temperature is lower than 7 degrees C.
- .4 Clean surfaces to be field welded; do not paint.

2.8 LANDING, STEPS AND STRINGER

- .1 Steel grid floor: galvanized steel type W-19-41 in compliance with ANSI/NAAM MBG531 standard; non-slip nosing 6 mm thick.
- .2 Steel grid floor steps and landings must be made in strong steel plate according to the profile shown and they must be fixed to the stringers and supports in accordance with the instructions. The steel grid floor landings must be reinforced according to the needs.
- .3 Finish: galvanized.
 - .1 Primer: maximum VOC limit 250 g/L to GS-11 when applied onsite.

3 EXECUTION

3.1 EXAMINATION

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

receipt of written approval to proceed from Ministerial Representative.

3.2 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Ministerial Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 [Make field connections with bolts to CSA S16 or Weld field connection.
- .7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of:
 - .1 Primer: maximum VOC limit 250 g/L to GS-11.
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.
 - .1 Primer: maximum VOC limit 250 g/L to GS-11.

3.3 LANDING, STEPS AND STRINGER

- .1 Install steps in accordance with the requirement of the NAAMM Metal Stairs.
- .2 Install the stairs plumb and aligned, exactly at in the places shown; as far as possible, join the element by welding so as to obtain a maximum rigidity. Fix the stairs to the structure with bolts, anchor plates and other joining elements.
- .3 Give to the competent building trades the templates and parts to be embedded in concrete or to set in masonry.
- .4 Otherwise indicated, perform the welding work in accordance with CSA W59 standard.
- .5 Once the erection completed, touch up the bolts, welded joints and burned or scratched surface with a sealer.

3.4 CLEANING

- .1 Clean the metal elements as soon as possible after their installation in order to get rid of the dust produced by the construction work or by the environment.
- .2 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .4 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

3.5 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 05 41 00 Structural metal stud framing.
- .2 Section 05 50 00 Metal fabrications
- .3 Section 06 40 00 Architectural woodwork
- .4 Section 07 21 29.03 Sprayed insulation – polyurethane foam
- .5 Section 07 25 00 Air-guard
- .6 Section 07 27 10 Air/vapour barrier and intra-muros flexible flashings
- .7 Section 07 46 13 Preformed metal siding
- .8 Section 07 61 13 Sheet metal roofing
- .9 Section 08 11 00 Metal doors and frames
- .10 Section 08 11 16 Aluminum doors and frames
- .11 Section 08 36 13.02 Metal roll-up doors
- .12 Section 08 42 29 Automatic entrances
- .13 Section 08 50 00 Windows
- .14 Section 09 22 16 Non structural metal framing
- .15 Section of divisions 22, 23 and 26 for the plumbing, HVAC and electricity devices.

1.2 REFERENCE STANDARDS

- .1 CSA International
 - .1 CSA B111-1974(R2003], Wire Nails, Spikes and Staples.
 - .2 CSA O121-08, Douglas Fir Plywood.
 - .3 CSA O141-05(R2009), Softwood Lumber.
 - .4 CSA O151-09, Canadian Softwood Plywood.
 - .5 CAN/CSA-O325.0-07, Construction Sheathing.
 - .6 CAN/CSA-Z809-08, Sustainable Forest Management.
- .2 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2010 (NBC).
- .3 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .4 Green Seal Environmental Standards (GS)
 - .1 GS-11-11, Paints and Coatings.
- .5 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2010.

- .6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-A2011, Architectural Coatings.
- .7 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2010-2014 Standard.

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 [rough carpentry work] and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 QUALITY ASSURANCE

- .1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood identification: by grade mark in accordance with applicable CSA standards.
- .3 Plywood, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA standards.
- .4 Sustainable Standards Certification:
 - .1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wood from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, banding, and packaging materials as specified in [Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2 PRODUCTS

2.1 MATERIALS

- .1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% (R-SEC) or less in accordance with following standards:
 - .1 CAN/CSA-O141.

- .2 NLGA Standard Grading Rules for Canadian Lumber.
- .3 CAN/CSA-Z809 or FSC or SFI certified.
- .2 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
 - .1 S2S is not acceptable.
 - .2 Board sizes: "Standard" or better grade.
 - .3 Dimension sizes: "Standard" light framing or better grade.
 - .4 Post and timbers sizes: "Standard" or better grade.
- .3 Panel Materials:
 - .1 Douglas fir plywood (DFP): to CSA O121, standard construction.
 - .1 Urea-formaldehyde free.
 - .2 Canadian softwood plywood (CSP): to CSA O151, standard construction.
 - .1 Urea-formaldehyde free.
 - .3 Plywood, OSB and wood based composite panels: to CAN/CSA-O325.
 - .1 Urea-formaldehyde free.
 - .4 Fibrous cement composite panels made up of Portland cement compound reinforced with synthetic fibers and additives, density of 1500 kb/m3, having a thickness indicated on the plans, conform to ULC S-114 noncombustibility standard and ASTM D1037 Impacts standard. Dimensions of 1220 mm x 3050 mm smooth finish. Light cement panels made up of beadwalls are not acceptable for these works
- .4 Wood Preservative:
 - .1 General points
 - .1 The preservative products must be danger free for the structures that will be in contact with humans or horticultural products.
 - .2 Products applied in factory: chemical type, in compliance with CSA 080 standards, under pressure, dried after treatment.
 - .2 Water repellent wood
 - .1 Preservative product applied on surface: coloured water repellent preservative product.
 - .2 VOC content no more than 350 g /l, in compliance with Rule number 113 of SCAQMD.
 - .3 Preservative products containing pentachlorophenol (PCP), creosote or inorganic arsenicals such as chromate copper arsenate (CCA) are not acceptable.
 - .4 Wood preservative methods against rot and mildew (water repellent)
 - .1 Apply on surface to cover the perforations, cuts and nicks of pressure treated products: Water repellent solution with 2% zinc, muted green, to apply in 2 coats (coloured water repellent preservative product).
 - .2 Vacuum and pressure wood impregnation product, in compliance with CSA 080 standard: wood impregnation with a preservative product until obtaining a net retention of at least 3.84 kg/m3 of wood; muted green colour.
 - .3 If a water base preservative product (water-soluble) have been used, after treatment, let the materials dry until getting a humidity degree of no more than 14%.
 - .5 Treat the following elements:
 - .1 Eaves boards, nailing bases for roof fascias, selvages, nailing strips, ledger strips for roof deck;
 - .2 Nailing bases of openings in walls that will have entrance or window frame ;
 - .3 Flashings, strips or any other wood pieces included in the structures of outer envelopes .
 - .4 Plywood boards for building roofs and the surround of the glass-porches structure. .

2.2 ACCESSORIES

- .1 Fasteners: to CAN/CSA-G164, for exterior work, pressure- preservative treated lumber.
- .2 Nails, spikes and staples: to CSA B111.
- .3 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.
- .4 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fiber plugs, [explosive actuated fastening devices], recommended for purpose by manufacturer.
- .5 Vaporized material to fill in empty spaces between the outer frames and the elements of the outer walls: polyurethane foam with one component, minimal foaming, adjustable gun applied in order to control the length of the isolating cordons.
 - .1 Acceptable product::
 - .1 Demilec R SEAL 260
 - .2 Hilti CF-I XTW
 - .3 Adfast AD Foam Plus
- .6 All purpose glue in compliance with CSA 0112.9 standards
 - .1 VOC content no more than 200g/L in accordance with Gs-36 standard and rule number 1168 of SCAQMD.
- .7 Nailing disks: sheet metal with a diameter of at least 25 mm and 0.4 mm thick ,made to prevent their cupping. Distorted disks are not acceptable.
- .8 Fasteners finish
 - .1 Galvanized steel: in compliance with ASTM A123/A123M and ASTM A653 standards for outer structures and pressure treated wood structures
 - .2 Stainless steel: shade 302

3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- .1 Treat surfaces of material with wood preservative, before installation.
- .2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and 1 minute soak on plywood.
- .3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation of the elements or treated wood.

3.3 MATERIALS USES

- .1 Exterior walls siding panels (nailing base)
 - .1 Douglas fir plywood or Canadian softwood, siding category, 19 mm thick rough standard category (unless otherwise indicated)
- .2 Underlayment
 - .1 . Douglas fir plywood or Canadian softwood, siding category, 19 mm thick rough framing headers (unless otherwise indicated)

3.4 INSTALLATION

- .1 Install the element square and plumb, according to recommended height dimensions, rivals and alignments
- .2 Realize continuous elements from the longest possible parts.
- .3 Comply with requirements of National Building Code of Canada (NBC), supplemented by the following paragraphs.
- .4 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding and other work as required.
- .5 Align and plumb faces of furring and blocking to tolerance of 1:600.
- .6 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .7 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized fasteners.
- .8 Install wood backing, dressed, tapered and recessed slightly below top surface of roof insulation for roof hopper.
- .9 Install sleepers as indicated.
- .10 Use caution when working with particle board. Use dust collectors and high quality respirator masks.
- .11 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .12 Countersink bolts where necessary to provide clearance for other work.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

- .1 Protect the installed materials and elements against all damages during construction.
- .2 Repair damages caused by the installation of carpentry element to materials and adjoining materials.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 06 08 99 – Rough carpentry for minor works
- .2 Section 07 92 00 – Joint sealants.
- .3 Section 08 70 05 – Cabinet and miscellaneous hardware
- .4 Section 09 22 16 – Non structural metal framing.
- .5 Section 09 65 19 – Resilient tile flooring

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI A208.1-09, Particleboard.
 - .2 ANSI A208.2-09, Medium Density Fiberboard (MDF) for Interior Applications.
 - .3 ANSI/HPVA HP-1-10, Standard for Hardwood and Decorative Plywood.
- .2 ASTM International
 - .1 ASTM E 1333-10, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.
 - .2 ASTM D 2832-92(R2011), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
 - .3 ASTM D 5116-10, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
- .3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
 - .1 Architectural Woodwork Quality Standards Illustrated, 8th edition, Version 1.0 (2009).
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
- .5 CSA International
 - .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
 - .2 CSA O112.10-08, Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
 - .3 CSA O121-08, Douglas Fir Plywood.
 - .4 CSA O141-05(R2009), Softwood Lumber.
 - .5 CSA O151-09, Canadian Softwood Plywood.
 - .6 CSA O153-M1980(R2008), Poplar Plywood.
 - .7 CAN/CSA-Z809-08, 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-11-11, Paints and Coatings.
 - .2 GS-36-11, Commercial Adhesives.
- .8 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

- .1 Material Safety Data Sheets (MSDS).
- .9 International Organization for Standardization (ISO)
 - .1 ISO 14040-2006, Environmental Management-Life Cycle Assessment - Principles and Framework.
 - .2 ISO 14041-98, Environmental Management-Life Cycle Assessment - Goal and Scope Definition and Inventory Analysis.
- .10 National Electrical Manufacturers Association (NEMA)
 - .1 ANSI/NEMA LD-3-05, High-Pressure Decorative Laminates (HPDL).
- .11 National Hardwood Lumber Association (NHLA)
 - .1 Rules for the Measurement and Inspection of Hardwood and Cypress 2011.
- .12 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2010.
- .13 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.
- .14 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2010-2014 Standard.

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 architectural woodwork and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit copy of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements, 01 35 43 - Environmental Procedures.
- .3 Shop Drawings:
 - .1 Indicate details of construction, profiles, jointing, fastening and other related details.
 - .2 Indicate materials, thicknesses, finishes and hardware.
 - .3 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit duplicate samples of wood element: sample size 200 mm x 200 mm or 300 mm long.
 - .4 Submit duplicate samples of laminated plastic for colour selection.
 - .5 Submit duplicate samples of laminated plastic joints, edging, cutouts and postformed profiles.
- .5 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.4 QUALITY ASSURANCE

- .1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Sustainable Standards Certification:
 - .1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.
- .3 Plywood, particleboard, OSB and wood based composite panels to CSA and ANSI standards.
- .4 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .1 Shop prepare one base cabinet unit, wall cabinet, complete with hardware and shop applied finishes, and install where directed by Ministerial Representative
 - .2 Allow 48 hours for inspection of mock-up by Ministerial Representative before proceeding with Work.
 - .3 When accepted, mock-up will demonstrate minimum standard for Work.
 - .4 Do not proceed with work prior to receipt of written acceptance of mock-up by Ministerial Representative.
 - .5 Mock-up may [not] remain as part of finished work.

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.
 - .1 Protect millwork against dampness and damage during and after delivery.
 - .2 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect [architectural woodwork] from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2 PRODUCTS

2.1 MATERIALS

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

- .3 Ensure manufacturing process adheres to Lifecycle Assessment (LCA) Standards to ISO 14040/14041 LCA Standards and CSA Z760-94 Life Cycle Assessment.
- .4 Hardwood lumber: moisture content 12% or less in accordance with following standards:
 - .1 National Hardwood Lumber Association (NHLA).
 - .2 CAN/CSA-Z809 or FSC or SFI certified.
 - .3 AWMAC premium grade, moisture content as specified.
- .5 Douglas fir plywood (DFP): to CSA O121, standard construction, CAN/CSA-Z809 or FSC or SFI certified.
 - .1 Plywood resin to contain no added urea-formaldehyde.
- .6 Canadian softwood plywood (CSP): to CSA O151, standard construction, CAN/CSA-Z809 or FSC or SFI certified.
 - .1 Plywood resin to contain no added urea-formaldehyde.
- .7 Hardwood plywood: to ANSI/HPVA HP-1, CAN/CSA-Z809 or FSC or SFI certified.
 - .1 Plywood resin to contain no added urea-formaldehyde.
- .8 Interior mat-formed wood particleboard: to ANSI/NPA A208.1, CAN/CSA-Z809 or FSC or SFI certified.
 - .1 Particleboard resin to contain no added urea-formaldehyde.
- .9 Fibreboard must contain less than 10% roundwood by weight, using weighted average over three month period at manufacturing locations.
 - .1 Fibreboard resin to contain no added urea-formaldehyde.
 - .2 CAN/CSA-Z809 or FSC or SFI certified.
- .10 Hardboard:
 - .1 To CAN/CGSB-11.3, CAN/CSA-Z809 or FSC or SFI certified.
 - .2 Hardboard resin to contain no added urea-formaldehyde.
- .11 MDF (medium density fibreboard) core: to ANSI A208.2, Grade, density 769 kg/m³, CAN/CSA-Z809 or FSC or SFI certified.
 - .1 Medium density fibreboard performance requirements to: ANSI A208.2.
 - .2 MDF resin to contain no added urea-formaldehyde.
- .12 Siding finish
 - .1 Acceptable products: Nevamar, Arborite or Formica
 - .2 Conformity: Electrical Manufacturers Association (NEMA)
 - .1 ANSI NEMA LD 3 – High Pressure Decorative Laminates
 - .3 For decorative surfaces
 - .1 Categories: HGS, VGS, HGP, VGP or CLS
 - .2 Thickness
 - .1 Between 0.71 mm and 0.99 mm for HGP or VGP category
 - .2 Between 0.71 mm and 1.22 mm for HGP or VGS category
 - .3 Between 0.51 mm and 1.22 mm for CLS category
 - .3 Colour: Uniform colour coating, according to Departmental representative preference, in the manufacturing standards.
 - .4 Decorative face: plain, Nepal teak like.
 - .5 Finish: glossy or dull, according to the blueprints
 - .4 For compensators
 - .1 BKH category
 - .2 Thickness:
 - .1 .For an “Economic” quality: thermo-joined melamine with at least a 400

- cycles wear resistance for a solid colour or 125 cycles for simulated wood colour, in accordance with ANSI/SEMA LD3
- .1 Furniture finish
- .3 Colour: Beige or in accordance to the instructions in the manufacturer' standards.
- .5 When both faces of the panels are exposed, they must be both sheathed. When one face of the support is sheathed, the back must have a compensator (beige).
- .13 Nails and staples: to CSA B111.
- .14 Wood screws: stainless steel, type and size to suit application.
- .15 Splines: metal.
- .16 Sealant: in accordance with Section 07 92 00 - Joint Sealants, type clear.
 - .1 Sealants: VOC limit 250 g/L maximum to SCAQMD Rule 1168.
- .17 Laminated plastic adhesive:
 - .1 Adhesive: in accordance with the instruction of the manufacturer of the adhesive for the provided application or usage:
 - .1 Contact adhesives type are to be avoided.
 - .2 For usages where resistance to humidity or heat is not required (such as kitchen cabinets or others, office walls) polyvinyl acetate type adhesives are acceptable in accordance with CSA O112.10 standard
 - .3 For usage where resistance to humidity or heat is required, resorcinol type adhesives in accordance with CSA O112.10 standard
 - .4 Usage of hot-melt adhesives with a fusion heat of at least 65°C must be reserved for the treatment the edges with application of a primer recommended by the manufacturer of the laminate
 - .2 Barrier product: VOC content of no more than 120g/L in accordance to GS-36 standard and rule 1113 of SCAQMD.
 - .3 Clear Wood Finishes: VOC limit 350, 550 g/L maximum to GS-11 SCAQMD Rule 1113
 - .4 Paints: VOC limit 50, 100 g/L maximum to GS-11 SCAQMD Rule 1113.

2.2 MANUFACTURED UNITS

- .1 Cabinets (frames):
 - .1 Cabinets manufactured in accordance with AWMAC "custom" quality standards
 - .2 Cabinets' panels (ends, dividers and backings).
 - .1 16 mm thick particleboards with hot-melted melamine surfacings when there are solid doors.
 - .2 16 mm thick pressed wood particleboards for interior usage covered with decorative laminate on all exposed faces when there are no doors.
 - .3 Back :
 - .1 16 mm thick particleboards with hot-melted melamine surfacings when there are solid doors.
 - .2 16 mm thick pressed wood particleboards for interior usage covered with decorative laminate on all exposed faces when there are no doors..
 - .4 Shelves :
 - .1 16 mm thick particleboards with hot-melted melamine surfacings when there are solid doors.
 - .2 16 mm thick pressed wood particleboards for interior usage covered with decorative laminate on all exposed faces when there are no doors.

- .2 Drawers:
 - .1 Drawers manufactured in accordance with AWMAC "custom" quality standards
 - .2 Sides, back and backing:
 - .1 16 mm thick particleboards with hot-melted melamine surfacings.
 - .3 Fronts:
 - .1 16 mm thick pressed wood particleboards for interior usage covered with decorative laminate on all exposed faces.
- .3 Cabinet doors:
 - .1 Doors manufactured in accordance with AWMAC "custom" quality standards and the following requirements:
 - .1 16 mm thick pressed wood particleboards panels for interior usage covered with decorative laminate on all exposed faces or according to the instructions.
 - .2 Softwood plywood: 16 mm thick squared edges Canadian softwood Douglas fir plywood.
- .4 Counters, dados and backsplashes:
 - .1 Counter tops, dados and backsplashes are not precast (except where shown on blueprints).
 - .2 Counter tops:
 - .1 16 mm (or 38 mm according to the instructions) thick wood particleboards covered with decorative laminate. Apply a compensator of the same thickness as the laminate on the top under the counter on the back of the core-board.
 - .2 Nose:
 - .1 19 mm plywood covered with plastic laminate same colour as the counter or polyester edging strip in accordance with the instructions.
 - .3 Dados and back splashes :
 - .1 16 mm thick plywood panels covered with decorative laminate.
- .5 Edges:
 - .1 All melamine finish particleboard panels have edges covered with decorative laminate close to 1.0 mm thick, colour and finish like the one of the faces of the panels.
 - .2 12 mm thick or more matching solid wood, thickness shown, to install on the perimeter of the plywood or particleboard panels. These edges with a width equal to the thickness of the plywood or particleboard panels will remain exposed after their installation.
- .6 Window-ledge
 - .1 Window-ledges are not precast.
 - .2 19 mm thick wood particleboards panels for interior use covered with decorative laminate on all exposed faces. Apply on all the non-exposed faces a compensator of the same thickness as the decorative laminate.

2.3 FABRICATION

- .1 Set nails and countersink screws apply wood filler to indentations adapted to the finish work, sand smooth and leave ready to receive finish.

- .2 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.
- .3 Shelving to cabinetwork to be adjustable unless otherwise noted.
- .4 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.
- .5 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.
- .6 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.
- .7 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .8 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 3000 mm. Keep joints 600 mm from sink cutouts.
- .9 Form shaped profiles and bends as indicated, using postforming grade laminate to laminate manufacturer's instructions.
- .10 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not miter laminate edges.
- .11 The assembly of the frames must be glued and screwed; all joints will be mortised with tongues and grooves or half-wood depending on the case to obtain the maximum solidity. Mitered joints will have a continuous key .
- .12 Laminate plastic finishes will have joints where deemed absolutely necessary and will have to be in the places approved by the Departmental representative. All laminate plastic exposed edges will have to be miter beveled at 22.5°
- .13 Drawers bottoms will be installed in a groove on the front and sides then glued to form one piece.
- .14 Drawer runs will installed on surface or embedded depending on the specified model..
- .15 Counter returns will be assembled at 45° with an integrated adjustable clamping screw on the underside of the counter.
- .16 Removable backs, console panels or access doors where plumbing and wiring are is mandatory.
- .17 Openings for plumbing fixtures, bathroom accessories, embedded pieces, electrical fixtures, outlet boxes and others accessories.
- .18 Unless otherwise indicated, cabinets shelves must be adjustable.
- .19 A compensator must be installed on the underside of the support.
- .20 A top sheet must be installed inside according to instructions.

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 Ministerial Representative.
 - .2 Inform Ministerial Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Ministerial Representative.

3.2 INSTALLATION

- .1 Do architectural woodwork to Quality Standards of AWMAC.
- .2 Install prefinished carpentry at locations shown on drawings.
 - .1 Position accurately, level, plumb straight.
- .3 Fasten and anchor carpentry securely.
 - .1 Supply and install heavy duty fixture attachments for wall mounted cabinets.
- .4 Use draw bolts in countertop joints.
- .5 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.
- .6 In accordance with section 09 92 00 – Joints tightness:
 - 1 Apply a thin sealing compound bead where furniture and all other adjacent horizontal and vertical surfaces meet.
 - 2 Apply a thin sealing compound bead where counters and backsplashes meet.
 - 3 Apply a thin sealing compound bead where electrical conducts and gypsum at the high cabinets with lighting.
- .7 Apply water resistant building paper or bituminous coating over wood framing members in contact with masonry or cementitious construction.
- .8 Fit hardware accurately and securely in accordance with manufacturer's written instructions.
- .9 Apply a crew cover on each exposed screws, opened cabinets and closed cabinets and counters.
- .10 Site apply laminated plastic to units as indicated.
 - .1 Adhere laminated plastic over entire surface.
 - .2 Make corners with hairline joints.
 - .3 Use full sized laminate sheets.
 - .4 Make joints only where approved by Ministerial Representative.
 - .5 Slightly bevel arises.
- .11 For site application, offset joints in plastic laminate facing from joints in core.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .1 Clean cabinet work inside cupboards and drawers and outside surfaces.
 - .2 Remove excess glue from surfaces.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

- .1 Protect millwork and cabinet 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.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 21 00 Allowances (for substitute insulation to anticipate)
- .2 Section 05 41 00 Structural metal stud framing.
- .2 Section 06 08 99 Rough carpentry for minor works
- .3 Section 07 25 00 Air barrier
- .4 Section 07 27 10 Air/vapor barrier membrane and intra-muros flexible flashings

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM C 553-13, Standard Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
 - .2 ASTM C 665-12, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - .3 ASTM C 1320-10, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
- .2 CSA Group
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .2 CSA B149 PACKAGE-10, Consists of B149.1, Natural Gas and Propane Installation Code and B149.2, Propane Storage and Handling Code.
- .3 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S702-2012, Standard for Mineral Fibre Insulation for Buildings.

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 [blanket insulation] and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Certificates:
 - .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Test Reports:
 - .1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.

1.4 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 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 Packaging Waste Management: remove for packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2 PRODUCTS

2.1 INSULATION

- .1 Batt and blanket mineral fibre: to ASTM C 665 (resistance to steel corrosion), CAN/ULC-S702, friction installation type 1 .
 - .1 Thickness: as indicated.
 - .2 Thermal resistance: value RSI 0,60/25 mm

2.2 ACCESSORIES

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

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for blanket insulation application in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Ministerial Representative.
 - .2 Inform Ministerial Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Ministerial Representative.
- .2 For the replacement allocation of batt insulation according to section 01 21 00 – Allocations, the contractor must carry out an inspection of the premises with the departmental representative and count the quantities to be replace. No work can be done before obtaining the departmental representative's written approval.

3.2 INSULATION INSTALLATION

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces and to ASTM C 1320.
- .2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .3 Do not compress insulation to fit into spaces.
- .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from [idewalls of CAN/ULC-S604 Type A chimneys and CSA B149.1 and CSA B149.2 Type B and L vents.
- .5 Do not enclose insulation until it has been inspected and approved by Ministerial Representative.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 05 41 00 Structural metal stud framing
- .2 Section 06 08 99 Rough carpentry for minor works
- .3 Section 07 25 00 Air barrier
- .4 Section 07 27 10 Air/vapor barrier membrane and intra-muros flexible flashings
- .5 Section 07 46 13 Performed metal siding

1.2 REFERENCE STANDARDS

- .1 Canadian Urethane Foam Contractors Association Inc. (CUFCA)
- .2 Green Seal (GS)
 - .1 GS-11-2013, Standard for Paints and Coatings.
- .3 South Coast Air Quality Management District (SCAQMD)
 - .1 SCAQMD Rule 1113-13, Architectural Coatings.
- .4 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S101-07, Standard Methods of Fire Tests of Building Construction and Materials.
 - .2 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .3 CAN/ULC-S705.1-01, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Material Specification. Includes Amendment 1.2.
 - .4 CAN/ULC-S705.2-05, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Application.

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 polyurethane foam sprayed insulation 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 and 01 35 43 - Environmental Procedures.
- .3 Test Reports:
 - .1 Submit certified test reports for insulation from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 - .2 Submit test reports in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.
- .4 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions and special handling criteria, installation

sequence, cleaning procedures.

- .5 Manufacturer's Reports:
 - .1 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 Applicators to conform to CUFCA Quality Assurance Program.
- .2 Qualifications:
 - .1 Installer: person specializing in sprayed insulation installations with documented experience and approved by manufacturer.
 - .2 Manufacturer: company with experience in producing of material used for work required for this project, with sufficient production capacity to produce and deliver required units without causing delay in work.
- .3 Mock-up:
 - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct mock-up 10 m² minimum, of sprayed insulation including one inside corner and one outside corner, door and window openings.
 - .3 Mock-up may be part of finished work.
 - .4 Allow 48 hours for inspection of mock-up by Ministerial Representative before proceeding with sprayed insulation work.
- .4 Health and Safety Requirements: worker protection:
 - .1 Protect workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations:
 - .2 Workers must wear gloves, respirators, dust masks, long sleeved clothing, eye protection and protective clothing when applying foam insulation.
 - .3 Workers must not eat, drink or smoke while applying foam insulation.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials 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 Packaging Waste Management: remove for reuse and return packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 SITE CONDITIONS

- .1 Ventilate area in accordance with Section 01 51 00 - Temporary Utilities.
- .2 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during

and 24 hour after application to maintain non-toxic, unpolluted, safe working conditions.

- .3 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.
- .4 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.
- .5 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

2 PRODUCTS

2.1 MATERIALS

- .1 Insulation: spray polyurethane.
 - .1 Two components intermediate density polyurethane foam using a foaming agent without damage for the ozone layer.
 - .2 With recycled plastic.
 - .3 to CAN/ULC-S705.1
 - .4 Characteristics:
 - .1 Minimum density 36 kg/m³ to ASTM D-1622
 - .2 Long term thermal resistance of 0,97 m²-K/W (0.97 RSI) for 25 mm to ASTM C-1303.
 - .3 Resistance to compression of 206-517 kPa to ASTM D-1623
 - .4 Tensile strength of 206-517 kPa to ASTM D-1623
 - .5 Insulation thickness: to indication on blueprints
- .2 Primers: in accordance with manufacturer's recommendations for surface conditions to CAN/ULC-S705.2.
 - .1 Maximum VOC limit 100 g/L to GS-11 Standard and to SCAQMD Rule 1113

3 EXECUTION

3.1 EXAMINATION

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

3.2 APPLICATION

- .1 Sizing
 - .1 Apply a sizing to the areas recommended by the manufacturer.
- .2 Application tools
 - .1 Apply insulation using the application tools recommended by the manufacturer.

- .2 Apply insulation using mechanical bleeding spray guns with integrated mixing chamber and heating hoses
- .3 Application
 - .1 Apply insulation on clean surfaces, according to the requirements of CAN/ULC-S705.2 and the manufacturer's written instructions.
 - .2 Apply insulation making a mixing ratio according to the manufacturer's requirements
 - .3 Apply indicated insulation thickness so as to obtain a waterproof and continuous thermal barrier on all the building
 - .4 Apply total indicated thickness in several successive passes, according to the manufacturer's recommendations, no pass should be over 50mm.
 - .5 During spraying, avoid the forming of air pockets under the foam.
 - .6 Make successive application in small quantities of insulation around the openings so as to control its expansion and decrease pressures on the frames and other parts of the openings.
- .4 Application close to heat sources :
 - .1 Do not spray polyurethane foam less than 75mm from heat sources including among others and without being limited to:
 - .1 Chimneys;
 - .2 Hot vents;
 - .3 Steam traces;
 - .4 Recessed lighting fittings;
 - .5 Other heat sources.
- .5 Tolerance of application :
 - .1 6mm more or less in relation to the specified thickness.
- .6 Protection and preliminary inspection:
 - .1 Once the application made, inspect the surfaces. Remove any insulation that comes off or that does not adhere perfectly to the support. Proceed to new application on those bear areas as well as on those where the thickness is less than the thickness required.
 - .2 Once the application finished, protect the insulation until the installation of the coverings from any physical or environmental exterior damages.
 - .3 Following the work of the other sections, but before final the installation of the other coverings that will hide the insulation, make and inspection of the insulation and finish off the areas damaged by the work of the other sections.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions. The period and rate of the visits is to be coordinated with the contractor and the departmental representative 4 weeks before beginning the work.

3.4 CLEANING

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

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove insulation material spilled during installation and leave work area ready for application of wall board.
- .3 Waste Management: separate waste materials for [ecycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 05 41 00 Structural metal stud framing.
- .2 Section 06 08 99 Rough Carpentry for minor works
- .3 Section 07 21 29.03 Sprayed insulation – Polyurethane foam
- .4 Section 07 27 10 Air/vapor barrier membrane and intra-muros flexible flashings
- .5 Section 07 46 13 Preformed metal siding
- .6 Division 8 – openings and closures (for the connection of the air barrier around these elements)
- .7 Section 09 21 16 Gypsum board assemblies (for intermediate skin panels)

1.2 REFERENCE STANDARDS

- .1 .1 ASTM International
 - .1 ASTM C920: Standard Specification for Elastomeric Joint Sealants
 - .2 ASTM C1193: Standard Guide for Use of Joint Sealants
 - .3 ASTM D882: Test Method of Tensile Properties of thin Plastic Sheetting
 - .4 ASTM D1117: Standard Guide for Evaluating Non-woven Fabrics
 - .5 ASTM E84: Test Method for Surface Burning Characteristics of Building Materials
 - .6 ASTM E96: Test Method for Water Vapor Transmission of Materials
 - .7 ASTM E1677: Specification for Air Retarder Material or System for Framed Building Walls
 - .8 ASTM E2178: Test Method for Air Permeance of Building Materials
 - .9 ASTM E2357: Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

1.3 PERFORMANCE REQUIREMENTS

- .1 Ensure the continuity between the materials and the air and water vapor barrier combinations and the materials described in sections named in the related requirements.

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 air barrier 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 and 01 35 43 - Environmental Procedures.
- .3 Certificates:
 - .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 QUALITY ASSURANCE

- .1 Mock-Ups:
 - .1 Submit mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct mock-up of sheet air barrier installation including one lap joint, one inside corner and at one electrical box. Mock-up may be part of finished work.
 - .3 Mock-up will be used to judge quality of work, substrate preparation, and material application.
 - .4 Locate [where directed] [where indicated] .
 - .5 Allow 48 hours for inspection of mock-up by Ministerial Representative before proceeding with air barrier work.
 - .6 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may [not] remain as part of finished work.

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 instruction.
- .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 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 Packaging Waste Management: remove packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2 PRODUCTS

2.1 AIR BARRIER ROLLS

- .1 Spun-bound air barrier skin reinforced with polyolefin, nonwoven, non punctured having the following properties and characteristics:
 - 1. Air permeability: ≤ 0.04 cfm/pi.² at 75 Pa to ASTM E2357 type 1
 - 2. Vapour permeance: 28 perms, to ASTM E96, method B
 - 3. Water penetration resistance: 280 cm to AATCC, method 127
 - 4 .Weight (density) 2.7 oz/yd², to TAPPI, method T-410
 - 5 .Tensile strength: 38/35 lb/inch, to ASTM, D882, method A.

6 .Breaking strength: 12"10 lb/inch, to ASTM D117

7. Characteristics of burning on surfaces: Class A, to ASTME 84, flame spread classification of 10 and smoke developed rating of 10.

2.2 ACCESSORIES

- .1 Joint sealing tape: commercial application air resistant pressure sensitive adhesive tape, type recommended by air barrier manufacturer, 75 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.
- .2 Sealant: compatible with air barrier retarder materials, recommended by air barrier manufacturer. To Section 07 92 00 - Joint Sealants.
- .3 Staples: staples with plastic washers compatible with substrate. Follow the manufacturer's recommendations.

3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Installation of the air barrier and tapes according to the manufacturer's recommendations, including any available technical bulletin, to instructions relating to handling, storing and using the products and to the information on the data sheets.
- .2 Install the air barrier leveled and horizontally beginning at the base so that the subsequent rows overlap. Seal to the manufacturer's recommendations, the air barrier at the foundation with a compatible elastomer sealing joint.
- .3 Ensure services are installed and inspected prior to installation of retarder.
- .4 Before installing the exterior siding, install the air barrier roll according to the information, in order to make a continuous barrier.
- .5 Use sheets of largest practical size to minimize joints.
- .6 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.
- .7 Fix the air barrier with adequate staples to the substrate according to the manufacturer's recommendations.

3.3 EXTERIOR SURFACE OPENINGS

- .1 Cut air barrier to form openings and ensure material is lapped and sealed to frame.

3.4 LAP JOINT SEALS

- .1 Seal the lap joint seals as described by the manufacturer of the air barrier with a recommended and standard tape.
- .2 Follow the information on blueprints for the connection of the air barrier roll to the other waterproof systems (membrane, openings and closures, roof, etc)

3.5 ELECTRICAL BOXES AND OTHER EXTERIOR WALL EXITS

- .1 Seal electrical switch and outlet device boxes that penetrate air barrier as follows:
 - .1 Wrap boxes with film sheet providing minimum 300 mm perimeter lap flange. Seal with recommended tape.
 - .2 Apply sealant to seal edges of flange to main air barrier and seal wiring penetrations through box cover. Use tape or elastomer sealer recommended by the manufacturer for perfect waterproofing.

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove insulation material spilled during installation and leave work area ready for application of wall board.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

1 GENERALPOINTS

1.1 RELATED REQUIREMENTS

- .1 Section 05 41 00 Structural metal stud framing
- .2 Section 06 08 99 Rough carpentry for minor works
- .3 Section 07 21 29.03 Sprayed insulation – polyurethane foam
- .4 Section 07 25 00 Air barrier
- .5 Section 07 46 13 Preformed metal siding
- .6 Division 8 – openings and closures (for the connection of the air barrier around these elements)
- .7 Section 09 21 16 (for intermediate skin panels)

1.2 REFERENCE STANDARDS

- .1 Requirements formulated in the professional contractor Quality Assurance program of the National Air Barrier Association.

1.3 PERFORMANCE REQUIREMENTS

- .1 Ensure the continuity between the materials and the air and water vapor barrier combinations and the materials described in sections named in the related requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Data sheets
 - .1 Submit the required data sheets as well as the manufacturer's specifications and literature about the products according to section 01 33 00 – Documents and samples to submit.
 - .2 If hazardous or toxic products are used, submit the WHMIS (Workplace Hazardous Material Information System) relevant safety data sheets according to section 01 33 00 – Documents and samples to submit.
- .2 Samples:
 - 1 Submit the required samples products according to section 01 33 00 – Documents and samples to submit.
 - 2 Submit the samples of all the required products in three copies.
- .3 Manufacturer's instructions:
 - .1 Submit the setting up instructions provided by the manufacturer.

1.5 QUALITY ASSURANCE

- .1 Qualification
 - .1 Applicator: The application of the materials must be performed by firm member of

the A.I.Q. ("Quebec Insulation Contractor Association") and specialized in the execution of the work planned in the present section.

.2 Work sample

- .1 Build the work samples according to section 01 45 00 – Quality control.
- .2 Build on sample of each type of membrane installation showing the method of installation. The sample must allow seeing the interfaces and the waterproofing products/devices between the different materials.
- .3 Build the samples in the areas and according to the spreading indicated by the departmental representative.
- .4 Wait 48 hours before beginning work, in order to allow the departmental representative to inspect the work sample.
- .5 Once accepted by the departmental representative, the work samples will be the minimum standard to respect as for the works that are part of the present section. They may part of the finish work.

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 instruction.
- .2 Transport, store and handle the materials and materiel according to the manufacturer's written instructions. Store the materials in a dry place, sheltered from bad weather and heated at least at 10° C. Take out from the storage area only the quantities of materials that will be used the same day.
- .3 In case of accidental spill, clean the soiled surfaces and put them back in their original states.

1.7 IDENTIFICATION AND DELIVERY

- .1 Deliver the materials in their original containers, sealed and with intact tags.

1.8 SETTING UP CONDITIONS

- .1 Set up the solvent evaporation polymerization waterproofing products and the adhesive materials emitting vapours in opened areas equipped with ventilation.
- .2 Maintain temperature and humidity degree at the levels recommended by the materials' manufacturer, before, during and after their setting up.
- .3 Supports must be humidity free on surface before the application of the membranes. Wait at least 24 hours after a precipitation in order to insure that the surface is dry enough.

1.9 WARANTIE

- .1 For works in the present section, the 12 month warrantie period prescribed in the general conditions is extended to five (5) years. Refer to general conditions
- .2 The installer and the manufacturer of the air/vapour barrier membranes and flexible flashings must provide a written document jointly signed, issued in the name of Canada, certifying the performance of the products and the non alteration of the properties of the said products that could affect their performance for the above mentioned period.

- .3 The warranties must include the fast correction of any defects upon reception of a written notice from the departmental representative to this effect. Repairing works must include the required labour, the materials, the equipment and the services to repair the defective parts of the element, and, in the case of manufactured parts, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative's liking. The warranties must also include the repairing or replacement of the building's other components (and its finishes) and all other elements of the departmental representative, damaged or moved during the repairing of the elements' defects.

2 PRODUCTS

2.1 MATERIALS / MATERIEL

- .1 Self-adhesive air/vapour barrier (for use other than on roofing)
- .1 Self-adhesive air/vapour barrier made of a woven trilaminar membrane coated with type SBS elastomer-bitumen such as Soprema Sopraseal Stick 1100 T or addenda replacement product according to bidders' instructions, having the following characteristics :
- .1 Colour: white and blue;
 - .2 Thickness: 1.0mm
 - .3 Air permeability: less than 0.0003 L/m².s at 75 Pa pressure differential;
 - .4 Vapour permeance: less than 0.90 ng/Pa.m².s (according to ASTM 96 test)
 - .5 Self-adhesive membrane primer:
 - .1 Solid content: ±24%;
 - .2 Installation temperature: -10° minimum.
 - .3 Acceptable product: Soprema Elastocol stick primer.
- .2 The Bakor Blueskin SA is an acceptable product; use the primer recommended by Bakor is this product is used.
- .3 The Grace Perm-A Barrier is an acceptable product; use the primer recommended by Grace is this product is used.

2.2 ACCESSORIES

- .1 Sealing compound for sealing joints: SBS bitumen-based, mineral matters fibers and solvent type recommended by the manufacturer of the self-adhesive membranes.
- .2 Cleaning products: non-corrosive type recommended by the manufacturer of the sealing compound and compatible with the contiguous materials.
- .3 Adhesives for insulations: Adhesive recommended insulation's manufacturer and compatible with the support surfaces.
- .4 Fasteners: galvanized steel bars and anchorages suitable for the works (when applicable) compatible with waterproofing and the substrate according to the manufacturer of the self-adhesive membrane recommendations.

3 - EXECUTION

3.1 MAUFACTURER'S INSTRUCTIONS

- .1 Confirmity: Coform to the manufacturer's written requirements, recommendations and specifications, including any available technical bulletin, instructions related to handling, storing and setting up of the products and to the information of the data sheets.

3.2 GENERALITIES

- .1 Execute the works according to the requirements of the Sealant and Caulking Guide Specification published by the Sealant and Waterproofer's Institute, regarding the materials and methods of setting up.
- .2 Execute the works according to the requirements made by the Professional Contractor Quality Assurance Program of the National Air Barrier Association and those concerning the materials and their setting up.
- .3 Execute the works according to the requirements made by the Contractor Quality Assurance Program of the Canadian Urethane Foam Contractor's Association and those concerning the materials and their setting up.

3.3 INSPECTION AND PREPARATION OF THE BASE SURFACES

- .1 Before beginning the works, inspect all the installation surfaces and ensure that they conform to all the requirements of the membranes' manufacturer; if need be, inform the departmental representative and do proceed with the works before having received his/her instructions. Also ensure that all the accessory element that have to be installed before the membranes are in place and have been verified and approved by the departmental representative.
- .2 Do not start any other part of the works until the surfaces are smooth, dry, free of ice, grease, oil, dust or any other material that could affect the installation or the performance of the membrane.
- .3 It is forbidden to start the works before the corrections of the anomalies and without the written approval from the technical representative of the supplier of the products used.
 - .1 The fact that the Contractor starts the works means that the latter has accepted the state of the work.
 - .2 In installing the products without the approval of the supplier, this contractor will be sole responsible for the repairing of the complete work including the works of the other sections and of the latter.
- .4 Do not install materials in rainy or snowy weather.

3.4 INSTALLATION OF THE SELF ADHESIVE AIR/VAPOUR BARRIER MEMBRANES

- .1 Apply the self adhesive membranes strips on all sub-frames around the openings in an exterior wall as well as any other place shown on the blueprints or required to ensure the continuity of the air barrier and that is not supplied by another section; the connection membranes needed around the openings and closures are supplied and installed by the respective section of Division 8 for fenestration or doors. Follow the details on blueprints.
- .2 At the roof's fascias, install continuous self adhesive air/vapour barrier membranes (full length) according to the indications. Temporarily spot the load-bearing elements hidden under the membranes so as to ensure the fixing of other materials or assemblies to the hidden framings.
- .3 Prime the surface with the appropriate primer and let dry at least 30 minutes before applying the self adhesive membrane. Reapply if the membrane is not installed the same day. It is essential that the solvent be completely evaporated before installing the membrane.

- .4 Install the waterproof self adhesive membrane according to installation instruction of the membrane's manufacturer. Overlap the lateral joints at least 75mm and the end joints at least 200mm. Where required, seal the membrane with a sealing product according to the recommendations of the membrane's manufacturer.
- .5 Smooth the membrane to avoid that air be trapped between the membrane and its support. Wrinkles are unacceptable and ensure an even application. Roll all the membrane with a manufacturer recommended type and weight roller.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove insulation material spilled during installation and leave work area ready for application of wall board.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION OF THE WORK

- .1 Protect the finish work according to section 01 61 00 – General requirements concerning the products.
- .2 Take the necessary precautions to prevent that the contiguous works damage the work achieved at the end of the present section.
- .3 Protect the finish work from bad weather.

FIN DE SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 02 41 99 Démolition for minor works
- .2 Section 05 41 00 Structural metal stud framing
- .3 Section 05 50 00 Metal fabrications
- .4 Section 06 08 99 Rough carpentry for minor works
- .5 Section 07 21 16 Blanket insulation
- .6 Section 07 21 29.03 Sprayed insulation - polyurethane foam
- .7 Section 07 25 00 Air barrier
- .8 Section 07 27 10 Air/vapor barrier membrane and intra-muros flexible flashings
- .9 Section 07 61 13 Sheet metal roofing
- .10 Section 07 62 00 Sheet metal flashing and trim
- .11 Section 07 92 00 Joint sealants
- .12 Section 08 11 00 Metal doors and frames
- .13 Section 08 11 16 Aluminium doors and frames
- .14 Section 08 50 00 Windows

1.2 REFERENCE STANDARDS

- .1 American Society of Mechanical Engineers (ASME)
 - .1 ASME B18.6.3-2011, Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series).
- .2 ASTM International
 - .1 ASTM D 2369-10e1, Test Method for Volatile Content of Coatings.
 - .2 ASTM D 2832-92(2011), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
 - .3 ASTM D 5116-10, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
 - .2 CAN/CGSB-93.3-M9], Prefinished Galvanized and Aluminum-Zinc Alloy Steel Sheet for Residential Use.
 - .4 CAN/CGSB-93.4-92, Galvanized and Aluminum-Zinc Alloy Coated Steel Siding Soffits and Fascia, Prefinished, Residential.
 - .5 CAN/CGSB-93.5-92, Installation of Metal Residential Siding, Soffits and Fascia.

- .4 CSA International
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .5 Environmental Choice Program (ECP)
 - .1 CCD-045-95, Sealants and Caulking Compounds.
- .6 Green Seal Environmental Standards (GS)
 - .1 GS-36-11, Standard for Commercial Adhesives.
- .7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
- .8 Underwriters' Laboratories of Canada (ULC)
 - .1 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 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for [metal siding] 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 and 01 35 43 - Environmental Procedures.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Canada.
 - .2 Indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, [soffits], [fascia], [metal furring], and related work.
- .4 Samples:
 - .1 Submit duplicate 600 mm x 300 mm samples of siding material, of colour and profile specified.

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements 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 metal siding from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 WARRANTY

- .1 Siding system
 - .1 For works in the present section, the 12 month warrantie period prescribed in the general conditions is extended to five (5) years and 20 years.
 - .2 Provide a written document jointly signed, issued in the name of Canada certifying that the works in the present section, including its installation, will meet all the performance requirements established in normal use conditions, for a period of 5 years.
 - .3 The warranty will cover among other, the metal skin systems against any bending due to the anticipated load, any loss of air and water waterproofing, any condensation, corrosion, deterioration of the finish..
- .2 Cladding finish
 - .1 Provide a written document jointly signed, issued in the name of Canada certifying the products of the present section against any deterioration of the finish for a period of (20) twenty years.
 - .2 The warranty will cover, in addition to the established performances, that the cladding finishes will not be damaged by the sunrays, bad weather or oxidation in a way that there will be no chalking, fading and loss in film integrity during the above warranty period (20 years).
 - .3 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments, and in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 STEEL CLADDING AND COMPONENTS

- .1 Strip siding: to CAN/CGSB-93.4, smooth surface category for vertical installation.
 - .1 Made of Z275 galvanized sheet metal to ASTM A653M grade 230 or Galvalume sheet metal to ASTM A792M grade 230
 - .2 Acceptable shape (hidden fixings)
 - .1 VicWest AD 300SR
 - .2 Agway HF-12NF
 - .3 Ideal Roofing, Urban Accent Series UA 1101 rib-free
 - .4 Or replacement product approved by addenda according to the instructions to the bidders

- .3 Colour: 2 colours to the choosing of the departmental representative in the Manufacturer's special finishes (acceptable finish: modified silicone polyester system, Valspar Weather XL Serie.
- .4 Gloss: low.
- .5 Thickness: 0,91 mm base metal thickness.

- .2 Fascia facings and exposed trim: to CAN/CGSB-93.4, Class plain:
 - .1 Colour: 2 colours to the choosing of the departmental representative in the Manufacturer's special finishes (acceptable finish: modified silicone polyester system, Valspar Weather XL Serie
 - .2 Gloss: low.
 - .3 Thickness: 0,60 mm base metal thickness.
 - .4 Profile: according to the plans and press shape

2.2 FASTENERS

- .1 Fasteners for metal siding system:
 - .1 Tapping screw # 14 AB or Cadmium steel with pre-paint hexagonal head, same colour as the siding and EPDM built-in washer.
 - .2 Screws and fasteners according to the written manufacturer's recommendations.

2.3 CAULKING

- .1 Sealants: in accordance with Section 07 92 00- Joint Sealants.
 - .1 Test for acceptable VOC emissions in accordance with ASTM D 2369 and ASTM D 2832.
 - .2 Adhesives and sealants: VOC limit 30, 70, 250g/L maximum to SCAQMD Rule 1168, GS-36.

2.4 SHEATHING PAPER

- .1 See section 07 27 10 Air/vapor barrier membrane and intra-muros flexible flashings

2.5 ACCESSORIES

- .1 Exposed trim: inside corners, outside corners, cap strip, drip cap, undersill trim, starter strip and window/door trim of same material, colour and gloss as cladding, with fastener holes pre-punched.
- .2 Non-exposed accessories: material is required for the installation of the metal cover strip
- .3 Closures: metal closures adapted to the type of strip chosen according to the manufacturer's recommendations.
- .4 Sub-girth, Z bars and Omega spacers
 - .1 A quality steel, Z-275 (G90) zinc coated covering as shown on blueprints.
 - .2 Minimum thickness of the elements of 1.22mm, gauge adjusted to the calculation criteria
 - .3 Install a dielectric spacer between different types of materials to avoid the electrolytic phenomenon
- .5 Wood spacer for fastening base according to section 06 08 99 – Carpentry – small scale works.

3 EXECUTION

3.1 EXAMINATION

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

3.2 SETTING UP QUALITY

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Unless otherwise indicated, execute the metal skin works according to the recommendations of the "Quebec Metal Skin Contractor Association".

3.3 SETTING UP CONDITIONS

- .1 Install cladding in accordance with CGSB 93.5, and manufacturer's written instructions.
- .2 Apply wall sidings to their supports and in weather condition above 5°C.
- .3 Maintain a room temperature of at least 5°C for a period of at least 24 hours following the installation of the siding.

3.4 PRELIMINARY WORKS

- .1 Examination of the support:
 - .1 Before starting the works, examine the metal steel frame and the other supports so as to be informed of the true tolerances and conditions of the latter and submit a written report.
 - .2 Check that the supports on which the metal skin must be installed answers the requirements so that it can be able to respect the required tolerances.
 - .3 Identify and coordinate the works and equipments of the other sections and fields to install on the metal skin systems.
 - .4 The elements to validate include among other and without being limited to, the veracity, the level, the geometry and the tolerances of the structural strength.
 - .5 Starting the installation works means that the contractor has proceeded to the examination of the metal steel frame and other supports and accepts the latter.
- .2 Inspection of the previous works:
 - .1 Notify the departmental representative 72 hours before starting the installation of the elements of the present section in order to allow the review of the installations that will be hidden.
- .3 Coordination with other sections:
 - .1 Identify and coordinate the works and equipments of the other sections and fields

- to install on the metal skin systems.
- .2 Ensure that the related works have been coordinated and if need be, completed according to the sequence of the works including among others and without being limited to:
 - .1 Air and water waterproofing, including the membrane flashings and others;
 - .2 Thermal insulation;
 - .3 Setting up of doors, windows;
 - .4 Setting up mechanical, electrical ducts or devices;
 - .5 Setting up any other element butting or going through the wall cladding.
- .3 Make in factory the necessary openings in the panels for the ducts or equipments' openings adjusting the dimensions of the opening to those of the duct or equipment.
- .4 Add in factory to the panels' wall trapdoors of the same material and finish as the panel allowing access to the equipments that will be located behind the skin, including among others the exterior hose bibs.
- .4 Protection of the adjoining works:
 - .1 Protect the surrounding works and surfaces from any damages during the application of the skin.
 - .2 Protect with an insulating plaster the metal surfaces in contact with concrete, masonry mortar, a sealer or any other cementitious base material.
 - .3 Protect with an insulating plaster the metal surfaces in contact with different metals to avoid electrolytic corrosion.
 - .4 Protect the finish work from bad weather or any other damages, installing the sealing compounds and flashings as quickly as possible.

3.5 INSTALLION OF THE PANELS ASSEMBLIES ON SITE

- .1 Fix the different wall coverings components with self-drilling screws using the screw speed appropriate to the size and type of screw.
- .2 Installation of the covering and its grid braces
 - .1 Install the grid braces according to the calculation criteria, in a continuous way, adding the thermal cuts.
 - .2 Provide and install the necessary alignment bars, the supports, the flanges, the trims and shims to solidly and permanently secure the siding to the framing of the building.
 - .3 Fix the lining and the support lathes to the wall structural elements. Fit together the lateral and end joint of each of the sheet making the lining, then seal them. First caulk one of the framing headers that fits together in order to make a continuous air/vapour barrier system.
 - .4 Coordinate with the recommendations in section 07 27 10 – Air/vapour barrier “membranes and intra-muros flexible flashings” for the installation of the waterproofing flashings; the intra-muros will have to be set in place before the insulations at least in the areas shown so as to ensure the continuity of the air and water waterproofing.
 - .7 Install the hidden nailing bases behind the exterior siding and fixed to the under-girths; a nailing base is required to all the works and equipments of the other sections and fields to install on the metal siding systems.

- .8 Install the metal siding on the support framing respecting the places of the joints shown on blueprints and insuring that the joints are perfectly aligned and butted.
- .9 Caulk the joints between the elements and the adjoining works with a caulking product in accordance with the recommendations of section 07 92 10 – Joints waterproofing.
- .3 Installation of the trims
 - .1 Provide and install shaped, notched and waterproofed closure pieces in order to protect the vertical profile wall sidings from bad weather. Ensure the balance of the pressures in a continuous way, according the rain-barrier screen principle.
 - .2 Provide and install the necessary alignment bars, the supports, the flanges, the trims and shims to solidly and permanently secure the siding to the framing of the building.
 - .3 Do not let the sheets' exterior sharp edges. Fold them toward the interior face on at least 6mm long.
- .4 Sidings' cut
 - .1 .Pre-cut the siding in factory. All cuts on site made with an abrasive saw must be cleaned or cut again with a shearer.

3.6 CONTROL / EXPANSION JOINTS

- .1 Make the joints according to the calculation criteria and recommendations.
- .2 Secure the joint covers with mechanical fixations.
- .3 Use joint covers of the same material and having the same finish as the adjoining elements, and whose profile has been press shaped.
- .4 Assemble the siding and fix it to the framing so that the working stresses put on the waterproofing joints are within the limits recommended by the manufacturer.

3.7 CONSTRUCTION TOLERANCES

- .1 Respect the following tolerances when installing the panels.
 - .1 The maximal admissible gap in relation to the plan or the spot shown the approved blueprints is 10mm.
 - .2 The maximal admissible gap in relation to the alignment of two adjoining elements butted together in the same plan is 0,75mm

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.

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

3.9 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 06 08 99 Rough carpentry for minor works.
- .2 Section 07 27 10 Air/vapor barrier membrane and intra-muros flexible flashings
- .3 Section 07 46 13 Preformed metal siding
- .4 Section 07 62 00 Sheet metal flashing and trim

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM A 167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM A 240/A 240M-11a, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - .3 ASTM A 653/A 653M-10, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .4 ASTM A 792/A 792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process.
 - .5 ASTM B 32-08, Standard Specification for Solder Metal.
 - .6 ASTM B 370-11, Standard Specification for Copper Sheet and Strip for Building Construction.
 - .7 ASTM D 523-89(2008), Standard Test Method for Specular Gloss.
 - .8 ASTM D 822-01(R2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
 - .2 CAN/CGSB-37.29-M89, Rubber-Asphalt Sealing Compound.
 - .3 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
 - .4 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.
- .3 CSA International
 - .1 CSA A123.3-05(2010), Asphalt Saturated Organic Roofing Felt.
- .4 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act (CEPA), 1999.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .6 National Building Code of Canada 2010 (NBC).
 - .1 CCMC- Registry of Product Evaluations.
- .7 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act (TDGA), 1992.

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 sheet metal roofing and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Proof of manufacturer's CCMC listing and listing number.
 - .3 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 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Canada.
 - .2 Shop drawings must include the installation and screwing pattern of the metal roofing and of all the accessories requested with regard the installation site, the winds and other conditions to consider
- .4 Samples:
 - .1 Submit duplicate 300 x 300 mm samples of each sheet metal material.

1.4 QUALITY ASSURANCE

- .1 Mock-ups:
 - .1 Submit mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Fabricate 1200 x 1200 mm sample roofing panel using identical project materials and methods to include typical seam.
 - .3 Mock-up will be used:
 - .1 To judge workmanship, substrate preparation, installation of the waterproofing membrane, operation of equipment and material application.
 - .4 Locate where directed .
 - .5 Allow 72 hours for inspection of mock-up by Ministerial Representative before proceeding with sheet metal flashing work.
 - .6 When accepted, mock-up will demonstrate minimum standard of quality required for this Work.
 - .7 Approved mock-up may remain as part of finished Work.
 - .8 Remove mock-up and dispose of materials when no longer required and when directed by Ministerial Representative.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect sheet metal roofing from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse by manufacturer of pallets, as specified in Waste Reduction Workplan in accordance with Section [1 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 WARRANTY

- .1 Sheet metal roofing system and waterproofing membrane
 - .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 and 20 years.
 - .2 Provide a written document jointly signed, issued by the manufacturer and the installer issued in the name of Canada certifying that the works of the present section, including its installation, will meet all the requirement performances established in normal use conditions, for a period of five (5) years.
 - .3 The warranty will cover among others the sheet metal roofing systems and the waterproofing membrane against any distortion due to the anticipated load, any loss of water and air waterproofing, any condensation, corrosion, deterioration of the finish.
- .2 Metal cladding finishing
 - .1 Provide a written document jointly signed, issued in the name of Canada certifying the products of the present section against any deterioration of the finish for a period of (20) twenty years
 - .2 The warranty will cover, in addition to the established performances, that the cladding finishes will not be damaged by the sunrays, bad weather or oxidation in a way that there will be no chalking, fading and loss in film integrity during the above warranty period (20 years).
- .3 The warranties must include the fast correction of any defects upon reception of a written notice from the departmental representative to this effect. Repairing works must include the required labour, the materials, the equipment and the services required to repair the defective parts of the work, and, in the case of manufactured parts, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative's liking. The warranties must also include the repairing or replacement of the building's other components (and its finishes) and all other elements of the departmental representative, damaged or moved during the repairing of the work's defects.

2 PRODUCTS

2.1 ROOF COMPONENTS

- .1 Roofing system: metal roofing on plywood
 - .1 Under layer: self-adhesive air barrier membrane (for use in roofing)
 - .1 Self-adhesive air barrier membrane made of modified bitumen with dry polymers. The surface is woven with nonslip trilaminar polyethylene and the under-surface is covered with a removable siliconized film such as the Soprema Lastobond Shield HT or replacement product by addenda having the following properties and characteristics in accordance with the instructions to the bidders:
 - .1 Thickness; 1.0 mm
 - .2 Air permeability less than 0.0003L/m2 at a pressure differential of 75 Pa;
 - .3 Moisture vapour permeance: less than 1.25 ng/Pa m2.s (according to ASTM E96);

- ;
- .4 Thermofusible sizing for membrane such as Soprema Elastocol Stick replacement product by addenda in accordance with the instructions to the bidders.
 - .2 The Henry Canada Blueskin PE-200-HT membrane is an acceptable equivalent product; use the sizing recommended by Henry Canada if the product is used.
 - .3 The Grace Ice & Water Shield HT membrane is an acceptable equivalent product; use the sizing recommended by Grace if the product is used.
 - .2 Staples system:
 - .1 Starting staples and moldings system with butyl separator that adapts to weather designed to allow the exterior metal sheet roofing thermal expansion and shrinkage. The staples must be made of steel with a minimum of 0.91 mm with a galvanized steel covering or above.
 - .2 Roofing fastening: Quantity and pitches as specified by the manufacturer to resist rising forces due to the wind and to the lateral loads due to the snow slide. To validate with the manufacturer's calculation notes.
 - .3 Exposed pre-finished exterior roofing metal sheet
 - .1 Profiled with ribs spaced 400 mm center to center.
 - .2 Panel: Gauge 230 Z275 galvanized steel plate (zinc plated) conform to ASTM A653M standard for the structural quality having a nominal web thickness of 0.76 mm.
 - .4 Staple cap:
 - .1 Allow for 25 mm high stapled caps on the roofing panel, made from Gauge 230 Z275 galvanized steel plate (zinc plated) conform to ASTM A653M standard for the structural quality having a nominal web thickness of 0.61 mm

2.2 COULOUR

- .1 The colour at the is at the choice of the departmental representative in the manufacturer's finishes (acceptable finish: silicone modified polyester system: Valpar Weather XL Serie).

2.5 ACCESSORIES

- 1 Flashings: conform to section 07 62 00 – Metal sheet flashings and accessories made with the same material as the roofing metal sheet. If needed, make them to measure to take into account the architectural details.
- .2 Closures: metal closures adapted to the type of profile chosen, according to the manufacturer's recommendations.
- .3 Waterproofing materials: in accordance with the manufacturer's recommendations and section 07 92 00 – Waterproofing products for joints
- .4 Snow guards: galvanized steel or cast aluminum snow guards of the same colour as the roof to be glued and screwed according to the manufacturer's recommendations, with the recommended anchoring and butyle tape under the guards.
 - .1 Duchesne individual snow guard

- .2 Euromax Canada Inc. model 640 snow guard
- .3 Northwest snow guard
- .4 Or replacement product by addenda in accordance with the instructions to the bidders.
- .5 Isolation coating: alkali resistant bituminous paint VicWest.
- .6 Plastic cement: to CAN/CGSB-37.5.
- .7 Sealant: Asbestos-free sealant, compatible with systems materials, recommended by system manufacturer, Caulking see Section 07 92 00 - Joint Sealants.
- .8 Rubber-asphalt sealing compound: to CAN/CGSB-37.29.
- .9 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .10 Touch-up paint: as recommended by sheet metal roofing manufacturer.
- .11 EPDM flashing: for roof for joint with air vent. Plan combination as on the plans and according to the manufacturer's recommendations.
- .12 Galvanized steel flashing, in the same materials as the metal sheet used for roofing for flashings and chimney ring. Plan combination as on the plans and according to the manufacturer's recommendations.

2.6 FABRICATION

- .1 Form individual pieces in 2400 mm maximum lengths. Make allowances for expansion at joints.
- .2 Hem exposed edges on underside 12 mm, mitre and seal.
- .3 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .4 Apply minimum 0.2 mm dry film thickness coat of plastic cement to both faces of dissimilar metals in contact.
- .5 Shape all roofing components in factory, ready to install on site.

3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

.1 Roofing materials

.1 Roofing self-adhesive membrane

- .1 Apply the self-adhesive membrane strips fully adhered on the roof plywood and fascias. Ensure an adequate overlapping and recommended by the manufacturer with the membrane (or the wall air barrier). Follow the manufacturer's recommendation for areas where the self-adhesive membrane is to be doubled (roof joint, valley, ridgeboard, etc.) Ensure continuity between wall and roof air barriers.
- .2 Prime the surface with the appropriate primer and let dry at least 30 minutes before applying the self adhesive membrane. Reapply if the membrane is not installed the same day. It is essential that the solvent be completely evaporated before installing the membrane.
- .3 Install the waterproof self adhesive membrane according to installation instruction of the membrane's manufacturer. Overlap the lateral joints at least 75mm and the end joints at least 200mm. Where required, seal the membrane with a sealing product according to the recommendations of the membrane's manufacturer.
- .4 Install the roofing membrane according to the details on the plan. The roofing membrane must go up to roof fascia and be sealed to the existing. Ensure continuity of the wall air barriers with the roofing membrane.
- .5 Smooth the membrane to avoid that air be trapped between the membrane and its support. Wrinkles are unacceptable and ensure an even application. Roll all the membrane with a manufacturer recommended type and weight roller.
- .6 Provide a continuous joint around all the openings of the metal sheet roofing system.

.2 Staples system: fix the staples with fasteners as recommended by the manufacturer to adjust to the substrate.

.3 Roof boards installation

- .1 Install the prefinished exterior roof boards on the support staples according to the manufacturer's appropriate construction method. Ensure that metal roofing lateral covering is adequately held by staples and the appropriate sheet metal roofing is held.
- .2 Install a stapled cap to all the lateral coverings as indicated on the approved shop drawings. Adjust the stapled cap if needed, to prevent any water from entering.
- .3 When indicated on the sops drawings, fix the roofing sheet metal ends in accordance with the manufacturer's detailed instructions in order to form a waterproof joint. The colour of the exposed fasteners must match the one of the roofing metal sheet.
- .4 Provide slotted and formed closures, whose joints are bad weather proof, slope changes as well as ridgeboards and eaves if needed.
- .5 Install all the counter flashings as indicated on the plans and shop drawings. Use hidden fasteners as far as possible. The colour of the exposed fasteners must match the one of the roofing metal sheet.
- .6 Shape valleys no longer than 3 m long. Make overlapping joints on 150 mm in the direction of the waterflow.
 - .1 Extend the valley sheets on width of at least 150 mm under the roofing sheets.
 - .2 At the end of the valleys, make a double pinch in the valley and roofing

- .4 Snow guards installation
 - .1 Glue and screw the snow guards staggered to the roof panels at the areas indicated and recommended by the manufacturer.
 - .2 Install a butyle tape under the snow guards before fastening them.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 06 08 99 Rough carpentry for minor works
- .2 Section 07 46 13 Preformed metal siding.
- .3 Section 07 61 13 Sheet metal roofing
- .4 Section 07 92 00 Joint sealants.

1.2 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 167-99(2004), Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM A 240/A 240M-07e1, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - .3 ASTM A 606-04, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
 - .4 ASTM A 653/A 653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .5 ASTM A 792/A 792M-[06a], Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .6 ASTM B 32-04, Standard Specification for Solder Metal.
 - .7 ASTM B 370-03, Standard Specification for Copper Sheet and Strip for Building Construction.
 - .8 ASTM D 523-89(1999), Standard Test Method for Specular Gloss.
 - .9 ASTM D 822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .2 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual 1997.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
 - .2 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.
- .4 Canadian Standards Association (CSA International)
 - .1 CSA A123.3-05, Asphalt Saturated Organic Roofing Felt.
 - .2 AAMA/WDMA/CSA 101/I.S.2/A440-2008, Standard/Specification for Windows, Doors, and Unit Skylights.
 - .3 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .5 Green Seal Environmental Standards
 - .1 Standard GS-03-93, Anti-Corrosive Paints.
 - .2 Standard GS-11-97, Architectural Paints.
 - .3 Standard GS-36-00, Commercial Adhesives.
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

- .7 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule #1113-04, Architectural Coatings.
 - .2 SCAQMD Rule #1168-05, Adhesives and Sealants.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.
- .3 Shop Drawings:
 - .1 Shop drawings: Submit drawings stamped and signed by professional engineer registered or licensed in Canada.
- .4 Samples:
 - .1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colours.
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures .
 - .2 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 DELIVERY, STORAGE AND HANDLING

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

1.5 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended by 2 and 5 years.
- .2 Provide a written document jointly signed, issued by the manufacturer and the installer in the name of Canada certifying that the prefinished sheets are warranted from any peeling, fading and corrosion defects, for a period of 5 years
- .3 Deliver a written and signed warranty certificate issued in the name of Canada, certifying that the sheet works will stay in place, will remain free from any waterproofing defects and that they are warranted by the roofing contractor for a period of two (2) years
- .4 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments, and in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental

representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 PRE FINISHED STEEL PLATES

- .1 Pre finished galvanized steel plate: commercial quality, conform to ASTM A653M, with Z275 zinc coating, 0.61 mm thick of the base metal (gauge 24), high molecular mass polyester Colorite HMP 100% ceramic pigment pre finished in factory of the colour chosen by the departmental representative. The colour will be match the colours and finishes recommended in sections 07 46 13 Sheet exterior wall siding and 07 61 13 Metal roofing system.
- .2 Use this sheet for the exposed caps, flashings, drip moldings and trims, except the hanging strips and the staples that can be shaped with a 0.46 mm thick (gauge 26) non finished galvanized sheet.
- .3 Use this sheet for bendings of punched steel required for the exterior vestibules. Percentage of perforating of 50% with staggered openings of 1 mm diameter and with a stainless steel screen grid glued at the back of the bending.

2.2 ANCHORAGES

- .1 Exposed anchorages are not allowed except when otherwise indicated. All the sheets must be stapled in hanging strips.
- .2 Screws: self-drilling and self-tapping flat-head screw with organic anti-corrosion finish such as Climaseal, Stalgard, Kwik-Cote or equivalent, of the gauge and length appropriate to the works.

2.3 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Plastic cement: to CAN/CGSB 37.5.
 - .1 Maximum VOC limit 50 g/L to SCAQMD Rule 1168 and to GSES GS-36.
- .3 Underlay for metal flashing: dry sheathing to CAN/CGSB-51.32
- .4 Waterproofing products:
 - .1 Stain resistant one-part silicone base, low modulus neutral setting, among the colours offered by the manufacturer to the departmental representative choice, conform to ASTM C920 standards, Type S, Grade NS, last revision. Refer to section 07 92 00 Waterproofing products for joints.
- .5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.
- .6 Fasteners: of same material as sheet metal, to CSA B111, [ring thread] flat head roofing nails of length and thickness suitable for metal flashings and installation contexts.
- .7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .8 Touch-up paint: as recommended by prefinished material manufacturer.
 - .1 Maximum VOC limit 150 g/L to Standard GS-11 and to SCAQMD Rule 1113.

2.4 FABRICATION

- .1 Fabricate metal flashings and other sheet metal work in accordance in accordance with the standards' technical documents in effect and to the recommendations.
- .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, copings and fascias to profiles indicated with galvanized prefinished steel, colour and finish recommended for sidings in sections 07 46 13 Exterior walls metal sidings and 07 61 13 Metal roofing system.

2.6 PANS

- .1 Form pans to receive roofing plastic from 61 mm thick galvanized prefinished steel sheet metal with minimum 75 mm upstand above finished roof and 100 mm continuous flanges with no open corners.
 - .1 Rivet joints.
 - .2 Make pans minimum 100 mm wider than member passing through roof membrane.

2.7 REGLETS AND CAP FLASHINGS

- .1 Reglets meant to receive the metal flashings and cap flashings must be shaped with 0.61 mm thick sheet in accordance with the standards' technical documents in effect and to the recommendations.
 - .1 Provide slotted fixing holes and steel/plastic washer fasteners.
 - .2 Cover face and ends with plastic tape.

2.8 EAVES TROUGHS AND DOWNPIPES

- .1 Form eaves troughs and downpipes from 0,61 mm thick galvanized prefinished steel, colour and finish recommended for sidings in sections 07 46 13 Exterior walls metal sidings and 07 61 13 Metal roofing system.
- .2 Sizes and profiles as indicated.
- .3 Provide goosenecks, outlets, strainer baskets and necessary fastenings.
- .4 Form 600 x 600 mm splash pans from 0,61 mm thick galvanized prefinished steel.
- .5 Anchorings will be of sufficient width and diameter to meet the standards in force and to resist the applicable climatic conditions. Contractor must make the demonstration of it on the workshop drawings.

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.
- .2 Set in place the sheet metal works according to the details on blueprints and the relevant standards in effect.

3.2 EXAMINATION

- .1 Before proceeding to the installation of the flashings and sheet metal accessories, make sure that the state of the surfaces/supports first set up at the end of other sections or contracts and the flatness variations are acceptable and allow for the realization of the works in accordance to the manufacturer's written instructions.
 - .1 Inform the departmental representative immediately of any unacceptable condition detected.
- .2 Provide, otherwise, a report showing the deficiencies or the approval of the control desk inspector before starting the installations.
- .3 Start installation works only after having corrected the unacceptable conditions and received the approval of the control desk inspector. Installing them without this approval, this contractor alone will be responsible for repairing the entire work including the works of other sections and of the latter.

3.3 INSTALLATION

- .1 Use concealed fastenings except where approved by Ministerial Representative before installation.
- .2 Provide underlay under sheet metal.
 - .1 Secure in place and lap joints 100 mm.
- .3 Flashings and other sheets works are installed on waterproof membranes. If required, install a # 15 asphalt felt underlay before installing the sheet elements that would not be installed on a membrane.
- .4 Install the caps, flashings and other works according to the blueprints. All the flashings must be stapled in hanging strips and to the vertical joints with punctiform staples spaced of no more than 300 mm c/c. Close the end joints seal them with a sealing product.
- .5 Coordinate the installation of the hanging strips and staples with the roofer and have the anchorages passing through a waterproofing membrane sealed less than 300 mm from the adjoining roof membrane's finished level.
- .6 Insulate with a spacer material any different sheet metal flashings joints so as to prevent the electrolytic corrosion phenomenoms.
- .7 Install surface mounted reglets true and level, and caulk top of reglet with sealant.
- .8 Insert metal flashing into reglets or under cap flashing to form weather tight junction.

- .9 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.
- .10 Caulk flashing at reglet or cap flashing with sealant.
- .11 Install pans, where shown around items projecting through roof membrane.

3.4 EAVES TROUGHS AND DOWNPIPES

- .1 Install eaves troughs and secure to building at 750 mm on centre with eaves or screw trough spikes through spacer ferrules.
 - .1 Slope eaves troughs to downpipes as indicated.
 - .2 Solder, seal joints watertight.
- .2 Install downpipes and provide goosenecks back to wall.
 - .1 Secure downpipes to wall with straps at 1800 mm on centre; minimum two straps per downpipe.
- .3 Install splash pans as indicated (when applicable).

3.5 FIELD QUALITY CONTROL

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

3.6 CLEANING

- .1 Cleaning when work is in progress: make cleaning works according to section 01 74 11 - Cleaning
 - .1 Leave the premises clean at the end of each working day.
- .2 Final cleaning: clear from the site the surplus materials, wastes, tools and equipment, in accordance with section 01 74 11 – Cleaning.
- .3 Wastes management: Sort the wastes having recycling in mind, in accordance with section 01 74 21 – Construction/demolition wastes management and disposal
 - .1 Remove carts and recycling bins from the site and dispose the materials at the appropriate facility.

3.7 PROTECTION

- .1 Protect the installed material and elements from any damages during the construction works.
- .2 Repair damages caused to materials and adjoining material by installing sheet metal coverings.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 07 92 00 Joint sealants
- .2 Section 09 21 16 Gypsum board and finish concrete panels finish
- .3 Section 09 91 23.01 Interior re-painting
- .4 See the mechanical and electrical reference drawings for the firewall and smoke barrier set in place in the mechanical and electrical installations (for example: and damper assemblies, cable trays)

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 2010 (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 DESIGN CRITERIAS

- .1 It is up to the present section to choose the different types of firewall assemblies to use for all the conditions in the project, in accordance with the recommendations.
- .2 The firewall assemblies chosen must be approved by the Underwriter's Laboratories of Canada (ULC) and bear an assembly number certifying the test and approval.
- .3 The choice of the different firewall assemblies must take into account alle the conditions related

to its location including among others and without being restricted to: adjoining materials and works, structure deflection and movement, environment and fire resistance indicated.

- .4 When the firewall assembly is installed in a non-hidden location, the latter must be made of paintable materials and must be painted.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit [two] copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 Health and safety requirements and 01 35 43 Environmental procedures.
- .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.
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
 - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
 - .2 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 and cleaning procedures.
 - .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.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company, person specializing in fire stopping installations approved by manufacturer.
- .2 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 during progress of Work at 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.

1.7 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, manufacturer, ULC markings.
- .2 Storage and Protection:
 - .1 Store materials indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for [recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.8 WORK SAMPLES

- .1 Make the work required samples at the locations indicated by the departmental representative.
- .2 Give 72 hours to the departmental representative to examine the work samples before beginning the works.
- .3 Once reviewed by the Architect, the work samples will be the minimum standard to respect concerning the works being part of the present section. Unless otherwise indicated, they may be part of the finish work. Otherwise, and for the rejected works, they may be dismantled, the rejected materials will taken out of the site and a new work sample will have to be made.
- .4 Make the following works samples:
 - .1 One (1) work sample for each type of proposed firewall assembly.

1.9 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 years.
- .2 Provide a written document jointly signed, issued by the manufacturer and the installer in the name of Canada certifying that the works in the present section will meet all the established performance requirements in normal use conditions for a five (5) year period.
- .3 The warranty will cover among others that the works made will free from defects, including the adhesion or cohesion losses, crazings, flarings, fusions, shrinkages, sagging or smudging of the adjoining surfaces and the lack of making an efficient flames, fumes and gas barriers
- .4 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments, and in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or

moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 MANUFACTURER

- .1 Acceptable manufacturers:
 - .1 A/D Fire Protection Systems
 - .2 3M Fire Protection Products
 - .3 Hilti
 - .4 Tremco
 - .5 Or replacement product approved by addenda in accordance with the instructions to the bidders.

2.2 MATERIALS

- .1 All the firewall and smoke barrier products of the assemblies of the same type set in place must come from one and the same manufacturer.
- .2 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
 - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3.
 - .2 Fire stop system rating: according to the indications and conform to the recommendations of the 2010 National Building Code..
- .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 2010.
- .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.
- .12 Firewall mastic to wrap the electrical outlets in the fire resistant divisions. Acceptable product: Hilti CP 617 or acceptable product according to the manufacturers' standards in point 2.01

- .13 Self-bracing intumescent pillows for clogging the bar or duct guides through the walls or floors: pillow made of a coating of intumescent materials embedded in fire-resistant insulation, the whole thing being covered with an airproof polyethylene envelope.

3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

- .1 Before proceeding to the installation of the fire-retardant assemblies, make sure that the state of the surfaces/supports first set up at the end of other sections or contracts and the flatness variations are acceptable and allow for the realization of the works in accordance to the manufacturer's written instructions.
 - .1 Inform the departmental representative immediately of any unacceptable conditions detected.
 - .2 Have the installation surfaces approved by the technical representative of the supplier of flexible pavement.
- .2 Provide, otherwise, a report showing the deficiencies or the approval of the control desk inspector before starting the installations.
- .3 Start installation works only after having corrected the unacceptable conditions and received the written approval of the control desk inspector of the partition's supplier. Installing them without this approval, this contractor alone will be responsible for repairing the entire work including the works of other sections and of the latter

3.3 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.

3.4 INSTALLATION

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

maintained.

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

3.5 SEQUENCES OF OPERATION

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

3.6 LOCATION OF THE FIRE-RETARDANT ASSEMBLIES

- .1 Determine the location of the fire-retardant assemblies according to the instructions for all the fields among others and without being limited to: for the location and dimensions of the openings, ducts, steel and concrete framing elements, types of partitions and exteriors walls.
- .2 The openings include among others and without being limited to: the electrical, mechanical and telecommunication ducts, the architectural elements and any other element that go through.
- .3 Walls and partitions include among others and without being limited to: plasterboard partitions, concrete elements' masonry walls, prefabricated concrete panels and any other type of exterior or interior walls and partitions.
- .4 Make fire-retardant and smoke barrier in the following locations:
 - .1 Walls and partitions making a fire-retardant division and whose fire resistance is shown:
 - .1 Walls and partitions openings.
 - .2 Joints between two types of walls and partitions.
 - .3 Walls and partitions intersection.
 - .4 Top and bottom part of the walls and partitions.
 - .5 Recessed and reinforcing joints made in walls and partitions.
 - .6 Access points and sheaths put in or set in place in fire-retardant partitions for future use, including among others and without being limited to the trapdoors for the mechanical and electrical equipments.
 - .7 Edge of the mechanical and electrical assemblies that go through walls and partitions.
 - .8 Edge and surface of electrical outlets inside fire-resistance partitions.
 - .2 Slabs, ceilings and roofs making a fire-retardant division and whose fire resistance is shown:
 - .1 Floor, ceiling and roof slabs.

- .2 Joints between floor, ceiling, roof and wall slabs, prefabricated partitions and concrete panels.
- .3 Joint in the floor, ceiling and roof slabs.
- .3 Prefabricated concrete panels making a fire-retardant division and whose fire resistance is shown:
 - :
 - .1 Joints between two prefabricated concrete panels making a fire-retardant division and whose fire resistance is shown:
 - .2 Opening of prefabricated concrete panels making a fire-retardant division
 - .3 Intersection of prefabricated concrete panels.
 - .4 Top and bottom part of the prefabricated concrete panels.
 - .5 Joints between prefabricated concrete panels and floor, ceiling, roof and wall slabs.
 - .6 Recessed and reinforcing joints made in walls and partitions
 - .7 Access points and sheaths put in or set in place in fire-retardant partitions for future use, including among others and without being limited to the trapdoors for the mechanical and electrical equipments.
 - .8 Edge of the mechanical and electrical assemblies that go through walls and partitions.

3.7 FIELD QUALITY CONTROL

- .1 Inspections: notify Ministerial 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.

3.8 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 06 40 00 Architectural woodwork
- .2 Section 07 46 13 Preformed metal siding
- .3 Section 07 61 13 Sheet metal roofing.
- .4 Section 07 62 00 Sheet metal flashing and trim
- .5 Section 07 84 00 Fire stopping
- .6 Division 8 For openings/closures
- .7 Division 9 for Sheating finish

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.
- .4 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.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .6 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 and 01 35 43 - Environmental Procedures.
- .3 Samples:
 - .1 Submit 2 samples of each type of material and colour.
 - .2 Cured samples of exposed sealants for each colour where required to match adjacent material.
- .4 Manufacturer's Instructions:
 - .1 Submit instructions to include installation instructions for each product used.
- .5 Laboratory tests reports
 - 1 Submit the laboratory tests reports, in accordance with section 01 45 00 – Quality control
 - 2 Test the sealing materials, accessories and substrates in accordance with the following elements before beginning work on this section.
 - 1 Obtain the samples of substrate specified in other sections.
 - 2. Adhesion: in accordance with C 510 or C1248 ASTM D2203, check that the sealing materials will not stain the substrates to be joined.
 - 3. Compatibility: in accordance with ASTM C1087, determine that the materials that join and the adjoining materials do not change the performance of the sealing materials and their colour.
 - 4. Stains: in accordance with C 510 or C1248 ASTM D2203, check that the sealing materials will not stain the substrates to be joined

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 indoors, in accordance with manufacturers' recommendations in clean, dry, well-ventilated area with room temperature or less than 15°C.
 - .2 Store and protect joint sealants from [nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Planning accordance with Section 01 74 21 - Construction/Demolition 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.
- .2 Ministerial Representative will arrange for ventilation system to be operated on maximum outdoor air and exhaust during installation of caulking and sealants. Ventilate area of work as directed by Ministerial Representative by use of approved portable supply and exhaust fans.

1.8 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 years
- .2 Provide a written document jointly signed, issued by the manufacturer and the installer in the name of Canada certifying that the works in the present section will meet all the established performance requirements, without water or air infiltration through the sealed joints for a five (5) year period.
- .3 The warranty will cover among others that the works made will free from defects, including the adhesion or cohesion losses, splitting, flairings, fusions, disintegrations, shrinkages, saggings or smudgings of the adjoining surfaces
- .4 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments, and in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 WATERPROOFING PRODUCTS – GENERALITIES

- .1 Caulking products emitting strong odours, containing toxic chemicals or not certified as being moistures resistant must not be used in air treatment apparatuses.
- .2 If we have to use toxic products, limit use in locations where emanations can be expelled outside or in locations where they will be contained behind an airtightness system or still let several months pass before occupying the area to allow expelling the emanations on the longest period possible.
- .3 Waterproofing products for each location must be one and only type and be from the same manufacturer.
- .4 In the case of waterproofing products homologated with a primer, only the primer in question must be used with the said waterproofing product.
- .5 Unless otherwise stated, the colour of each waterproofing product for each location will at the departmental representative from the manufacturer's standard colours.

2.2 WATERPROOFING PRODUCTS - DESCRIPTION

- .1 Urethane base sealing material
 - .1 Type 1:
 - .1 Multi-components waterproofing material.
 - .2 Type M, Grade NS, conform to ASTM C 920 standard.
 - .1 Average strength modulus:
 - .1 Acceptable products (see note 1 at the end of 2.02)
 - .1 Sika Class 25 Sikaflex 2c NS, T, NT, M, G, A and O use.
 - .2 Tremco Class 25 or 50 Dymeric 240 or 240FC, T, NT, M, A and O use.
 - .2 Tremco Class 50 Dymonic FC, NT, M, A and O use.
 - .2 2B - Average strength modulus:
 - .1 Acceptable products (see note 1 at the end of 2.02)
 - .1 Tremco Class 25, Vulkem 116, T, NT, M, A, I and O use.
 - .2 Type 2:
 - .1 One component waterproofing material.
 - .2 Type S, Grade NS, conform to ASTM C 920 standard.
 - .1 2A – Low strength modulus
 - .1 Acceptable product (see note 1 at the end of 2.02)
 - .1 Tremco Class 50 Dymonic FC, NT, M, A and O use.
 - .2 2B - Average strength modulus:
 - .1 Acceptable products (see note 1 at the end of 2.02)
 - .1 Tremco Class 25, Vulkem 116, T, NT, M, A, I and O use.
 - .3 Type 3:
 - .1 Self-leveling multi-components waterproofing material
 - .2 Type M, Grade P, conform to ASTM C 920 standard.
 - .1 Average strength modulus:
 - .1 Acceptable product (see note 1 at the end of 2.02)

- .1 Tremco Class 25 THC 900 (THC 901 for inclined plan up to 10%),, T, M and O use
 - .2 Sika Class 25, Sikaflex 2c SL, T, NT, M, G, A, O, I use.
 - .4 Type 4:
 - .1 Self-leveling one component waterproofing material.
 - .2 Type S, Grade P, conform to ASTM C 920 standard.
 - .1 Average strength modulus:
 - .1 Acceptable product (see note 1 at the end of 2.02)
 - .1 Sika Class 25 Sikaflex self-leveling T and M use.
 - .2 Tremco Class 50 Vulkem 45 SSL T, M, A, O and I use.
- .2 Silicon base neutral maturing sealant:
 - .1 Type 5:
 - .1 Multi-components waterproofing material
 - .2 Type M, Grade S, conform to ASTM C 920 standard.
 - .1 Low strength modulus:
 - .1 Acceptable product (see note 1 at the end of 2.02)
 - .1 Tremco Class 25 Spectrem 4-TS NT, M, G, A and O use.
 - .2 Type 6:
 - .1 Multi-components waterproofing material
 - .2 Type M, Grade P, conform to ASTM C 920 standard.
 - .1 Very low strength modulus :
 - .1 Acceptable product (see note 1 at the end of 2.02)
 - .1 Sika Grade P Class 100/50 Sikasil-728 RCS T, M, G, A and O use.
- .3 Type 7:
 - .1 One component waterproofing material.
 - .2 Type S, Grade NS, conform to ASTM C 920 standard.
 - .1 Type-7A - Very low strength modulus:
 - .1 Acceptable product (see note 1 at the end of 2.02)
 - .1 Tremco Class 100/50 Spectrem 1, NT, M, G, A and O use.
 - .2 Dow Corning Class 100/50 790 Silicone building sealant, T, NT, M, G, A and O use.
 - .2 Type-7B - Low strength modulus:
 - .1 Acceptable product (see note 1 at the end of 2.02)
 - .1 Sika Class 100/50 Sikasil-728 NS, NT, T, M, G, A and O use.
 - .2 Tremco Class 50 Spectrem 3, NT, M, G, A and O use.
 - .3 Dow Corning Class 50 Contractor concrete sealant (CCS), T, NT, M, G, A and O use.

- .3 Type 7C: Average strength modulus.
 - .1 Acceptable product (see note 1 at the end of 2.02)
 - .1 Dow Corning Class 25 Contractors weatherproofing sealant (CWS), NT, M, A and O use
 - .2 Tremco Class 25 Tremsil 600, NT, G, A and O use.
 - .4 Type 7D : . - Low strength modulus, for parking lots, Class 100/50
 - .1 Acceptable product (see note 1 at the end of 2.02)
 - .1 Tremco Spectrem 800, application with sprayer.
 - .2 Self-leveling Tremco Spectrem 900.
 - .3 Dow Corning NS Parking structure sealant
- .3 Acetic acid maturing silicone base sealant:
 - .1 Type 8:
 - .1 One component waterproofing material.
 - .2 Type S, Grade NS, conform to ASTM C 920 standard
 - .1 8A - Mold and mildew resistant:
 - .1 Acceptable product (see note 1 at the end of 2.02)
 - .1 Dow Corning 786 Silicone sealant, Class 25, NT, G, and A use.
 - .2 Tremco Tensil 200, NT, G, A et O use.
 - .2 8B - Glazing:
 - .1 UV resistant and non-yellowing acceptable product (see note 1 at the end of 2.02).
 - .1 Dow Corning 999-A Silicone building and glazing, NT, G, A and O use.
 - .2 Acceptable product (see note 1 at the end of 2.02)
 - .1 Dow Corning 795 Silicone Building Sealant, NT, G, A and O use.
 - .2 Tremco Spectrem2, Class 50, NT, M. G. A and O use.
 - .3 Tremco Proglaze, NT, G, A et O use.
 - .4 Other sealants
 - .1 Type 9:
 - .1 Acrylic latex one component waterproofing material
 - .2 Conform to ASTM 834 standard; one component, solvent maturing, does not stain, bleeding-free, non-sag.
 - .1 Acceptable product: Tremco Tremflex 834 (see note 1 at the end of 2.02)
 - 2 Type 10:
 - .1 Rubber bas one component waterproofing material
 - .1 Acceptable product: Tremco Acoustic sealant (see note 1 at the end of 2.02)

- .3 Type 11:
 - .1 Butyle or polyisobutylene one component waterproofing material conform to ASTM C1311 standard.
 - .1 Acceptable product: Tremco Butyle sealant (see note 1 at the end of 2.02)

** Note 1: for all the acceptable products it is possible to suggest a replacement product by addenda in accordance with the instructions to the bidders in the products from Dow Corning, Tremco, Sika.

2.3 ACCESSORIES

- .1 Non-corrosive cleaner, leaving no stain in accordance with the sealant manufacturer's recommendations and compatible with the materials to join.
- .2 Primer:
 - .1 Leaving no stain, leaving no stain in accordance with the sealant manufacturer's recommendations and compatible with the substrates on which it will be applied.
- .3 Compressible and non-compressible preformed backup strips:
 - .1 Backup strips must fit the appropriate waterproofing products and be of the same type recommended by the manufacturer.
 - .2 Polyethylene foam elements
 - .1 Cavernous/extruded foam filling rods.
 - .2 Elements oversized by 30 to 50%.
 - .3 Conform to ASTM C1330 type B standard.
 - .3 Neoprene or rubber-butyle elements
 - .1 Round and solid rods, with 70 Shore A hardness.
 - .4 Strong density foam elements.
 - .1 Extruded cellular polythene foam elements,
 - .2 with 20 Shore A hardness
 - .3 Tensile strength from 140 to 200 kPa.
- .4 Ant- positive connection tape.
 - .1 Polyethylene tape that does not adhere to the waterproofing material and recommended by the sealant's manufacturer.
- .5 Masking tape:
 - .1 Leaving no stain and non-absorbent, recommended by the sealant's manufacturer and compatible with substrates on which it will be applied.

2.4 CLEANING PRODUCTS FOR JOINTS:

- .1 Non-corrosive and non-dirty, compatible with the materials with which the joints are made and the waterproofing products, and recommended by their manufacturer.

3 EXECUTION

3.1 QUALITY OF EXECUTION

- .1 Conformity: conform with the manufacturer's written requirements, recommendations and specifications, including the technical bulletins and installation instructions specified in the products' catalogues and the wrapping cardboards, as well as to the indications on the data sheets.
- .2 In addition to the manufacturers' requirements, ensure that the sealing works respect the requirements in the « Applicator Training Manual » of the Sealant, Waterproofing & Restoration Institute (SWR Institute)

3.2 INSPECTION

- .1 Check the surfaces and joints openings meant to receive these works. Before proceeding to the installation of the waterproofing products:
 - .1 Make sure that the state of the surfaces/supports first set up at the end of other sections or contracts and the flatness variations are acceptable and allow for the realization of the works in accordance to the manufacturer's written instructions.
 - .2 Make sure that the concrete surfaces have completed their setting cycle.
 - .3 Inform the departmental representative immediately of any unacceptable conditions detected
- .2 Have the installation surfaces approved by the technical representative of the supplier. Send this approval immediately to the departmental representative.
- .3 Start installation works only after having corrected the unacceptable conditions and received the written approval of the control desk inspector of the partition's supplier. Beginning the works without this approval means the acceptance of the base works and the responsibility if need be.

3.3 PREPARATION

- .1 Protect works installed by third parties from soiling or any other form of contamination. Before applying the primer and the waterproofing product, mask the adjoining surfaces to avoid soiling.
- .2 Preparing the surfaces:
 - .1 Prepare the surface in accordance with AST C 1193 and the manufacturer's instructions.
 - .2 Check the dimensions of the joints to make and the state of the surfaces in order to obtain an adequate width-depth ratio for the setting up of the backup strips and waterproofing products.
 - .3 Remove from the joints' surfaces any undesirable matter, including dust, rust, oil, grease and other foreign matters that are likely to impede the quality of execution of the works.
 - .4 Make sure that joints' surfaces are well dried and that they are not frozen.

3.4 SETTING UP CONDITIONS

- .1 Environment:

- .1 Do not proceed to the setting up of waterproofing products in the following conditions:
 - .1 When room temperature and the substrate temperature are outside the limits fixed by the manufacturer of the products.
 - .2 When the degree of relative humidity and the moisture content of the substrate are outside the limits fixed by the manufacturer of the products.
 - .3 Or any other more strict recommendations of the manufacturer or mentioned standards and organisms.
- .2 Width of the joints:
 - .1 Do not proceed with the setting up of the waterproofing products when the width of the joints is inferior to the one fixed by the product's manufacturer for the indicated applications or to less than 6 mm
 - .2 Obtain the approval of the departmental representative to make joint that are less than 6 mm or more than 13 mm.
- .3 Substrate:
 - .1 Do not proceed to the setting up of waterproofing products until the substrate have been cleared of any contaminants that are likely to prevent the adherence of the products.
- .4: Safety :
 - .1 Make sure that building's ventilation system works at the maximum admission of air and de-aeration during the setting up of the waterproofing and caulking products. Aerate the working areas following the instruction of the manufacturer's Consultant or the technical advisor with portable blower and roof fans
 - .2 Satisfy the requirements of the Workplace Hazardous Materials Information System (WHMIS) concerning the use, handling, storing and disposal of hazardous materials as well as the labeling and providing safety data sheets acknowledge by Labour Canada

3.5 SETTING UP THE PRIMER

- 1 Apply the primer on the lateral surfaces of the joints immediately before setting up the waterproof product, in accordance with the instructions of the waterproof product's manufacturer.

3.6 INSTALLATION OF THE BACKUP STRIP

- .1 Install Anti-positive connection tape at the required locations, in accordance with the manufacturer's instructions.
- .2 Compressing it about 30%, install the backup joint according to the depth and profile of desired and requested by the technical representative of the waterproofing products' manufacturer.

3.7 SETTING UP THE WATERPROOFING PRODUCT

- .1 Proportion:
 - .1 Proportion the components rigorously respecting the instructions of the waterproofing products' manufacturer

- .2 Application of the waterproofing product:
 - .1 Set up the waterproofing product in accordance with the manufacturer's written instructions.
 - .2 In order to achieve clean joints, install masking tape on the edges of the surface to joint.
 - .3 Apply the waterproofing product making a continuous bead.
 - .4 Apply the waterproofing product with a constant flow electric gun equipped with a nozzle of the appropriate dimension.
 - .5 The feeding pressure must be strong enough to allow the filling of voids and the perfect filling of the joints.
 - .6 Achieve the joint so as to form a continuous waterproofing bead free from edges, plies, saggings, airspaces and covered dirt.
 - .7 Before a skin is formed on the joints, shape the exposed surfaces in order to give them a slightly concave profile.
 - .8 Remove the surplus of waterproofing products as the works progress as well as at the end.
 - .9 Where it is unavoidable to join silicone sealants to urethane sealants:
 - .1 First install the urethane sealant..
 - .2 Join the silicone sealants to urethane sealants according to the manufacturer's recommendations.
 - .10 Give a concave profile to the exposed sealants or according to the manufacturer's recommendations
- .3 Drying :
 - .1 Ensure the drying and hardening of the waterproofing products according to the instructions of these products' manufacturer.
 - .2 Do not cover the joints made waterproofing products before they are well dry.
- .4 Make sure that the waterproofing products are free from forming skin, bad adhesion and that they do not have defective works that are likely to harm the quality of the work.

3.8 LISTS AND TABLES

- .1 Waterproofing products – exterior locations:
 - .1 Application
 - .1 Expansion and control joints provided for in the exterior withe of the site concrete walls.
 - .2 Expansion and control joints provided for in the exterior withe of the prefabricated decorative panels walls.
 - .3 Expansion and control joints provided for in the exterior withe of the masonry walls (Stone, clay brick, concrete block)
 - .4 Joints between the metal panels.
 - .5 Joints between the materials mentioned above.
 - .6 Joints between the exterior walls' materials mentioned above and the doors, windows, louvers and other openings' frames.
 - .7 Joints provided for in horizontal surfaces (eaves, weatherboards)

- .8 Other moving joints provided for in vertical surfaces and other horizontal surfaces not prone to vehicle or pedestrian traffic.
- .2 Type of products to use depending on the working conditions and according and the manufacturer's recommendations:
 - .1 Type-1, type-2B, type-5, type-7C.
- .2 Waterproofing products – interior locations
 - .1 Application:
 - .1 Expansion and control joints provided for in the interior with the of the site concrete walls
 - .2 Interior edge of the openings made in exterior walls according to the detail of the drawings
 - .3 Joints provided for in the prefabricated beams or planks underside.
 - .4 Joints between the interior walls' materials mentioned above and the doors, windows, louvers, elevator's doors and other openings according to indications and details.
 - .5 Other moving joints provided for in vertical surfaces and other horizontal surfaces not prone to vehicle or pedestrian traffic such as:
 - .1 At the intersection of masonry walls (blocks/blocks, blocks/concrete).
 - .2 At the top of non-bearing masonry wall, at the underside of site concrete elements.
 - .3 In drywall partitions constructions.
 - .2 Type of products to use depending on the working conditions and according and the manufacturer's recommendations:
 - .1 Type-1, Type-2B, Type-5, Type-7A,C ou Type-9.
- .3 Waterproofing products for traffic surfaces
 - .1 Application:
 - .1 Expansion and control joints provided for in interior floors.
 - .2 Expansion and control joints provided for in site concrete elements.
 - .3 Expansion and control joints provided for in prefabricated concrete structural elements.
 - .4 Joints between the prefabricated concrete paving blocks.
 - .5 Expansion and control joints provided for in tiling works other than works in section 09 30 13 – Ceramic tilings
 - .6 Joints between materials mentioned above.
 - .7 Other moving joints provided for in exterior or interior horizontal or inclined surfaces prone to vehicle or pedestrian traffic.
 - .2 Type of products to use depending on the working conditions and according and the manufacturer's recommendations:
 - .1 Type-3, Type-4, Type-6 et Type-7D.
- .4 Interior waterproofing products in indirect contact with food. Refer to the requirements of CFIA:
 - .1 Application:
 - .1 Joints on kitchen counters and preparation surfaces.
 - .2 Joints between the food service equipments and the adjoining

- construction.
- .3 Other joints where contact with food is possible.
- .2 Type of products to use depending on the working conditions and according and the manufacturer's recommendations:
 - .1 Type-8A, Type-9
- .5 Interior waterproofing products – Sanitary facility:
 - .1 Applications:
 - .1 Joint on restroom and bathroom counters.
 - .2 Joints between the plumbing equipments and the adjoining materials.
 - .3 Joints between the lockers and the adjoining materials.
 - .4 Joints between the food service equipments and the adjoining construction.
 - .5 Other interior joints in humid or wet locations where the control of mold and mildew is necessary.
 - .2 Type of products to use depending on the working conditions and according and the manufacturer's recommendations:
 - .1 Type-8A
- .6 Waterproofing products in immersion
 - .1 Applications: joints in liquid approved by manufacturer of the immersed sealant.
 - .1 Type of products to use depending on the working conditions and according and the manufacturer's recommendations:
 - .1 Tremco Vulkem 116, Type-2B
 - .2 Sika Sikaflex 2c SL, Type-3
 - .3 Tremco Vulkem 45 SSL, Type-4
- .7 Waterproofing products – fuel petroleum product
 - .1 Applications:
 - .1 Joints in concrete surfaces prone to fuel petroleum product spill.
 - .2 Type of products to use depending on the working conditions and according and the manufacturer's recommendations:
 - .1 Type-4.
- .8 Other hidden waterproofing products.
 - .1 Applications: Joints between the metal flashings and the trims.
 - .1 Type of products to use depending on the working conditions and according and the manufacturer's recommendations: Type-7B.
 - .2 Applications: treated bed joints under the metal thresholds.
 - .1 Type of products to use depending on the working conditions and according and the manufacturer's recommendations: Type-7C or Type-10.
 - .3 Applications: Joints between the vapour barrier sheets.
 - .1 Type of products to use depending on the working conditions and according and the manufacturer's recommendations:
 - .1 Type -10.

- .4 Applications: Interior acoustic joints
 - .1 Type of products to use depending on the working conditions and according and the manufacturer's recommendations:
 - .1 Type-10.
- .5 Applications: Glazing joints
 - .1 Type of products to use depending on the working conditions and according and the manufacturer's recommendations:
 - .1 Type-8B

3.9 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean adjacent surfaces immediately.
 - .3 Remove excess and droppings, using recommended cleaners as work progresses.
 - .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 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

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 09 21 16 Gypsum board assemblies.
- .2 Section 09 30 13 Ceramic tiling
- .3 Section 09 53 00.01 Acoustical suspension.

1.2 REFERENCE STANDARDS

- .1 Aluminum Association (AA)
 - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 ASTM International
 - .1 ASTM A 167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM D 412-06ae2, Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.
 - .3 ASTM D 2240-05(2010), Standard Test Method for Rubber Property - Durometer Hardness.
 - .4 ASTM D 2628-91(2011), Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.
- .3 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.
- .4 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
 - .1 MPI #79 Primer, Alkyd, Anti-Corrosive for Metal.
 - .2 MPI #80 Primer, Vinyl Wash.
 - .3 MPI #95 Primer, Quick Dry, for Aluminum.

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 expansion joint cover assemblies 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 Canada.
 - .2 Indicate on drawings:
 - .1 Lengths, fasteners, accessories, anchors, seals, butt joints and locations finishes and profiles required for each condition.
- .4 Samples:
 - .1 Submit duplicate 150 mm long samples of each type expansion joint cover assemblies.

1.4 QUALITY ASSURANCE

- .1 Certificates:
 - .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .2 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.
- .3 Manufacturers Field Services:
 - .1 Submit manufacturers field reports.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect expansion joint cover assemblies from [nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of packaging materials as specified in Construction Waste Management Plan and Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2 PRODUCTS

2.1 DESIGN REQUIREMENTS

- .1 Joint movement: design to permit unrestricted lateral, vertical or omnidirectional movement of up to +/-50% of joint width.
- .2 Service Temperature: design exterior expansion joint cover assemblies to accommodate joint movements within service temperature range of -40 degrees C to 65 degrees C.

2.2 MATERIALS

- .1 Joint covers for acoustic ceiling systems
 - .1 Dual Dunometer" 80 Shore A/97 Shore A thermoplastic joint covers, conform to ASTM D2000 standard.
 - .1 Colour: white
 - .2 Width: 102mm
 - .3 Acceptable products:
 - .1 C/S Specialties HC joint covers
 - .2 Balco ACVS joint covers
 - .3 MM System DX joint covers
- .2 Joint covers for partition/partition assembly

- .1 6063-T5 aluminum alloy extrusion, conform to ASTM B221 standard
 - .1 Finish: anodized natural aluminum
 - .2 Width: 102 mm
 - .3 With "Single Durometer" 80 Shore A hidden joints conform to ASTM D2000
 - .4 Acceptable products:
 - .1 C/S Specialties ASM joint covers
 - .2 Balco WD joint covers
 - .3 MM Systems EX-K joint covers
- .3 Flexible joint for replacement on an existing joint cover
 - .1 "Dual Durometer", 65 Shore A / 90 Shore A thermoplastic flexible joint, conform to ASTM D2240 standard.
 - .1 Colour: Grey in the manufacturer's standard chart.
 - .2 Width: 51 mm
 - .3 Acceptable products:
 - .1 C/S Specialties GFT model flexible joint for existing joint-covers.

2.3 FAÇONNAGE

2.4 FABRICATION

- .1 Fabricate expansion joint covers, square, true, straight and accurate to required sizes and profiles.
- .2 Fabricate in maximum practical lengths to minimize joints.
- .3 Shop assemble covers ready for installation where practicable.
- .4 Fabricate joint cover assemblies with anchors, levelling nuts, filler inserts and shop applied protection as required for a complete installation to suit installation and project requirements.
- .5 Fabricate acceptable means of anchorage, such as anchor clips, expansion bolts and shields, welded studs or toggles.
- .6 Factory fabricate terminations and transitions.

3 EXECUTION

3.1 EXAMINATION

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

3.2 MANUFACTURER'S RECOMMENDATIONS

- .1 Comply with manufacturer's written data, including product technical bulletins, product catalogue

installation recommendations, product carton installation recommendations and data sheets.

3.3 INSTALLATION

- .1 Set work plumb, square, level, free from distortion.
- .2 Secure work accurately to structure in manner not restricting joint movement.
- .3 Maintain continuity of air barrier and vapour retarder.
- .4 Seal butt joints in accordance with manufacturer's written recommendations to provide watertight and light tight joints using sealant.
- .5 Protect cover plates during construction. Remove shop protection prior to final inspection.
- .6 Ensure sound and clean substrates before installation.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Remove traces of primer, caulking, epoxy and filler materials; clean expansion joint covers.
- .4 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

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

END OF SECTION

1 GENERAL POINTS

1.1 RELATED REQUIREMENTS

.1 For the general points, the products and the setting up, refer to the following sections:

- .1 Section 08 71 10 – Door hardware
- .2 Chart of doors and frames in the plans' leaflets

1.2 ABBREVIATIONS

- .1 Lr: Length required (to coordinate with the openings in question)
- .2 Hr: Height required (to coordinate with the openings in question)
- .3 D.t.: Door thickness (to coordinate with the openings in question)
- .4 LC: Less cylinder
- .5 RK: Regular key or change key (regular keying)
- .6 EMK: Existing Master Key. Coordinate with the items working a key to the existing systems and keyways. Coordinate with the owner for further information. Supply 5 copies of each master key requested by the owner. Provide all the necessary assistance to the owner so that he can introduce this key system well.

2 PRODUCTS

2.1 NOTES

- .1 .Refer to requirements in section 08 71 10 – Door, tumblers hardware and keys.
- .2 Door numbers are listed for information only next to the groups; refer to the doors and frames chart for the groups used on each of the doors.
- .3 The quantities specified in the groups are the required unit quantities for each of the doors in the indications.
- .4 The hardware bill is supplied as a guide to establish the type, function, quality and minimum weight of the required articles, but must not be interpreted as being a list of quantity. Therefore the contractor must check the list in the plans must provide any additional hardware article that is no on this list, but even so required to install the doors.
- .5 At the insulated steel doors:
 - .1 The kick plates and weather-strips must not touch each other: adapt the dimensions of the kick plates to leave a 13 mm space between those two elements.
- .6 At aluminum doors:

- .1 Coordinate all the hardware article with the construction of the aluminum doors.
- .7 For all the electrified hardware articles specified in the groups:
 - .1 Electrical outlets, control wiring junctions, fish lines are all supplied and installed by division 26 – Electricity. Coordinate with this section.
 - .2 The electrical components are supplied, installed and connected by the present section, including the running of wires with each other. All the running of wire from each component will be duly identified and brought to the dedicated control wiring junction, connections from this point will be taken care of by division 26 – Electricity.
- .8 Supplying and installation of hardware:
 - .1 Section 08 11 00 is responsible for supplying and installing of its required hardware.
 - .2 Section 08 11 16 is responsible for supplying and installing of its required hardware.
 - .3 Section 08 42 29 is responsible for supplying and installing of its required hardware.

2.2 ANSI/BHMA MATERIALS AND FINISHES CHART

Code BHMA	Code description	Basic material
619	Satin finish nickel	Brass and / or bronze
626	Satin finish chromium	Brass and / or bronze
628	Anodized light satin finish aluminum	Aluminum
630	Satin finish stainless steel	Stainless steel # 300
652	Satin finish plated chromium	Steel
689	Aluminum paint	All
719	Lack free natural aluminum	Aluminum

2.3 GROUPS

Key way system should be like MEDECO or equal approve by the owner.

Groupe/Group 01 – Portes/Doors # 06-08

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
3	CHARNIÈRES / HINGES # TA2714-114 X 100	652	McKINNEY
ou	CHARNIÈRES/ HINGES FBB179-114 X 100	652	STANLEY
ou	CHARNIÈRES/ HINGES AB700-114 X 100	652	HAGER
1	SERRURE MORTAISE / MORTISE LOCKSET ML2057-LWA X S/C	630	CORBIN
ou	SERRURE MORTAISE / MORTISE LOCKSET CRR8805FL X S/C	630	YALE
ou	SERRURE MORTAISE / MORTISE LOCKSET L9080P-03B X S/C	630	SCHLAGE
1	CYLINDRE MORTAISE / MORTISE CYLINDER ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE	630	MEDECO
1	FERME-PORTE / DOOR CLOSER # 8501	689	NORTON
ou	FERME-PORTE / DOOR CLOSER # DC6200	689	CORBIN
ou	FERME-PORTE / DOOR CLOSER # 1461	689	LCN
1	PLAQUE DE PROTECTION / DOOR PLATE # KOO50-200 X L.R.	630	TRIMCO
ou	PLAQUE DE PROTECTION / DOOR PLATE # K1O50-200 X L.R.	630	ROCKWOOD
ou	PLAQUE DE PROTECTION / DOOR PLATE # K1OA-200 X L.R.	630	SM
1	BUTOIR / DOOR STOP # 1270	626	TRIMCO
ou	BUTOIR / DOOR STOP # 400	626	ROCKWOOD
ou	BUTOIR / DOOR STOP # S125	626	SM
1	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # PK55B X L.R.	Noir	PEMKO
ou	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # W-21 X L.R.	Noir	KNC
ou	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # CF-12 X L.R.	Noir	UNIQUE
1	SEUIL TOMBANT / DOOR BOTTOM # 420APKL X L.R.	628	PEMKO
ou	SEUIL TOMBANT / DOOR BOTTOM # 320V X L.R.	628	UNIQUE
ou	SEUIL TOMBANT / DOOR BOTTOM # CT-54 X L.R.	628	KNC

Groupe/Group 01A – Porte/Door # 09

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
3	CHARNIÈRES / HINGES TA2714-114 X 100	652	McKINNEY
ou	CHARNIÈRES/ HINGES FBB179-114 X 100	652	STANLEY
ou	CHARNIÈRES/ HINGES AB700-114 X 100	652	HAGER
1	SERRURE MORTAISE / MORTISE LOCKSET ML2057-LWA X S/C	630	CORBIN
ou	SERRURE MORTAISE / MORTISE LOCKSET CRR8805FL X S/C	630	YALE
ou	SERRURE MORTAISE / MORTISE LOCKSET L9080P-03B X S/C	630	SCHLAGE
1	CYLINDRE MORTAISE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	FERME-PORTE / DOOR CLOSER # CLP8501	689	NORTON
ou	FERME-PORTE / DOOR CLOSER # DC6200-A4	689	CORBIN
ou	FERME-PORTE / DOOR CLOSER # 1461-CUSH	689	LCN
1	PLAQUE DE PROTECTION / DOOR PLATE # KOO50-200 X L.R.	630	TRIMCO
ou	PLAQUE DE PROTECTION / DOOR PLATE # K1O50-200 X L.R.	630	ROCKWOOD
ou	PLAQUE DE PROTECTION / DOOR PLATE # K1OA-200 X L.R.	630	SM
1	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # PK55B X L.R.	Noir	PEMKO
ou	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # W-21 X L.R.	Noir	KNC
ou	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # CF-12 X L.R.	Noir	UNIQUE
1	SEUIL TOMBANT / DOOR BOTTOM # 420APKL X L.R.	628	PEMKO
ou	SEUIL TOMBANT / DOOR BOTTOM # 320V X L.R.	628	UNIQUE
ou	SEUIL TOMBANT / DOOR BOTTOM # CT-54 X L.R.	628	KNC

Groupe/Group 02 – Portes/Doors # 13-15-17b

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
3	CHARNIÈRES/ HINGES TA2714-114 X 100	652	McKINNEY
ou	CHARNIÈRES / HINGES FBB179-114 X 100	652	STANLEY
ou	CHARNIÈRES / HINGES AB700-114 X 100	652	HAGER
1	SERRURE MORTAISE / MORTISE LOCKSET ML2055-LWA X S/C	630	CORBIN
ou	SERRURE MORTAISE / MORTISE LOCKSET CRR8808FL X S/C	630	YALE
ou	SERRURE MORTAISE / MORTISE LOCKSET L9070P-03B X S/C	630	SCHLAGE
1	CYLINDRE MORTAISE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	FERME-PORTE / DOOR CLOSER # 8501	689	NORTON
ou	FERME-PORTE / DOOR CLOSER # DC6200	689	CORBIN
ou	FERME-PORTE / DOOR CLOSER # 1461	689	LCN
1	PLAQUE DE PROTECTION / DOOR PLATE # KOO50-200 X L.R.	630	TRIMCO
ou	PLAQUE DE PROTECTION / DOOR PLATE # K1O50-200 X L.R.	630	ROCKWOOD
ou	PLAQUE DE PROTECTION / DOOR PLATE # K1OA-200 X L.R.	630	SM
1	BUTOIR / DOOR STOP # 1270	626	TRIMCO
ou	BUTOIR / DOOR STOP # 400	626	ROCKWOOD
ou	BUTOIR / DOOR STOP # S125	626	SM
1	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # PK55B X L.R.	Noir	PEMKO
ou	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # W-21 X L.R.	Noir	KNC
ou	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # CF-12 X L.R.	Noir	UNIQUE
1	SEUIL TOMBANT / DOOR BOTTOM # 420APKL X L.R.	628	PEMKO
ou	SEUIL TOMBANT / DOOR BOTTOM # 320V X L.R.	628	UNIQUE
ou	SEUIL TOMBANT / DOOR BOTTOM # CT-54 X L.R.	628	KNC

Groupe/Group 02A – Porte/Door # 18

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
3	CHARNIÈRES / HINGES TA2714-114 X 100	652	McKINNEY
ou	CHARNIÈRES / HINGES FBB179-114 X 100	652	STANLEY
ou	CHARNIÈRES/ HINGES AB700-114 X 100	652	HAGER
1	SERRURE MORTAISE / MORTISE LOCKSET ML2057-LWA X S/C	630	CORBIN
ou	SERRURE MORTAISE / MORTISE LOCKSET CRR8805FL X S/C	630	YALE
ou	SERRURE MORTAISE / MORTISE LOCKSET L9080P-03B X S/C	630	SCHLAGE
1	CYLINDRE MORTAISE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	FERME-PORTE / DOOR CLOSER # 8501	689	NORTON
ou	FERME-PORTE / DOOR CLOSER # DC6200	689	CORBIN
ou	FERME-PORTE / DOOR CLOSER # 1461	689	LCN
1	PLAQUE DE PROTECTION / DOOR PLATE # KOO50-200 X L.R.	630	TRIMCO
ou	PLAQUE DE PROTECTION / DOOR PLATE # K1O50-200 X L.R.	630	ROCKWOOD
ou	PLAQUE DE PROTECTION / DOOR PLATE # K10A-200 X L.R.	630	SM
1	BUTOIR / DOOR STOP # 1270	626	TRIMCO
ou	BUTOIR / DOOR STOP # 400	626	ROCKWOOD
ou	BUTOIR / DOOR STOP # S125	626	SM
1	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # PK55B X L.R.	Noir	PEMKO
ou	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # W-21 X L.R.	Noir	KNC
ou	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # CF-12 X L.R.	Noir	UNIQUE
1	SEUIL TOMBANT / DOOR BOTTOM # 420APKL X L.R.	628	PEMKO
ou	SEUIL TOMBANT / DOOR BOTTOM # 320V X L.R.	628	UNIQUE
ou	SEUIL TOMBANT / DOOR BOTTOM # CT-54 X L.R.	628	KNC
1	GÂCHE ÉLECTRIQUE / ELECTRIC STRIKE# 1006-CLB X 2005M3 X 12/24VDC	630	HES
ou	GÂCHE ÉLECTRIQUE / ELECTRIC STRIKE # 742-75 X 12/24VDC	630	f/a
ou	GÂCHE ÉLECTRIQUE / ELECTRIC STRIKE # 6210 X 12/24VDC	630	vd
1	LECTEUR DE CARTE FOURNI PAR AUTRE /CARD READER BY OTHER		

Groupe/Group 02B - Porte/Door # 17a

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
3	CHARNIÈRES / HINGES TA2714-114 X 100	652	McKINNEY
ou	CHARNIÈRES / HINGES FBB179-114 X 100	652	STANLEY
ou	CHARNIÈRES / HINGES AB700-114 X 100	652	HAGER
1	SERRURE MORTAISE / MORTISE LOCKSET ML2055-LWA X S/C	630	CORBIN
ou	SERRURE MORTAISE / MORTISE LOCKSET CRR8808FL X S/C	630	YALE
ou	SERRURE MORTAISE / MORTISE LOCKSET L9070P-03B X S/C	630	SCHLAGE
1	CYLINDRE MORTAISE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	FERME-PORTE / DOOR CLOSER # 8501	689	NORTON
ou	FERME-PORTE / DOOR CLOSER # DC6200	689	CORBIN
ou	FERME-PORTE / DOOR CLOSER # 1461	689	LCN
1	PLAQUE DE PROTECTION / DOOR PLATE # KOO50-200 X L.R.	630	TRIMCO
ou	PLAQUE DE PROTECTION / DOOR PLATE # K1O50-200 X L.R.	630	ROCKWOOD
ou	PLAQUE DE PROTECTION / DOOR PLATE # K1OA-200 X L.R.	630	SM
1	BRAS D'ARRÊT / DOOR HOLDER # 6-336ADJ	630	RIXSON
ou	BRAS D'ARRÊT / DOOR HOLDER# 104S	630	GJ
1	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # PK55B X L.R.	Noir	PEMKO
ou	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # W-21 X L.R.	Noir	KNC
ou	ENS.COUPÉ-FUMÉE / SMOKE GASKETING # CF-12 X L.R.	Noir	UNIQUE
1	SEUIL TOMBANT / DOOR BOTTOM # 420APKL X L.R.	628	PEMKO
ou	SEUIL TOMBANT / DOOR BOTTOM # 320V X L.R.	628	UNIQUE
ou	SEUIL TOMBANT / DOOR BOTTOM # CT-54 X L.R.	628	KNC

Groupe/Group 03 – Porte/Door # 20

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
3	CHARNIÈRES / HINGES TA2314-114 X 114 X FNA	652	McKINNEY
ou	CHARNIÈRES / HINGES FBB191-114 X 114 X FNA	652	STANLEY
ou	CHARNIÈRES / HINGES AB800-114 X 114 X FNA	652	HAGER
1	TRANSFERT DE COURANT / CURRENT TRANSFER # EPTL		SECURITRON
OU	TRANSFERT DE COURANT / CURRENT TRANSFER # 4612		AR
OU	TRANSFERT DE COURANT / CURRENT TRANSFER # 8810		ABLOY
1	VERROU PANIQUE /EXIT DEVICE # ED4200-D x 24vdc	626	CORBIN
OU	VERROU PANIQUE /EXIT DEVICE # 7200-D x 24vdc	626	YALE
OU	VERROU PANIQUE /EXIT DEVICE # CX35EO x 24vdc	626	VD
1	FERME-PORTE/ DOOR CLOSER # CPS-7500 X 7788	689	NORTON
ou	FERME-PORTE / DOOR CLOSER # DC8200-A05	689	CORBIN
ou	FERME-PORTE / DOOR CLOSER # 4040XP-SP-CUSH X 4040-18	689	LCN
1	ENS.COUPÉ-FROID ET SEUIL BRIS THERMIQUE DIMENSION À DÉTERMINER SUR PLACE FOURNI PAR LE MANUFACTURIER DES PORTES ET CADRES / THRESHOLD AND WEATHERSTRIP BY DOOR MANUFACTURER		
1	ENSEIGNE / ENGRAVED SIGN # SCC3292-31F/A POUR PORTE DE VERRE	Rouge/ RED	SCC
1	BOITIER D'ALIMENTATION / POWER SUPPLY BPS12/24-1		SECURITRON
OU	BOITIER D'ALIMENTATION / POWER SUPPLY# PS914 X 24		VD
1	CYLINDRE MORTAISE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO

Operation :

- To leave towards the area trafic, to pass the map of access in the reader, alarm will be disabled temporarily and to push in the door. Alarm will be rearmed

Groupe/Group 04 - Porte/Door # 12

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
3	CHARNIÈRES/ HINGES TA2314-114 X 114 X FNA	630	McKINNEY
OU	CHARNIÈRES/ HINGES FBB191-114 X 114 X FNA	630	STANLEY
OU	CHARNIÈRES/ HINGES AB800-114 X 114 X FNA	630	HAGER
1	SERRURE MORTE ET PALETTE D'URGENCE / LOCKSET WITH PUSH PADDLE # 4510 X 4591	628	AR
1	GÂCHE ÉLECTRIQUE /ELECTRIC STRIKE # 7400 X 12/24VDC À DÉTERMINER	628	AR
1	ENS.POIGNÉE À TIRER-POUSSER / PUSH AND PULL BAR # 1747 X EP X MTG DISSIMULÉ	630	TRIMCO
OU	ENS.POIGNÉE À TIRER-POUSSER / PUSH AND PULL BAR # BF15847 X EP X MTG DISSIMULÉ	630	ROCKWOOD
OU	ENS.POIGNÉE À TIRER-POUSSER / PUSH AND PULL BAR # 3012 X 3034-2 X EP X MTG DISSIMULÉ	630	SM
1	CYLINDRE MORTAISE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	FERME-PORTE / DOOR CLOSER # CPS-7500 X 7788	689	NORTON
OU	FERME-PORTE / DOOR CLOSER # DC8200-A05	689	CORBIN
OU	FERME-PORTE / DOOR CLOSER # 4040XP-SP-CUSH X 4040-18	689	LCN
1	PROTÈGE PÊNE / LATCH PROTECTOR # CiiA-30	628	CAPITOL
1	PROTÈGE PÊNE / LATCH PROTECTOR # 5000T	626	TRIMCO
1	PROTÈGE PÊNE / LATCH PROTECTOR # 150	628	HES
1	ENS.COUPÉ-FROID ET SEUIL BRIS THERMIQUE DIMENSION À DÉTERMINER SUR PLACE FOURNI PAR LE MANUFACTURIER DES PORTES ET CADRES / THRESHOLD AND WEATHERSTRIP BY DOOR MANUFACTURER.		
1	LECTEUR DE CARTE PAR AUTRE / CARD READER BY OTHER		
1	ÉLECTROAIMANT / MAGNET# iMXDA x 24vdc	630	SECURITRON
OU	ÉLECTROAIMANT / MAGNET # DE8310 x 24vdc	630	RCI
1	ENSEIGNE /ENGRAVED SIGN # SCC3292-31F/A	Rouge	SCC
1	BOITIER D'ALIMENTATION / POWER SUPPLYBPS12/24-1		SECURITRON
OU	BOITIER D'ALIMENTATION / POWER SUPPLY# 10-1 x 12/24-1		RCI
1	INTERUPTEUR À CLÉ / KEY SWITCH # MK	630	SECURITRON
OU	INTERUPTEUR À CLÉ / KEY SWITCH # 960	630	RCI
1	CYLINDRE MORTAISE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO

Operation :

- To leave towards the area traffic, to pass the map of access in the reader, the electromagnet will slacken the door.
- To enter of the area traffic, to use the key switch located outside.

Groupe/Group 05 – Porte/Door 18b

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
1	QUINCAILLERIE FOURNIE PAR LE MANUFACTURIER DES PORTES SAUF / HARDWARE BY DOOR MANUFACTURER		
1	SEUIL D'ALUMINIUM / ALUMINIUM TRESHOLD # AB7 X ABBT X AB33 X ABBT X AB7 X L.R.	628	UNIQUE
1	INTERRUPTEUR À CLÉ / KEY SWITCH # MK	630	SECURITRON
OU	INTERRUPTEUR À CLÉ / KEY SWITCH # MCK-4	630	ALARM CONTROL
OU	INTERRUPTEUR À CLÉ / KEY SWITCH # CM-1200	630	CAMDEM
1	CYLINDRE MORTAISE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO

Groupe/Group 06 – Portes/Doors # 14-16

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
1	ENS DE RAIL, CHARIOTS ET GUIDE / TRACKS, CARRIER AND GUIDE # TYPE C X L.R.	628	KNC
1	SERRURE MORTE / DEADLOCK # C-90L X C-90C X C90T	626	KNC
1	CYLINDRE MORTAISE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE / MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO

Groupe/Group 07 – Portes/Doors # 11-17

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
3	CHARNIÈRES/ HINGES TA2314-114 X 114 X FNA	630	McKINNEY
OU	CHARNIÈRES/ HINGES FBB191-114 X 114 X FNA	630	STANLEY
OU	CHARNIÈRES / HINGES AB800-114 X 114 X FNA	630	HAGER
1	TRANSFERT DE COURANT / CURRENT TRANSFER # EPTL		SECURITRON
OU	TRANSFERT DE COURANT / CURRENT TRANSFER # 4612		AR
OU	TRANSFERT DE COURANT / CURRENT TRANSFER # 8810		ABLOY
1	VERROU PANIQUE /EXIT DEVICE # ED5200-D XTH957 X S/C	626	CORBIN
OU	VERROU PANIQUE /EXIT DEVICE # 7100-D X 632F X S/C	626	YALE
OU	VERROU PANIQUE /EXIT DEVICE # CX98NL X 990NL-R X S/C	626	VD
1	CYLINDRE À TIGE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	FERME-PORTE / DOOR CLOSER # CPS-7500 X 7788	689	NORTON
OU	FERME-PORTE / DOOR CLOSER # DC8200-A05	689	CORBIN
OU	FERME-PORTE / DOOR CLOSER # 4040XP-SP-CUSH X 4040-18	689	LCN
1	PLAQUE DE PROTECTION / DOOR PLATE # KOO50-200 X L.R.	630	TRIMCO
ou	PLAQUE DE PROTECTION / DOOR PLATE # K1O50-200 X L.R.	630	ROCKWOOD
ou	PLAQUE DE PROTECTION / DOOR PLATE # K1OA-200 X L.R.	630	SM
1	SEUIL D'ALUMINIUM / ALUMINIUM TRESHOLD# AB7 X ABBT X AB33 X ABBT X AB7 X L.R.	628	UNIQUE
1	ENS.COUPÉ-FROID / WEATHERSTRIP # W-50S X L.R.	628	KNC
1	ENSEIGNE /ENGRAVED SIGN # SCC3292-31F/A	Rouge	SECURITRON
1	BOITIER D'ALIMENTATION / POWER SUPPLYBPS12/24-1		SECURITRON
OU	BOITIER D'ALIMENTATION / POWER SUPPLY#914 X 12/24		SECURITRON
1	INTERUPTEUR À CLÉ / KEY SWITCH # MK	630	SECURITRON
OU	INTERUPTEUR À CLÉ / KEY SWITCH # 960	630	RCI
2	CYLINDRES MORTAISE ASSUJETTIS AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	LECTEUR DE CARTE PAR AUTRE /CARD READER BY OTHER		

Operation :

- To leave towards the area trafic, to pass the map of access in the reader, alarm will be disabled temporarily and to push in the door. Alarm will be rearmed after the exit.
- To enter of the area trafic, to use the key switch located outside.

Groupe/Group 07A – Porte/Door # 18A

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
3	CHARNIÈRES / HINGES TA2314-114 X 114 X FNA	652	McKINNEY
OU	CHARNIÈRES / HINGES FBB191-114 X 114 X FNA	652	STANLEY
OU	CHARNIÈRES / HINGES AB800-114 X 114 X FNA	652	HAGER
1	VERROU PANIQUE /EXIT DEVICE # ED5200	626	CORBIN
1	VERROU PANIQUE /EXIT DEVICE # 7100	626	YALE
1	VERROU PANIQUE /EXIT DEVICE # 98EO	626	VD
1	FERME-PORTE / DOOR CLOSER # CPS-7500 X 7788	689	NORTON
OU	FERME-PORTE / DOOR CLOSER # DC8200-A05	689	CORBIN
OU	FERME-PORTE / DOOR CLOSER # 4040XP-SP-CUSH X 4040-18	689	LCN
1	SEUIL D'ALUMINIUM / ALUMINIUM THRESHOLD # AB7 X ABBT X AB33 X ABBT X AB7 X L.R.	628	UNIQUE
1	ENS.COUPÉ-FROID / WEATHERSTRIP # W-50S X W-20S L.R.	628	KNC

Groupe/Group 08 – Porte/Door # 11a

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
3	CHARNIÈRES / HINGES TA2714-114 X 114 X FNA	652	McKINNEY
OU	CHARNIÈRES / HINGES FBB179-114 X 114 X FNA	652	STANLEY
OU	CHARNIÈRES / HINGES AB700-114 X 114 X FNA	652	HAGER
1	TRANSFERT DE COURANT / CURRENT TRANSFER # EPTL		SECURITRON
OU	TRANSFERT DE COURANT/ CURRENT TRANSFER # 4612		AR
OU	TRANSFERT DE COURANT / CURRENT TRANSFER # 8810		ABLOY
1	VERROU PANIQUE /EXIT DEVICE # ED5200A-D XTH957 X S/C	626	CORBIN
OU	VERROU PANIQUE /EXIT DEVICE # 7100F-D X 632F X S/C	626	YALE
OU	VERROU PANIQUE /EXIT DEVICE # CX98NL-F X 990NL-R X S/C	626	VD
1	CYLINDRE À TIGE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	FERME-PORTE / DOOR CLOSER # CPS-7500 X 7788	689	NORTON
OU	FERME-PORTE / DOOR CLOSER # DC8200-A05	689	CORBIN
OU	FERME-PORTE / DOOR CLOSER # 4040XP-SP-CUSH X 4040-18	689	LCN
1	ENSEIGNE / ENGRAVEC SIGN # SCC3292-31F/A	Rouge	SECURITRON
1	BOITIER D'ALIMENTATION / POWER SUPPLYBPS12/24-1		SECURITRON
OU	BOITIER D'ALIMENTATION / POWER SUPPLY #914 X 12/24		SECURITRON
1	INTERUPTEUR À CLÉ / KEY SWITCH # MK	630	SECURITRON
OU	INTERUPTEUR À CLÉ / KEY SWITCH # 960	630	RCI
2	CYLINDRES MORTAISE ASSUJETTIS AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	LECTEUR DE CARTE PAR AUTRE / CARD READER BY OTHER		

Operation :

- To leave towards office 11, to pass the map of access in the reader, alarm will be disabled temporarily and to push in the door. Alarm will be rearmed after the exit.
- To enter of the area trafic, to use the key switch located outside
- For the system of time 3-15, it will have to be connected to door # 11 so that the two doors are unbarred simultaneously if somebody activates the system of the door 11a.

Groupe/Group 09 – Porte/Door # 19

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
3	CHARNIÈRES / HINGES TA2314-114 X 100	630	McKINNEY
3	CHARNIÈRES / HINGES FBB191-114 X 114 X FNA	630	STANLEY
3	CHARNIÈRES / HINGES AB800-114 X 114 X FNA	630	HAGER
1	SERRURE MORTE ET PALETTE D'URGENCE / LOCKSET WITH PUSH PADDLE# 4510 X 4591	628	AR
1	ENS.POIGNÉE À TIRER / PUSH AND PULL BARS # 1747 X L.R. X EP X MTG DISSIMULÉ	630	TRIMCO
1	ENS.POIGNÉE À TIRER / PUSH AND PULL # BF15847 X L.R. X EP X MTG DISSIMULÉ	630	ROCKWOOD
1	ENS.POIGNÉE À TIRER / PUSH AND PULL # 3012 X 3034-2 X L.R. X EP X MTG DISSIMULÉ	630	SM
1	CYLINDRE MORTAISE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	FERME-PORTE / DOOR CLOSER # CPS-7500 X 7788	689	NORTON
1	FERME-PORTE / DOOR CLOSER # DC8200-A04	689	CORBIN
1	FERME-PORTE / DOOR CLOSER # 4040XP-SP-CUSH X 4040-18	689	LCN
1	PROTÈGE PÊNE / LATCH PROTECTOR # CiiA-30	628	CAPITOL
1	PROTÈGE PÊNE / LATCH PROTECTOR # 5000T	626	TRIMCO
1	PROTÈGE PÊNE / LATCH PROTECTOR # 150	628	HES

Groupe/Group 10 – Porte/Door # 21

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
3	CHARNIÈRES / HINGES TA2714-114 X 100	652	McKINNEY
3	CHARNIÈRES / HINGES FBB179-114 X 100	652	STANLEY
3	CHARNIÈRES / HINGES AB700-114 X 100	652	HAGER
1	TRANSFERT DE COURANT / CURRENT TRANSFER # EPTL		SECURITRON
1	TRANSFERT DE COURANT/ CURRENT TRANSFER # 4612		AR
1	TRANSFERT DE COURANT / CURRENT TRANSFER # 8810		ABLOY
1	VERROU PANIQUE /EXIT DEVICE # 8412M1 X EP X L.R.	628	AR
1	ENS.POIGNÉE À TIRER / PUSH AND PULL BARS # 1191-5 X EP X MTG DISSIMULÉ	630	TRIMCO
1	ENS.POIGNÉE À TIRER / PUSH AND PULL BARS # BF159 X EP X MTG DISSIMULÉ	630	ROCKWOOD
1	ENS.POIGNÉE À TIRER / PUSH AND PULL BARS # 3012 X EP X MTG DISSIMULÉ	630	SM
1	CYLINDRE MORTAISE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE/ MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	OPÉRATEUR / DOOR OPERATOR # SW-200i X L.R. X 120VAC	689	BESAM
2	BOUTONS / PUSH BUTTON # NTR-1FS	630	ALARM CONTROL
1	PROTÈGE PÊNE / LATCH PROTECTOR # CiiA-30	628	CAPITOL
1	PROTÈGE PÊNE / LATCH PROTECTOR # 5000T	626	TRIMCO
1	PROTÈGE PÊNE / LATCH PROTECTOR # 150	628	HES
1	GÂCHE ÉLECTRIQUE / ELECTRIC STRIKE # 7400 X 12/24VDC	628	AR
1	LECTEUR DE CARTE FOURNI PAR AUTRE/CARD READER BY OTHER		

Operation :

- When door # 22 is in open position the supply will be cut off for the operator in order to allow the loading of the passengers

Groupe/Group 10A – Porte/Door # 22

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
3	CHARNIÈRES / HINGES TA2714-114 X 100	652	McKINNEY
3	CHARNIÈRES / HINGES FBB179-114 X 100	652	STANLEY
3	CHARNIÈRES / HINGES AB700-114 X 100	652	HAGER
1	VERROU PANIQUE /EXIT DEVICE # 8412 X EP X L.R.	628	AR
1	ENS.POIGNÉE À TIRER / DOOR PULL # 1191-5 X EP X MTG DISSIMULÉ	630	TRIMCO
1	ENS.POIGNÉE À TIRER / DOOR PULL # BF159 X EP X MTG DISSIMULÉ	630	ROCKWOOD
1	ENS.POIGNÉE À TIRER / DOOR PULL # 3012 X EP X MTG DISSIMULÉ	630	SM
1	CYLINDRE MORTAISE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE / MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	FERME-PORTE / DOOR CLOSER # CPS-7500H X 7788	689	NORTON
1	FERME-PORTE / DOOR CLOSER # DC8200-A5	689	CORBIN
1	FERME-PORTE / DOOR CLOSER # 4040XP-SP-H-CUSH X 4040-18	689	LCN
1	PROTÈGE PÊNE / LATCH PROTECTOR # CiiA-30	628	CAPITOL
1	PROTÈGE PÊNE / LATCH PROTECTOR # 5000T	626	TRIMCO
1	PROTÈGE PÊNE / LATCH PROTECTOR # 150	628	HES
1	GÂCHE ÉLECTRIQUE / ELECTRIC STRIKE # 7400 X 12/24VDC	628	AR
2	LECTEURS DE CARTE FOURNI PAR AUTRE/CARD READER BY OTHER		
1	ÉLECTROAIMANT / MAGNET # iMXDA x 24vdc	630	SECURITRON
1	ÉLECTROAIMANT / MAGNET # DE8310 x 24vdc	630	RCI
1	ENSEIGNE / ENGRAVED SIGN # SCC3292-31F/A	Rouge	SECURITRON
1	BOITIER D'ALIMENTATION / POWER SUPPLY BPS12/24-1		SECURITRON
1	BOITIER D'ALIMENTATION / POWER SUPPLY # 10-1/24		RCI
1	INTERUPTEUR À CLÉ / KEY SWITCH # MK	630	SECURITRON
1	INTERUPTEUR À CLÉ / KEY SWITCH # 960	630	RCI
2	CYLINDRES MORTAISE ASSUJETTI AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE / MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	DÉTECTEUR DE POSITION DE PORTE / DOOR POSITION SWITCH # DPS-M		SECURITRON

Operation :

- To leave towards the apron, to pass the map of access in the reader, the electromagnet will slacken the door.
- To enter of the area trafic, to use the card reader side part # 22. The system will slacken, the electromagnet and the electric strike.

Groupe/Group 11 – Porte/Door # 22A

QTÉ QTY	DESCRIPTION	FINI FINISH	MANUFACTURIER MANUFACTURER
1	ENS.PORTE COULISSANTE AUTOMATIQUE / AUTOMATIC SLIDING DOOR # SL500 (SO-SX)	628	BESAM
1	ENS.PORTE COULISSANTE AUTOMATIQUE / AUTOMATIC SLIDING DOOR # DS-18-1-FBL (SO-SX)	628	HUNTER
1	ENS.PORTE COULISSANTE AUTOMATIQUE / AUTOMATIC SLIDING DOOR # DURA-GLIDE (SO-SX)	628	STANLEY
2	CYLINDRES MORTAISES ASSUJETTIS AU SYSTÈME DE CLÉ DU PROPRIÉTAIRE / MORTISE CYLINDER KEYED ON ONWNER SYSTEM	630	MEDECO
1	SEUIL D'ALUMINIUM ET COUPE-FROID FOURNI PAR LE MANUFACTURIER DES PORTES / TRESHOLD AND WEATHERSTRIP BY DOOR MANUFACTURER	62	

Key system:

- 1 Medceco safety key system to define; 3 keys for each cylinder and 3 master keys of each of the copies.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 21 00 - Allowances
- .2 Section 06 08 99 – Rough carpentry for minor works.
- .3 Section 07 21 16 – Blanket insulation.
- .4 Section 07 25 00 – Air barrier.
- .5 Section 07 27 10 – Air/vapor barrier membrane and intra-muros flexible flashings.
- .6 Section 07 92 00 - Joint sealants, with regard to joints caulking between the frames and other elements of the building.
- .7 Section 08 06 71 – Doors hardware.
- .8 Section 08 71 10 – Door hardware.
- .9 Section 08 80 50 - Glazing
- .10 Section 09 22 16 – Non-structural metal framing
- .11 Section 09 91 13.01 – Exterior re-painting
- .12 Section 09 91 23.01 – Interior re-painting
- .13 Doors and frames chart on the plans's leaflets
- .14 Division 23 (15000) – With regard to works related to Heating, Ventilating and Air Conditioning (HVAC)
- .15 Section 26 (16000) - Electricity, with regard to wiring meant for electrical hardware.

1.2 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 653/A 653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM B 29-03, Standard Specification for Refined Lead.
 - .3 ASTM B 749-03, Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
 - .2 CGSB 41-GP-19Ma-84, Rigid Vinyl Extrusions for Windows and Doors.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
- .4 Canadian Steel Door Manufacturers' Association (CSDMA)
 - .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
 - .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.
- .5 National Fire Protection Association (NFPA)

- .1 NFPA 80-99, Standard for Fire Doors and Fire Windows.
- .2 NFPA 252-03, Standard Methods of Fire Tests of Door Assemblies.
- .7 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1113-04, Architectural Coatings.
 - .2 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.
- .8 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S701-01, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .2 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
 - .3 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
 - .4 CAN4-S104-M80, Standard Method for Fire Tests of Door Assemblies.
 - .5 CAN4-S105-M85, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.3 SYSTEM DESCRIPTION

- .1 Design Requirements:
 - .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35 degrees C to 35 degrees C.
 - .2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.
 - .3 Steel fire rated doors and frames: labeled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 and NFPA 25 for ratings specified or indicated.
 - .4 Provide fire labeled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104, ASTM E 152 or NFPA 252 and listed by nationally recognized agency having factory inspection services.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide product data: in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Canada.
 - .2 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, louvred, arrangement of hardware and fire rating and finishes.
 - .3 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing, fire rating finishes.
 - .4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.
 - .5 Submit test and engineering data, and installation instructions.
- .4 Provide required samples data sheets in accordance with Section 01 33 00 - Submittal Procedures.
- .5 Submit the set up instructions supplied by the manufacturer.
- .6 Submit the homologation tests reports conducted in a laboratory.

1.5 TRANSPORTATION, 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 in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 DOCUMENTS/ELEMENTS TO HAND OVER AT THE COMPLETION OF THE WORKS

- .1 Provide the necessary instructions for cleaning and maintenance of the finished surfaces and joint them to the manual mentioned in section 01 78 00 - Documents/Elements to hand over at the completion of the works.
- .2 Provide the tools and instructions necessary for the adjustment of moving parts, panic locks and door closers and hand them down to the departmental representative.

1.7 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 and 10 years.
- .2 Provide a written and signed document, issued in the name of Canada, certifying the doors and frames against any loss of airtightness and waterproofing, any condensation, any deterioration of the finish, any deformation due to the anticipated load, corrosion, collapse, hair crack in edges and joints defects, for a period of five (5) years. Refer to the general conditions for the beginning of the warranties.
- .3 In addition to what is mentioned in section 08 50 50 – Glazing, the warranty must stipulate the sealed glass will keep its appearance and transparency, with no forming of opaque film, condensation or deposit inside the units for a period of 10 years. Refer to the general conditions for the beginning of the warranties.
- .4 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments and the required services to repair the defective parts of the work and, in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 MATERIALS

- .1 General points: all the steel doors and frames must come from one and only manufacturer.
- .2 Galvanized steel plate: conform to ASTM A653, CS, Type B standard, designation of siding ZF75 minimum; minimum thickness of steel conform to annex 1 of CSDMA « *Recommended Specifications for Commercial Steel Door and Frame Products* ».
- .3 Backings: steel conform to table 1 of CSDMA « *Recommended Specifications for Commercial Steel Door and Frame Products* » and according to ASTM A 653M standard.

2.2 DOOR CORES

- .1 Hollow core for interior door:
 - .1 "Honeycomb" type core, with cores no more than 25.4 mm maximum, in Kraft paper whose mass is at least 36.3 Kg per ream and density is at least 16.5 kg/m³, sandpapered until obtaining the required thickness.
- .2 Insulated core for exterior core:
 - .1 Isocyanurate core: isocyanurate rigid panels, modified, with closed cores, of a density of 32 16.5 kg/m³, thermal value RSI=1.9 minimum, according to ASTM C591 or C1289 standard.
- .3 Core for classified fire-resisting door (thermal rating): the material of the core of a door must allow to limit the heating on the non exposed side of the door to 250° C for the time indicated on the chart of doors and frames.
- .4 Core must be tested as an integral part of the door in accordance with CAN4-S104, ASTM E152 or NFPA 252 standards about the doors performance in fire tests, it must be homologated by a nationally acknowledged organism and ensuring a factory inspection service.

2.3 PRIMER

- .1 Low VOC level spot priming rustproof paint only conform to CA/CGSB-1.191 standard.

2.4 PANIT

- .1 Doors and frames must be painted on both sides in accordance with sections 09 91 13.01 and 09 91023.01 – Paints: refinishing works. Weather-strips must not be painted. Finish surfaces must free from scratches or other defects.

2.5 ADHESIVES

- .1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
 - .1 Adhesive: maximum VOC content 50 g/L to SCAQMD Rule 1168.
- .2 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.
- .3 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

2.6 ACCESSORIES

- .1 Door stoppers: neoprene rubber.
- .2 Adhesives: VOC free, according to the manufacturer's standards.
- .3 Glazing beads must be made from shaped profiles at least 16 mm high; they must be well adjusted, be abutted at the angles and be fixed at the elements of the frame with over-head countersink head sheet metal screws.
- .4 Hardware: report to section 08 71 10 – Door hardware.

- .5 Metal expansion-joint filler: according the manufacturer's specifications.
- .6 Fire-resistant homologation tags: fixed with metal rivets.
- .7 Waterproofing product report to section 07 92 00 – Waterproofing products for joints.
- .8 Glazing: report to section 08 80 50 – Glazing.
- .9 Plan glazing installation, according to the indications and supply the necessary glazing beads.
 - .1 Glazing must maintained with galvanized steel moving glazing beads of at least 1.22 mm thick of the base metal and have the same galvanized finish as the frame itself. Use glazing tape and mastic and fix the glazing beads with countersink head stainless steel screws allowing the installation of the glazing in dry channel and just by pressing.
 - .2 The exterior glazing beads must be of tamperproof type.
- .10 Material sprayed to fill in the spaces between the exterior frames and the elements of the exterior walls: one component polyurethane foam, minimum blowing, applicable with an adjusting gun in order to control the dimension of the insulating bead.
 - .1 Acceptable products:
 - .1 Demilec R SEAL260
 - .2 HILTI CF-XTW
 - .3 Adfast AD foam Plus
 - .4 or replacement product approved by addenda in accordance with the instructions to the bidders.

2.7 MANUFACTURING OF FRAMES – GENERAL POINTS

- .1 Frames must be manufactured according to CSDMA standards.
- .2 Frames must be manufactured according to the indicated maximum front dimensions and profiles.
- .3 Exterior frames: 1.6 mm thick, welded, thermal bridge breakage.
- .4 Interior frames: 1.6 mm thick, welded.
- .5 Frames must be cut, reinforced, drilled and tapped if needed, to receive the mortised and template and the necessary electrical hardware, and that with templates supplied by the finishing hardware parts supplier. The frames must be reinforced to receive, if needed, the hardware parts to set in bow.
- .6 Plan the openings for the indicated glazing and supply the required moving glazing beads.
- .7 Installed frame mortises must be protected with steel mortise covers.
- .8 One leaf door frames must be equipped with three stoppers and the two leaf door frames with two stoppers installed on the top rail.
- .9 No manufacturer identification plate is to be set on the frames and panels.
- .10 Unless otherwise indicated, the fastening elements must be hidden.
- .11 Frames must be spot painted with a primer where the zinc coating has been damaged during manufacturing.
- .12 Insulate the exterior frame with a polyurethane base insulation.

2.8 ANCHORING OF THE FRAMES

- .1 Appropriate devices used to fix frames to the walls and floors must be supplied and installed in accordance with table 1 of CDMA « *Recommended Specifications for Commercial Steel Door and Frame Products* ».
- .2 Wall anchoring devices must be directly above or under each hinge reinforcement on the hinge side of the jamb and directly at the opposite of the latch stile.
- .3 Jamb whose leaf height is equal to or less than 1 520 mm must be equipped with 2 anchorages; one additional anchoring must be planned for each additional segment or portion of segment of 760 mm.
- .4 The anchorages that will be embedded in bay casing made before the installation of the door frames must be set at 1500 mm from the top and bottom of each jamb the at 660 mm center to center at the most.

2.9 WELDED FRAME

- .1 Welds must be made in accordance with CSA W59 standard.
- .2 Frames' elements must be assembled with precision, mechanically or mitered, then solidly

- welded to each other, weld being made on the interior side of the profiles.
- .3 But joints between the elements of the mullions, transform bars, lock rails as well as the thresholds and window sills must be counter-profiled with precision.
- .4 Welded joints and angles must be grinded until obtaining a smooth surface fitted with filling mastic for metal, then sanded until obtaining a smooth and even finish.
- .5 Anchors on the floor must solidly fixed inside each post.
- .6 Two temporary tie beams must be welded to each frame to keep them straight during transport. These tie beams must be removed before installation and replaced with spacers of the exact required length.

2.10 SLIDING FRAME

- .1 Sliding frames must be delivered knocked down.
- .2 Frames must be made of mechanical joints elements fitting into each other solidly and the must show a satisfactory functional performance once assembled and installed in accordance with the document "Recommended Installation Guide For Steel Doors and frames" published by the CSDMA
- .3 Sliding frames covering posts must be fixed to the wall with a special adjustable tie rod, supplied by the manufacturer, and they must be able to be solidly fixed at the base in a horizontal runner.

2.11 MANUFACTURING OF DOORS – GENERAL POINTS

- .1 Doors must be smooth, swinging and they must have an opening allowing the installation of a glazing or louvers, depending on the indications.
- .2 Exterior steel doors must have a reinforced and insulated core. Interior steel doors must have a honeycomb core.
- .3 Exterior doors must have top horizontal closing posts; waterproof steel posts.
- .4 The longitudinal edges of the doors must be mechanically stapled with visible longitudinal joint but of 1.5 mm wide at the most.
- .5 Exterior doors must be of special fabrication, tested and/or designed to be part of an ensemble completely able to function and having a door, a frame, waterproof trims, and hardware parts, in accordance with ASTM E330 standard and offering a blast resistance as prescribed in NBC Article 4.1.
- .6 Doors must be cut, reinforced and tapped in needed to receive the mortised and template hardware pieces as well as the necessary electronic equipment.
- .7 Plan for the indicated glazing openings and supply the required moving glazing beads.
- .8 Openings whose diameter is equal to or more than 12.7 mm must be drilled in factory, except those that are intended to receive the mounting bolts and through bolts, that must be drilled on site, when installing the hardware pieces.
- .9 Doors must be reinforced where hardware pieces must be lipped mounted. Exterior doors must have, at the bottom, a flush closing post.

- .10 Interior doors must be made of 1.2 mm thick steel shell plate.
- .11 Exterior doors must be made of 1.6 mm thick steel shell plate.
- .12 Hollow core doors must have reinforced vertical reinforcements solidly welded to each shell plate, at 1.5 mm center to center at the most.
- .13 Empty spaces between the doors' reinforcements must be filled with fiberglass: minimum mass density 24 Kg/m³, according to ASTM C553 or ASTM C592 standard.
- .14 Doors must be spot primed where the zinc coating has been damaged during manufacturing.
- .15 Conformity: homologated fire-resisting doors must be planned in the case of the openings that have to be closed by elements with fire resistance degree, in accordance with the established list. Products must be tested in accordance with CAN4-S104 or NFPA 252 standards, be homologated by a nationally acknowledged organism and ensuring a factory inspection service, and be manufactured following the indicated details in the follow-up procedures and factory inspection manuals published by the homologation organism and supplied to the different manufacturers.
- .16 No manufacturer identification plate is to be set on the doors.

2.12 THERMAL BRIDGE BREAKAGE FRAME

- .1 Thermal bridge breaking frames must be made of a continuous breakage mechanism mechanically stapled and used to insulate the exterior elements from the interior elements.
- .2 Frames must be filled with a polyurethane base insulation.
- .3 Thermal bridge breaking frames must be made of 1.6 mm thick steel shell plate.
- .4 Thermal bridge breaking frames must be made of rigid PVC extruded element conform to CGSB 41-GP-19Ma standard.

3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Conformity: conform to the written requirements, recommendations and specifications, including any available technical bulletin, the instructions related to handling, storing and setting up of the products, and to the data sheets indications.

3.2 EXAMINATION

- .1 Checking the conditions: before proceeding to the installation of the steel doors and frames, make sure that state of the surfaces/supports previously set up at the end of other sections or contracts is acceptable and allow the realization of the works in accordance with the manufacturer' written instructions.
 - .1 Inform the departmental representative immediately of any unacceptable conditions detected. Begin the installation works only after having corrected the unacceptable conditions and received the manufacturer's written approval.
 - .2 Beginning the works means that the Contractor has proceeded to the

examination of the substrate and have accepted it.

3.3 INSTALLATION – GENERAL POINTS

- .1 Unless otherwise indicated, install the fire-resistant doors and frames with the appropriate homologation tag in accordance with NFPA 80 standard.
- .2 Doors are installed by the installer of the finishing hardware. Refer to section 08 71 10 – Door hardware.
- .3 Install doors and frames in accordance with the CSDAM installation guide.

3.4 INSTALLATION OF FRAMES

- .1 Install the elements plumb, square, leveled and the appropriate height.
- .2 In each space, make sure that the frames' rails are installed at the same level all the while respecting the spacing demanded in paragraph 3.03.
- .3 Fix the anchors to the adjoining construction elements.
- .4 Hold the frames strongly in place with wind braces until their installation. Install temporary wood tie beams at the third of the opening in order to maintain the width of the frames constant. Install a vertical strut under the top rail in the center of the bay when its width is higher than 1200mm. Remove the wood tie beams once the frame is in place.
- .5 Leave the clearances necessary for the flexion to avoid that the loads put by the skeleton be transferred to the frames.
- .6 Caulk around the frames between the latter and the adjoining elements.
- .7 See to ensuring the continuity of the airtightness system and the vapour barrier.
- .8 Ensure thermal tightness around the exterior frames. Fill the empty spaces between the frames and the elements of the exterior walls with a double application inside and outside of low blowing foam insulation.
- .9 Fill the empty spaces between the interior frames and the interior walls and partitions elements with a bat fiberglass insulation.

3.5 INSTALLATION OF DOORS

- .1 Conformity: install the doors and hardware pieces with the supplied templates, in accordance with the manufacturer's instructions and the prescriptions in section 08 71 10 – Door hardware.
- .2 Make an event spacing between the doors and the frame posts and between the doors and the finished floor and the threshold, as follow:
 - .1 hinges side: 1.00 mm;
 - .2 latch and door head side: 1.5 mm;
 - .3 finish floor and threshold strip: 13.mm
- .3 Adjust hardware so that the doors work smoothly.
- .4 Install the louvers, including those supplied by the section 23.

3.6 SPOT PAINTING EXECUTION

- .1 Spot paint with a primer the surfaces damaged during installation.
- .2 Cover the exposed surface of the frames' anchors as well as the surfaces showing imperfections with a metal filling mastic, then sand until obtaining a smooth and even finish.

3.7 GLAZING INSTALLATION

- .1 Install glazing in accordance with section 08 80 50 – Glazing.

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.
- .3 Remove traces of primer, caulking, epoxy and filler materials; clean expansion joint covers.
- .4 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.9 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 21 00 - Allowances
- .2 Section 06 08 99 – Rough carpentry for minor works.
- .3 Section 07 21 16 – Blanket insulation.
- .4 Section 07 25 00 – Air barrier.
- .5 Section 07 27 10 – Air/vapor barrier membrane and intra-muros flexible flashings.
- .6 Section 07 92 00 - Joint sealants, with regard to joints caulking between the frames and other elements of the building.
- .7 Section 08 06 71 – Door hardware list.
- .8 Section 08 71 10 – Door hardware.
- .9 Section 08 80 50 - Glazing
- .10 Section 09 22 16 – Non-structural metal framing
- .11 Section 09 91 13.01 – Exterior re-painting
- .12 Doors and frames chart on the plans's leaflets
- .13 Division 23 (15000) – With regard to works related to Heating, Ventilating and Air Conditioning (HVAC)
- .14 Section 26 (16000) - Electricity, with regard to wiring meant for electrical hardware.

1.2 REFERENCE STANDARDS

- .1 American Architectural Manufacturers Association (AAMA)
 - .1 AAMA 609/610-09, Cleaning and Maintenance Guide for Architecturally Finished Aluminum.
- .2 ASTM International
 - .1 ASTM E 330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 1.40-97, Anticorrosive Structural Steel Alkyd Primer.
 - .2 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
 - .3 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.
- .4 CSA International
 - .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .5 Environmental Choice Program (ECP)
 - .1 CCD-045-95, Sealants and Caulking Compounds.
- .6 Green Seal Environmental Standards (GS)

- .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for doors and frames 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 , Canada.
 - .2 Indicate materials and profiles and provide full-size, scaled details of components for each type of door and frame. Indicate:
 - .1 Interior trim and exterior junctions with adjacent construction.
 - .2 Junctions between combination units.
 - .3 Elevations of units.
 - .4 Core thicknesses of components.
 - .5 Type and location of exposed finishes, method of anchorage, number of anchors, supports, reinforcement, and accessories.
 - .6 Location of caulking.
 - .7 Each type of door system including location.
 - .8 Arrangement of reinforcing for hardware and joints.
 - .9 Arrangement of hardware and required clearances.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit one 300 x 300 mm corner sample of each type door and frame.
 - .4 Submit sample showing glazing detail, reinforcement, finish and location of manufacturer's nameplates.
 - .5 Frame sample to show glazing stop, door stop, jointing detail, finish, wall trim.
- .5 Submit the set up instructions supplied by the manufacturer.

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 cleaning and maintenance of aluminum finishes for incorporation into manual.
- .3 Provide the tools and instructions necessary for the adjustment of moving parts, panic locks and door closers and hand them down to the departmental representative

1.5 QUALITY ASSURANCE

- .1 Certifications: product certificates signed by manufacturer certifying materials comply with

specified performance characteristics and criteria and physical requirements.

1.6 TRANSPORTATION, 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, labeled with manufacturer's name and address.
 - .1 Apply temporary protective coating to finished surfaces. Remove coating after erection. Use coatings that are easy to remove and residue free.
 - .2 Leave protective covering in place until final cleaning of building.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect aluminum doors and frames from nicks, scratches, and blemishes .
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.7 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 and 10 years
- .2 Provide a written document and jointly by the manufacturer and the installer, issued in the name of Canada, certifying the doors and aluminum frames against any loss of airtightness and waterproofing, any condensation, any deformation due to wind load, any deterioration of the finish, for a period of five (5) years. Refer to the general conditions for the beginning of the warranties
- .3 In addition to the established performances, the warranty must state the glazing tightness products, tapes and trims will not be damaged by sunrays, bad weather or oxidation in a way that there will be no tightness loss, cracking, flaring, loss of strength, loss of adherence or clouding of the adjoining surfaces for the warranty period indicated above.
- .4 In addition to what is mentioned in section 08 50 50 – Glazing, the warranty must stipulate the sealed glass will keep its tightness, appearance and transparency, with no forming of opaque film, condensation or deposit inside the units for a period of 10 years. Refer to the general conditions for the beginning of the warranties.
- .5 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments and the required services to repair the defectives parts of the work and, in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 WORKS DESCRIPTION / DESIGN REQUIREMENTS

- .1 Doors and frames installed in exterior walls must be designed so that:
 - .1 The elements of the doors and frames be able to dilate and contract freely at service temperature ranging from -45° to +35°C, without damaging the components in question. Install appropriate expansion joints and detail them to the shop drawings;
- .2 The maximum deflection of mullions will not be higher than 1/175 of the free load, tests are conducted in accordance with ASTM E 330 standard under a wind load (design load) according to calculations made in accordance with National Building Code of Canada (NBC);
- .3 Doors and frames must allow movements between their component elements.
- .4 Doors and frames elements must be able to allow free movements between their component elements and the skeleton of the bay or the support.
- .5 The glass thickness and the dimensions of the glazing must not higher than the limiting values indicated in CAN/CGSB-12.20 standard.
- .6 Door units must have an integrated air tightness and vapour barrier system, mainly aligned with the interior glazing and the weather strip.

2.2 MATERIALS

- .1 Aluminum doors and frames must come from the same manufacturer.
- .2 Aluminum extruded posts: ASTM b221; alloy AA6063-T5 or T6 dipped, anodizing quality, according to Aluminum Association.
- .3 Tolerances: mentioned dimensions for the withes and other cross cut dimensions of the elements are nominal dimensions and must be conform to standards and data for aluminum of the Aluminum Association (AA).
- .4 Aluminum sheet: alloy AA5005 H32, anodizing quality, according to Aluminum Association.
- .5 Galvanized steel plate: commercial quality, conform to ASTM A653M, with Z275 designation coating, with bear metal thickness in accordance with what follows:
 - .1 For spandrels' purins: steel plate of at least 0.9 mm (gauge 20) except if a thicker plates required to meet maximum deflection indicated. Refer to section 08 44 13 – Curtain Prefabricated aluminum curtain walls and panel sidings.
 - .2 To support the air/vapour barriers membranes if the width of the cavity to bridge is higher than 38 mm: steel plate of at least 0.5 mm (gauge 26).
- .6 Steel backings: conform to CAN/CSA-G40.20/G40.21 standard, serie 300W grade.
- .7 Invisible fasteners: grade 300 stainless steel, for exterior installations and grade 400 elsewhere.
- .8 Insulation coating: when steel fastening devices are used, provide insulation between the steel materials and the aluminum materials and its alloys to prevent any galvanic action such as alkalis resistant bituminous paint.

- .9 Glass and glazing materials:
 - .1 Conform to prescriptions in section 08 80 50 – Glazing.
 - .2 Glazing materials:
 - .1 Setting blocks and locating blocks, tapes, trims and accessories: type recommended by the manufacturer.
- .10 Tightness products: report to section 07 92 00 – Tightness products for joints, colour chosen by the departmental representative.
- .11 Zinc-rich type primer paint for galvanized surfaces conform to CGSB-1.181 standard.
 - .1 acceptable product: WR Meadows Galvafruid Grade SB or Sherwin-Williams Zinc Clad 5 – B69A45.
- .12 Steel alkyd resin primer paint conform to CGSB 1.40 standard or fast drying conform to CAN/CGSB-1.10.
- .13 Vaporized material to fill in empty spaces between the outer frames and the elements of the outer walls: polyurethane foam with one component, minimal foaming, adjustable gun applied in order to control the length of the isolating bead.
 - .1 Acceptable products:
 - .1 Demilec R SEAL 260
 - .2 Hilti CF-I XTW
 - .3 Adfast AD Foam Plus
 - .4 or replacement product approved by addenda according to the instructions to the bidders.

2.3 ALUMINUM DOORS

- .1 Doors: made of hollow extruded posts with of at least 3 mm thick withe. Nominal widths of the posts, top and bottom rails are as required by the manufacturer or indicated on the plans
- .2 Mecanically lock corner joints: reinforced and welded a greater strength.
- .3 Posts, bottom, middle and top rails: refer to plan leaflets for nominal dimensions.
- .4 Glazing beads: mere pressure installation for mastic free glazing. Glazing beads installed on the exterior side: tamper proof type.
- .5 Acceptable insulated door model opening toward the exterior (thermal bridge breakage type): A.D. Prévost 2750 series doors. Aluminum doors equivalent to 2750 series from Kawneer and Alumico are acceptable products or replacement product approved by addenda in accordance with the instructions to the bidders.
- .6 Acceptable non-insulated door model opening toward the interior: A.D. Prévost 2700 series doors or approved equivalent for moderate users. Aluminum doors equivalent to 2700 series from Kawneer and Alumico are acceptable products or replacement product approved by addenda in accordance with the instructions to the bidders.

2.4 ALUMINUM FRAMES

- .1 Exterior frames: made of extruded aluminum posts, thermal bridge breakage type and insulated for exterior frames. Withe thickness must be as required to give each element the structural strength to answer the requirements in the contract documents.

- .2 Extruded posts: designed to receive a flush glazing or with glazing beads and according to the dimensions mentioned in the plans' leaflet.
- .3 Exterior frames for new exterior vestibules made of extruded aluminum posts, with the thickness must be as required to give each element the structural strength to answer the requirements in the contract documents.
- .4 Posts, bottom, middle and top rails: refer to plans' leaflet for the nominal dimensions.
- .5 Acceptable exterior frame model: A.D. Prévost 3400 series posts. The aluminum frames equivalent to 3450 series from Kawneer and Alumico are acceptable products or replacement product approved by addenda in accordance with the instructions to the bidders.
- .6 Acceptable exterior frame model (for new exterior vestibules): A.D. Prévost 30 series posts. Aluminum frames equivalent to 30 series from Kawneer and Alumico are acceptable products or replacement product approved by addenda in accordance with the instructions to the bidders.
- .7 Acceptable interior frame model: A.D. Prévost 65 series posts. Aluminum frames equivalent to 65 series from Kawneer and Alumico are acceptable products or replacement product approved by addenda in accordance with the instructions to the bidders.

2.5 ALUMINUM BENDING

- .1 Manufacturing tolerances for aluminum panels:
 - .1 Length: 0.8 mm up to 1219 mm and 1.6 mm up to 3538 mm.
 - .2 Height: 0.8 mm up to 1219 mm and 1.6 mm up to 3538 mm.
 - .3 Arch at 0.02% of the length or height: maximum 5 mm.
 - .4 Diagonal: 5 mm
 - .5 Bowing: 0.8 mm
- .2 Aluminum plates made in accordance with the performances criteria and levels, the design, dimensions and prescribed thickness.
- .3 Exposed parts designed so as to respect and ensure the continuity of the design.
- .4 Joints between the different parts aligned with precision and rigid at assembly and allowing expansion, creep and other movements induced by the material, framing or winds, joints of bended, curved, sanded and polished aluminum sheets.
- .5 Shape the different panels according to the details prescribed and if needed. No edges and/or opened joints, non-shaped, non-welded, non-sanded, non-polished tuck pointed joints will be accepted.
- .6 No distortion or fading of the exposed materials left by the welding works.
- .7 Finish the panels and extrusions once they are made and shaped, to the forms and profiles prescribed.
- .8 Install all the sub-boundary of finish bonded with the aluminum plates for all the vertical and horizontal joints of the plates.

2.6 FINISHES OF THE ALUMINUM SURFACES

- .1 The aluminum elements exposed surfaces must be finished according to the manufacturer's indications.
- .2 Apply an anodized finish on the exposed aluminum surfaces on the side exposed to the view on the interior and exterior side according to the following prescriptions:
- .3 Show all the required finishes required in the shop drawings.
- .4 The anodized finish must be conform to the requirements of the Aluminum Association.
- .5 Du côté intérieur: appliquer un fini anodisé naturel AA-M12C22A31, revêtement anodique de Classe II, d'au moins 0.4 mil d'épaisseur.
- .6 Du côté extérieur: appliquer un fini anodisé naturel AA-M12C22A41, revêtement anodique de Classe I, d'au moins 0.7 mil d'épaisseur.

2.7 STEEL PIECES FINISHES

- .1 Interior steel ties and backings must be coated with an alkyd resins primer coat after manufacturing.
- .2 exterior steel ties and backings must be zinc coated conform to CSA G164 standard and painted with one coat of zinc-rich type primer after manufacturing.

2.8 MANUFACTURING

- .1 Doors and frames must be manufactured following the maximum indicated facing dimensions and profiles.
- .2 If needed, doors and frames must be equipped with hot dip galvanized steel backing.
- .3 Elements joints must be tightened and held mechanically.
- .4 Fastening pieces must be hidden.
- .5 In order to receive the hardware, doors, frames and backings must be mortised, reinforced, drilled and tapped at the required locations, with the templates prescribed in section 08 71 10 – Door hardware.
- .6 Aluminum surfaces in direct contact with dissimilar metals, concrete or masonry surfaces must be coated with an insulating coating.

2.9 HARDWARE PIECES

- .1 Supply the following hardware pieces required for aluminum doors and frames, if not prescribed in section 08 71 10 – Door hardware.
 - .1 Ball-tip hinges: plated steel for interior.
 - .2 Continuous hinges: stainless steel for exterior.
 - .3 Stainless steel 304 push-pull bars, vertical model, full height, 32 mm diameter, hidden fasteners, / 1 per door.
 - .4 Weather strip of an integral part of the doors, replaceable, manufacturer' standard (mohair on aluminum support).
 - .5 Door bottom integrated weather strp : manufacturer's standard.
 - .6 Aluminum tresholds for interior doors and aluminum thermal break for exterior doors and door stoppers Unique V-22 Or replacement product approved by addenda

- according to the instructions to the bidders.
- .7 Insulated sub frame: acceptable products: A . D . P r é v o s t 3442 or replacement product approved by addenda according to the instructions to the bidders.
- .8 Door stoppers : Produits acceptables : acceptable products: A . D . P r é v o s t 213 or replacement product approved by addenda according to the instructions to the bidders.
- .9 Finish: at the departmental representative choice.

3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Set frames plumb, square, level at correct elevation in alignment with adjacent work.
- .3 Anchor securely.
- .4 Install doors and hardware in accordance with hardware templates and manufacturer's instructions.
- .5 Adjust door components to ensure smooth operation.
- .6 Make allowances for deflection of structure to ensure that structural loads are not transmitted to frames.
- .7 Install the bended aluminum plates in accordance with standards in force as well as details and instructions in plans' leaflet.
- .8 Glaze aluminum doors and frames in accordance with Section 08 80 50 - Glazing.
- .9 Seal joints to provide weathertight seal at outside and air, vapour seal at inside.
- .10 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within the aluminum work except where exposed use is permitted by Ministerial Representative.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Perform cleaning of aluminum components in accordance with AAMA 609.1 - Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.

- .3 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .4 Clean aluminum with damp rag and approved non-abrasive cleaner.
- .5 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.
- .6 Clean glass and glazing materials with approved non-abrasive cleaner.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 05 50 00 Metal fabrications
- .2 Section 06 08 99 Rough carpentry for minor works
- .3 Section 07 92 00 Joint sealants
- .4 Section 09 21 16 Gypsum board and concrete panels finish
- .5 Section 09 22 16 Non-structural metal framing
- .6 Section 10 26 00.01 Wall and corner guards

1.2 REFERENCE STANDARDS

- .1 Aluminum Association (AA)
 - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 American Architectural Manufacturers Association (AAMA)
 - .1 AAMA 609/610-09, Cleaning and Maintenance Guide for Architecturally Finished Aluminum.
- .3 ASTM International
 - .1 ASTM A 167-99(R2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - .2 ASTM A 276-10, Standard Specification for Stainless Steel Bars and Shapes.
 - .3 ASTM A 480/4 80M-11, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
- .4 Architectural Woodwork Manufacturers' Association of Canada (AWMAC)
 - .1 Architectural Woodwork Standards 2009.
- .5 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
 - .2 CAN/CGSB-12.12-M90, Plastic Safety Glazing Sheets.
- .6 CSA International
 - .1 CSA O141-05(R2009), Softwood Lumber.
 - .2 CAN/CSA-Z809-08, Sustainable Forest Management.
- .7 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .8 Green Seal Environmental Standards (GS)
 - .1 GS-11-11, Paints and Coatings.
 - .2 GS-36-11, Commercial Adhesives.
- .9 National Fire Prevention Association (NFPA)
 - .1 NFPA 80-2010, Standard for Fire Doors and Other Opening Protectives.
- .10 National Hardwood Lumber Association (NHLA)
 - .1 Rules for the Measurement and Inspection of Hardwood and Cypress [2007].

- .11 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2007.
- .12 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.
- .3 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2010-2014 Standard.
- .14 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
 - .1 MPI #25 Cleaner, Etching, for Galvanized Metal.
 - .2 MPI #26 Primer, Galvanized Metal, Cementitious.
 - .3 MPI #46 Undercoat, Enamel, Interior.
 - .4 MPI #80 Primer Vinyl Wash.
- .15 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.

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 [coiling counter doors and hardware] 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 Canada.
 - .2 Indicate each type of coiling counter door, arrangement of hardware, operating mechanism and required clearances.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.

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 coiling counter doors and hardware for incorporation into manual.

1.5 QUALITY ASSURANCE

- .1 Regulatory Agency Approvals:
 - .1 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada for ratings specified or indicated.
- .2 Certifications: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: 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 coiling doors from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse of packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal

1.7 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 years
- .2 Provide a written and jointly signed document issued by the manufacturer and the installer in the name of Canada, certifying that their operating and control devices will remain free from any defect for a period of 5 years. In addition, this warranty will include a protection from any major failure of the work. Refer to the general conditions for the beginning of the warranties
- .3 In addition, in the name of the department representative, the installer promise to provide full maintenance and servicing of the entire operating and control system, and that, for the warranty period mentioned above.
- .4 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments and the required services to repair the de defectives parts of the building and, in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 MATERIALS

- .1 Coiling doors.
- .2 Galvanized steel sheet: commercial quality, with [Coating Designation Z275 :
 - .1 Locations: as indicated.
- .3 Aluminum sheet metal: plain finish utility sheet.
- .4 Aluminum extrusions: Aluminum Association alloy AA 6063-T5.

- .5 Stainless steel sheet metal: to ASTM A 167.
- .6 Stainless steel bars, wire and shapes: to ASTM A 276.
- .7 Adhesives and Sealants: VOC limit 250 g/L maximum to SCAQMD Rule 1168 and GS-36.

2.2 COILING DOORS

- .1 Rivet continuous end locks to slat ends.
- .2 Assemble opaque coiling door curtain of 9 mm wide x 38 mm height, flat extruded aluminum interlocking slat sections, 1.3 mm thick.
- .3 Extruded aluminum bottom bar made of aluminum metal profiles.
- .4 Guides rails of extruded aluminum mounting cleats, of at least 5 mm thick and installed according to the indications.
- .5 Construct counterbalance assembly consisting of torsion spring with 25% overload factor. Enclose spring in steel pipe to support door curtain and counterbalance mechanism with maximum deflection of 1/360th of opening width. Provide ball bearings at rotating points. Provide spring tension adjusting wheel, accessible for setting.
 - .1 Enclose spring in steel pipe to support door curtain and counterbalance mechanism with maximum deflection of 1/360th of opening width.
 - .2 Use ball bearings at rotating points.
 - .3 Use spring tension adjusting wheel, accessible for setting.
- .6 Support counterbalance assembly on 5 mm minimum thickness steel or extruded aluminum plate brackets, forming end enclosures.
- .7 Enclose counter balance assembly with aluminum sheet formed hood.
- .8 Extruded aluminum tubular locking bar, 32 mm x 51 mm equipped with locking bolts on each side. The bolts insert in the vertical profiles. Lock cylinders could be replace without having to remove the bar at the bottom of the curtain.
- .9 Equip coiling doors for locking from inside both sides with cylinder locks for master keyed cylinder.
- 10. Cap: supply a natural anodized aluminum cap, 1 mm thick on 4 sides for the barrel and the winding closure.

2.3 OPERATION

- .1 Equip coiling doors for operation by:
 - .1 Hand, install 1 lift handles at coiling door bottom on inside face of coiling door.

2.4 ACCEPTABLE PRODUCTS

- .1 Mobilex Counter louver model safety closure
- .2 C.H.I. # 6500 model safety closure
- .3 Raynor Dura Shutter Select model safety closure
- .4 or replacement product approved by addenda in accordance with the instructions to the bidders.

3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Install coiling counter door in accordance with manufacturers' printed instructions.
- .2 Install master keyed cylinders specified in Section 08 71 00 - Door Hardware.
- .3 Adjust operable parts for correct function and smooth operation.
- .4 Test labelled coiling counter doors for proper operation by activating fusible link.
 - .1 Test shutters in presence of Ministerial Representative.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Perform cleaning of aluminum components in accordance with: AAMA 609.
 - .3 Clean aluminum with damp rag and approved non-abrasive cleaner in accordance with manufacturer's instructions.
 - .4 Remove traces of primer, caulking; clean doors and frames.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 06 08 00 Rough carpentry for minor works.
- .2 Section 07 21 16 Blanket insulation
- .3 Section 07 21 29.03 Sprayed insulation – polyurethane foam
- .4 Section 07 27 10 Air/vapor barrier membrane and intra-muros flexible flashings
- .5 Section 07 46 13 Preformed metal siding
- .6 Section 07 62 00 Sheet metal flashing and trim
- .7 Section 07 92 00 Joint sealants

1.2 REFERENCE STANDARDS

- .1 Aluminum Association (AA)
 - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 ASTM International
 - .1 ASTM A 1008/A 1008M-10, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
 - .2 ASTM D 523-08, Standard Test Method for Specular Gloss.
 - .3 ASTM D 822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.105-M91, Quick-Drying Primer.
 - .2 CAN/CGSB-1.213-04, Etch Primer (Pretreatment Coating or Tie Coat) for Steel and Aluminum.
 - .3 CAN/CGSB-1.181-99, Ready-Mixed, Organic Zinc-Rich Coatings.
- .4 CSA International
 - .1 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .5 Environmental Choice Program (ECP)
 - .1 CCD-016-97(R2005), Thermal Insulation.
 - .2 CCD-047-98(R2005), Architectural Surface Coatings.
 - .3 CCD-048-98(R2006), Surface Coatings - Recycled Water-borne.
- .6 Green Seal Environmental Standards (GS)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-A2007 Architectural Coatings.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings:

- .1 Convene pre-installation meeting 2 weeks prior to beginning work of this Section and on-site installation, with Contractor's Representative and Ministerial Representative in accordance with Section 01 31 19 - Project Meeting to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other construction subtrades.
 - .4 Review manufacturer's written installation instructions and warranty requirements.
- .2 Arrange for site visit with Ministerial Representative prior to start of Work to examine existing site conditions adjacent to demolition Work.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for doors, hardware, and 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 Canada.
 - .2 Indicate sizes, service rating, types, materials, operating mechanisms, glazing locations and details, hardware and accessories, required clearances and electrical connections.
- .4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .5 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for sectional metal doors for incorporation into manual.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Spare parts:
 - .1 Supply spare parts for sectional metal doors as follows:
 - .1 Panels and weather strips: 1 for each model of identical doors (finish and dimensions, etc.)
 - .2 Springs, cables and bearings: 1 set per model of doors installed having the same operating mechanism.
 - .2 Store where directed. Identify each part and reference to appropriate door.

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 Store and protect sectional metal doors, hardware and accessories from [nicks, scratches, and blemishes].
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.9 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 years
- .2 Provide a written and jointly signed document issued by the manufacturer and the installer in the name of Canada, certifying that the sectional doors, their operating and control devices will remain free from any defect for a period of 5 years. In addition, this warranty will include a protection from any major failure of the work. Refer to the general conditions for the beginning of the warranties
- .3 In addition, in the name of the department representative, the installer promises to provide full maintenance and servicing of the entire operating and control system, and that, for the warranty period mentioned above
- .4 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments and the required services to repair the defective parts of the building and, in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 DESIGN CRITERIA

- .1 Exterior doors and their rails must be designed to be able to resist a load due to wind (design load) according to the calculations made in accordance with the National Building Code of Canada (NBC), with a sagging in the horizontal plan no higher than $[1/240]$ of the width of the

- bay.
- .2 Sectional doors must have a RSI 2.8 thermal resistance value.
- .3 Doors, springs and their rails must be designed to be able to support a useful life of 50 000 nominal cycles of operation.

2.2 MATERIALS

- .1 Galvanized sheet metal: commercial quality, zinc coated, (G90) minimum, conform to ASTM A653/A653M standard. .
- .2 Galvanized sheet metal conform to A.S.T.M. A653-7 & A.S.T.M. A653M-97 standard, coating class G60 0.60mm (0.02"). This zinc galvanized sheet metal with minimum 180g/m² (0.04lb/pi²). The 2 coats polyester paint finish will respect the A.S.T.M. A653-7 & A.S.T.M. A653M-97 standard and will be 1.0 mils thick. The steel sheet metal surface will be a smooth finish embellished with horizontal decorative grooves. Colour to the choice of the departmental representative among the colour range offered by the manufacturer.
- .3 Aluminum profiles: alloy AA 6063-T5 of the Aluminum Association.
- .4 Paint for primer coating:
 - .1 Rich zinc type for galvanized steel surfaces conform to CGSB-1.181 standard.
 - .1 Acceptable products: WR Meadows Galvafrid Grade SB or Sherwin-Williams Zinc Clad 5 – B69A45.
 - .2 Fast dry type conform to CAN/CGSB-1.105 standard for steel works.
 - .3 Reactive type as treatment coating or bondage coat conform to CAN/CGSB-1.213 standard for aluminum works.
- .5 Thermal insulation: CFC free polyurethane foam, high pressure injected between the withe of the panels, density of 40.4 kg/m³ (2.5 lb/pi³) with RSI 1.6 thermal resistance per 25 mm (1"0 thickness, the total insulating value will be R-16, RSI 2.8 (k = 0.357 W/m²K) (A.S.T.M. C-518-91 standard). This insulation will be conform to ONGC 51-GP-21M and 51.26-M86 standard.
- .6 Cables: airplane type galvanized stranded cables.

2.3 DOORS

- .1 Doors: Door panels will be made of 0.60 mm (0.02") steel sheet metal, shaped by roll forming and with electronically injected high pressure polyurethane, the whole being 44.5 mm (1.8") thick minimum.
- .2 Panels: 2.00 mm (0.08") steel screwing plates will be inserted inside the door panels to ensure the adequate fastening of the accessories such as knobs, hinges electric door-opener plate. At each end of door sections, a dry pine piece (grade 4) will be inserted in the insulated section to allow the fastening of the lateral hinges.
- .3 Assembly of various elements: by arc or spot welding or by riveting (coated rivets) or with adhesive and self-tapping screws, according to the manufacturer's recommendations.
- .4 Paint for priming coat: doors coated in factory with one coat of primer once the assembly completed.

2.4 HEAVY-DUTY INDUSTRIAL HARDWARE

- .1 Guiding rails: regular type shape, vertical elevation or raised, following the indications, galvanized steel 75 mm wide and 2.6mm. The horizontal rail will be reinforced with a 50 x 50 mm metal corner.
- .2 Guiding rails supports: continuous, in galvanized steel angles, 2.3 mm thick minimum required to answer the contract requirements.
- .3 Balance springs: oil tempered torsion springs, heavy-duty, equipped with supports conform to the manufacturer's recommendations to respect the required performance requirements.
 - .1 Wrap drum: minimum 150 mm diameter.
 - .2 Shaft: galvanized steel, minimum 25 mm diameter.
 - .3 Ironworking fixed to the door must be specified and supplied by the manufacturer of the door to ensure the right choice of hardware pieces.
- .4 Top roller-holder: galvanized steel, minimum 3.00 mm thick, adjustable.
- .5 Rollers: hardened steel, grease lubricated, lateral free movement, ball bearings, 75 mm diameter, heavy-duty tire of steel.
- .6 Rollers supports: adjustable, galvanized steel, minimum 2.5 mm thick.
- .7 Hinges: heavy-duty, conform to manufacturer's recommendations, galvanized steel, 2.4 mm thick.
- .8 Cables: galvanized steel stranded cables, minimum 4.80 mm diameter, airplane type.

2.5 ACCESSORIES

- .1 Horizontal rails and door-openers supports: galvanized steel, type and dimensions suitable for installation and use.
- .2 L rail protectors: 1500 mm high, 5 mm thick steel sheet metal shaped.
- .3 Locking and operating mechanisms:
 - .1 Horizontal bars locking mechanisms, with night latch.
 - .2 Cylinder locking mechanisms with key for unlocking from the exterior (for door #26). Match the cylinder with the key system of the departmental representative to allow the master key to function.
- .4 Tightness:
 - .1 Under the bottom panel of each door, supply and install a continuous weather-strip made of U shape aluminum profile and a rubber sensor bar with safety contact (see 2.7.5 – Safety contactors)
 - .2 AT the junction of each panel, a flexible and rigid PVC spacer weather-strip must ensure an efficient thermal breakage as well as a double tightness answering the following standards: at a pressure of 0.075 kPa equivalent to a wind load of 40km/hour, measured air infiltration according to E-283 A.S.T.M. standard will be 0.033 liter/sec. by meter of joints between the sections of the door.
 - .3 At the head of the door, install on the top of the panel a continuous wheater-strip made

of reinforced aluminum profile and a 65 mm (0.03") long flexible PVC head flashing.

- .4 At the abutments and lintel, exterior side, supply and install a weather-strip made of an aluminum profile and an arctic vinyl double lip head flashing. This weather-strip must be adjustable have a rigid P.V.C. screw cover.
- .5 Hardware pieces as supplied by the manufacturer of the ferrous metal door, zinc coated at least 300 g/m² in accordance with CAN/CAS-G164 standard.

2.6 OPERATION TYPES

- .1 Doors must be equipped with the following accessories, depending on the type of operation.
 - .1 Manual operation: knob inside and outside.
- .2 Safety:
 - .1 Safety mechanism used to stop the door at the detection of a cable breakage when the door closes; maximum load in accordance with the manufacturer's recommendations.

2.7 ALUMINUM FINISHES

- .1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.

3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Install doors and hardware in accordance with manufacturer's instructions.
- .3 Rigidly support rail and operator and secure to supporting structure.
- .4 Touch-up steel doors with primer where galvanized finish damaged during fabrication.
- .5 Install operator including electrical motors, controller units, pushbutton stations, relays and other electrical equipment required for door operation (when applicable).
- .6 Lubricate and adjust door operating components to ensure smooth opening and closing of doors.

- .7 Adjust weatherstripping to form a weather tight seal.
- .8 Adjust doors for smooth operation.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove traces of primer; clean doors and frames.
 - .2 Clean glass and glazing materials with approved non-abrasive cleaner.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 06 08 99 – Rough carpentry for minor works.
- .2 Section 07 21 16 – Blanket insulation.
- .3 Section 07 25 00 – Air barrier.
- .4 Section 07 27 10 – Air/vapor barrier membrane and intra-muros flexible flashings.
- .5 Section 07 92 00 - Joint sealants, with regard to joints caulking between frames and the other element of the building.
- .6 Section 08 06 71 – Door hardware list.
- .7 Section 08 71 10 – Door hardware.
- .8 Section 08 80 50 - Glazing
- .9 Section 09 22 16 – Non-structural metal framing
- .10 Chart of the doors and frames in the plans' leaflet.
- .11 Division 23 (15000) – As for works related to Heating, Ventilation and Air conditioning (HVC)
- .12 Section 26 (16000) - Electricity, with regard to wiring intended for electrical hardware.

1.2 REFERENCE STANDARDS

- .1 Aluminum Association (AA)
 - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 American Architectural Manufacturers Association (AAMA)
 - .1 AAMA 701/702-04, Voluntary Specifications for Pile Weather Stripping and Replaceable Fenestration Weatherseals.
- .3 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
 - .1 ANSI/BHMA A156.1-2006, American National Standard for Butts and Hinges.
 - .2 ANSI/BHMA A156.3-2001, Exit Devices.
 - .3 ANSI/BHMA A156.4-2008, Door Controls - Closers.
 - .4 ANSI/BHMA A156.5-2001, Auxiliary Locks and Associated Products.
 - .5 ANSI/BHMA A156.10-2005, Power Operated Pedestrian Doors.
 - .6 ANSI/BHMA A156.19-2007, Power Assist and Low Energy Power Operated Doors.
- .4 ASTM International
 - .1 ASTM A 167-99(R2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - .2 ASTM B 209M-07, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
 - .3 ASTM B 221M-07, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
 - .4 ASTM D 2000-08, Classification System for Rubber Products in Automotive Applications.
 - .5 ASTM D 2287-96(R2010), Standard Specification for Non Rigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.
 - .6 ASTM E 283-04, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences

- Across the Specimen.
- .7 ASTM E 330-[02], Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .8 ASTM E 331-[00(2009)], Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- .9 ASTM E 547-[00(2009)], Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference.
- .5 Canadian General Standards Board (CGSB)
 - .1 CGSB 1.132M-90, Zinc Chromate Primer, Low Moisture Sensitivity.
 - .2 CAN/CGSB 1.181-99, Ready-Mixed, Organic Zinc-Rich Coatings.
- .6 CSA International
 - .1 CAN/CSA-A440-00, Windows /Special Publication A440.1-00(R2005), User Selection Guide to CSA Standard CAN/CSA-A440-00, Windows.
 - .2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .7 Environmental Choice Program (ECP)
 - .1 CCD-045-95(R2005), Sealants and Caulking Compounds.
 - .2 CCD-047-98(R2005), Architectural Surface Coatings.
 - .3 CCD-048-98(R2006), Surface Coatings - Recycled Water-borne.
- .8 Green Seal Environmental Standards (GS)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .9 National Research Council of Canada (NRC)
 - .1 National Energy Code of Canada for Buildings -2010 (NECB).
 - .2 National Building Code of Canada 2010 (NBC).
- .10 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
 - .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
- .11 Underwriters' Laboratories of Canada (ULC)
 - .1 ULC/ORD C305-72, Panic Hardware.
 - .2 CAN/ULC-S524-06, Standard for the Installation of Fire Alarm Systems.
 - .3 CAN/ULC-S533-08, Egress Door Securing and Releasing Devices.

1.3 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 Ministerial Representative in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's written installation instructions and warranty requirements.
- .2 Arrange for site visit with Ministerial Representative prior to start of Work to examine existing site conditions adjacent to demolition Work.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for [doors, hardware, and 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 Canada.
 - .2 Indicate layout, dimensions, elevations, detail sections of members and sill conditions, materials, finishes, recesses, hardware including mounting heights, anchors and reinforcements, provisions for expansion and contraction, methods of joining sheet metal and joint locations, glass types and] glass thicknesses, glazing details, types of sealants, details of other pertinent components of the work, and adjacent construction to which work of this section is attached.
 - .3 Identify installation tolerances required, assembly conditions, routing of service lines, locations of operating components, controls and boxes.
 - .4 Indicate door signs.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit 2 samples of each required aluminum finish on 300 mm long sections of extrusions and 150 x 150 mm sheet/plate.
 - .1 Where colour and texture variations are anticipated, include two or more units in each set of samples indicating limits of variations.
 - .4 Submit (2) 300 x 300 mm samples of each type of glass.
 - .6 Submit samples of typical fabricated sections, indicating joints, exposed fastenings, quality of work and finish, including hardware and accessory items, before proceeding with fabrication.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Submit project record documents that accurately record locations of concealed and remote equipment, services, and conduit.
- .3 Operation and Maintenance Data: submit operation and maintenance data for [door system] for incorporation into manual.
- .4 Parts List:
 - .1 Submit manufacturer's parts lists ; include servicing frequencies, instructions for adjustment and operation applicable to each type of component or hardware, and name, address and telephone number of nearest authorized service representative.
- .5 Maintenance Contract:
 - .1 Supply complete service and maintenance of operating equipment for 1 year from date of substantial performance of the work.

1.6 MAINTENANCE MATERIAL SUBMITTALS

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

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

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Conform to applicable code for automatic release of control drive unit to permit manual operation of emergency exit doors.
 - .2 Conform to [applicable code] for release of automatic locks to permit manual operation of emergency exit doors and to CAN/ULC-S524 where required to be integrated with building's fire alarm system.
- .2 Certifications: 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, well-ventilated area.
 - .2 Store and protect automatic entrance doors and frames from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Cover exposed metal surfaces with pressure sensitive heavy protection paper or strippable plastic coating.
 - .1 Use materials of type which will not leave residue or become bonded when exposed to sun.
 - .2 Use padded blankets or approved protective wrapping for decorative metal work and similarly finished exposed elements.
- .5 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan and Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.9 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 and 10 years
- .2 Provide a written document and jointly signed by the manufacturer and the installer, issued in the name of Canada, certifying the doors and aluminum frames against any loss of airtightness and waterproofing, any condensation, any deformation due to wind load, any deterioration of the finish, for a period of five (5) years. Refer to the general conditions for the beginning of the warranties.
- .3 In addition to the established performances, the warranty must state the glazing tightness products, tapes and trims will not be damaged by sunrays, bad weather or oxidation in a way that there will be no tightness loss, cracking, flaring, loss of strength, loss of adherence or clouding of the adjoining surfaces for the warranty period indicated above
- .4 In addition to what is mentioned in section 08 50 50 – Glazing, the warranty must stipulate that

the sealed glass will keep its tightness, appearance and transparency, with no forming of opaque film, condensation or deposit inside the units for a period of 10 years.

- .5 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments and the required services to repair the defectives parts of the work and, in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 SYSTEMS

- .1 Design Requirements:
- .1 Design automatic entrances to comply with applicable requirements of ANSI/BHMA A156.10.
 - .2 Design power assist and low energy power operated doors to applicable requirements of ANSI/BHMA A156.19.

2.2 MATERIALS

- .1 Aluminum Extrusions: alloy and temper recommended by producer or finisher for type of use and finish indicated, and to ASTM B 221 for Aluminum Association designation 6063-T5.
- .1 Supply frame extrusions with 3 mm minimum wall thickness, and door extrusions with 3 mm minimum wall thickness unless otherwise indicated; glazing stops and other applied trim extrusions with 1.6 mm minimum wall thickness.
- .2 Aluminum Sheets: alloy and temper recommended by producer or finisher for type of use and finish indicated, and to [ASTM B 209] for Aluminum Association designations 1100- H14 or 5005- H32.
- .3 Fasteners: aluminum, non-magnetic stainless steel, cadmium plated steel, or other non-corrosive metal fasteners compatible with aluminum components, hardware, anchors and other items being fastened.
- .1 For exposed fasteners (for hardware only), supply Phillips flat head screws with finish matching item being fastened.
- .4 Reinforcement and Brackets: high strength aluminum to ASTM B 209, steel to CSA G40.20/G40.21, Grade 300 W, stainless steel to ASTM A 167, Type 304.
- .5 Steel Primer: oil alkyd primer to CGSB 1-GP-40M.
- .1 VOC limit 250 g/L maximum to GS-11 and SCAQMD Rule 1113.
 - .1 VOC limit: 150 g/L maximum to CCD-047 and CCD-048.
 - .2 Meet minimum recycled content and not exceed toxicity concentrations to CCD-048.
- .6 Galvanizing Touch-Up: zinc-rich, organic, ready mixed primer to CAN/CGSB 1.181.
- .1 VOC limit 250 g/L maximum to GS-11 and SCAQMD Rule 1113.
 - .1 VOC limit: 150 g/L maximum to CCD-047 and CCD-048.
 - .2 Meet minimum recycled content and not exceed toxicity concentrations to

CCD-048.

- .7 Isolation Coating: zinc chromate primer to CGSB 1.132M or acid and alkali resistant bituminous paint.
- .8 Sealants and Gaskets:
 - .1 Types recommended by manufacturer to remain permanently elastic, non-shrinking and non-migrating, and required for fabrication and assembly of screen and door framing.
 - .2 Exposed Sealants and Back-up Required for Installation of System at Project Site: in accordance with Section 07 92 00 - Joint Sealants. Colour selected by Ministerial Representative.

2.3 SLIDING AUTOMATIC ENTRANCES

- .1 Model: Besam SL500 automatic sliding doors; Stanley Dura-glide (SO-SX) and Hunter DS-18-1-FFBL (SO-SX) automatic sliding doors are acceptable products or replacement product approved by addenda according to the instructions to the bidders
 - .1 Aluminum doors and frames with sidelites and active door leaves.
 - .2 Overhead concealed, electro-mechanical, microprocessor controlled, sliding door operator.
 - .3 Operator housing, guide system and door carriers.
- .2 Sliding Automatic Entrance Doors Configuration:
 - .1 Single slide, fixed sidelite, door system.
 - .1 Configuration: Single slide, two equal panel door unit with one operable leaf and one fixed sidelite unit.
 - .2 Traffic Pattern: Two-way
 - .3 Emergency Breakaway Capability: Exterior sliding leaf only.
 - .4 Mounting: Overhead header installed between jambs.
 - .2 Dimensions: Confirm door package dimensions as indicated on Architectural drawings.

2.4 ALUMINUM DOORS AND FRAMES

- .1 Doors and Frames: Extruded Aluminum, Alloy 6063-T5.
 - .1 Door panels shall have a minimum 3.1 mm structural wall thickness including adjoining horizontal members and perimeter frames where applicable.
 - .2 Door Construction shall be by means of an integrated corner block with 9.5 mm all-thread through bolt from each stile.
 - .3 Glass stops shall be 15.8 mm wall thickness and shall provide security function as a standard by means of a fixed non-removable exterior section with glazing to be performed from the interior only. Glazing stops that allow for glass removal from the exterior shall not be deemed as equivalent.
 - .4 The sliding door system shall include two interlocks securing the leading stile of the sidelite and the butt stile of the sliding door panel together.
 - .5 Vertical Stiles shall be wide stile 127 mm.
 - .6 Bottom Rails shall be standard 178 mm
 - .7 Intermediate Muntin shall be 102 mm
 - .8 Weather-stripping shall be slide-in type, replaceable pile mohair seals retained by the aluminum extrusions. The following types of weather-stripping are required: complementing weather-stripping on the joining vertical stiles of the sidelite and sliding

- door panels, complementing weather-stripping on the lead edge of the lock stiles of bi-parting doors, single pile weather-stripping between the carrier and the header, single pile weather-stripping on the lead edge stile of single slide door panels, dual pile weather-stripping on the pivot stile of breakout sidelite panels, and dual pile weather-stripping on the butt stile of fixed sidelite panels. Bottom rails shall be provided with an adjustable nylon sweep.
- .9 Besam EcoDoor Package
- .1 EcoDoor Seals: High pile mohair weather stripping on the lock stile of the sliding doors, integrated mohair weather stripping with vinyl fin on the joining vertical stiles of the sidelite and sliding door panels, and expandable foam inserts in leading stile of sidelite panels at pockets for interlocks. Bottom rails shall be provided with a concealed adjustable nylon sweep.
- .2 Glazing Active Door and Sidelite Panels: Insulating glass, thickness as indicated.
- .3 Hydraulic closer(s) to return breakout door and sidelite panels to the closed position, and magnetic catch(s) to retain breakout door and sidelite panels in the closed position.
- .2 Glass: Glazing shall comply with ANSI Z97.1, thickness as indicated. (see section 08800 Glazing)
- .3 Door Carriers: Manufacturer's standard carrier assembly that allows vertical adjustment.
- .1 Carriage Assembly: Carriage bar with two wheel assemblies. Each assembly shall have tandem roller wheels.
- .2 Roller Wheels: Two heavy duty Delrin roller wheels per wheel assembly, for a total of four (4) roller wheels, 36.51 mm diameter, per active door leaf for operation over a replaceable aluminum track. Single journal with sealed oil impregnated bearings.
- .3 Two (2) heavy duty self-aligning anti-risers per leaf.
- .4 Framing Members: Provide automatic entrances as complete assemblies. Manufacturer's standard extruded aluminum framing reinforced as required to support loads.
- .1 Vertical jambs shall be 44 mm by 114 mm
- .5 Header: Manufacturer's standard one-piece extruded aluminum header with a replaceable aluminum track extending full width of entrance unit. Header to conceal door operators, carrier assemblies, and roller track; complete with hinged access panel for service of door operator, and controls.
- .1 Span: Maximum (4.9 m) without intermediate supports when using 6mm glass.
- .1 Capacity: Capable of supporting active breakout leafs up to maximum of 300 lb (136 kg) per leaf when header is supported per manufacturer's recommendations.
- .2 Size: 152 mm wide by 177.8 mm high.
- .3 Header height including the sensor plate cap which spans the clear door opening width is 215.9 mm high.
- .4 Hinge Point: Continuous hinge at top of header allows for complete access to operator and internal electronic and mechanical assemblies.
- .5 Design: Manufacturer's standard closed header.
- .6 Hardware: Provide manufacturer's standard hardware as required for operation indicated.
- .1 Breakaway arms and bottom pivot assemblies shall be supplied by the manufacturer and shall be adjustable to comply with applicable codes.
- .7 Locking hardware shall be provided as indicated.

- .1 Electrified slide lock shall automatically lock the sliding function of all sliding door panels within the entrance when the door panels are in the closed position.
 - .1 Fail secure operation: Slide lock shall lock the sliding function of the door panels upon loss of power.
- .2 Mortise type hookbolt latch. (Single slide sliding door system).
 - .1 Interior Side: Keyed cylinder. Lock indicators shall be provided if required by code.
 - .2 Exterior Side: Keyed cylinder.
- .3 Exit devices shall lock the breakout function while allowing emergency egress at all times. Exit devices in combination with the automatic slide locking hardware to be provided on secured doors. Automatic locking for the sliding door when the door control switch is in the closed position.
 - .1 Adams-Rite 8600 Series, concealed vertical rod exit device mounted to active doors (interior sliding doors).
 - .2 Keyed cylinder to retract vertical rod.
 - .3 Flush mounted Adams-Rite F86 Series, concealed vertical rod exit devices mounted to active doors.
 - .4 Exterior jamb mounted key switch to unlock sliding door operation.
 - .5 Keyed cylinders shall be provided as indicated.
 - .1 Keyed cylinder specified in Division 8 Section "Door Hardware".
- .8 Guide Track/Threshold: Manufacturer's threshold as indicated.
 - .1 Aluminum guide track integrated in the bottom of the sidelite portion of the sliding automatic door assembly.
 - .1
 - .2 13 mm high by 300 mm width continuous aluminum threshold (without integral track) shall span the entire width of the sliding door header and fit between the vertical framing members. Threshold design shall allow for optional extruded ramps to securely interlock to flat section to meet ADA requirements. Aluminum guide track is integrated into the bottom of the sidelite portion of the door assembly.
 - .1 Surface mounted threshold with interlocking ADA accessible ramps with integrated thermal breakage.

2.5 SLIDING DOOR OPERATOR

- .1 Door Operator and Controller:
 - .1 Electro-mechanical controlled unit utilizing a high-efficiency, energy efficient, DC motor requiring a maximum of 3 amp current draw, allowing 5 operators on one 20 amp circuit. The supplied system shall have the capability to operate at full performance well beyond a brown out and high line voltage conditions (85V – 265V) sensing changes and adjusting automatically. The operator shall allow an adjustable hold open time delay of 0 to 60 seconds and have internal software to incorporate a self-diagnostic system.
- .2 Microprocessor Control Box:
 - .1 Modular control unit to allow for changing technology. Factory-adjusted configuration with opening and closing speeds set to comply with ANSI/BHMA A156.10 requirements and electronic dampening to reduce wear on drive train. Should the drive train operations deviate from design criteria ranges, Watchdog Control Circuit Monitoring will assume command of the system and shut down the automatic function allowing a secondary supervisory circuit to perform as a backup. Control unit shall allow the following functions: Diagnostics with the ability to produce application data.

- .2 Mode Selector Control:
 - .1 Touch pad mode selector to be interior jamb mounted control with the following visual indication and trouble shooting.
 - .2 Touch pad mode selector with selection indication, to allow selection of the indicated functions.
 - .3 Touch pad security code to prevent accidental change of settings.
 - .4 Multi-colored, trouble shooting LED indicator for the following conditions: inspection is required, service is required, or error condition such as door in breakout position.
 - .5 Mode selector control to allow the following functions:
 - .1 "Off"
 - .2 "Exit Only" one way traffic with automatic operation from the interior.
 - .3 "Two Way Traffic" allowing automatic operation from exterior and interior.
 - .4 "Partial Opening" energy saving door position allows door to automatically adjust opening width based on amount of usage, that is, full open during high use and partial open during low use. The control for this setting is programmable allowing adjustment to both the usage setting and the opening width.
 - .5 "Hold Open" doors activated and held in the full open position.

2.6 ACTIVATION AND SAFETY CONTROL DEVICES

- .1 General: Provide the types of activation and safety devices specified in accordance with ANSI/BHMA standards, for the condition of exposure and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.
- .2 Combination Activation Motion Sensor/Safety Presence Sensor:
 - .1 Shall be a sliding door sensor utilizing K-band microwave technology to detect motion and focused active infrared technology to detect presence, combined in a single housing surface mounted on each side of the header.
 - .1 Presence sensor shall remain active at all times.
 - .2 The sensor shall communicate with the automatic door operator through a self-monitoring connection that allows the door to go into a fail safe mode preventing the door from closing in the event of a sensor failure.
 - .2 Motion/presence detecting sensors to be field installed and adjusted.

2.7 ELECTRICAL

- .1 High-Efficiency DC Motor: Maximum of 3 amp current draw, allowing 5 operators to run on one 20 Amp circuit.
- .2 Power: Self-detecting line voltage capable control. 120 VAC through 240 VAC, 50/60 Hz, 3 amp minimum incoming power with solid earth ground connection for each door system.
- .3 Key Impulse Input: Input for card readers or remote activation with independent adjustable hold open delay.
- .4 Wiring: Separate internal channel raceway free from moving parts.

- .5 Brown out / high voltage capability: System has capability to operate at full performance well beyond brown out and high voltage line conditions (85 V – 265 V) sensing changes and adjusting automatically.
- .6 Convenience Battery: Shall be concealed in header and capable of full operation with blackout conditions, including sensor capabilities for minimum of 100 cycles.]
- .7 Digital Cycle Counter: Battery powered, 7 digit LCD cycle counter with a reset feature to track door usage cycles.

2.8 ACCESSORIES

- .1 Vaporized material to fill in the empty spaces between the outer frames and the elements of the outer walls: polyurethane foam with one component, minimal foaming, adjustable gun applied in order to control the length of the isolating bead.
 - .1 Acceptable products:
 - .1 Demilec R SEAL 260
 - .2 Hilti CF-I XTW
 - .3 Adfast AD Foam Plus
 - .4 or replacement product approved by addenda according to the instructions to the bidders.
 - .2 Door Signs:
 - .1 Sign Material: self adhesive type for mounting on glass.
 - .8 Include "AUTOMATIC SLIDING DOOR" and « PORTE COULISSANTE AUTOMATIQUE » sign on each side of power operated sliding door leaves; red horizontal background strip with minimum 25 mm high contrasting letters, each end of horizontal strip with arrow pointing toward nearest door stile. Locate sign centrally on door leaf 900 mm to 1.5 mm above floor.

2.9 FINISHES

- .1 Finish exposed surfaces of aluminum components in accordance with AA DAF-45 - Aluminum Association Designation System for Aluminum Finishes.
 - .1 Natural Anodic Finish: to designation AA- M12C22A41, Classe I, 0,018 mm.
- .2 Exposed Operator and Components: finish to match door and door hardware finish selected by Ministerial Representative.
- .3 Steel Brackets and Reinforcing Steel and Steel Anchors: one coat of steel primer for interior conditions. Galvanized with 380 g/m² zinc coating to CSA G164 for exterior conditions.

3 EXECUTION

3.1 EXAMINATION

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

after receipt of written approval to proceed from Ministerial Representative.

3.2 INSTALLATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Install doors and frames in accordance with shop drawings and manufacturer's instructions.
- .3 Co-ordinate installation of components with related and adjacent work. Attach and seal air vapour barrier materials to perimeter framing. Attach and seal dampproofing flashings to perimeter framing.
- .4 Set work plumb, square, level, free from warp, twist and superimposed loads.
- .5 Securely anchor work in required position. Do not restrict thermal movement.
- .6 Brace frames rigidly for building-in. Supply temporary horizontal spreaders at third points of door openings to maintain frame width. Vertically support at centre, heads of openings over 1.2 m wide. Remove temporary bracing after framing is set.
- .7 Apply isolation coating to separate aluminum and primed or galvanized steel surfaces at points of contact with cementitious materials.
- .8 Pack fibrous insulation in shim spaces at perimeter of assembly and void spaces between members to maintain continuity of thermal barrier.
- .9 Maintain clearances between head members and structure to ensure that structural loads are not transmitted to frames.
- .10 Install hardware using templates provided. Refer to Section 08 71 00 - Door Hardware for installation requirements.
- .11 Install door operator system in accordance with manufacturer's instructions, including piping controls, control wiring. Install remote power units.
- .12 Set tracks, header assemblies, operating brackets, rails and guides level and true to location, with adequate anchorage for permanent support.
- .13 Install glass in accordance with Section 08 80 50 - Glazing using exterior glazing method.

3.3 SEALANT APPLICATION

- .1 Install perimeter type sealant and back-up materials, to ensure weather tight seal at outside and air, vapour seal at inside.
- .2 Comply with requirements of Section 07 92 00 - Joint Sealants for sealants, fillers and gaskets to be installed during installation of doors and frames.
- .3 Conceal sealant within aluminum work except where exposed use is permitted by Ministerial Representative.
- .4 Set sill members in bed of sealant.

3.4 ADJUSTING

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

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Remove traces of primer, caulking; clean doors and frames.
 - .3 Clean aluminum surfaces promptly after installation. Exercise care to avoid damage to coatings.
 - .4 Clean glass and glazing materials with approved non-abrasive cleaner.
 - .5 Remove protective material from prefinished aluminum surfaces.
 - .6 Wash exposed surfaces with mild solution of detergent and warm water, using soft, clean wiping cloths. Remove dirt from corners. Wipe surfaces clean.
 - .7 Remove excess sealant by moderate use of solvent, of type acceptable to sealant manufacturer.
 - .8 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section [01 74 11 - Cleaning].
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 DEMONSTRATION

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

3.7 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 05 41 00 Structural metal stud framing
- .2 Section 06 08 99 Rough carpentry for minor works
- .3 Section 07 25 00 Air barrier
- .4 Section 07 27 10 Air/vapour barrier membrane and intra-muros flexible flashings.
- .5 Section 07 46 13 Preformed metal siding
- .6 Section 07 62 00 Sheet metal flashing and trim
- .7 Section 07 92 00 Joint sealants
- .8 Section 08 80 50 Glazing

1.2 REFERENCE STANDARDS

- .1 Aluminum Association (AA)
 - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 ASTM International
 - .1 ASTM A 123/A 123M-12, Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM E 1748-95(2009), Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System.
- .3 CSA Group
 - .1 AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
 - .2 CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
 - .3 CAN/CSA-A440.4-07(R2012), Window, Door, and Skylight Installation
 - .4 CAN/CSA-A440.2/A440.3-09, Fenestration energy performance/User guide to CSA A440.2, Fenestration energy performance.
 - .5 CAN/CSA-Z91-02(R2013), Health and Safety Code for Suspended Equipment Operations.
 - .6 CAN/CSA-Z809-08(R2013), Sustainable Forest Management.
- .4 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .5 Green Seal (GS)
 - .1 GS-11-11, Paints and Coatings.
- .6 Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - [current edition].
 - .1 MPI #79, Primer, Alkyd, Anti-Corrosive for Metal.
- .7 South Coast Air Quality Management District (SCAQMD)
 - .1 SCAQMD Rule 1113-11, Architectural Coatings.

- .2 SCAQMD Rule 1168-05, Adhesives and Sealants.
- .9 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2010-2014 Standard.
- .10 Screen Manufacturers Association (SMA)
 - .1 SMA 1201R-2002 Specification for Insect Screens for Windows, Sliding Doors and Swinging Doors.

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 windows 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 Canada.
 - .2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim, junction between combination units elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes fasteners, and caulking. Indicate location of manufacturer's nameplates.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit one representative model of each type window.
 - .4 Include frame, sash, sill, glazing and weatherproofing method, insect screens, surface finish and hardware. Show location of manufacturer's nameplates.
 - .5 Include 150 mm long samples of head, jamb, sill, meeting rail, mullions to indicate profile.
- .5 Test and Evaluation Reports:
 - .1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications.
 - .2 All test reports that reference the NAFS must include, on the first page, a summary of the results including, at minimum:
 - .1 The product manufacturer.
 - .2 The type of product.
 - .3 The model number/series number.
 - .4 The primary product designation.
 - .5 The secondary product designation.
 - .1 Positive design pressure.
 - .2 Negative design pressure.
 - .3 Water penetration resistance test pressure.
 - .4 Canadian air infiltration and exfiltration levels.
 - .6 The test completion date.
 - .3 The report will also contain the following information:
 - .1 Test dates.
 - .2 Report preparation dates.
 - .3 Test information retention period.
 - .4 Location of testing facilities.
 - .5 Full description of test samples, including:

- .1 [Anodized][Enamelled] finish, [weathering characteristics] [wood preservative].
- .2 Condensation resistance.
- .3 Safety drop - vertical sliding windows only.
- .4 Block operation - sliding windows only.
- .5 Sash strength and stiffness - operable casement.
- .6 Sash pull-off - vinyl windows.
- .7 Forced entry resistance.
- .8 Mullian deflection - combination and composite windows.
- .6 Complete description of amendments, as applicable.
- .7 Conclusion.
- .8 Drawings signed by the testing laboratory, if provided.

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 [windows] for incorporation into manual.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements] [and] [with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: 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 windows from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.7 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 and 10 years
- .2 Provide a written document and jointly signed by the manufacturer and the installer, issued in the name of Canada, certifying the doors and aluminum frames against any loss of airtightness and waterproofing, any condensation, any deformation due to wind load, any deterioration of the finish, for a period of five (5) years. Refer to the general conditions for the beginning of the warranties.
- .3 In addition to the established performances, the warranty must state the glazing tightness products, tapes and trims will not be damaged by sunrays, bad weather or oxidation in a way that

there will be no tightness loss, cracking, flaring, loss of strength, loss of adherence or clouding of the adjoining surfaces for the warranty period indicated above

- .4 In addition to what is mentioned in section 08 50 50 – Glazing, the warranty must stipulate that the sealed glass will keep its tightness, appearance and transparency, with no forming of opaque film, condensation or deposit inside the units for a period of 10 years.
- .5 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments and the required services to repair the defectives parts of the work and, in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 MATERIALS

- .1 Materials: conform to AAMA/WDMA/CSA/101/I.S.2/A440-08 (NAFS-08 – North American Fenestration Standard (NAFS) Specification related to windows, doors and skylights.
- .2 All the windows must come from the same manufacturer.
- .3 Aluminum frames and shutters must be A&D Prévost 1360 series for double glazing, with triple thermal bridge breakage, high performance and with MAXSCEL glazing beads to ensure rain screen. Casing depth of 152 mm. Kawneer and Alumico aluminum windows equivalent to A&D Prévost 1360 series are acceptable products or replacement product approved by addenda in accordance with the instructions to the bidders.
- .4 Aluminum frames and shutters profiles must be AA.6063-T5 alloy and hardened.
- .5 Minimum thickness of the edges must be 1.8 mm and more to receive the hardware fasteners.
- .6 Thermal barrier must be fiberglass reinforced nylon polyamide (no PVC).
- .7 Rain screen principle will be apply with the 'MAXSCEL" type glazing bead.
- .8 Window screen: aluminum standard
 - .1 Screens must be minimally aluminum profiled treated with black paint, 2 x 7 spaces x cm² and conform to class S1 ONGC 79 GP1M standard.
 - .2 Screen on the opening part of the window designed for interior stud with vandal proof fasteners.
- .9 Exterior metal backings: extruded aluminum aprons of the type and dimensions indicated and answering the need of the work, with joints covers, weather boards, chairs and fasteners.
- .10 Interior/exterior aluminum trims: press shaped aluminum sheet metal, of the type and dimensions indicated and answering the need of the work, of at least 2 mm thick or 3.2 mm with joints covers, weather boards and fasteners mechanisms.

- .11 Caulking must be with spray polyurethane foam between the aluminum frames and the rough work. Follow the indications on the plans.
- .12 Screws, bolts, fasteners of all kind for fixing the frames and shutters' hardware pieces must zinc plated steel.
- .13 Glass: in accordance with section 08 80 50 – Glazing.
- .14 Sprayed materials to fill in the empty spaces between the outer frames and the elements of the outer walls: polyurethane foam with one component, minimal foaming, adjustable gun applied in order to control the length of the isolation of the bead.
 - .1 Acceptable product :
 - .1 Demilec RSEAL 260
 - .2 Hilti CF-I XTW
 - .3 Adfast AD Foam Plus
 - .4 or replacement product approved by addenda according to the instructions to the bidders.

2.2 WINDOW PERFORMANCES REQUIREMENTS

- .1 Required performance class
 - .1 The performances classes are for information only, the manufacturer's calculation notes prevail over the indications below and are to be transmitted in accordance with section 01 33 00 – Documents and samples to submit.
 - .2 Main designation
 - .1 Performance class: AW
- .2 Main and secondary characteristics
 - .1 Maximum dimension to the project $\pm 1800 \text{ mm} \times \pm 2400 \text{ mm}$
 - .2 Minimal performance category (PC): 45
 - .3 Minimal positive design pressure (DP): 2160 Pa
 - .4 Minimal negative design pressure (DP : 2160 Pa
 - .5 Minimal pressure of water infiltration resistance test: 440Pa
 - .6 Minimum Canadian level of air infiltration/exfiltration: A2
 - .7 Condensation control at the surface: conform to CAN/CSA-A440.2/A-440.3 standard.
- .3 Thermal performance depending on the type of window
 - .1 The maximum overall heat transfer index (U_{max}) of the fenestration products must be $2.10 \text{ w/(m}^2\text{°C)}$.
 - .2 The overall temperature index (I) must be determined by the manufacturer according to his calculation notes.

2.3 MANUFACTURING

- .1 Windows must be fabricated by the factory designer and in accordance with the requirements of AAMA/WDMA/CSA/101/I.S.2/A440-08 (NAFS-08) standard and to the prescriptions below.

- .2 Windows must be fabricated with precision and square, with a maximum tolerance of 1.5 mm more or less for windows measuring 1800 mm or less diagonally and 3mm more or less for windows measuring more than 1800mm.
- .3 Detailed front dimensions are the maximum sizes allowed.
- .4 Steel ties and backing pieces must have one coat of primer applied in factory, conform to CAN/CGSB-1.40 standard **380 g/m²**, zinc coated, conform to CAN/CSA-G164 standard.
- .5 Frames and shutters must be made of two aluminum profiles united by a profiled fiberglass reinforced nylon polyamide thermal barrier.
- .6 Frames must be braced during transportation and installation to keep their rigidity and maintain the angles straight.
- .7 Shutters' corners must be miter cut with precision. They must be reinforced with two assembly angle plates coated with epoxy glue and mechanically pressed at 212 kg cm/ca to obtain extra heavy-duty joints, waterproof and precise.
- .8 Aluminum made angle plates must be slid in the interior and exterior assembly grooves of the aluminum profiles to close the conjunction of the profiles and serve as air barrier.
- .9 Shutters must be fit, on their perimeter, with two (2) double density weather-strips. A stiff part and a flexible part. The stiff part, durometer D 95, must be slid in the aluminum profile slot. The stiffness of this part of the weather-strip prevent its coming out from its initial position. The flexible part, durometer D-65 Shore A, must lean on a stopper when the shutter is closed. This system must offer a perfect waterproofing.
- .10 Glazing shims must be integrated to the shutters' profiles to allow an adjustment of the glazing panels and prevent the shutters from curving.
- .11 The EPDM intermediate weather-strip must be located at the perimeter of the opening, inside, between the main frame and the shutter to create an air barrier screen.
- .12 This weather-strip must fill the function of creating an insulated chamber at the perimeter between the frame and the shutter, above the thermal barrier so that the cold do not pas this thermal barrier.
- .13 This weather-strip must also serve as water deflector to drain rain water that could infiltrate when the shutter remains open.
- .14 Glazing beads must be aluminum type "Maxscel" and must be fitted with a double density vinyl glazing trim, to ensure the waterproofing part of the rain screen. No rabbet joints will be accepted on site as equivalence.
- .15 The 9D70A waterproofing corner, PVC special moulding, must seal the trims' vertical and horizontal junctions, thus creating the necessary waterproofing for the rain screen principle.
- .16 This glazing trims adds a thermal barrier to the glazing beads and thus insulate the glazing panels in their perimeter, from cold penetration.
- .17 A glazing tape, exterior side, must be a flexible PVC profile to create a straight line and thus avoid water being held at the level of the fin. No wet trim will be accepted.
- .18 Mastic glazing tapes cannot be accepted neither on the interior side nor on the exterior side.
- .19 The window screen frame will the same finish and colour as the aluminum of the window.
- .20 The window screens' frames will be held to the window frame with the spring mechanism accessible from inside the room.
- .21 The window screens' frames must be secured with vandal proof screws piercing the window fin from the inside, up into the profile of the window screen frame.

2.4 ALUMINUM SURFACES FINISHES

- .1 The exposed surfaces of the aluminum component elements must be finished in accordance with the « Designation System for Aluminum Finishes », published by the Aluminum Association.
- .2 Exterior finish
 - .1 Anodized and transparent finish: designation AA-M12-C22-A41, natural aluminum colour.
- .3 Interior finish
 - .1 Anodized and transparent finish: designation AA-M12-C22-A41, natural aluminum colour;

2.5 GLAZING

- .1 Glazing must be installed in accordance with CSA A440.4-07 standard, Windows, doors and skylights installation.
- .2 See section 08 80 50 – Glazing.

2.6 HARDWARE PIECES

- .1 The different hardware pieces must be appropriate to the required installations be first approved by the architect.
- .2 The different pieces of hardware will be inserted in a groove appropriate for this use, « Euro-Groove » type so that they keep the precision of their localization and the easiness of their adjustment.
- .3 Any screw only hardware tying pieces mechanism will be rejected.
- .4 Shutters are fitted with an appropriate hardware:
 - .1 PHOE: hinged high exterior opening
 - .1 Multi point latch knob with integrated hardware;
 - .2 2 friction hinges;
 - .3 1 standard window screen 348.

3 EXÉCUTION

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 Ministerial Representative.
 - .2 Inform Ministerial Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Ministerial Representative.

3.2 INSTALLATION

- .1 Window installation:
 - .1 Install in accordance with AAMA/WDMA/CSA 101/I.S.2/A44].
 - .2 Arrange components to prevent abrupt variation in colour.
- .2 Sill installation:
 - .1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use piece recommended lengths at each location.
 - .2 Cut sills longer than window opening.
 - .3 Secure sills in place with anchoring devices located at ends [joints of continuous sills] and evenly spaced 600 mm on centre in between.
 - .4 Fasten expansion joint cover plates and drip deflectors with self tapping stainless steel screws.
 - .5 Maintain 6 to 9 mm space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3 to 6 mm space at each end.
- .3 Caulking:
 - .1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.
 - .2 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant

within window units except where exposed use is permitted by Ministerial Representative.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 06 40 00 Architectural woodwork
- .2 Section 09 91 23.01 Interior re-painting.

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
 - .1 ANSI/BHMA A156.9-2003, Cabinet Hardware.
 - .2 ANSI/BHMA A156.11-2004, Cabinet Locks.
 - .3 ANSI/BHMA A156.16-2008, Auxiliary Hardware.
 - .4 ANSI/BHMA A156.18-2006, Materials and Finishes.
 - .5 ANSI/BHMA A156.20-2006, Strap and Tee Hinges and Hasps.

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 [cabinet hardware] and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Hardware List:
 - .1 Submit contract hardware list.
 - .2 Indicate specified hardware, including make, model, material, function, finish and other pertinent information.
- .4 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .5 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

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

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE AND HANDLING

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

- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
- .4 Storage and Handling Requirements:
 - .1 Store materials[indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect cabinet hardware from nicks, scratches, and blemishes.
 - .3 Protect prefinished surfaces with wrapping strippable coating.
 - .4 Replace defective or damaged materials with new.
- .5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2 PRODUCTS

2.1 HARDWARE ITEMS

- .1 Use one manufacturer's product for all similar items.

2.2 CABINET HARDWARE

- .1 Cabinet hardware items: conform to ANSI/BHMA A156.9 standard, referred to a numeric code precede by le letter B according to the list below.
 - .1 Hidden door hinges (clip top blu motion) in general full or half surface with nickel-plated steel lock case, 110° opening and automatic closure, nickel-plated zamac mounting plate, adjustable in height, nickel-plated steel cache, silent closure, designed for 200 000 cycles. Plan 2 hinges for doors 915 mm high and less, 3 hinges for doors 1220 mm high and 4 hinges for full-height doors.
 - .2 Hidden door hinges (clip top blu motion) in general full or half surface with nickel-plated steel lock case, 90° opening (for panels opening toward a wall or a piece of furniture) and automatic closure, nickel-plated zamac mounting plate, adjustable in height, nickel-plated steel cache, silent closure, designed for 200 000 cycles. Plan 2 hinges for doors 915 mm high and less, 3 hinges for doors 1220 mm high and 4 hinges for full-height doors.
 - .3 stainless steel continuous hinge (piano type), 32 mm wide by the length of the panel indicated on the plans.
 - .4 Telescopic slides for computer keyboard drawer with release lever, steel ball bearings, open and close position support mechanism. Adjustable height from 62 mm to 95 mm. Lateral mounting under the drawer with the supports. Extension of 19 mm. Capacity 75 lb/pair. Length 305 mm, zinc finish.
 - .5 Ultra heavy-duty telescopic slides, full extension with close position support mechanism, steel ball bearings release lever, cam adjustment. Mounting on the side. Capacity 100 lb. Zinc finish. Length to plan according to the dimensions of the drawer.
 - .6 Simple shelf standards U shape, 16 mm, zinc finish with steel shelf standards shelf support, zinc finish.
 - .7 Steel table folding bracket tested according DIN 1637: 2013 with striking cap of 3.7 pounds, with heavy-duty automatic locking mechanism.
 - .8 Stainless steel foot leveler with black plastic end, capacity adjustable to the support on which it is opposed.
 - .9 Contemporary metal knob, flush model for doors and drawers, brush nickel finish.

- .1 Acceptable products:
 - .1 Richelieu knob # 39965195
 - .2 Richelieu knob# POI-R9955-128-555
 - .3 Hettich knob # 9071067
 - .4 or replacement product approved by addenda in accordance with the instructions to the bidders.
- .10 Translucent polyurethane cushion 8 mm diameter to place on top and bottom of each batten and drawer.
- .11 60 mm plastic diameter circular grommet matching the colour of the laminate. Plan a grommet every 1525 mm long c/c maximum when there is an empty space under counter. If the counter is less than 1525 mm install two (2) grommets. The grommets' positioning and boring must be coordinated on site.
- .12 PVC grommet mouldings with self-adhesive tape designed to hide most of the electrical wires 38 mm long x 50 mm wide. To install everywhere required inside the pedestal for the passing of electrical wiring.
- .13 2 ply edging strip: 3 mm thick, polyester, ready-paste back side, mat finish, colour matching the laminate, same thickness as the support panel on which it is opposed.
- .2 Cabinet locks: to ANSI/BHMA A156.11, designated by letter E and numeral identifiers as listed below
 - .1 Cam lock for panel up to 23 mm thick, opening at 90°. The set must include 2 cams (straight and bent) and two keys. Heights of the cam off center 9.5 mm and 14.5 mm. Cam bolt lock with key. Chrome finish.
 - .2 Reversible secret door latch, nickel finish for commercial use, conform to ANSI/BHMA A156-9-2003 standard.
 - .3 Cylinders: key into keying system as directed.

2.3 FASTENINGS

- .1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .2 Exposed fastening devices to match finish of hardware.
- .3 Use fasteners compatible with material through which they pass.

2.4 KEYING

- .1 Locks for each airline and car location desk (plan for 5 different set of keys) for furniture must be fitted with keys that are different according to the recommendations. Submit the keying list for approval.
- .2 Supply keys in duplicate for every lock in this Contract.
- .3 Stamp keying code numbers on keys and cylinders.

3 EXECUTION

3.1 INSTALLATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Install hardware to standard hardware location dimensions in accordance with manufacturer's

recommendations and to project design requirements.

3.2 ADJUSTING

- .1 Adjust cabinet hardware for optimum, smooth operating condition.
- .2 Lubricate hardware and other moving parts.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
 - .3 Remove protective material from hardware items where present.
 - .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 DEMONSTRATION

- .1 Keying System Setup and Cabinet:
 - .1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
 - .2 Place file keys and duplicate keys in key cabinet on their respective hooks.
 - .3 Lock key cabinet and turn over key to Ministerial Representative.
- .2 Maintenance Staff Briefing:
 - .1 Brief maintenance staff regarding:
 - .1 Proper care, cleaning, and general maintenance of projects complete hardware.
 - .2 Description, use, handling, and storage of keys.
- .3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.5 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 21 00 Allowances
- .2 Section 08 06 71
- .3 Section 08 11 00 Metal doors and frames
- .4 Section 08 11 16 Aluminium doors and frames
- .5 Section 08 42 29 Automatic entrances
- .6 Chart of doors and frames in the plans' leaflet

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
 - .1 ANSI/BHMA A156.1-2000, American National Standard for Butts and Hinges.
 - .2 ANSI/BHMA A156.2-2003, Bored and Preassembled Locks and Latches.
 - .3 ANSI/BHMA A156.3-2001, Exit Devices.
 - .4 ANSI/BHMA A156.4-2000, Door Controls - Closers.
 - .5 ANSI/BHMA A156.5-2001, Auxiliary Locks and Associated Products.
 - .6 ANSI/BHMA A156.6-2005, Architectural Door Trim.
 - .7 ANSI/BHMA A156.8-2005, Door Controls - Overhead Stops and Holders.
 - .8 ANSI/BHMA A156.10-1999, Power Operated Pedestrian Doors.
 - .9 ANSI/BHMA A156.12-2005, Interconnected Locks and Latches.
 - .10 ANSI/BHMA A156.13-2002, Mortise Locks and Latches Series 1000.
 - .11 ANSI/BHMA A156.14-2002, Sliding and Folding Door Hardware.
 - .12 ANSI/BHMA A156.15-2006, Release Devices - Closer Holder, Electromagnetic and Electromechanical.
 - .13 ANSI/BHMA A156.16-2002, Auxiliary Hardware.
 - .14 ANSI/BHMA A156.17-2004, Self-closing Hinges and Pivots.
 - .15 ANSI/BHMA A156.18-2006, Materials and Finishes.
 - .16 ANSI/BHMA A156.19-2002, Power Assist and Low Energy Power - Operated Doors.
 - .17 ANSI/BHMA A156.20-2006, Strap and Tee Hinges and Hasps.
- .2 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
 - .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.
- .3 The standardized positioning of the hardware pieced must satisfy the requirement of the Canadian metric conversion guide for steel doors and frames – Section Modular construction, prepared by the Canadian Steel Door Manufacturers Association.
- .4 Conform to the standards and other documents indicated below in their most recent versions.
 - .1 NFPA-80 – Standard for Fire Doors and Fire Windows
 - .2 NBC – National Building Code of Canada
 - .3 ANSI – American National Standard Institute
 - .4 BHMA – Builders Hardware Manufactures Association
 - .5 ULC – Underwriters Laboratories of Canada
 - .6 cUL – Underwriters Laboratories for usage in Canada

.7 DHI – Door and Hardware Institute (Institut des portes et de la Quincaillerie)

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 door hardware and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 not used.
- .4 Circuit diagram
 - .1 Submit for approval the final circuit diagrams. The latter will have to be compatible with the safety and fire systems. Report to Electricity document, Section 26.
 - .2 Include the location of the control boxes and plan for access doors in walls and ceilings as required.
 - .3 For all the doors (types) with electrified hardware items, provide an elevation of the door and its components and a diagram of the electrical hookups point-to-point of the said components.
- .5 Hardware List:
 - .1 Submit contract hardware list.
 - .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
- .6 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .7 Manufacturer's Instructions: submit manufacturer's installation instructions.

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 [door hardware] for incorporation into manual.

1.5 MAINTENANCE MATERIALS SUBMITTALS

- .1 Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Tools:
 - .1 Supply 2 sets of wrenches for door closers, locksets and fire exit hardware.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified

performance characteristics and criteria and physical requirements.

.3 Meeting preceding the setting up

- .1 Call a meeting one week prior the beginning of the works in the present section.
- .2 Require the presence of the installer, the supplier and the parties directly concerned by the works in this section.
- .3 Examine the works requirements, the manufacturer's instructions about the setting up and the coordination with the works the related sections as well as the terms of the warranty offered by the latter.
- .4 Tape the procedures, important decisions and identify the intervention of the parties. Distribute the minutes, within the 3 days following the meeting, to the participants of the meeting and to the interested parties absent at the meeting.

1.7 TRANSPORTATION, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
- .4 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect door hardware from nicks, scratches, and blemishes.
 - .3 Protect prefinished surfaces with wrapping, strippable coating.
 - .4 Replace defective or damaged materials with new.

1.8 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 1, 5 and 10 years.
- .2 Provide a written document and jointly signed by the manufacturer and the installer, issued in the name of Canada, guaranteeing the whole hardware items, from any material and installation defect, for a period of 3 years. Refer to the general conditions for the beginning of the warranties.
- .3 This warranty must be extended to 5 years for the electric locks and 10 years for the door closers. Refer to the general conditions for the beginning of the warranties.
- .4 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments and the required services to repair the defectives parts of the work and, in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the

building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 GENERAL POINTS

- .1 All the items of the same type must come from the same manufacturer.
- .2 All hardware pieces and all the various electrified products for homologated fire doors will have to be conform to NFPA_80 and be ULC or WHL fire stop homologated.
- .3 Except in particular cases prescribed in section 08 06 10 – List of doors, all hardware pieces must minimally, but not necessarily being limited to, be Grad 1 and conform to ANSI standards in force.
- .4 Section 08 06 71 – List of door hardware, is supplied as guide to establish the type, quality and minimum weight of the required items, but must not interpreted as being a quantity list. Check the required quantities.

2.2 FASTENERS

- .1 Only the fasteners supplied by the manufacturer can be used. Failure to respect this requirement can compromise the warranties and invalidate the homologation tags if need be.
- .2 Supply the screws, bolts, expansion shields and other fastening mechanisms needed for a satisfactory bracing and good functioning of the hardware items.
- .3 Exposed fastening pieces must have the same finish as the hardware items.
- .4 Where a pull handle is needed on one of the two sides and a push plate on the other side of the door, supply the fastening pieces needed and install them so that the handle be fastened right through the door. Install the plate to hide the fasteners.
- .5 Use fastening pieces made of a material compatible with the one they go through.
- .6 Even if they are supplied in option by the manufacturer, the self-tapping and /or self-drilling screws will not be tolerated for the installation of hinges, panic locks, door closers and stop arms. All those items must be installed the machine screws supplied by the manufacturers who will have been processed in the doors and frames beforehand.
- .7 The door protections plates will be fixed with double coated tape such as Tesa Tape #51970 0.18 mm thick.

2.3 CYLINDER, BAREL AND KEYS

- .1 To replace all the existing barrels on all the doors (interior and exterior) existing preserved by a Médeco barrel.
- .2 All locks must be controlled with master keys to hand down to the departmental representative. Supply six copies of master key. All the keys and cylinder will keyway lock controlled and protected with Canadian patent that will not expire before a minimum of ten years after the

delivery of the building.

- .2 All the cylinders and keys must have a minimum of 6 pin tumblers from Medeco or equivalent.
- .3 Coordinate with the departmental representative all the keyways in order to meet the specific need.
- .4 Supply three copies of the keys for each lock being part of the present contract.
- .5 Provide the temporary cylinders, barrels and keys that will be used during construction; the temporary cylinders, barrels will be painted orange and will all use one master key.
- .6 The supplying of temporary cylinders is for the duration of the construction works, the permanent cylinders will be installed only at the end of the works by the Contractor.
- .7 Stamp the code numbers on the keys and barrels.
- .8 Supply the codification chart for the keys that will handed down to the Owner for future needs.

2.4 VANDAL PROTECTION

- .1 Even if they are not specifically described in the present section or shown on the hardware bill, supply the protection pieces like the bolt protectors, hinges with non removable pins, etc., for all the exterior or interior doors.

2.5 KEYS

- .1 Cabinet and door locks must controlled with universal master keys, according to the instruction to come during construction. Prepare a detailed list of the keys in collaboration with the departmental representative.
- .2 Supply three (3) keys for each locks planned in terms of the present contract.
- .3 Supply three (3) master keys for each group of master key or grand master key.
- .4 Stamp the code numbers on the keys and barrels
- .5 Supply the temporary rings that will be used during construction.
- .6 Hand down to the departmental representative all the final rings with their keys.

3 EXECUTION

3.1 ORDERS AND VERIFICATION

- .1 Make sure that the manufacturer's templates and instructions be supplied to the others having related works to do.
- .2 For all the doors (types) with electrified hardware items, coordinate all the documents with those prepared by the electrical engineers and the various manufacturers of the components.
- .3 Coordinate the installation of the standard hardware with the one of the hardware for controlled

access and with all the other related works.

- .4 Examine the shop drawings of the related works to do and ensure that the necessary measures be taken to locate and install the hardware pieces in accordance with the prescribed requirements.
 - .1 Inform the departmental representative immediately of any unacceptable conditions detected.
 - .2 Begin the installation works only after having corrected the unacceptable conditions and received the manufacturer's written approval.
 - .3 Beginning the works means that the Contractor has proceeded to the examination of the substrate and has accepted it.

3.2 INSTALLATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Supply metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .3 Supply manufacturers' instructions for proper installation of each hardware component.
- .4 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).
- .5 Install the hardware plumb, with the screws and bolts supplied by the manufacturer and following the instructions. Pieces will be flush-mounted with the fronts of the doors.
- .6 Where door stop contacts door pulls, mount stop to strike bottom of pull.
- .7 Install key control cabinet.
- .8 Use only manufacturer's supplied fasteners.
 - .1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
- .9 Remove construction cores, locks when directed by Ministerial Representative.
 - .1 Install permanent cores and ensure locks operate correctly.

3.3 ADJUSTING

- .1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
- .2 Lubricate hardware, operating equipment and other moving parts.
- .3 Adjust door hardware to ensure tight fit at contact points with frames.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware

- in accordance with manufacturer's instructions.
- .3 Remove protective material from hardware items where present.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 DEMONSTRATION

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

3.6 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 07 92 00 Joint sealants
- .2 Section 08 11 00 Metal doors and frames
- .3 Section 08 11 16 Aluminium doors and frames
- .4 Section 08 50 00 Glazing
- .5 Section 08 87 53 Security films
- .6 Chart of doors and frames in the plans' leaflet

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 330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - .8 ASTM F 1233-08, Standard Test Method for Security Glazing Materials and Systems.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
 - .2 CAN/CGSB-12.2-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.
- .3 Environmental Choice Program (ECP)
 - .1 CCD-045-95(R2005), Sealants and Caulking Compounds.
- .4 Glass Association of North American (GANA)
 - .1 GANA Glazing Manual - 2008.
 - .2 GANA Laminated Glazing Reference Manual - 2009.

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

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting 3 week prior to beginning work of this Section and on-site installation, with Contractor's Representative and Ministerial Representative]in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's written installation instructions and warranty requirements.
 - .2 Arrange for site visit with Ministerial Representative prior to start of Work to examine existing site conditions adjacent to demolition Work.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for 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 Canada.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
- .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.
 - .2 Submit shop [inspection] [and] [testing] for glass.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for [glazing] for incorporation into manual.

1.6 QUALITY ASSURANCE

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

- .2 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct mock-up to include glass].
 - .3 Mock-up will be used:
 - .1 To judge quality of work, substrate preparation, operation of equipment and material application.
 - .4 Locate [where directed] [where indicated] .
 - .5 Allow 72 hours for inspection of mock-up before proceeding with work.
 - .6 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.07 TRANSPORTATION, 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, labeled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect glazing and frames from nicks, scratches, and blemishes.
 - .3 Protect prefinished aluminum surfaces with wrapping, strippable coating.
 - .4 Replace defective or damaged materials with new.
- .5 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.8 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.

1.9 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 10 years
- .2 Provide a written document and jointly signed by the manufacturer and the installer, issued in the name of Canada, certifying that the works in the present section will meet all the established performance requirements in normal use conditions, for period of ten (10) years. Refer to the general conditions for the beginning of the warranties.
- .3 Sealed insulated glazing:
 - .1 The warranty will cover among other that the sealed insulated glazing will remain in place and will keep their waterproof, appearance and transparency with no forming of opaque film, condensation or deposit inside the units for a period of 10 years.
- .4 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include

workmanship, materials, equipments and the required services to repair the defectives parts of the work and, in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 MATERIALS

- .1 Design Criteria:
 - .1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:
 - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
 - .2 Size glass to withstand wind loads, dead loads and positive and negative live loads [acting normal to plane of glass to design pressure to ASTM E330.
 - .3 Limit glass deflection to flexural limit of glass with full recovery of glazing materials.
- .2 Glass and glazing, quality
 - .1 Sheet glass: to CAN/CGSB-12.2, AA-special selected, thickness indicated on the plans.
 - .2 Safety glass: to CAN/CGSB-12.1, transparent 2 mm thick.
 - .1 Type 2-tempered.
 - .2 Class B.
 - .3 Category 1.
 - .4 Edges chamfered and grinded.
- .3 Insulating Glass Units:
 - .1 Insulating glass units: to CAN/CGSB-12.8, double unit, 25.4 mm overall thickness.
 - .1 Components:
 - .1 Exterior glass: 6 mm Neutral 78/65 clear, soft coating placed in face 3 (tempered when indicated on the plans).
 - .2 Technoform warm edge spacer argon space at 95% of 12.7 mm, black.
 - .3 Interior glass 6 mm thick (tempered when indicated on the plans).

U value (winter) w/m²-k: 0,31

R value: 3.22

Shading coefficient: 0,75

Solar heat gain coefficient: 0,65

Relative heat gain w/m² : 155.0

% of visible light transmitted: 78%

% of visible light reflected toward the exterior: 13%

% of visible light reflected toward the interior : 12%

% of solar energy transmitted: 54%

% of solar energy reflected toward the exterior: 19%

% of UV transmission: 38%

Light-to-solar gain: 1,19

- .2 Multiver Econover Select 63 clear glass sealed unit is an acceptable product or replacement product approved by addenda in accordance with the instructions to

the bidders.

- .4 Plastic Film: in accordance with Section 08 87 53 - Security Films]
- .5 Sealant: in accordance with Section 07 92 00 - Joint Sealants.
 - .1 VOC limit 250 g/L maximum to SCAQMD Rule 1168.
 - .1 VOC limit: 5 % maximum by weight to CCD-045.
 - .2 Ensure sealant does not contain chemical restrictions to CCD-045.

2.2 ACCESSORIES

- .1 Setting blocks: neoprene, 80-90 Shore A durometer hardness to ASTM D 2240, length of minimum 100 mm x width of glazing rabbet space minus 1.5 mm x height to suit glazing method, glass light weight and area.
- .2 Spacer shims: neoprene, 50-60 Shore A durometer hardness to ASTM D 2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.
- .3 Glazing tape:
 - .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D 2240; coiled on release paper; adapted dimensions, black colour.
 - .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2 %, designed for compression of 25 %, to effect an air and vapour seal.
- .4 Glazing splines: resilient silicone, extruded shape to suit glazing channel retaining slot.
- .5 Glazing clips: manufacturer's standard type.
- .6 Lock-strip gaskets: to ASTM C 542.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.
 - .1 Verify that openings for glazing are correctly sized and within tolerance.
 - .2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
 - .3 Visually inspect substrate in presence of Ministerial Representative.
 - .4 Inform Ministerial Representative of unacceptable conditions immediately upon discovery.
 - .5 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Ministerial Representative.

3.2 PREPARATION

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

3.3 INSTALLATION - GENERAL

- .1 Unless otherwise indicated, plan for tempered glass for glass doors and panels in the adjoining parts and the interior glass partitions located less than 1015 mm from the floor. When the panel exceeds the prescribed dimension, extend the tempered glass up to the next horizontal skeleton element.

3.4 INSTALLATION: EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

- .1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.
- .2 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.
- .3 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.
- .4 Place setting blocks at 1/4 points, with edge block maximum 150mm from corners.
- .5 Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.
- .6 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line. Place glazing tape on glazing light or unit with tape flush with 16 mm below sight line.
- .7 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.
- .8 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.
- .9 Make sure of the compatibility between the preformed glazing adhesive strips.

3.5 INSTALLATION: EXTERIOR - WET METHOD (SEALANT AND SEALANT)

- .1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.
- .2 Place setting blocks at 1/4 points and install glazing light or unit.
- .3 Install removable stops with glazing centred in space by inserting spacer shims both sides at 600 mm intervals, 6 mm below sight line.
- .4 Fill gaps between glazing and stops with sealant to depth of bite on glazing, maximum 9 mm below sight line to ensure full contact with glazing and continue air and vapour seal.
- .5 Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

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

- .1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual] for glazing installation methods.
- .2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.

- .3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
- .4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.
- .5 Place glazing tape on free perimeter of glazing in same manner described.
- .6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- .7 Knife trim protruding tape.

3.7 INSTALLATION: PLASTIC FILM

- .1 Install plastic film with adhesive, applied in accordance with film manufacturer's instructions.
- .2 Place without air bubbles, creases or visible distortion.
- .3 Fit tight to glass perimeter with razor cut edge.
- .4 Apply the plastic film in accordance with the indications on the plans.

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.
 - .1 Remove traces of primer, caulking.
 - .2 Remove glazing materials from finish surfaces.
 - .3 Remove labels.
 - .4 Clean glass [and mirrors] using approved non-abrasive cleaner in accordance with manufacturer's instructions.
 - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.9 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 08 11 00 Metal doors and frames
- .2 Section 08 11 16 Aluminum doors and frames
- .3 Section 08 80 50 Glazing

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI Z97.1-1984(R1994), Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.
- .2 International Window Film Association (IWFA)
 - .1 IWFA Visual Quality Standard for Applied Window Film 1999.
- .3 Consumer Product Safety Commission Publications (CPSC)/Code of Federal Regulations (CFR)
 - .1 CPSC, 16 CFR 1201 CAT I.
 - .2 CPSC, 16 CFR 1201 CAT II.
- .4 General Services Administration (GSA)
 - .1 GSA-TS01-2003, Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.
- .5 Government of Canada
 - .1 Canada Labour Code, WHMIS datasheets.
- .6 Underwriters laboratories of Canada (ULC)
 - .1 ULC-S332-93, Standard for Burglary Resisting Material.
 - .2 UL-972-02, Burglary resisting Glazing Material.

1.3 DEFINITIONS

- .1 Safety: reduction of risk of injury, loss or death of persons due to accidental, natural or unintentional causes.
- .2 Security: reduction of risk of injury, loss or death of persons due to intentional actions of others.
- .3 Security and Safety Film Types:
 - .1 Type 1 Safety: areas of concern related to common residential or light commercial accidents.
 - .2 Type 2 Safety / Security / Seismic: areas of concern related to seismographic upgrade, low end smash and grab break and entry and over pressure due to violent weather.
 - .3 Type 3 Security / Blast: areas of concern related to bomb blasts.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section [01 33 00 - Submittal Procedures].
- .2 Product Data: submit WHMIS MSDS - Material Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.

- .3 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Submit samples in accordance with Section [01 33 00 - Submittal Procedures].
 - .1 Submit one 500 x 500 mm sample of film installed on 6 mm thick clear plate glass.
- .5 Submit test reports in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit test reports from approved independent testing laboratory, certifying film's compliance with specified requirements.
- .6 Submit Closeout Submittals in accordance with Section 01 78 00 - Closeout Submittals.
 - .1 Provide operation and maintenance data for window film for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
 - .2 Follow manufacturers written instructions for care and maintenance of security and safety film.
 - .3 Use only cleaning solution recommended by manufacturer for regularly scheduled cleaning of security film.

1.5 QUALITY ASSURANCE

- .1 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
 - .2 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Canada Labour Code.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with section 01 61 00 - Common Product Requirements.
- .2 Provide and maintain dry, off-ground weatherproof storage.
- .3 Store rolls of film flat on cross supports. Do not stand rolls of film on end.
- .4 Remove from storage, in quantities required for same day use.
- .5 Store materials in accordance with manufacturers written instructions.
- .6 Waste Management and Disposal:
 - .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal, and with Waste Reduction Workplan.
 - .2 Place materials defined as hazardous or toxic waste in designated containers.
 - .3 Ensure emptied containers are sealed and stored safely.

1.7 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 10 years
- .2 Sealed insulated glazing:
 - .1 The warranty will cover among other that the sealed insulated glazing will remain in place and will keep their waterproof, appearance and transparency with no forming of opaque

film, condensation or deposit inside the units for a period of 10 years

- .3 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments and the required services to repair the defectives parts of the work and, in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.
- .4 The warranty must state what follows:
 - .1 The films will keep their adhesive strength and will show neither blisters, bubbles nor disbonding signs.
 - .2 The films will keep their original appearance and will not fade.
 - .3 In case of defects, films will be removed and replaced with new ones.
 - .4 In case of defects covered by the warranty, films, but not the protected glasses/glazing will be removed and replaced with new ones, with no additional fees for the departmental representative.

1.8 MAINTENANCE DATA

- .1 Provide operation and maintenance data for window film for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

2 PRODUCTS

2.1 MATERIALS

- .1 Security Film - General: optically clear polyester film, abrasion resistant coating and release liner.
 - .1 Type 1 Safety Film:
 - .1 Testing in accordance with ANSI Z97.1 and CPSC 16 CFR 1201 CAT II.
 - .2 Type 2 Safety / Security / Seismic Film:
 - .1 Testing in accordance with ANSI Z97.1, CPSC 16 CFR 1201 CAT II, and ULC - S332, UL 972.
 - .3 Type 3 Security/Blast Film:
 - .1 Testing in accordance with GSA-TS01, ANSI Z97.1, and CPSC 16 CFR 1201 CAT II.
- .2 Acceptable products
 - .1 Madico MT-200-White-2-MIL frosted security film
 - .2 3M Fasara (Aerina film) frosted security film
 - .3 Solyx SX-3140 frosted security film
 - .4 or replacement product approved by addenda in accordance with the instructions to the bidders.

3 EXECUTION

3.1 PREPARATION

- .1 Clean glass before beginning installation using neutral cleaning solution.
- .2 Ensure no deleterious material adheres to glass by scraping surface of glass using industrial

razors.

- .3 Before beginning Work, place absorbent material on window frame to absorb moisture accumulation generated by film application.

3.2 INSTALLATION ON SITE

- .1 Field Installation of Security Film to Glass Windows:
 - .1 Install film in the same manner as tested.
 - .2 Remove any window stops and window sealing device.
 - .3 Ensure no deleterious material adheres to glass by scraping surface of glass using industrial razors.
 - .4 Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.
 - .5 Examine glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate, or cause vision transparency or distortion problems. Report findings to Ministerial Representative before starting Work.
 - .6 Proceed with Work only after receipt of written approval from Ministerial Representative.
 - .7 Install security film to glass windows ensuring no blisters, bubbles, scratches or distortions.
- .2 Cut film edges straight and square.
- .3 Ensure film is installed behind window stops.
- .4 Cut edges 3 mm maximum from edge of glass sealing device and in accordance with manufacturers written instructions.
- .5 Apply and attach film to glass in accordance with manufacturer's written instructions.
- .6 Splicing:
 - .1 Splice film only when glass is greater in width than film.
 - .2 Splice film only after receipt of written approval from Ministerial Representative.
 - .3 Use butt or overlapped factory edges only.
 - .4 Ensure maximum overlap of 3 mm.
- .7 Use only water and film slip solution on glass to facilitate positioning of film.
- .8 Ensure removal of excess water from between film and glass.
- .9 Remove left over material from work area and return work area to original condition.

3.3 INSTALLER'S INSPECTION

- .1 Visual Inspection: in accordance with IWFA - Visual Quality Standard for Applied Window Film.
- .2 Remove and replace without glass replacement, film that continues to show blisters, bubbles, tears, scratches, edge defects or vision distortion [in film] when viewed under natural daylight from 2.0 mm minimum after 30 day period.

3.4 FINAL CLEANING

- .1 Wash interior and exterior of each [window] [glass panel] and film using cleaning solution recommended by film manufacturer.

3.5 PROTECTION

- .1 Protect materials and installed elements from any damage during construction works.
- .2 Repair damage to adjacent materials caused by doors hardware installation.

END OF SECTION

TABLEAU DES FINIS / FINISHES TABLE (1/2)										
	NOM DU LOCAL / ROOM NUMBER	PLANCHER / FLOOR		MURS / WALLS				PLAFONDS / CEILINGS		REMARQUES / NOTES
NUMÉRO DU LOCAL / ROOM NUMBER		FINI / FINISHED	PLINTE / WALL BASE	MUR A / A WALL	MUR B / B WALL	MUR C / C WALL	MUR D / D WALL	FINI / FINISHED	HAUTEUR (mm) / HEIGHT (mm)	POSITION DES MURS / WALLS POSITION
01	VEST. 1	CE	NPCE	GEP	GEP/GP	GEP	GEP	PG	2520	
02	SALLE D'ATTENTE / WAITING ROOM	CE	NPCE	GP/GEP	GEP/GP	GEP/MV	GEP	NTA	2520	#1
03	SALLE DES EMPLOYES / EMPLOYEES ROOM	CE	NPCE	GEP	GEP	GEP	GEP	TA/NTA	2440	
04	CORRIDOR	CE	NPCE	GEP/GP	GEP	GEP/GP	GEP/MV	NTA	2520	#1
05	TOILETTES/WC F/W	CEE	PCEE	GEP	GP/GEP	GEP	GEP	NTA	2440	
06	ENTRETIEN/JANITOR	CE	PV	GP	GP	GP	GP	NTA	2440	
07	TOILETTES/WC H/M	CEE	PCEE	GEP	GEP	GEP	GEP/GP	NTA	2440	
08	SALLE MECANIQUE / MECHANICAL ROOM	BP	PV	GEP/GP	GEP/PBL/GP	GEP/PBL	GEP/GP	SAP	2743	
09	SALLE ELECT. / ELECTRICAL ROOM	BP	PV	GEP	CPP	CPP	GEP	SAP	2743	
10	SALLE TELEPHONE / TELEPHONY ENTRY	BP	PV	GEP	GEP	GEP	GEP	SAP	2743	
11	BUREAU ENVIR. / ENVIR. OFFICE	TVC	PV	GEP	GEP	GEP/GP	GEP/GP	NTA	2440	
12	C.C.U	TVC	PV	GEP	GEP	GEP	GEP	TA/NTA	2440	
13	BUREAU / OFFICE	TVC	PV	GP	GP/GEP	GP	GP	NTA	2440	#1
14	AGENCE AERIEUNE / AIRLINE AGENCY	TVC	PV	GP	GP	GP	GP	NTA	2470	
15	BUREAU / OFFICE	TVC	PV	GP	GP	GP	GP	NTA	2440	#1
16	AGENCE AERIEUNE / AIRLINE AGENCY	TVC	PV	GP	GP	GP	GP	NTA	2470	
17	CORRIDOR	CE	NPCE	GP	GP	GP/GEP	GP	NTA	2440	
18	SALLE À BAGAGES / LUGGAGE ROOM	CE	NPCE	GP	GP	GEP/GP	GP	NTA	2745	#1
19	FOUILLE / SECURITY AREA	CE	NPCE	GEP/GP/MV	GP	GP	GEP	NTA	2520	
20	DEPARTS / DEPARTURES	CE	NPCE	MV	GP	GEP/GP	GEP/MV	NTA	2520	#1

TABLEAU DES FINIS / FINISHES TABLE (2/2)										
	NOM DU LOCAL / ROOM NUMBER	PLANCHER / FLOOR		MURS / WALLS				PLAFONDS / CEILINGS		REMARQUES / NOTES
NUMÉRO DU LOCAL / ROOM NUMBER		FINI / FINISHED	PLINTHE / WALL BASE	MUR A / A WALL	MUR B / B WALL	MUR C / C WALL	MUR D / D WALL	FINI / FINISHED	HAUTEUR (mm) / HEIGHT (mm)	POSITION DES MURS / WALLS POSITION
										<div><div>A</div><div>B</div><div>C</div><div>D</div></div>
21	ARRIVEES/ARRIVALS	CE	NPCE	GEP	GEP/GP/MV	GEP/MV	GEP/GP	NTA	2520	#1
22	VEST.3	CE	NPCE	MV	MV	GEP/GP	GEP/MV	PG	2520	
23	LOC. AUTO/CAR RENTAL	CE	NPCE	GEP	GP/GEP	GEP	GEP/GP	NTA	2470	
24	VEST.4	CE	NPCE	GEP	MV	MV	GEP	PG	2520	
LÉGENDE / LEGEND										
CE	NOUVELLE TUILE DE CERAMIQUE / NEW CERAMIC TILE									
TVC	NOUVELLE TUILE DE VINYLE / NEW VINYL TILE									
BP	BETON EXISTANT ET NOUVEAU A PEINDRE / EXISTING AND NEW CONCRETE TO PAINT									
CEE	CERAMIQUE EXISTANTE CONSERVEE / KEEP THE EXISTING CERAMIC									
SAP	STRUCTURE APPARENTE A PEINDRE / VISIBLE STRUCTURE TO PAINT									
CPP	CONTREPLAQUE A PEINDRE / PLYWOOD TO PAINT									
PBL	NOUVEAU PANNEAU BETON LEGER / NEW LIGHT CONCRETE PANNELS									
PV	NOUVELLE PLINTHE DE VINYLE / NEW VINYL BASE WALL									
PCEE	PLINTHE DE CERAMIQUE EXISTANTE CONSERVEE / KEEP THE EXISTING CERAMIC BASE WALL									
MV	NOUVEAU MUR VITRE / NEW GLASS WALL									
GP	NOUVEAU GYPSE A PEINDRE / NEW GYPSUM TO PAINT									
GEP	GYPSE EXISTANT A PEINDRE / EXISTING GYPSUM TO PAINT									
TA	TUILE ACOUSTIQUE EXISTANTE / EXISTING ACOUSTIC TILE									
NTA	NOUVEAU PLAFOND DE TUILES ACOUSTIQUES / NEW ACOUSTIC TILE CEILING									
PG	NOUVEAU PLAFOND DE GYPSE RESISTANT A L'HUMIDITE A PEINDRE / NEW GYPSUM CEILING WITH MOISTURE TO PAINT									
NPCE	NOUVELLE PLINTHE CERAMIQUE / NEW CERAMIQUE BASE WALL									
REMARQUES / NOTES										
1	PROTECTION MURALE A PREVOIR A CERTAINS ENDROITS, VOIR PLAN REAMENAGEMENT / PROVIDE WALL PROTECTION AT SOME AREA, SEE REORGANIZATION PLAN									

FIN DE SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 21 00 Allowances
- .2 Section 05 41 00 Structural metal stud framing submitted to overcharges due to wind
- .3 Section 06 08 99 Rough carpentry for minor works
- .4 Section 07 21 16 Blanket and bat insulations
- .5 Section 07 21 29.03 Sprayed insulation – polyurethane foam
- .6 Section 07 25 00 Air barrier
- .7 Section 07 27 10 Air/vapor barrier membrane and intra-muros flexible et flashings
- .8 Section 07 84 00 Fire stopping
- .9 Section 07 92 00 Joints sealants
- .10 Section 09 22 16 Non-structural metal framing
- .11 Section 09 30 13 Ceramic tiling
- .12 Divisions 21, 22 and 23 for the positioning of access doors to fire-fighting and mechanical equipment and embedded equipments in these divisions.
- .13 Divisions 26, 27 and 28 for the positioning of access doors to electrical, communication and electronic security equipment and embedded equipments in these divisions.

1.2 REFERENCE STANDARDS

- .1 Aluminum Association (AA)
 - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 ASTM International
 - .1 ASTM C 475-02(2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - .2 ASTM C 514-04(2009e1), Standard Specification for Nails for the Application of Gypsum Board.
 - .3 ASTM C 557-03(2009)e1, Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
 - .4 ASTM C 840-08, Standard Specification for Application and Finishing of Gypsum Board.
 - .5 ASTM C 954-07, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
 - .6 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.
 - .7 ASTM C 1047-09, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

- .8 ASTM C 1280-99, Standard Specification for Application of Gypsum Sheathing.
- .9 ASTM C 1177/C 1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .10 ASTM C 1178/C 1178M-08, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.
- .11 ASTM C1396/C1396M-09a, Standard Specification for Gypsum Wallboard.
- .3 Association of the Wall and Ceilings Industries International (AWCI)
 - .1 AWCI Levels of Gypsum Board Finish-97.
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - .2 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.
- .6 Green Seal Environmental Standards (GS)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
 - .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
- .8 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-07, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit one samples of corner and casing beads and shadow mould.

1.4 TRANSPORTATION, 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, labeled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store gypsum board assemblies materials level off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
 - .3 Protect from weather, elements and damage from construction operations.
 - .4 Handle gypsum boards to prevent damage to edges, ends or surfaces.

- .5 Protect prefinished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
- .6 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse of pallets, as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal].

1.5 AMBIENT CONDITIONS

- .1 Maintain temperature 10 degrees C minimum, 21 degrees C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.
- .2 Apply board and joint treatment to dry, frost free surfaces.
- .3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

1.6 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 years.
- .2 Provide a written and signed document issued in the name of Canada, certifying the installed material from any presence of mildew, any delamination or any other deformation or deterioration for a period of 5 years. Refer to the general condition for the beginning of the warranties.
- .3 The warranties must include the fast correction of any defect upon reception of a written notice to Canada to this effect. The repairing works must include workmanship, materials, equipments and the required services to repair the de defectives parts of the building and, in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 PANELS AND BOARDS

- .1 Standard gypsum boards: to ASTM C1396/C1396M standard having thicknesses indicated on the drawings, and Type X, 1200 mm wide x maximum practical length, square edges on the ends and beveled edges on the sides.
- .2 Water-resistant gypsum board: to ASTM C1396/C1396M, having the thicknesses indicated on the plans, Type X, 1200 mm wide x longest practical length with square edges on the ends and beveled edges on the sides.
- .3 Gypsum boards resistant to shocks, conform to ASTM C36/C36M and C1396 standards, cellulose reinforced, having a thickness indicated on the plans, Type X, 1200 mm wide x maximum practical length possible, square edges on the ends and beveled edges on the sides.

- .4 Glass mat gypsum substrate sheathing: to ASTM C 1177/C 1177M, having thicknesses indicated on the drawings, 1200 mm wide x maximum practical length.
- .5 Fibrous cement composite panels made up of Portland cement compound reinforced with synthetic fibers and additives, density of 1500 kg/m³, having a thickness indicated on the plans, conform to ULC S-114 noncombustibility standard and ASTM D1037 Impacts standard. Dimensions of 1220 mm x 3050 mm smooth finish. Light cement panels made up of beadwalls are not acceptable for these works.

2.2 MOLDINGS AND ACCESSORIES

- .1 Metal furring runners, hangers, tie wires, inserts, anchors: according to the manufacturer's characteristics.
- .2 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.
- .3 Resilient clips: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.
- .4 Nails: to ASTM C 514.
- .5 Steel drill screws: to ASTM C 1002.
- .6 Stud adhesive: to CAN/CGSB-71.25.
- .7 Laminating compound: as recommended by manufacturer, asbestos-free.
- .8 Casing beads, corner beads, control joints and edge trim: to ASTM C 1047, metal, galvanized by 0.5 mm base thickness, perforated flanges, one piece length per location.
- .9 Aluminum extrusion molding: 6063 conform to ASTM B-221 standard for recessed joint.
- .10 Adjustable and detachable guard "J" molding for PVC window edge with integrated thermal break.
- .11 Cornice cap: 12.7 mm deep x partition width, of 1.6 mm base thickness galvanized sheet steel, prime painted and extruded aluminum, minimum 2.5 mm thick, clear anodized to Aluminum Association designation AA . Include splice plates for joints.
- .12 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
 - .1 VOC limit 250 g/L maximum to SCAQMD Rule 1168.
 - .2 Acoustic sealant: in accordance with Section 07 92 00 - Joint Sealants.
- .13 Polyethylene: to CAN/CGSB-51.34, Type 2.
- .14 Insulating strip: rubberized, moisture resistant, 3 mm thick closed cell neoprene strip, with self sticking permanent adhesive on one face, with right length and width.
- .15 Joint compound for gypsum boards: conform to ASTM C 475 standard, asbestos-free type recommended by the panel manufacturer for the required application.
- .16 Joint tape for gypsum boards: conform to ASTM C 475 standard, preformed plastic and coated to receive the joint compound and recommended by the panel manufacturer for the required application.
- .17 Non-combustible acoustic insulation: fiberglass bat insulation to be inserted, conform to CAN/ULC S702 and CAN 4-S114 standard, type 1 of the indicated thickness. Bats must be of

the right dimensions for the spacing of the studs.

- .18 Polyethylene film : conform to CAN/CGSB-51-34 standard, 0.15 mm (6 mils) thick for walls with adapted sealing tape and recommended by the manufacturer.
- .19 Wood furring for attachment backing in accordance with section 06 08 99 - Carpentry - minor works

2.3 ACCESS PANELS

- .1 Supply the non-prescribed access panels in the electromagnetic sections (divisions 21 to 28).
 - .1 Steel, type to be installed in gypsum partition, embedded, with no resistance to fire, of a thickness recommended by the manufacturer, prefinished in factory with a primer coating
- .2 Flush model with no resistance to fire for installation in gypsum.
 - .1 Acceptable product: Acudor Model DW-5040 or ED-2002, or equivalent product approved by the ministerial representative.
- .3 Flush model with resistance to fire of 90 minutes to 120 minutes for installation in gypsum.
- .4 Tight model in aluminum, of the right dimensions for tightness joints.
- .5 Dimensions: according to the indications (305 x 305 mm, 457 x 457 mm or 610 x 610 mm).
- .6 Lock working with a master key for spaces used by the public and working with a screwdriver for service spaces.

3 EXECUTION

3.1 EXAMINATION

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

3.2 ERECTION

- .1 Do application and finishing of gypsum board to ASTM C 840 except where specified otherwise.
- .2 Do application of gypsum sheathing to ASTM C 1280.
- .3 Erect hangers and runner channels for suspended gypsum board ceilings to ASTM C 840 except where specified otherwise.
- .4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .5 Install work level to tolerance of 1:1200
- .6 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles, as well as all the other equipments embedded in the ceiling.

- .7 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.
- .8 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.
- .9 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.
- .10 Install wall furring for gypsum board wall finishes to ASTM C 840, except where specified otherwise.
- .11 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
- .12 Furr duct shafts, beams, columns, pipes and exposed services where indicated.
- .13 Erect drywall resilient furring transversely across studs or joists between the layers of gypsum board, spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with drywall screw long enough to ensure a minimum drive of 10 mm in the steel studs.
- .14 To fill in the difference between the height of the partition and the height of the sack panels, install a continuous adjustment gypsum strip at the base of the partition cut in a gypsum panel making this partition mounted on resilient furring to ensure its rigidity.
- .15 Install the cement panels in accordance with ANSI A108.11 standard and to the manufacturer's instructions.
- .16 Set in place the bat insulation in the partitions identified on the plans according to the required thicknesses and in accordance with the manufacturer's instructions.

3.3 APPLICATION

- .1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.
- .2 Apply single or double layer gypsum board to metal furring or framing using screw fasteners for first layer and for second layer. Maximum spacing of screws 300 mm on centre.
 - .1 Single-Layer Application:
 - .1 Apply gypsum board on ceilings prior to application of walls to ASTM C 840.
 - .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.
 - .2 Double-Layer Application:
 - .1 Install gypsum board for base layer and exposed gypsum board for face layer.
 - .2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250mm.
 - .3 Apply base layers at right angles to supports unless otherwise indicated.
 - .4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.
- .3 Apply single or double layer gypsum board to concrete or concrete block surfaces, where indicated, using laminating adhesive.
 - .1 Comply with gypsum board manufacturer's recommendations.
 - .2 Brace or fasten gypsum board until fastening adhesive has set.

- .3 Mechanically fasten gypsum board at top and bottom of each sheet.
- .4 In the case of walls and partitions going up to the structural slabs, make joints de désolidarisation at the top of these partitions with a double ledger strip and according to the indications on the drawings. In general, do not fix the gypsum boards to the wall plates but only to the studs leaving enough space to allow a bending of the slabs of at least 16 mm.
- .5 Install cement panels used as skin to the walls and ceilings, according to the indications. Fix the panels with anticorrosion screws recommended by the panels' manufacturer and ANSI A108.11 spacing them by 200 mm for the walls and 150 mm for the ceilings. Make sure that the steel skeletons receiving those panels are at least 0.8 mm thick (gauge 20). At the top of the exterior walls with joints de désolidarisation, leave a space of at least 16 mm between the cement panel and the slab. Allow for steel perimeter mouldings according to the indications on the drawings and 07 62 00Flashins and metal sheet accessories.
- .6 Exterior Soffits and Ceilings: install exterior gypsum board perpendicular to supports; stagger end joints over supports. Install with 6 mm gap where boards abut other work.
- .7 Apply water-resistant gypsum board where wall tiles coating to be applied and adjacent to slop sinks, janitors closets and other indicated locations. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.
- .8 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, in partitions where perimeter sealed with acoustic sealant.
- .9 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.
- .10 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.
- .11 Install gypsum board with face side out.
- .12 Do not install damaged or damp boards.
- .13 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4 INSTALLATION

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

- .5 Install shadow mould at gypsum board/ceiling juncture as indicated. Minimize joints; use corner pieces and splicers.
- .6 Construct control joints of preformed units set in gypsum board facing and supported independently on both sides of joint.
- .7 Provide continuous polyethylene dust barrier behind and across control joints.
- .8 Locate control joints where indicated at changes in substrate construction at approximate 10 m spacing on long corridor runs at approximate 15 m spacing on ceilings.
- .9 Install control joints straight and true.
- .10 Construct expansion joints as detailed, at building expansion and construction joints. Provide continuous dust barrier.
- .11 Install expansion joint straight and true.
- .12 Install cornice cap where gypsum board partitions do not extend to ceiling.
- .13 Fit cornice cap over partition, secure to partition track with two rows of sheet metal screws staggered at 300 mm on centre.
- .14 Splice corners and intersections together and secure to each member with 3 screws.
- .15 Install access doors to electrical and mechanical fixtures specified in respective sections.
 - .1 Rigidly secure frames to furring or framing systems.
- .16 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.
- .17 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI Levels of Gypsum Board Finish:
 - .1 Levels of finish and location:
 - .1 Degree 0: no jointing product, accessory or finish element required.
 - .1 Location: for temporary works.
 - .2 Degree 1: Install with interior joints and angles covered with a masking tape embedded in the joint compound. The jointed surfaces must be free from excess joint compound but tool marks and dents are acceptable.
 - .1 Location: acoustic partition in the ceiling spaces.
 - .3 Degree 2 : Embed the tape put on the interior joints and angles in a joint compound and apply a distinct layer of joint compound on the joints, angles and head of fastening devices and other used accessories. The jointed surfaces must be free from excess joint compound but tool marks and dents are acceptable
 - .1 Location: panels covered with ceramic/porcelain tiling.
 - .4 .Degree : Embed the tape put on the interior joints and angles in a joint compound and apply two distinct layers of joint compound on the joints, angles and head of fastening devices and other used accessories. The jointed surfaces must be free from excess joint compound but tool marks and dents are acceptable
 - .1 Location : Exposed panels to be coated with a medium or heavy thickness of textured material or to cover with a thick wallpaper.
 - .5 Degree 4 : Embed the tape put on the interior joints and angles in a joint compound and apply three distinct layer of joint compound on the joints, angles

and head of fastening devices and other used accessories. The jointed surfaces must be free from tool marks and dents.

- .1 Location lightly textured partitions, interior faces of the walls, ceilings and everywhere else.
- .6 Degree 5: Embed the tape put on the interior joints and angles in a joint compound and apply three distinct layers of joint compound on the joints, angles and head of fastening devices and other used accessories. Then apply a thin layer of skimming coat on all the surface of the skin set in place. The jointed surfaces must be smooth and free from tool marks and dents
 - .1 Location: plain partitions with not very or not visible joints and fastening devices, once the decoration completed.
- .18 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.
- .19 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.
- .20 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .21 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 05 41 00 Structural metal stud framing submitted to overcharges due to wind
- .2 Section 06 08 99 Rough carpentry for minor works
- .3 Section 07 21 16 Blanket and bat insulations
- .4 Section 07 21 29.03 Sprayed insulation – polyurethane foam
- .5 Section 07 92 00 Joint sealants
- .6 Section 07 95 13 Expansion joint cover assemblies
- .7 Section 08 11 00 Metal doors and frames
- .8 Section 08 11 16 Aluminum doors and frames
- .9 Section 08 33 13 Coiling doors
- .10 Section 08 36 13.02 Metal sectional roll-up doors
- .11 Section 08 42 29 Automatic entrances
- .12 Section 08 50 00 Windows

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM C 645-11a, Standard Specification for Nonstructural Steel Framing Members.
 - .2 ASTM C 754-11, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- .2 Environmental Choice Program (ECP)
 - .1 CCD-047-98(R2005), Architectural Surface Coatings.
 - .2 CCD-048-95(R2006), Surface Coatings - Recycled Water-Borne.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - [current edition].
 - .1 MPI #26, Primer, Galvanized Metal, Cementitious.
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for [metal framing] and include product characteristics, performance criteria, physical size, finish and limitations.

- .3 Samples:
 - .1 Submit duplicate 300 mm long samples of non-structural metal framing.

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements 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 metal framing from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 years
- .2 Provide a written document jointly signed by the manufacturer and the installer, issued in the name of Canada certifying the installed material from any deformation or deterioration and will meet all the performance requirements established in normal use conditions, for a period of 5 years. Refer to general conditions for the beginning of the warranty.
- .3 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments required services to repair the defective parts of the work and in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other work of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 MATERIALS

- .1 Non-loadbearing channel stud framing: studs of indicated dimensions, conform to ASTM C 645 standard, flat rolled hot dipped galvanized steel metal plate with required thickness designed for

screwing gypsum panels, strip laths and with knockouts set at 460 mm center to center for the passing of active pipes.

<i>Stud:</i>	<i>Max. height Partition, one</i>	<i>Max. height Partition, two</i>	<i>Max. height Build-out</i>
41	2.510m	2.700m	2.175m
64	3.270m	3.580m	2.970m
64	3.657m	4.267m	3.505m
92	4.267m	4.750m	3.886m
92	4.495m	5.384m	4.572m
152	6.090m	6.090m	5.715m
152	6.959m	7.594m	7.086m

Note: the maximum spacing of the profiles will be 400 mm c/c and the deflection L/360.

- .2 Upper and lower laths: conform to ASTM C 645 standard, of width appropriate to the dimension of the studs and with 32 mm high legs except in the case of partitions going up to the structural slabs where the legs must be 50 mm high so as to make désolidarisation joints.
- .3 Metal stiffeners of required dimensions: 1.4 mm thick, galvanized cold rolled steel profiles
- .4 Z bar: flat rolled hot dipped galvanized metal sheet with required thickness with the required thickness according to stud indicated on the plans.
- .5 Acoustic sealing compound: conform to ASTM C919, last revision and report to section 07 92 10 – Sealing products for joints.
- .6 Insulating strip: rubber foam strip, 3 mm thick and 12 mm wide, resistant to humidity, self-adhesive on one face and cut to the required length.
- .7 Sealing strip: closed cells polyethylene foam, 4.7 mm thick, of width indicated or required (to fill in void between low lath and substrate).
- .8 Non-combustible acoustic insulation: fiberglass bat insulation to insert, conform to CAN/ULC S702 and CAN4-S114 standards, type 1, of the thickness indicated. Bats must be of the dimensions appropriate to the spacing of the studs.
- .9 Anchor backings: 1.21 mm thick galvanized steel metal plate (gauge 18) of the required width.

3 EXECUTION

3.1 INSPECTION

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

3.2 ERECTION

- .1 Align partition tracks at floor and ceiling and secure at [600] mm on centre maximum.

- .2 Install damp proof course under stud shoe tracks of partitions on slabs on grade.
- .3 Place studs vertically at 400 mm on centre and not more than 50 mm from abutting walls, and at each side of openings and corners.
 - .1 Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
- .4 Brace the steel stud, if needed, so as to ensure the stiffness of the skeleton.
- .5 Erect metal studding to tolerance of 1:1000.
- .6 Attach studs to bottom ceiling track using screws except in the case of désolidarisation joints where we must not fix the jambs to the top laths leaving a space between the top of the jamb and the core of the top lath (top plate) making a double lath assembly: install 2 top laths with 50 mm overlapping legs and fixing the studs to the bottom lath only. Respect the spacing between the two laths according to the indications.
- .7 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.
- .8 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.
- .9 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified.
 - .1 Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.
- .10 Install 0.914 mm and more (gauge 20 and less) heavy gauge single jamb studs at openings.
- .11 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs.
 - .1 Secure track to studs at each end, in accordance with manufacturer's instructions.
 - .2 Install intermediate studs above and below openings in same manner and spacing as wall studs.
- .12 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.
- .13 Provide 40mm 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.
- .14 Install steel studs or furring channel between studs for attaching electrical and other boxes.
- .15 Extend partitions to ceiling height except where noted otherwise on drawings.
- .16 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.
 - .1 Use 50 mm leg ceiling tracks. Use double track slip joint as indicated.
- .17 Install continuous insulating strips to isolate studs from non insulated surfaces.
- .18 Install two continuous beads of acoustical sealant or insulating strip under studs and tracks around perimeter of sound control partitions.
- .19

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 21 00 Allowances
- .2 Section 07 92 00 Joint sealants
- .3 Section 07 95 13 Expansion joint cover assemblies
- .4 Section 09 21 16 Gypsum board finish and concrete panels
- .5 Section 09 65 19 Resilient tile flooring
- .6 Section 09 91 23.01 Interior re-painting
- .7 Division 22 – Plumbing regarding floor drains

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI)
 - .1 ANSI A108.1-99, Specification for the Installation of Ceramic Tile (Includes ANSI A108.1A-C, 108.4-.13, A118.1-.10, ANSI A136.1).
 - .2 CTI A118.3-92, Specification for Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive (included in ANSI A108.1).
 - .3 CTI A118.4-92, Specification for Latex Cement Mortar (included in ANSI A108.1).
 - .4 CTI A118.5-92, Specification for Chemical Resistant Furan Resin Mortars and Grouts for Tile Installation (included in ANSI A108.1).
 - .5 CTI A118.6-92, Specification for Ceramic Tile Grouts (included in ANSI A108.1).
- .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 144-04, Specification for Aggregate for Masonry Mortar.
 - .2 ASTM C 207-06, Specification for Hydrated Lime for Masonry Purposes.
 - .3 ASTM C 847-06, Specification for Metal Lath.
 - .4 ASTM C 979-05, Specification for Pigments for Integrally Coloured Concrete.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - .2 CGSB 71-GP-22M-78(AMEND.), Adhesive, Organic, for Installation of Ceramic Wall Tile.
 - .3 CAN/CGSB-75.1-M88, Tile, Ceramic.
 - .4 CAN/CGSB-25.20-95, Surface Sealer for Floors.
- .4 Canadian Standards Association (CSA International)
 - .1 CSA A123.3-05, Asphalt Saturated Organic Roofing Felt.
 - .2 CAN/CSA-A3000-03(R2006), Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .5 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.
- .6 Terrazzo Tile and Marble Association of Canada (TTMAC)
 - .1 Tile Specification Guide 09 30 00 2006/2007, Tile Installation Manual.

- .2 Tile Maintenance Guide 2000.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Include manufacturer's information on:
 - .1 Ceramic tile, marked to show each type, size, and shape required.
 - .2 Chemical resistant mortar and grout (Epoxy and Furan).
 - .3 Cementitious backer unit.
 - .4 Dry-set cement mortar and grout.
 - .5 Divider strip.
 - .6 Elastomeric membrane and bond coat.
 - .7 Reinforcing tape.
 - .8 Levelling compound.
 - .9 Latex cement mortar and grout.
 - .10 Commercial cement grout.
 - .11 Organic adhesive.
 - .12 Slip resistant tile.
 - .13 Waterproofing isolation membrane.
 - .14 Fasteners.
- .3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Base tile: submit duplicate, 300 x 300 mm sample panels of each colour, texture, size, and pattern of tile.
 - .2 Floor tile: submit duplicate, 300 x 300 mm sample panels of each colour, texture, size, and pattern of tile.
 - .3 Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, colour, and size.
 - .4 Adhere tile samples to 11 mm thick plywood and grout joints to represent project installation.

1.4 QUALITY ASSURANCE

- .1 Quality Assurance Submittals:
 - .1 Manufacturer's Instructions: manufacturer's installation instructions.
 - .2 Manufacturer's Field Reports: manufacturer's field reports specified.

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

1.6 AMBIENT CONDITIONS

- .1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12 degrees C for 48 hours before, during, and 48 hours after, installation.
- .2 Do not install tiles at temperatures less than 12 degrees C or above 38 degrees C.
- .3 Do not apply epoxy mortar and grouts at temperatures below 15 degrees C or above 25 degrees

C.

1.7 MAINTENANCE

- .1 Extra Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Provide minimum 5% of each type and colour of tile required for project for maintenance use. Store where directed.
 - .3 Maintenance material same production run as installed material.

1.8 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 years
- .2 Provide a written and jointly signed document issued by the manufacturer and the installer in the name of Canada, certifying the tiling works from delamination, flaring, colour fading, crevices, loss of watertightness, for a period of 5 years. Refer to the general conditions for the beginning of the warranties
- .3 The warranties must include the fast correction of any defect upon reception of a written notice to Canada to this effect. The repairing works must include workmanship, materials, equipments and the required services to repair the defective parts of the building and, in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 MATERIALS – GENERAL POINTS

- .1 All the mortars, adhesives, additive products, membranes and grouts must come from the same manufacturer.
- .2 All the tiles of a given type must come from a one and only manufacturer and must be modular.
- .3 The tiling bonding coat and the grout must be supplied by the same manufacturer.

2.2 FLOOR TILING

- .1 Ceramic tiles: conform to CAN/CGSB-75.1 standard
 - .1 Acceptable products:
 - .1 Tuile Olympia Eco-Stone, colour Grigio # 7600564, size 300 mm x 600 mm, 9.5 mm thick.
 - .2 Soligo Gravel Serie tile, colour Mud # CA70682, size 300 mm x 600 mm, 9.5 mm thick.
 - .3 Ciot Tecnica Serie tile, colour Cenere, size 300 mm x 600 mm, 9.5 mm thick.
 - .4 or replacement product approved by addenda in accordance with the instructions to the bidders.

2.3 BASEBOARDS

- .1 Baseboards: blocks of the type, shape, colour and texture corresponding to the adjoining floor tiling.

2.4 EDGE ELEMENT

- .1 The characteristics of the edge elements must correspond to those of the tiling
- .2 The edge element to install on constantly humid horizontal surfaces must be non-slip surface.
- .3 The size and dimension of the edge elements must correspond to the tile elements, joints included, unless otherwise indicated.
- .4 Internal and external angles: the following edge elements must be planned at the indicated location.
 - .1 Rounded edge elements for external angles edges.
 - .2 Groove elements for internal angles.

2.5 TILING BONDING COAT

- .1 Portland cement mortar-glue (dry mortar or for dry setting): two components (powder and liquid polymer), conform to ANSI A118.4
 - 1 Acceptable products:
 - .1 Proma Probond grey with for walls and Probond Plus..
 - .2 Mapei Kerabond grey white and Keralastic
 - .3 TEC TA 337 with additive TA 862
 - .4 or replacement product approved by addenda in accordance with the instructions to the bidders
 - .2 Water: drinkable and free from minerals or chemicals that could spoil the mortar and grout mixes. (Where there is no water supply system, use bottled water).

2.6 GROUT

- .1 Pigments:
 - .1 Mineral pigments, lime resistant, non-fading, conform to ASTM C979 standard.
 - .2 Pigments must be added to the grout by the manufacturer.
 - .3 Grouts coloured on site are not accepted.
 - .4 Pigments can be added to the commercial type cement grouts, to the grout for dry setting and to latex modified cement grout.
- .2 Chemicals resistant grout: conform to ANSI A118.3 standard, non-slip, high resistance and 100% solids.
 - .1 Acceptable products:
 - .1 Proma Prosuperpoxy 2
 - .2 Mapei Kerapoxy
 - .3 TEC TA440
 - .4 or replacement product approved by addenda in accordance with the instructions to the bidders

2.7 ACCESSORIES

- .1 Transition and tape edgings:
 - .1 Stainless steel extruded special elements to cover the top of the tiling baseboard and transition between the floor finishes.
- .2 Reducer strip : stainless steel extruded special elements showing a maximal slope of 1:2.
- .3 Prefabricated control joints: stainless steel extruded special elements with a coloured elastomer strip.
 - .1 Acceptable product: Schluter Systems DILEX-EKSA
- .4 Floor drain
 - .1 Refer to documents in division 22 - Plumbing
- .5 Tightness product:
 - .1 To seal joints and drill into the wall ceramic works: mono-component silicone rubber sealant with incorporated fungicide conform to CAN/CGSB-19.22-M standard, colours chosen by the departmental representative among the manufacturer's standard range.
 - .1 Acceptable product: Dow Corning #786
 - .2 To seal control joints in floor ceramic works: sealant conform to CAN/CGSB-19.24-M standard, last revision, type 1 category B, self-leveling, colours chosen by the departmental representative among the manufacturer's standard range
 - .1 Acceptable product : Tremco THC 900 or 901
 - .3 Backup strips, primers and other accessories: according to the recommendations in section 07 92 00 – Joints' tightness
- .6 Sealer (primer) and floor sealer: conform to the recommendations of the tiling and grout manufacturer,
- .7 Cleaning products
 - .1 Specially designed products for cleaning masonry and concrete surfaces, but that do not spoil the bonding of the various layers of sealer for the setting of tiling, including the patching-smoothing layers as well as the layers and elastomer base waterproofing membranes.
 - .2 Products with acid or caustic matters are not accepted.

2.8 PATCHING-SMOOTHINGS SEALER

- .1 Portland cement base polymer resins pre-dosed mix, specially designed to recharge and smooth the concrete support-slabs. Products with gypsum are not accepted.
- .2 The sealer must be able to be applied in three coats of no more than 50 mm thick, to feather edged and smooth with a trowel.
- .3 The sealer coating must be ready to receive the following coating 48 hours after application.
- .4 Patching-smoothing sealer mixed with a polymer applicable with a trowel:
 - .1 Acceptable products:

- .1 Proma Propatch Plus
- .2 Mapei Planipatch plus
- .3 TEC TA330
- .4 or replacement product approved by addenda in accordance with the instructions to the bidders.
- .5 Primers and adhesives: as required and recommended by the manufacturer of the patching-smoothing sealer.

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 INSPECTION

- .1 Examine the state of the surfaces, supports and works intended to receive the ceramic tiles.
- .2 Checking the conditions: before proceeding to the setting of the ceramics, make sure that the state of the surfaces/supports first set up at the end of other sections or contracts and the flatness variations are acceptable and allow for the realization of the works in accordance to the manufacturer's written instructions.
 - .1 Inform the departmental representative immediately of any unacceptable conditions detected.
 - .2 Have the installation surfaces approved by the technical representative of the supplier. Send this approval immediately to the departmental representative.
 - .3 Start installation works only after having corrected the unacceptable conditions and received the written approval of the control desk inspector of the ceramics' supplier. Beginning the works without this approval means the acceptance of the base works and the responsibility of their correction if need be.

3.3 PRELIMINARY WORKS

- .1 Preparing the support
 - .1 Inspect the supports to determine the works that must be made to have them clean to receive the ceramic tiling.
 - .2 Fill in the 3 mm wide crevices and smooth the protrusions of more than 1 mm with an appropriate and compatible patching-smoothing sealer.
 - .3 Respect the manufacturer recommendations with regard to thickness of sealer to apply.
 - .4 Apply a compatible primer on the large surfaces to repair.
 - .5 Concrete supports must be dry, hardened and clean.
 - .6 Concrete supports must be free from paint, dirt, grease, oil, curing compound and désolidarisation, sealer and any other contaminant susceptible of spoiling the gluing of the bonding sealer.
 - .7 Apply on the porous or powdery concrete supports a primer compatible with the bonding sealer so as to make the surface suited to receive a covering set by direct bonding on the support.
- .2 Preparing the surfaces: prepare the surfaces in accordance with the Terrazzo, Tile and Marble Association of Canada (TTMAC) and in the allowed tolerances.
- .3 Preparing the supports ceramic tiling: according to the manufacture's written instructions.

3.4 QUALITY OF EXECUTION

- .1 Unless otherwise indicated, execute the tiling according to the manual titled "Tile setting manual 2006/2007" published by the Terrazzo, Tile and Marble Association of Canada (TTMAC)
- .2 Set the tiles or support sealers on sound and clean surfaces.
- .3 Adjust the tiles at the angles, around the accessories, equipments, floor drains and other embedded objects. Make even joints. Cut the edged so that they are clean and smooth.
- .4 Maximum flatness deviation admissible is 1:800.
- .5 Make even joints of the width recommended by the manufacturer so that the tiles be plumb, square, aligned and all in the same plan. Make sure that we do not distinguish the different tile boards in the finished work. Align the patterns.
- .6 Set the tiling so that the peripheral tiles measure less than half of their full size. Plan a staggered n installation of the tiling, overlapping 1/3:2/3.
- .7 After setting, pat the tiles and replace those that sound hollow in order to obtain a perfect adherence.
- .8 Make the inside corners with sharp edges and the outside corners with smooth edges.
- .9 Use smooth edges tiles to finish the a wall panel except at the crossing line of the panel with an overhanging surface or in a different plan.
- .10 Set the baguette joints where the floor tiling and different floor coverings meet.
- .11 Wait at least 24 hours after setting the tiles before applying the jointing grout.
- .12 Once the work has hardened and that the grout is well set, clean the tiled surfaces.
- .13 Execute control joints at the indication locations, of a width equal to the one of the joints between the tiles. Fill in the control joints with waterproofing product conform to section 07 92 00 – Waterproofing products for joints. Keep the expansion joints of the building free mortar and grout.
- .14 Use the double spread method in order to reduce the voids.
- .15 Unless otherwise indicated, set the door openings, interrupt the floor tiling under lateral axis of the door when the tiling finish or colour is different in the adjoining rooms. Install the transition molding centered in the median plane of the door or the frame.
- .16 Unless otherwise indicated, set the floor tiling flush with the adjoining finishes. Make tiling slope at the door openings, when required, to join the finishes with the existing floors. The slope must not exceed 1:12 (8.33%). The vertical drops are not acceptable.
- .17 At the saw marks and the construction or expansion joints, set the tile in accordance with the TTMAC 301 MJ-E detail and according to the manufacturer's written instructions.

3.5 FLOOR TILING

- .1 Set the tiling accordance with the TTMAC 311F-2002A detail and according to the manufacturer's written instructions.

3.6 BASEBOARDS

- .1 Set the tiling accordance with the TTMAC instructions.

3.7 PRIMER AND FLOOR SEALERS

- .1 Apply in accordance with the manufacturer's instructions.

3.8 ACCESSORIES

- .1 Install the prefabricated tape edgings, transition and control joints according to the manufacturer's written instructions and the minimum following instructions:
 - .1 For protection, outside angles decoration, install a Schiene type molding.
 - .2 At the changes of different finishes and of same thickness, install a Schiene type molding.
 - .3 At raising finishes changes, install a Quadec type molding.
 - .4 At the baseboards stoppers, install a Quadec type molding.
 - .5 At the top of the baseboards, install a Schiene type molding.

3.9 QUALITY CONTROL ON SITE

- .1 Controls made on site by the manufacturer.
 - .1 The manufacturer must make recommendations regarding the use of the product(s), and make periodic visits to verify if the setting up has been made according to his recommendations

3.10 CLEANING

- .1 . Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning
 - .1 . Leave Work area clean at end of each day.
 - .1 Remove any trace of primer and sealer, caulking and waterproofing.
 - .2 Clear the finished surfaces of the mastic and any other material used to set glazings.
 - .3 Remove all the tags, once the works completed.
 - .4 Clean the glazing with a non-abrasive product, according to the manufacturer's instructions.
 - .2 Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facilities.

3.11 PROTECTION

- .1 Protect installed products and components from any damage during construction.
- .2 Once the installation completed, mark each glazing with an X with a removable compound or plastic tape.
 - .1 Do not mark mirrored glass or heat absorbing glass panels.
- .3 Repair the damages caused by the installation of the glazings to adjoining materials.

Terminal upgraded norms
Terminal Blanc Sablon (Quebec)
Transport Canada
Project #: R.075371.001

CERAMIC TILING

Section 09 30 13
Page 9 of 9

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 07 95 13 Expansion joint cover assemblies
- .2 Section 09 53 00.01 Acoustical suspension
- .3 Sections for divisions: 21, 23, 26 and 27 for embedded sprinklers, mechanical, lighting and communication equipments.

1.2 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 423-02a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - .2 ASTM E 1264-98, Standard Classification for Acoustical Ceiling Products.
 - .3 ASTM E 1477-98a(2003), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction and Amendment No. 1 [1988].
 - .2 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .4 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
 - .2 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .6 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-[2003], Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: submit WHMIS MSDS.
- .3 Co-ordinate submittal requirements and provide submittals required.
- .4 Submit duplicate samples of each type acoustical units.

1.4 QUALITY ASSURANCE

- .1 Regulatory Requirements:

- .1 Fire-resistance rated floor/ceiling and roof/ceiling assembly: certified by Canadian Certification Organization accredited by Standards Council of Canada.
- .2 Mock-up:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct mock-up 15m² minimum of each type acoustical panel ceiling including one inside corner and one outside corner.
 - .3 Construct mock-up where directed.
 - .4 Allow 72 hours for inspection of mock-up by Ministerial Representative before proceeding with ceiling work.
 - .5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.
- .3 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section [01 35 29.06 - Health and Safety Requirements].

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Protect on site stored or installed absorptive material from moisture damage.
- .2 Store extra materials required for maintenance, where directed by Ministerial Representative.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for recycling] in accordance with Section 01 74 21 - Construction /Demolition Waste Management and Disposa].
 - .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 recycling and place in designated containers Steel, Metal, Plastic waste in accordance with Waste Management Plan.
 - .5 Place materials defined as hazardous or toxic in designated containers in accordance with Section 01 35 43 - Environmental Procedures.
 - .6 Handle and dispose of hazardous materials in accordance with CEPA, Regional and Municipal, regulations.
 - .7 Ensure emptied containers are sealed and stored safely in accordance with Section 01 35 43 - Environmental Procedures.
 - .8 Fold up metal and plastic banding, flatten and place in designated area for recycling.

1.6 ENVIRONMENTAL REQUIREMENTS

- .1 Permit wet work to dry before beginning to install.
- .2 Maintain uniform minimum temperature of 15 degrees C and humidity of 20-40% before and during installation.
- .3 Store materials in work area 48 hours prior to installation.

1.7 EXTRA MATERIALS

- .1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide acoustical units amounting to 5% of gross ceiling area for each pattern and type required

for project.

- .3 Ensure extra materials are from same production run as installed materials.
- .4 Clearly identify each type of acoustic unit, including colour and texture.
- .5 Deliver to Ministerial Representative, upon completion of the work of this section.

1.8 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 and 10 years.
- .2 Provide a written and jointly signed document issued by the manufacturer and the installer in the name of Canada, certifying that the supplied ceiling acoustic elements will remain free from any material, finish, manufacturing defect for a period of ten (10 years); refer to the general conditions.
- .3 The installer of the ceiling acoustic elements supplied in this section must provide a written and signed document, issued in the name of Canada certifying that the works in the present section are warranted from any installation defect for a period of 5 years; refer to the general conditions.
- .4 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments and services required to repair the defective parts of the work and in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 MATERIALS

- .1 Acoustic units for suspended ceiling system: to ASTM E 1264.
 - .1 Type IV, form 2, E pattern.
 - .2 Resistant to Class A fire.
 - .3 Durabrite Hydroformed mineral fibers with acoustically transparent membrane.
 - .4 Textures: fine.
 - .5 Flame spread rating of 25 or less in accordance with CAN/ULC-S102.
 - .6 Smoke developed 50 or less in accordance with CAN/ULC-S102.
 - .7 Noise Reduction Coefficient (NRC) designation: 0..80
 - .8 Ceiling Attenuation Class (CAC) rating 35, in accordance with ASTM E 1264
 - .9 Light Reflectance (LR) range of [] to [ASTM E 1477] [].
 - .10 Colour. White
 - .11 Size 610 mm x 1220 mm x 25 mm thick.
 - .12 Shape: square suspended.
- .2 Acceptable products
 - .1 Armstrong Ultima tegular 1943
 - .2 Rockfon Sona tegular 16101
 - .3 CGC Mars tegular 88185
 - .4 or replacement product approved by addenda in accordance with instructions to bidders

3 EXECUTION

3.1 EXAMINATION

- .1 Do not install acoustical panels and tiles until work above ceiling has been inspected by Ministerial Representative.

3.2 INSTALLATION

- .1 Install acoustical panels and tiles in ceiling suspension system.
- .2 Install fibrous acoustical media [and spacers] over entire area above [suspended metal panels].
- .3 In fire rated ceiling systems, secure lay-in panels with hold-down clips and protect over light fixtures, diffusers, air return grilles and other appurtenances according to Certification Organizations design requirements.

3.3 INTERFACE WITH OTHER WORK

- .1 Co-ordinate with Section 09 53 00.01 - Acoustical Suspension.
- .2 Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 07 95 13 Expansion joint cover assemblies
- .2 Section 09 51 13 Acoustical Panel ceilings.
- .3 Sections for divisions: 21, 23, 26 and 27 for the trims of embedded mechanical, electrical and electronic equipments.

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

1.3 CALCULATION CRITERIA

- .1 Maximum flexion: deflection of 1/360 of the span, determined by the bending tests prescribed in ASTM C 635 standard.
- .2 Submit the calculation notes showing that the design of the suspended ceilings meets the requirements article 4.1.8, Charges and effects due to earthquakes, National Building Code of Canada (NBC 2010) or those of ASTM E 580/E 580M, Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint. These calculations must bear the seal and signature of an engineer acknowledged in Canada. This seal certifies that the designs of the works prescribed in the present section answer the requirements of the contract documents.
- .3 In addition, these sealed calculations certify that the capacity of the anchorings to the supports indicated supports in the installation plans and are used to answer the requirements of the NBC and of the applicable standards.

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 [acoustical suspension] and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submitted drawings must bear the seal and signature of an engineer acknowledged or licensed in Canada.
 - .2 Submit reflected ceiling plans for special grid patterns as indicated.
 - .3 The shop drawing must clearly show the layout, spacing details and fastening method of

the anchoring and suspension elements to meet the requirements imposed by a seismic categorization B for ceiling grid braces, location of hidden splines, changes in level details, access door dimensions, and locations and acoustical unit support at ceiling fixture, 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 one representative model of each type ceiling suspension system.
 - .4 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

1.5 CLOSEOUT SUBMITTALS

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

1.6 QUALITY ASSURANCE

- .1 Fire-resistance rated suspension system: certified by a Canadian Certification Organization accredited by Standards Council of Canada.
- .2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance criteria and physical characteristics, namely the requirements for seismic charges.

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, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store acoustical ceiling braces so as to protect them from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.8 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 10 years.
- .2 Provide a written and jointly signed document issued by the manufacturer and the installer in the name of Canada, certifying that the installed braces will remain free from any material, manufacturing, finish and installation defect for a period of 10 years. Refer to the general conditions.

- .3 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments and services required to repair the defective parts of the work and in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work

2 PRODUCTS

2.1 MATERIALS

- .1 Heavy duty system to ASTM C 635/ASTM C635M.
- .2 Basic materials for suspension system: commercial quality hot rolled steel.
- .3 Suspension system: non fire rated, made up as follows:
 - .1 Parallel exposed T section grid.
 - .2 Acceptable products:
 - .1 Armstrong Prelude XL suspension, 24 mm
 - .2 Rockfon #1250 suspension, 24 mm
 - .3 CGC DX/DL suspension, 24 mm
 - .4 or replacement product approved by addenda in accordance with the instructions to the bidders.
- .4 Hanger wire: galvanized soft annealed steel wire:
 - .1 3.6 mm diameter for access tile ceilings.
 - .2 2.6 mm diameter for other ceilings.
- .5 Carrying channels: 38 x 19 mm channel, painted steel.
- .6 White extruded aluminum molding, supplied by the manufacturer of suspension braces for vertical installation between two different ceiling levels. Moulding height \pm 50 mm.
- .7 Accessories: splices, clips, metal ties (wire or other), retainers, anchoring for perimeter rod, sections and shims and wall-ceiling moulding for flush or recessed erection, to achieve a complete suspension grid, as recommended by system manufacturer.
- .8 Staples release :
 - .1 Acceptable products :
 - .1 Modèl CHDC, Armstrong
 - .2 Modèl 935, Chicago Metallic of Rockfon
 - .3 Modèl PZ (variable locking hold-down clip) of CGC

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for acoustical ceiling tile and track installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Ministerial Representative.
 - .2 Inform Ministerial Representative of unacceptable conditions immediately upon

- discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Ministerial Representative.

3.2 INSTALLATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Installation: to ASTM C 636/C 636M except where specified otherwise.
- .3 Install suspension system to manufacturer's instructions and Certification Organizations tested design requirements.
- .4 Seismic restraint: install the grid elements in accordance to ASTM E 580-87 standard, manufacturer's instructions and the sop drawing certified by a qualified engineer.
- .5 Do not erect ceiling suspension system until work above ceiling has been inspected and approved by Ministerial Representative.
- .6 Secure hangers to overhead structure using attachment methods as indicated on the sop drawings and installation plans certified by a qualified engineer concerning the resistance to earthquakes and the suspension of the equipments and other heavy objects.
- .7 Install hangers spaced at maximum 1200mm centres and within 150 mm from ends of main tees.
- .8 Lay out centre line of ceiling both ways, to provide balanced borders at room perimeter with border units not less than 50% of standard unit width system according to reflected ceiling plan.
- .9 Ensure suspension system is co-ordinated with location of related components.
- .10 Install wall moulding to provide correct ceiling height.
- .11 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles and speakers
- .12 Support at light fixtures, diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .13 Interlock cross member to main runner to provide rigid assembly.
- .14 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.
- .15 Finished ceiling system to be square with adjoining walls and level within 1:1000.
- .16 Expansion joints:
 - .1 All along the building's expansion joint, install parallel to and at ± 100 mm from each other, two main T bearing sections. A joint cover for expansion joint will be installed between the two T sections in accordance with the instructions in section 07 95 13 Joint covers for expansion joints.
- .17 Staples release to be installed only in room # 18 –Luggage room

3.3 CLEANING

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

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning
 - .1 Touch up scratches, abrasions, voids and other defects in painted surfaces.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

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

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 21 00 Allowances.
- .2 Section 06 40 00 Architectural woodwork
- .3 Section 07 92 00 Joint sealants
- .4 Section 09 30 13 Ceramic tiling
- .5 Division 22 – Plumbing with regard to floor drains.

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, nosing, feature strips, treads, edge strips.

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 in each colour, pattern and type a quantity of flooring material, baseboards and adhesive equivalent to 5% of the gross surface required for maintenance.
 - .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 Ministerial Representative, upon completion of the work of this section.
 - .6 Store where directed by Ministerial Representative.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements][and][with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials 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 Packaging Waste Management: remove for recycling of packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition 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.
- .2 Poured concrete slabs must have a minimum compression resistance of 25 Mpa and have set at least 28 days and be dry before beginning the works.
- .3 Water content: Do not proceed to the installation of resilient tile floorings before achieving a minimum of 3 tests to make sure that the water content, humidity level and alkalinity of the support is within the limits prescribed by the manufacturer.

1.7 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 3 and 5 years.
- .2 Provide a written and jointly signed document issued by the manufacturer and the installer in the name of Canada, warranting that the resilient tile floorings and baseboards will remain free from any material, finish manufacturing defect for a period of 5 years: refer to the general conditions.
- .3 The installer of the resilient tile floorings and baseboards planned in this section must provide a written and jointly signed document issued by the manufacturer and the installer in the name of Canada certifying that the works are warranted against installation defect for a period of three (3) years: refer to the general conditions.
- .4 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments and services required to repair the defective parts of the work and in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 MATERIALS

- .1 Vinyl composition tile: to ASTM F 1066, Composition 1 - non asbestos 3.2 mm, 305 x 600.
 - .1 Acceptable products:
 - .1 Polyflor Expona Design Stone and Effect Pur tiles, colour Roman Limestone # 7219.
 - .2 Armstrong Natural Creations Diamond 10 technology Earthcuts tiles, colour Braco Mortan
 - .3 Johnsonite ID Freedom Stone tiles, colour zinc #4144.
 - .4 or replacement product approved by addenda in accordance with the instructions to the bidders.
 - .2 Finish:
 - .1 Factory prefinished.
 - .2 Applied on-site as indicated (if needed):
 - .1 Four coats polyurethane.
 - .2 Apply polyurethane] at a coverage of not less than 5 m².
 - .3 Check for obvious limps, bugs, dust etc.
 - .4 When dry sand lightly, using 120 grit paper to ensure adhesion of subsequent application of finish.
 - .5 Vacuum thoroughly.
 - .6 Apply additional finish coatings as required.
 - .7 Allow 24 hours for the finish to dry before permitting foot traffic and 7 days for the finish to cure before placing furniture and other heavy objects.
 - .3 Resilient baseboards: continuous, rested on the floor covering with end pre-molded pieces and outside corners.
 - .1 Height: 100 mm
 - .2 Length: longest possible
 - .3 Colour: to the departmental representative choice
 - .1 Acceptable products:
 - .1 Johnsonite Tightlock model.
 - .2 Centura Roppe model.
 - .3 or replacement product approved by addenda in accordance with the instructions to the bidders.
 - .4 Primers and adhesives: waterproof, recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.
 - .1 Flooring adhesives:
 - .1 Adhesive: maximum VOC limit 50 g/L to SCAQMD Rule 1168.
 - .2 Cove base adhesives:
 - .1 Adhesive: maximum VOC limit 50 g/L to SCAQMD Rule 1168.
 - .5 Filling product and leveling coat for supports: according to the recommendations of the floor

covering manufacturer.

- .6 Floor sealer/coating applicable with a trowel mixed with a polymer:
 - .1 Acceptable products:
 - .1 Proma Propatch Plus.
 - .2 Mapei Planipatch plus.
 - .3 TEC TA330.
 - .4 or replacement product approved by addenda in accordance with the instructions to the bidders
- .7 Primers and adhesives: as required and recommended by the manufacturer of the floor sealer/coating manufacturer.
- .8 Metal edgings: smooth, extruded aluminum, factory finished, with flap extending under the floor covering, with shoulder flush to the top side of the floor covering.
- .9 Primer: type recommended by the manufacturer of the floor covering.
- .10 Wax (if needed): to CAN/CGSB-25.21, type recommended by flooring manufacturer.

3 EXECUTION

3.1 MANUFACTURE'S INSTRUCTIONS

- .1 Compliance: comply with the manufacturer's written recommendations and specifications, including any technical bulletin, instructions relating to handling, storage and installation of the products and the indications in the data sheets.

3.2 EXAMINATION

- .1 Examine the state of the surfaces, supports and works designed to receive the resilient coverings.
- .2 Checking the conditions: before proceeding to the installation of the resilient coverings, make sure that the state of the surfaces/supports first set up at the end of other sections or contracts and the flatness variations are acceptable and allow for the realization of the works in accordance with the manufacturer's written instructions
 - .1 Inform the departmental representative immediately of any unacceptable conditions detected.
 - .2 Have the installation surfaces approved by the technical representative of the coverings supplier.
- .1 Allow 72 hours before the works to check the concrete slab moisture content by setting in place the required quantity of probes and randomly in accordance with ASTM F 710 - «*Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring*» et à l'ASTM F2170 - «*Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes*».
- .2 Allow 72 hours before the works to check pH level, in accordance with the floor covering manufacturer's requirements.

- .3 Hand to the departmental representative a document showing the level of relative humidity of the concrete slab as well as its pH level and the approval of the support if need be. The relative humidity level must include at least 4 values: one at the time of the test, and three estimations of the moisture movement, that is one value at the 1/3 of the period, one at the 2/3 and another at the end.
- .3 Pull-out tests
 - .1 Coordinate the site tests according to the requirements of section 01 45 00 – Quality control and with the technical representative of floor coverings manufacturer.
 - .2 With the methods recommended by the floor covering manufacturer, make sure that the concrete slab is clean and dry.
 - .3 Make a pull-out test in a location indicated by the departmental representative.
 - .1 Set in place four (4) tiles using the filling and adhesive products prescribed for the works.
 - .2 Let the sample dry for 24 hours and then make the pull-out test following the manufacturer's instructions taking care of checking the adhesion of the different elements.
 - .4 Provide a test report with the manufacturers' approval to the departmental representative. Do not start the works if the adhesion is defective.
- .4 Start the installation works only after having corrected the unacceptable conditions and received the written approval of the technical representative of the floor coverings' manufacturer. Installing the resilient floor coverings without this approval, this contractor alone will be responsible for repairing the entire work including the works of other sections and of the latter.

3.3 PREILMINARY WORKS

- .1 Preparing the support
 - .1 Inspect the supports to determine the works that must be made to have them clean to receive the resilient floor coverings.
 - .2 Fill in the 3 mm wide crevices and smooth the protrusions of more than 1 mm with an appropriate and compatible latex patching-smoothing sealer.
 - .3 Respect the manufacturer recommendations with regard to thickness of sealer to apply
 - .4 Apply a compatible primer on the large surfaces to repair.
 - .5 Concrete supports must be dry, hardened and clean.
 - .6 Concrete supports must be free from paint, dirt, grease, oil, curing compound and désolidarisation, sealer and any other contaminant susceptible of spoiling the gluing of the bonding of the adhesive.
 - .7 Apply on the porous or powdery concrete supports a primer compatible with the bonding sealer so as to make the surface suited to receive a covering set by direct bonding on the support.
- .2 Preparing the surfaces: prepare the surfaces in accordance with the manufacturer's written recommendations applying at least 3 coats of floor sealer. A tolerance of 1:1000 is required..
- .3 Preparing the resilient coverings: according to the manufacture's written instructions.

- .4 Everywhere a different floor covering meet ceramic tiling, plan to set in place a zone of ± 1200 mm x 1200 mm of filling product or floor sealer in order to fill in the difference in height between the two different types of floor coverings. The finished level of the vinyl tiles must be flush with the ceramic tiling. The slope must be low so that the transition between the floor covering be easy and imperceptible.

3.4 SETTING UP

- .1 Setting the tile floor covering
 - .1 To facilitate the installation, store the material at a temperature above 20°C, for at least 48 hours, rolls being upside.
 - .2 Ensure a high ventilation rate, with a maximum fresh air supply, for all the duration of setting up and for a period of 48 to 72 hours following their completion. Ventilate directly outside as much as possible. Avoid that contaminated air circulates in a part or the whole distribution network. Ensure an additional ventilation for a period of at least one month once the building is occupied
 - .3 Apply the adhesive evenly with the recommended trowel. Avoid spreading the adhesive on surface too large so that the initial bonding does not occur before setting the floor covering. Clean the surplus immediately. The installer must make sure to put the material in the wet and freshly applied adhesive, according to the recommendations of the resilient floor covering manufacturer.
 - .4 Set the tiles making joints to parallel the building so as to obtain a symmetric pattern. The width of the peripheral tiles must not be less than half the width of a normal tile.
 - .5 Set the pattern tiles staggered, overlapping 1/3:2/3.
 - .6 With the progress of the works and immediately after the setting, roll the floor covering with a roller to ensure a perfect adherence. The weight of the roller must be in accordance with the manufacturer's recommendations.
 - .7 Carefully cut the floor covering around the fixed objects.
 - .8 Set decorative strips, of different colours and the reference elements at the indicated locations. Achieve the pattern of the covering.
 - .9 Set a piece of floor covering on top of the floors' access covers. Respect the pattern of the covering.
 - .10 Extend the floor covering on the surfaces where removable partitions will be installed, cabinets, lockers and embedded furniture; respect the pattern.
 - .11 At the door openings, stop the floor covering under the door span axis when the finish or colour of the floor covering is different in the adjoining rooms.
 - .12 After setting the covering, wait 72 hours before moving equipments with caster wheels and 7 days to move heavy equipments.
 - .13 After installing the floor covering, wait 48 hours before cleaning and preparing in accordance with the manufacturer's instruction manual.
 - .14 Set the appropriate edgings at the locations where the edged of the floor covering are exposed or not protected.
- .2 Installing the resilient baseboards
 - .1 Install the baseboards so that there is as little joints as possible. Use the longest baseboards possible.
 - .2 Clean the substrate and prime it with a layer of adhesive.

- .3 For adequate adherence, apply the adhesive in a continuous way at the backside of the baseboard.
- .4 Firmly secure the baseboards with the wall and floor with a 3 kg hand roller.
- .5 Install the baseboards aligned and level, the maximum admissible gap being 1:1000.
- .6 Cut the baseboards and adjust them to the door frames and other obstacles. Where the door frames are embedded, install pre-molded end pieces.
- .7 In inside angles, make lap joints. Use pre-molded angle pieces at the extruded joints. Use pre-molded straight partitions to make the extruded joints that are not square and plan for at least 300 mm for each leg. At the extruded joints, install straight wrapping baseboards.
- .8 Heat weld the baseboards in accordance with the manufacturer's written instructions..

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
 - .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.
- .5 Waste Management: in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

- .1 Protect new floors from [time of final set of adhesive after initial waxing until final waxing (when required)].
- .2 Prohibit traffic on floor for [48] hours after installation.
- .3 After removing the protective elements, clean as previously prescribed.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 08 11 00 Metal doors and frames
- .2 Section 09 91 23.01 Interior re-painting

1.2 REFERENCE STANDARDS

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .2 The Master Painters Institute (MPI)
 - .1 Maintenance Repainting Manual 2004, Master Painters Institute (MPI), including Identifiers, Evaluation, Systems, Preparation and Approved Product List.
- .3 National Research Council Canada (NRC)
 - .1 National Fire Code of Canada 2010 (NFC).
- .4 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings) of the Environmental Protection Agency (EPA).

1.3 QUALITY ASSURANCE

- .1 Conform to latest MPI requirements for exterior repainting work including cleaning, preparation and priming.
- .2 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, and solvents) to be in accordance with the latest edition of the MPI Approved Product List and to be from a single manufacturer for each system used.
- .3 Paint materials such as linseed oil, shellac, and turpentine, to be the highest quality product of an approved manufacturer listed in MPI Maintenance Repainting Manual and shall be compatible with other coating materials as required.
- .4 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Ministerial Representative.
- .5 Mock-ups:
 - .1 Provide a mock-up in accordance with requirements of Section 01 45 00 - Quality Control to Ministerial Representative.
 - .2 Prepare and repaint mock-up designated exterior surface or item to requirements specified herein, with specified paint or coating showing selected colours, number of coats, gloss/sheen, textures and workmanship to MPI Maintenance Repainting Manual standards for review and approval.
 - .3 When approved, repainted surface and/or item shall become acceptable standard of finish quality and workmanship for similar on-site exterior repainting work.

1.4 PERFORMANCE REQUIREMENTS

- .1 Environmental Performance Requirements: ecological performance required in accordance with the Green Seal Agency MPI GPS-1 "Green Seal" standard.

- .2 Provide paint products meeting MPI "Environmentally Friendly" E3 ratings based on VOC (EPA Method 24) content levels. When products are not E3 homologated by the MPI, use product having received the E2 rating.

1.5 SCHEDULING

- .1 Submit work schedule for various stages of painting to Ministerial Representative for review. Submit schedule minimum of 72 hours in advance of proposed operations.
- .2 Paint occupied facilities in accordance with approved schedule. Schedule operations to approval of Ministerial Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.
- .3 Obtain written authorization from Ministerial Representative for changes in work schedule.
- .4 Schedule repainting operations to prevent disruption by other trades if applicable and by occupants in and about building.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit full range colour sample chips for review and selection. Indicate where colour availability is restricted.
- .3 Provide product data and manufacturer's installation/application instructions for paints and coating products to be used.
- .4 Provide WHMIS Material Safety Data Sheets (MSDS) for paints and coating materials to be used.
- .5 Quality Assurance Submittals:
 - .1 Manufacturer's Instructions: manufacturer's installation instructions.
- .6 Closeout Submittals:
 - .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
 - .2 Provide records of products used. List products in relation to finish system and include following:
 - .1 Product name, type and use (i.e. materials and location).
 - .2 Manufacturer's product number.
 - .3 Colour code numbers.
 - .4 MPI Environmentally Friendly classification system rating.
 - .5 Manufacturer's Material Safety Data Sheets.

1.7 MAINTENANCE

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

1.8 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, supplemented as follows:.

- .1 Deliver and store materials in original containers, sealed, with labels intact.
 - .2 Labels to indicate:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
 - .3 Remove damaged, opened and rejected materials from site.
 - .4 Store and handle in accordance with manufacturer's recommendations.
 - .5 Store materials and equipment in secure, dry, well-ventilated area with temperature range between 7 degrees C to 30 degrees C. Store materials and supplies away from heat generating devices and sensitive products above minimum temperature as recommended by manufacturer.
 - .6 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Ministerial Representative. Upon completion of operations, return areas to clean condition to approval of Ministerial Representative.
 - .7 Remove paint materials from storage in quantities required for same day use.
 - .8 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
 - .9 Fire Safety Requirements:
 - .1 Provide one 9 kg Type ABC [dry chemical] fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site daily.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada.
- .2 Waste Management and Disposal:
- .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Paint, stain and wood preservative finishes and related materials are hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
 - .3 Materials that cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
 - .4 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
 - .5 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:
 - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.
 - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 - .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - .4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
 - .5 Empty paint cans are to be dry prior to disposal or recycling (where available).
 - .6 Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.
 - .6 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

- .7 Set aside and protect surplus and uncontaminated finish materials: Deliver to or arrange collection by organizations for verifiable re-use or re-manufacturing.

1.9 AMBIENT CONDITIONS

- .1 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer.
 - .2 Do not perform repainting work when:
 - .1 Ambient air and substrate temperatures are below 10 degrees C.
 - .2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.
 - .3 Substrate and ambient air temperatures are expected to fall outside MPI and paint manufacturer's prescribed limits.
 - .4 Relative humidity is above 85% or when dew point is less than 3 degrees C variance between air/surface temperature.
 - .5 Rain or snow is forecast to occur before paint has thoroughly cured.
 - .6 It is foggy, misty, raining or snowing at site.
 - .3 Conduct moisture tests using properly calibrated electronic Moisture Meter, except test existing painted concrete floors for moisture using simple "cover patch test" on failed areas.
 - .4 Do not perform repainting work when maximum moisture content of substrate exceeds:
 - .1 12% for concrete and masonry (clay and concrete brick/block).
 - .2 15% for wood.
 - .3 12% for stucco.
 - .5 Test painted concrete, masonry and plaster surfaces for alkalinity as required.
- .2 Application Requirements:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind conditions are such that airborne particles will affect quality of finished surface.
 - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted.
 - .3 Apply paint when previous coat of paint is dry or adequately cured, unless otherwise pre-approved by specific coating manufacturer.
 - .4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.
 - .5 Do not apply paint when:
 - .1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.
 - .2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
 - .3 Surface to be painted is wet, damp or frosted.
 - .6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.
 - .7 Schedule repainting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.
 - .8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

2 PRODUCTS

2.1 MATERIALS

- .1 Paint materials listed in latest edition of MPI Approved Product List (APL) are acceptable for use on this project.
- .2 Where required by authorities having jurisdiction, paints and coatings to provide fire resistant rating.
- .3 Paint materials for repaint systems: products of single manufacturer.
- .4 Only qualified products with E2 or E3 MPI "Environmentally Friendly" rating are acceptable for use on this project.
- .5 Use only MPI listed L rated materials.
- .6 Paints, coatings, thinners, solvents, cleaners and other fluids used in repainting to be as follows:
 - .1 Be manufactured without compounds which contribute to ozone depletion in upper atmosphere.
 - .2 Be manufactured without compounds which contribute to smog in lower atmosphere.
 - .3 Be manufactured where matter generating 'Biochemical Oxygen Demand' (BOD) in undiluted production plant effluent discharged to natural watercourse or sewage treatment facility lacking secondary treatment does not exceed 15 mg/L.
 - .4 Be manufactured where total suspended solids (TSS) content in undiluted production plant effluent discharged to natural watercourse or sewage treatment facility lacking secondary treatment does not exceed 15 mg/L.
- .7 Paints and coatings must be manufactured and transported in a manner that steps of processes, including disposal of waste products, will meet requirements of applicable governmental acts, by-laws and regulations including, for facilities located in Canada, Fisheries Act and Canadian Environmental Protection Act (CEPA).
- .8 Paints and coatings must not be formulated or manufactured with formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
- .9 Water based covering products, new or recycled, must have a flash point of 61:00C or more.

2.2 COLOURS

- .1 Ministerial Representative will provide Colour Schedule after Contract award.
- .2 The contractor is responsible for digitalizing the existing colours of the surfaces to be repainted in the same colour and to submit them to the departmental representative for approval.
- .3 Colour schedule will be based upon selection of eight base colours and twelve accent colours. No more than twenty colours will be selected for entire project and no more than three colours will be selected in each area.
- .4 Selection of colours will be from manufacturers full range of colours.
- .5 Where specific products are available in restricted range of colours, selection will be based on limited range.
- .6 In three (3) coats painting systems, the second coat will have to be of a slightly paler than the finishing coat to ease the visual reference of each coat.

2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed with Ministerial Representative's written permission.
- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Where thinner is used, addition not to exceed paint manufacturer's recommendations. Do not use kerosene or such organic solvents to thin water-based paints.
- .4 Thin paint for spraying in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Ministerial Representative.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

- .1 Paint gloss: defined as sheen rating of applied paint, in accordance with following MPI gloss/sheen standard values:

Gloss Level Category	Units @ 60 Degrees	Units @ 85 Degrees
G1 - matte finish	0 to 5	maximum 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	minimum 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	> 85	

- .2 Gloss level ratings of repainted surfaces as specified and as noted on Finish Schedule .

2.5 EXTERIOR PAINTING SYSTEMS

- .1 General points
 - .1 For the acceptable products mentioned in the painting systems, the acceptable products equivalent to each product from:
 - .1 Benjamin Moore,
 - .2 Dulux (Bétonel),
 - .3 Sherwin-Williams,
 - .4 PPG are accepted as replacement products
 - .5 or replacement product approved by addenda in accordance with the instructions to the bidders.
- .2 System 01 – System for concrete panels

- .1 Preparation of the surfaces in accordance with ONGC 1.138 standard and according to the manufacturer's instructions.
- .2 Clean thoroughly according to the manufacturer's instructions.
- .3 Apply 3 coats of acrylic latex mat such as Sico Expert Serie 971.

- .3 System for galvanized or zinc coated surfaces (steel doors and frames and mechanical elements/exits)
 - .1 Preparation of the surfaces in accordance with ONGC 85-GP-16M standard and according to the manufacturer's instructions.
 - .2 Treat the surface with the cleaner and de-rusting for galvanized metal such as Sico 635-104
 - .3 Rinse with clear water.
 - .4 Apply 1 coat of latex primer for galvanized metal such as Sico 635-045 (in the hour that follows).

 - .5 Apply 2 coats of rust resistant paint for metal such as Sico Corrostop Ultra Serie 635.

3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

- .1 Exterior repainting work: inspected by MPI Accredited Paint Inspection Agency (inspector) acceptable to specifying authority and local Painting Contractor's Association. Painting contractor to notify Paint Inspection Agency minimum of three week prior to commencement of work and provide copy of project repainting specification and Finish Schedule (as well as plans and elevation drawings if available).
- .2 Exterior surfaces requiring repainting: inspected by both painting contractor and Paint Inspection Agency who will notify Ministerial Representative in writing of defects or problems, prior to commencing repainting work, or after surface preparation if unseen substrate damage is discovered.
- .3 Where an assessed degree of surface degradation of DSD-1 to DSD-3 before preparation of surfaces for repainting is revealed to be DSD-4 after preparation, repair or replacement of such unforeseen defects discovered are to be corrected, as mutually agreed, before repainting is started.
- .4 Where "special" repainting or recoating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer to provide as part of work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Ministerial Representative.

3.3 PREPARATION

- .1 Perform preparation and operations for exterior painting in accordance with MPI Maintenance Repainting requirements except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.
- .3 Clean and prepare exterior surfaces to be repainted in accordance with MPI Maintenance Repainting Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and surface debris by [brushing], wiping with dry, clean cloths [or compressed air].
 - .2 Wash surfaces with a biodegradable detergent (and bleach where applicable) and clean warm water using a stiff bristle brush to remove dirt, oil and surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Use trigger operated spray nozzles for water hoses.
 - .5 Allow surfaces to drain completely and to dry thoroughly.
 - .6 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.
 - .7 Many water-based paints cannot be removed with water once dried. However, minimize the use of kerosene or such organic solvents to clean up water-based paints.
- .4 Where required, pressure wash exterior surfaces prior to repainting in accordance with MPI standards for type of surfaces and recommended pressures to ensure complete removal of loose paint, stains, dirt, and foreign matter. This work to be carried out by qualified workers experienced in pressure water cleaning. Use of spray equipment such as water hose cleaning will not be considered satisfactory unless specified. Allow sufficient drying time and test surfaces using an electronic moisture metre before commencing work.
- .5 Clean metal surfaces to be repainted by removing rust, dirt, oil, grease and foreign substances in accordance with MPI requirements. Remove such contaminants from surfaces, pockets and corners to be repainted by brushing with clean brushes, blowing with clean dry compressed air, or brushing/vacuum cleaning as required.
- .6 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.
- .7 Do not apply paint until prepared surfaces have been accepted by Ministerial Representative
- .8 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects from previously painting (e.g. runs, and sags) that are visible from distance up to 1000 mm.

3.4 EXISTING CONDITIONS

- .1 Prior to commencing work, examine site conditions and existing exterior substrates to be repainted and report in writing to Ministerial Representative and General Contractor damages, defects, unsatisfactory or unfavourable conditions of surfaces that will adversely affect this work.
- .2 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test" and report findings to Ministerial Representative and General Contractor. Maximum moisture content not to exceed specified limits.

- .3 No repainting work to commence until such adverse conditions and defects have been corrected and surfaces and conditions are acceptable to Painting Subcontractor and Inspection Agency.
- .4 Degree of surface deterioration (DSD) to be assessed using MPI Identifiers and Assessment criteria indicated in the MPI Maintenance Repainting Manual. MPI DSD ratings and descriptions are as follows:

<u>Deterio ration rate</u>	Description
DSD-0	Sound Surface (includes visual (aesthetic) defects that do not affect film's protective properties).
DSD-1	Slightly Deteriorated Surface (indicating fading; gloss reduction, slight surface contamination, minor pin holes and scratches).
DSD-2	Moderately Deteriorated Surface (small areas of peeling, flaking, slight cracking, and staining).
DSD-3	Severely Deteriorated Surface (heavy peeling, flaking, cracking, checking, scratches, scuffs, abrasion, small holes and gouges).
DSD-4	Substrate Damage (repair or replacement of surface required).

3.5 PROTECTION

- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Ministerial Representative.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.
- .4 Protect general public and building occupants in and about the building.
- .5 Removal of light fixtures, surface hardware on doors, and surface mounted equipment, fittings and fastenings to be done prior to undertaking painting operations. Store items and re-install after painting is completed.
- .6 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
- .7 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas to approval of Ministerial Representative.

3.6 APPLICATION

- .1 Apply paint by method that is best suited for substrate being repainted using brush, roller, air sprayer and/or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise. In each case method of application to be as pre-approved by Ministerial

Representative before commencing work.

- .2 Brush and Roller Application:
 - .1 Apply paint in a uniform layer using brush, and/or roller of types suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces to be free of roller tracking and heavy stipple unless approved by Ministerial Representative
 - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray Application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 - .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently necessary.
 - .3 Apply paint in uniform layer, with overlapping at edges of spray pattern.
 - .4 Back roll spray applications and brush out runs and sags immediately.
 - .5 Use brushes to work paint into cracks, crevices and places that are not adequately painted by spray.
- .4 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Ministerial Representative.
- .5 Apply paint coats in a continuous manner and allow surfaces to dry and cure between coats for minimum time period as recommended by manufacturer. Minimum dry film thickness of coats not less than that recommended by manufacturer. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Sand and dust between coats to remove visible defects.
- .7 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.
- .8 Repaint all doors and frames surfaces including all edges including top and bottom edges. Surfaces concealed by door hardware must also be repainted unless otherwise approved.

3.7 MECHANICAL / ELECTRICAL EQUIPMENT

- .1 Unless otherwise noted, repainting to include exposed to view/previously painted exterior mechanical and electrical equipment and components (panels, conduits, piping, hangers, and ductwork).
- .2 Touch up scratches and marks and repaint such mechanical and electrical equipment and components with colour and finish to match existing finish unless otherwise noted or scheduled.
- .3 Do not paint over name plates or instruction labels.
- .4 Standard of Acceptance: when viewed using natural prevailing sunlight at peak period of the day (mid-day) on surface viewed, surfaces to indicate following:
 - .1 Walls: no defects visible from a distance of 1000 mm at [90] degrees to surface.
 - .2 Soffits: no defects visible from grade at 45 degrees to surface.
 - .3 Final coat to exhibit uniformity of colour and sheen across full surface area.

3.8 SITE QUALITY CONTROL

- .1 Inspection
 - .1 Inform the ministerial representative and the paint works inspection organism when a surface and its paint coatings are ready to be inspected. Do not apply the next coat before the approval of the preceding coat.
 - .2 Cooperate with the paint works inspection organism and give it the access to the all the work areas.
 - .3 Site inspection of paint works will be performed by an independent inspection organism named and hired by the ministerial representative.

3.9 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
- .3 Keep work area free from unnecessary accumulation of tools, equipment, surplus materials and debris.
- .4 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.
- .5 Clean equipment and dispose of wash water used for water borne materials, solvents used for oil based materials as well as cleaning and protective materials (e.g. rags, drop cloths, and masking papers), paints, thinners, paint removers/strippers in accordance with the safety requirements of authorities having jurisdiction and as specified.
- .6 Clean painting equipment in leak-proof containers that will permit particulate matter to settle out and be collected. Sediment remaining from cleaning operations to be recycled or disposed of in manner acceptable to authorities having jurisdiction.
- .7 Recycle paint and coatings in excess of repainting requirements as specified.

3.10 RESTORATION

- .1 Clean and re-install hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashings on affected exposed surfaces. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .4 Protect freshly completed surfaces from paint droppings and dust to approval of Ministerial Representative. Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Ministerial Representative.

END OF SECTION

1 GENERAL POINTS

1.1 RELATED REQUIREMENTS

- .1 Section 08 11 00 Metal doors and frames
- .2 Section 09 21 16 Gypsum board assemblies
- .3 Section 09 91 13.01 Exterior re-painting

1.2 REFERENCE STANDARDS

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

1.3 QUALITY ASSURANCE

- .1 Conform to latest MPI requirements for interior repainting work including cleaning, preparation and priming.
- .2 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners and solvents) shall be in accordance with the latest edition of the MPI Approved Product List and shall be from a single manufacturer for each system used.
- .3 Paint materials such as linseed oil, shellac, reducers and turpentine shall be the highest quality product of an approved manufacturer listed in MPI Maintenance Repainting Manual and shall be compatible with other coating materials as required.
- .4 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Ministerial Representative.
- .5 Standard of Acceptance: when viewed using final lighting source surfaces shall indicate the following:
 - .1 Walls: no defects visible from a distance of 1000 mm at 90degrees to surface.
 - .2 Ceilings: no defects visible from floor at 45 degreesto surface.
 - .3 Final coat to exhibit uniformity of colour and sheen across full surface area.
- .6 Mock-ups: construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .1 Provide a mock-up in accordance with requirements of Section 01 45 00 - Quality Control to Ministerial Representative.
 - .2 Prepare and repaint mock-up designated interior room, surface or item to requirements specified herein, with specified paint or coating showing selected colours, gloss/sheen, textures and workmanship to MPI Maintenance Repainting Manual standards for review

- and approval.
- .3 When approved, repainted room, surface and/or item shall become acceptable standard of finish quality and workmanship for similar on-site interior repainting work.

1.4 PERFORMANCE REQUIREMENTS

- .1 Environmental Performance Requirements: ecological performance required in accordance with the Green Seal Agency MPI GPS-1 "Green Seal" standard.
- .2 Provide paint products meeting MPI "Environmentally Friendly" E3 ratings based on VOC (EPA Method 24) content levels. When products are not E3 homologated by the MPI, use product having received the E2 rating.
- .3 Where indoor air quality (odour) is a problem, use only MPI listed materials having a minimum E3 rating.

1.5 SCHEDULING

- .1 Submit work schedule for various stages of painting to Ministerial Representative for review. Submit schedule a minimum of 48 hours in advance of proposed operations.
- .2 Paint occupied facilities in accordance with approved schedule. Schedule operations to approval of Ministerial Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.
- .3 Obtain written authorization from Ministerial Representative for changes in work schedule.
- .4 Schedule repainting operations to prevent disruption by other trades if applicable and by occupants in and about building.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide product data and manufacturer's installation/application instructions for each paint and coating product to be used in accordance with the requirements of Section 01 33 00 - Submittal Procedures.
- .2 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Submit full range colour sample chips for review and selection. Indicate where colour availability is restricted.
- .2 Submit WHMIS MSDS - Material Safety Data Sheets for paint and coating materials.
- .3 Closeout Submittals:
- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .1 Submit records of products used. List products in relation to finish system and include following:
- .1 Product name, type and use (i.e. materials and location).
- .2 Manufacturer's product number.
- .3 Colour code numbers.
- .4 MPI Environmentally Friendly classification system rating.
- .5 Manufacturer's Material Safety Data Sheets (MSDS).

1.7 DELIVERY, STORAGE AND HANDLING

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

- .1 Deliver and store materials in original containers, sealed, with labels intact.
- .2 Labels to indicate:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
- .3 Remove damaged, opened and rejected materials from site.
- .4 Store and handle in accordance with manufacturer's recommendations.
- .5 Store materials and equipment in secure, dry, well-ventilated area with temperature range between 7 degrees C to 30]degrees C. Store materials and supplies away from heat generating devices and sensitive products above minimum temperature as recommended by manufacturer.
- .6 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Ministerial Representative. After completion of operations, return areas to clean condition to approval of Ministerial Representative.
- .7 Remove paint materials from storage in quantities required for same day use.
- .8 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- .9 Fire Safety Requirements:
 - .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site daily.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
 - .3 Materials that cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
 - .4 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
 - .5 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:
 - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.
 - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 - .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - .4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
 - .5 Empty paint cans are to be dry prior to disposal or recycling (where available).
 - .6 Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.
 - .6 Where paint recycling is available, collect waste materials by type and provide for delivery to recycling or collection facility.
 - .7 Set aside and protect surplus and uncontaminated finish materials: Deliver to or arrange

collection by organizations for verifiable re-use or re-manufacturing.

1.8 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
 - .1 Do not perform repainting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above [10] degrees C for 24 hours before, during and after paint application and until paint has cured sufficiently.
 - .2 Ventilate enclosed spaces in accordance with Section 01 35 29 Health and safety requirements. Where required, provide continuous ventilation for seven days after completion of application of paint.
 - .3 Co-ordinate use of existing ventilation system with General Contractor and Ministerial Representative and ensure its operation during and after application of paint as required.
 - .4 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements. Use of gas-fired appliances is not permitted.
 - .5 Do not perform painting work unless minimum lighting level of 323 Lux is provided on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer, do not perform repainting work when:
 - .1 Ambient air and substrate temperatures are below 10 degrees C.
 - .2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.
 - .3 Relative humidity within area to be repainted is above 85%.
 - .2 Conduct moisture tests using properly calibrated electronic Moisture Meter, except use simple "cover patch test" on concrete floors to be repainted.
 - .3 Do not perform repainting work when maximum moisture content of substrate exceeds:
 - .1 12% for concrete and masonry (clay and concrete brick/block).
 - .2 15% for wood.
 - .3 12% for plaster and gypsum board.
 - .4 Test painted concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Surface and Environmental Conditions:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when ventilation conditions are such that airborne particles will not affect quality of finished surface.
 - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted herein.
 - .3 Apply paint when previous coat of paint is dry or adequately cured, unless otherwise pre-approved by specific coating manufacturer.
 - .4 Apply paint in occupied facilities unoccupied rooms or areas. Schedule operations to approval of the Ministerial Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

1.10 MAINTENANCE

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

2 PRODUCTS

2.1 MATERIALS

- .1 Paint materials listed in latest edition of MPI Approved Product List (APL) are acceptable for use on this project.
- .2 Where required by authorities having jurisdiction, paints and coatings to provide a fire resistant rating.
- .3 Paint materials for repaint systems to be products of single manufacturer.
- .4 Only qualified products with MPI "Environmentally Friendly" E3 and E2 rating are acceptable for use on this project.
- .5 Use only MPI listed L rated materials.
- .6 Paints, coatings, thinners, solvents, cleaners and other fluids used in repainting, to be as follows:
 - .1 Be manufactured without compounds which contribute to ozone depletion in upper atmosphere.
 - .2 Be manufactured without compounds which contribute to smog in lower atmosphere.
 - .3 Be manufactured where matter generating 'Biochemical Oxygen Demand' (BOD) in undiluted production plant effluent discharged to natural watercourse or a sewage treatment facility lacking secondary treatment does not exceed 15 mg/L.
 - .4 Be manufactured where total suspended solids (TSS) content in undiluted production plant effluent discharged to natural watercourse or sewage treatment facility lacking secondary treatment does not exceed 15 mg/L.
- .7 Paints and coatings must not be formulated or manufactured with formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
- .8 Water based covering products, new or recycled, must have a flash point of 61:00C or more.
- .9 Painting products and sealers must be manufactured and transported so that every steps of the process, including the disposal of wastes generated during the works, conform to the relevant requirements of governmental laws, order and rules, including in the case of installations located in Canada, to the Fisheries Act and the Canadian Environmental Protection Act (CEPA).

2.2 COLOURS

- .1 Ministerial Representative will provide Colour Schedule after Contract award.
- .2 Colour schedule will be based upon selection of eight base colours and twelve accent colours. No more than twenty colours will be selected for entire project and no more than three colours will be selected in each area.
- .3 Selection of colours will be from manufacturers full range of colours.
- .4 Where specific products are available in restricted range of colours, selection will be based on limited range.
- .5 First coat in three coat (Premium) repaint system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting

materials.

- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Where thinner is used, addition not to exceed paint manufacturer's recommendations. Do not use kerosene or such organic solvents to thin water-based paints.
- .4 Thin paint for spraying in accordance with paint manufacturer' instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Ministerial Representative.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

- .1 Paint gloss defined as sheen rating of applied paint, in accordance with following MPI gloss / sheen standard values:

Gloss Level Category	Units @ 60 Degrees	Units @ 85 Degrees
G1 - matte finish	0 to 5	maximum 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	minimum 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	> 85	

- .2 Gloss level ratings of repainted surfaces shall be as specified herein and as noted on Finish Schedule.

2.5 INTERIOR RESTORING PAINTING SYSTEMS

- .1 General points:
 - .1 For the acceptable products mentioned in the painting systems, the acceptable products equivalent to each product from:
 - .1 Benjamin Moore,
 - .2 Dulux (Bétonel),
 - .3 Sherwin-Williams,
 - .4 PPG are accepted as replacement products.
 - .5 or replacement product approved by addenda in accordance with the instructions to the bidders

- .2 System 01 – System for gypsum board walls (except in bathrooms and equipment rooms).
 - .1 Preparation of the surfaces: conform to 85-GP-33M standard.
 - .2 Latex sealer primer, 0 VOC, MPI approved and conform to CAN/CSGB-1.119-95 standards.
 - .1 Reference product: ECOSOURCE 850-130.
 - .3 Finish: 2 coats of 100% acrylic latex paint, eggshell finish, 0VOC, 15 to 25% sheen (85 degrees); MPI and Green Seal GS-11 approved.
 - .1 Reference product: ECOSOURCE Serie 853
- .3 System 02 - System for gypsum board walls in bathrooms and equipment rooms.
 - .1 Preparation of the surfaces: conform to 85-GP-33M standard.
 - .2 Latex sealer primer, conform to CAN/CSGB-1.119-95 and MPI-6 standards, 0 VOC 83 g/l.
 - .1 Reference product: SICO EXPERT 870-177
 - .3 Finish: 2 coats of 100% acrylic latex paint, melamine finish, MPI-43 approved, VOC <150g/l, 20-30% sheen (60 degrees).
 - .1 Reference product: SICO EXPERT Serie 875.
- .4 System 03 - System for gypsum board ceiling
 - .1 Preparation of the surfaces: conform to 85-GP-33M standard.
 - .2 Latex sealer primer, low VOC, MPI approved and conform to CAN/CSGB-1.119-95 standards.
 - .1 Reference product: SICO EXPERT 870-177
 - .3 Finish: 2 coats of interior latex paint finish mat for ceiling. Low VOC.(85degrees): 0 to 5%, MPI approved.
 - .1 Reference product: SICO EXPERT Serie 871.
- .5 System 04 - System for concrete wall panels
 - .1 Preparation of the surfaces: conform to ONGC 1.138 standard and to the manufacturer's instructions.
 - .2 Clean thoroughly according to the manufacturer's instructions.
 - .3 Apply 3 coats of acrylic latex mat such as Sico Expert Serie 971.
- .6 System 05 - System for galvanized or zinc coated surfaces (interior steel doors and frames and other metals left with a hot dip galvanized finish).
 - .1 Preparation of the surfaces in accordance with ONGC 85-GP-16M standard and according to the manufacturer's instructions.
 - .2 Treat the surface with a cleaner and de-rusting for metal.
 - .1 Reference product : SICO 635-104.
 - .3 Rinse with clear water.
 - .4 Finish: 2 coats of 1 component paint without VOC.
 - .1 Reference product: Sierra S37.

- .7 System 06 – 2 components floor water base epoxy coating system for equipment rooms, 0 VOC industrial quality primer.
 - .1 Mechanical preparation of all the surfaces to paint, necessary to remove existing paint surfaces and/or to apply the covering system.
 - .2 Two finishing coats of the thickness of a dry film per coat: 125 microns (5 mils), thickness of wet film to obtain dry film: 250 microns (10 mils).
 - .1 Reference product: SICO SIERRA S-40 / RUST-OLÉUM
 - .3 Colour: at the choice of the ministerial representative.
- .8 System 07 – System for interior material, primed
 - .1 Preparation of the surfaces: touch up the bare spots in accordance with CAN/CGSB-1.40-97 standard.
 - .2 Primer/finish: 2 coats of anticorrosion water bas paint for metal, conform to MPI-153 standard.
 - .1 Reference product: SICO Serie 632

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

- .1 Interior repainting work: inspected by MPI Accredited Paint Inspection Agency (inspector) acceptable to specifying authority and local Painting Contractor's Association. Painting contractor to notify Paint Inspection Agency a minimum of three week prior to commencement of work and provide a copy of project repainting specification and Finish Schedule (as well as plans and elevation drawings).
- .2 Interior surfaces requiring repainting: inspected by both painting contractor and Paint Inspection Agency who will notify Ministerial Representative in writing of defects or problems, prior to commencing repainting work, or after surface preparation if unseen substrate damage is discovered.
- .3 Where an assessed degree of surface degradation of DSD-1 to DSD-3 before preparation of surfaces for repainting is revealed to be DSD-4 after preparation, repair or replacement of such unforeseen defects discovered are to be corrected, as mutually agreed, before repainting is started.
- .4 Where "special" repainting or recoating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer to provide as part of work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Ministerial Representative.

3.3 PREPARATION

- .1 Perform preparation and operations for interior painting in accordance with MPI Maintenance Repainting Manual requirements except where otherwise specified.

- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.
- .3 Clean and prepare interior surfaces to be repainted in accordance with MPI Maintenance Repainting Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and surface debris by [vacuuming,] wiping with dry, clean cloths [or compressed air].
 - .2 Wash surfaces with a biodegradable detergent [and bleach where applicable] and clean warm water using stiff bristle brush to remove dirt, oil and surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and to dry thoroughly. Allow sufficient drying time and test surfaces using an electronic moisture metre before commencing work.
 - .5 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.
 - .6 Many water-based paints cannot be removed with water once dried. Minimize use of kerosene or such organic solvents to clean up water-based paints.
- .4 Clean metal surfaces to be repainted by removing rust, dirt, oil, grease and foreign substances in accordance with MPI requirements. Remove such contaminants from surfaces, pockets and corners to be repainted by brushing with clean brushes, blowing with clean dry compressed air, or brushing/vacuum cleaning as required.
- .5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.
- .6 Do not apply paint until prepared surfaces have been accepted by Ministerial Representative.
- .7 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from distance up to 1000 mm.

3.4 EXISTING CONDITIONS

- .1 Prior to commencing work, examine site conditions and existing interior substrates to be repainted. Report in writing to Ministerial Representative and General Contractor damages, defects, or unsatisfactory or unfavourable conditions or surfaces that will adversely affect this work.
- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test" and report findings to Ministerial Representative and General Contractor. Maximum moisture content not to exceed specified limits.
- .3 Do not commence until such adverse conditions and defects have been corrected and surfaces and conditions are acceptable to Painting Subcontractor and Inspection Agency.
- .4 Degree of surface deterioration (DSD) to be assessed using MPI Identifiers and Assessment criteria indicated in MPI Maintenance Repainting Manual. MPI DSD ratings and descriptions are as follows:

Conditio n	Description
DSD-0	Sound Surface (includes visual (aesthetic) defects that do not affect film's protective properties).

- DSD-1 Slightly Deteriorated Surface
(indicating fading; gloss
reduction, slight surface
contamination, minor pin holes
scratches).
- DSD-2 Moderately Deteriorated Surface
(small areas of peeling, flaking,
slight cracking, and staining).
- DSD-3 Severely Deteriorated Surface
(heavy peeling, flaking,
cracking, checking, scratches,
scuffs, abrasion, small holes and
gouges).
- DSD-4 Substrate Damage (repair or
replacement of surface required).

3.5 PROTECTION

- .1 Protect existing surfaces and adjacent fixtures and furnishings from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Ministerial Representative.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.
- .4 Protect general public and building occupants in and about building.
- .5 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and surface mounted equipment, fittings and fastenings prior to undertaking re-painting operations. Store items and re-install after painting is completed.
- .6 Move and cover furniture and portable equipment as necessary to carry out repainting operations. Replace as painting operations progress.
- .7 As repainting operations progress, place "WET PAINT" signs in occupied areas to approval of Ministerial Representative.

3.6 APPLICATION

- .1 Apply paint by method that is best suited for substrate being repainted using brush, roller, air sprayer and/or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise. Methods of application as pre-approved by Ministerial Representative before commencing work.
- .2 Brush and Roller Application:
 - .1 Apply paint in uniform layer using brush and/or roller of types suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple unless approved by Ministerial Representative.
 - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray Application:

- .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
- .2 Keep paint ingredients properly mixed in containers during paint application by continuous mechanical agitation or intermittent agitation frequently as necessary.
- .3 Apply paint in uniform layer, with overlapping at edges of spray pattern.
- .4 Back roll spray applications and brush out runs and sags immediately.
- .5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.
- .4 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Ministerial Representative.
- .5 Apply paint coats in continuous manner and allow surfaces to dry and properly cure between coats for minimum time period as recommended by manufacturer. Minimum dry film thickness of coats not less than that recommended by manufacturer. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Sand and dust between coats to remove visible defects.
- .7 Repaint 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 Repaint top, bottom, and vertical edges of doors and frames to be repainted.
- .9 Repaint inside of cupboards and cabinets as specified for outside surfaces.
- .10 Repaint closets and alcoves to match existing, unless otherwise scheduled or noted.

3.7 MECHANICAL / ELECTRICAL EQUIPMENT

- .1 Unless otherwise noted, repainting to include exposed to view / previously painted mechanical and electrical equipment and components (panels, conduits, piping, hangers, and ductwork.).
- .2 Touch up scratches and marks and repaint such mechanical and electrical equipment and components with colour, and sheen finish to match existing unless otherwise noted or scheduled.
- .3 Do not paint over name plates or instruction labels.
- .4 Leave unfinished exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish.
- .5 Keep sprinkler heads free of paint.
- .6 Do not paint interior transformers and substation equipment.
- .7 Standard of Acceptance: when viewed using natural prevailing sunlight at peak period of day (mid-day) on surface viewed, surfaces to indicate following:
 - .1 Walls: no defects visible from distance of 1000 mm at 90 degrees to surface.
 - .2 Soffits: no defects visible from grade at 45 degrees to surface.
 - .3 Final coat to exhibit uniformity of colour and sheen across full surface area.
- .8 Apply a primer and one coat of black paint finish G1 on the interior surfaces of the ventilation ducts that can be seen through the louvers.

3.8 SITE QUALITY CONTROL

- .1 Inspection:
 - .1 Advise Ministerial Representative and Paint Inspection Agency when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
- .2 Co-operate with Paint Inspection Agency and provide access to areas of work.
- .3 The inspection on site of the interior painting works will be performed by an independent inspection organism named and hired by the ministerial representative.

3.9 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning, supplemented as follows:
 - .1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
 - .2 Keep work area free from unnecessary accumulation of tools, equipment, surplus materials and debris.
 - .3 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.
 - .4 Clean equipment and dispose of wash water used for water borne materials, solvents used for oil based materials as well as other cleaning and protective materials (e.g. rags, drop cloths, and masking papers), paints, thinners, paint removers/strippers in accordance with safety requirements of authorities having jurisdiction and as noted herein.
 - .5 Clean painting equipment in leak-proof containers that will permit particulate matter to settle out and be collected. Sediment remaining from cleaning operations to be recycled or disposed of in manner acceptable to authorities having jurisdiction.
 - .6 Recycle paint and coatings in excess of repainting requirements as specified.

3.10 RESTORATION

- .1 Clean and re-install hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashings on affected exposed surfaces. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .4 Protect freshly completed surfaces from paint droppings and dust to approval of Ministerial Representative . Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Ministerial Representative.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 09 21 16 Gypsum finish and concrete panels
- .2 Section 09 22 16 Non-structural metal framing.

1.2 REFERENCE STANDARDS

- .1 Aluminum Association (AA)
 - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 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 [wall and corner guards] 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] and 01 35 43 - Environmental Procedures. Indicate VOC's for material as follows:
 - .1 Caulking materials during application and curing.
 - .2 Adhesives.
- .3 Installation Drawings:
 - .1 Indicate on drawings large scale details, materials, finishes, dimensions, anchorage and assembly.
- .4 Samples:
 - .1 Submit duplicate 300 mm long samples of profiles and colours for corner and door frame and wall guards trolley rail.

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE AND HANDLING

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

- .2 Delivery and Acceptance Requirements: 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 wall and corner guards from nicks, scratches, and blemishes .
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for recycling as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 years
- .2 Provide a written document and signed, issued in the name of Canada certifying that the works in the present section will meet all the established performance requirements in normal use conditions for a five (5) year period.
- .3 The warranty will cover among others, the panels and accessories in the present section from the brakings the peeling and the clouding of finishes.
- .4 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments, and in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

2 PRODUCTS

2.1 MATERIALS

- .1 Metal corner guards: 50 mm thick, 50 mm x 1200 mm height, with 3 mm corner radius type 304 satin finished stainless steel, with removable protective paper cover, adhesive mounted (full adhesive capacity) for salient set up.
- .2 Metal wall protection: stainless steel, gauge 16, grade 304, satin finish, 1200 mm high x length indicated on the plans, with protective paper cover, adhesive mounted (full adhesive capacity) for salient set up. Plan for stainless steel sheets of ± 3000 mm, limit the joints at the maximum and plan them in the angles of the walls.

2.2 ACCESSORIES

- .1 Fasteners: self-tapping stainless steel, flush mounting (if needed).
- .2 Adhesive: water resistant type as recommended by manufacturer for substrate.

2.3 FINISHES

- .1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.
 - .1 As fabricated or mill finish: designation AA- [_____].
 - .2 Clear anodic finish: designation AA- [_____].
 - .3 Integral colour anodic finish: designation AA- [_____] , [_____] colour [to match [Departmental Representative's] [DCC Representative's] [Consultant's] sample].
 - .4 Impregnated colour anodic finish: designation AA- [_____] , [_____] colour [to match [Departmental Representative's] [DCC Representative's] [Consultant's] sample].
 - .5 Electrolytically deposited colour anodic finish: designation AA- [_____] , [_____] colour [to match [Departmental Representative's] [DCC Representative's] [Consultant's] sample].
- .2 Appearance and properties of anodized finishes designated by the Aluminum Association as Architectural Class 1, Architectural Class 2, and Protective and Decorative.

3 EXECUTION

3.1 EXAMINATION

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

3.2 MANUFACTURER'S INSTRUCTIONS

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

3.3 INSTALLATION

- .1 Install units on solid backing and erect with materials and components straight, tight and in alignment.
- .2 Glue the guards with the recommended adhesives. Plan for full surface adhesive for the guards so that they be in full adherence. Abut the wall guards' sheets in order to offer square and surfacing joints.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .3 Clean surfaces after installation using manufacturer's written recommended cleaning procedures.
- .4 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

- .5 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .6 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

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

END OF SECTION

1. GENERAL

1.1 REFERENCES

- 1.1.1 NFPA 10, Portable Fire Extinguishers.
- 1.1.2 CAN/ULC-S508, Rating and Fire Testing of Fire Extinguishers and Class « D » Extinguishing Media.

1.2 WORKSHOP DRAWINGS AND DATA SHEETS

- 1.2.1 Submit shop drawings and data sheets in accordance with the requirements of section 21 05 01.

1.3 MAINTENANCE SHEETS

- 1.3.1 Provide the required maintenance records and enclose them to the manual referred to in section 21 05 01.

2. PRODUCTS

2.1 FIRE EXTINGUISHERS

- 2.1.1 Location and type: see plan view.

2.2 FIRE EXTINGUISHER BRACKETS

- 2.2.1 Brackets recommended by the manufacturer for the fire extinguisher.
- 2.2.2 Location : see plan view.

2.3 FIRE EXTINGUISHERS CABINETS

- 2.3.1 Cabinets for semi-recessed or surface mounting as indicated, 1.6 mm thick steel with 2.5 mm thick steel door opening at 180° and equipped with a locking device.
- 2.3.2 Cabinets having a fire resistance equivalent rating of the structure on which they will be installed.
- 2.3.3 Cabinet doors: with 5 mm thick glass panel.
- 2.3.4 Finish
 - 2.3.4.1 Tub: coated with a primer.
 - 2.3.4.2 Door and frame: coated with a primer.

2.4 IDENTIFICATION

- 2.4.1 Identify fire extinguishers in accordance with the NFPA 10, CAN/ULC-S508 standards.
- 2.4.2 Tag or attach a bilingual label to the fire extinguisher indicating the year and month of installation. Space should be provided for the recording of periodic maintenance dates.

3. EXECUTION

3.1 INSTALLATION

- 3.1.1 Install or mount fire extinguishers in the cabinets or on the brackets as indicated.
- 3.1.2 The location of the cabinets must be coordinated with the Departmental Representative.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section of division 3 for concrete works.
- .2 Section 09 30 13 – Ceramic tiling

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings:
 - .1 Provide the shop drawings of all the elements listed in content of the present section.
 - .2 Shop drawings must indicate the materials, the properties of the metals, the finishes, the gauges and dimensions of the profiles, the intermediate supports spacers, the outside dimensions, the jointing and anchoring methods for each grill
- .3 Samples:
 - .1 Submit the following samples in two (2) copies:
 - .1 300 x 300 mm for each type of foot grille.
 - .2 Each element demanding a choice of colour of finish, 300 mm long, of suggested forms and colours.
- .4 Data sheets:
 - .1 Submit the required data sheets as well as the specifications and the documentation of the manufacturer regarding all the products in the present section.
- .5 Manufacturer's instructions
 - .1 Submit the installation instructions provided by the manufacturer.

1.3 QUALITY ASSURANCE

- .1 Meeting prior to installation: hold a meeting during which we will examine the works requirements, the manufacturer's installation instructions as well as the terms of the warranty offered by the latter. Conform to section 01 45 00 – Quality control.

1.4 TRANSPORT, ENTREPOSAGE ET MANUTENTION

- .1 Transport, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Deliver materials in their wrapping bearing the manufacturer's seal and tag.
- .3 Store materials in a dry place.
- .4 Proceed to the inspection of the products upon reception on the site and submit the inspection reports and delivery slips of the materials to departmental representative.

1.5 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 15 years.
- .2 Provide a written document jointly signed by the manufacturer and the installer, issued in the name of Canada certifying that the works in the present section, including its installation, will meet all the performance requirements established in normal use conditions, for a period of fifteen (15) years.
- .3 The warranty will cover among others the grilles, the drain pans and accessories in the present section from breakings, perforating.
- .4 The warranties must include the fast correction of any defect upon reception of a written notice from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments, and in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

1.6 MAINTENANCE

- .1 .Provide the instructions necessary to the functioning and maintenance of the foot grilles and join them with the manual mentioned in section 01 78 00 – Documents/Elements to hand in at the completion of the works.

PART 2- PRODUCTS

2.1 MATERIALS -- GENERAL

- .1 All the foot grilles, the drain pans and accessories must come from a one and only manufacturer.
- .2 Make the foot grilles in section of the longest practical dimensions.

2.2 FOOT GRILLE

- .1 Prefabricated foot grille with drain pan, embedded and without drainage.
- .2 Frame: aluminum extrusion, alloy 6061-T6, inverted « T » profile for installation to concrete, welded miter joints.
- .3 Intermediate supports: aluminum extrusion, fixed to the frame.
- .4 Blades: aluminum extrusion, alloy 6061-T6, every 13.8 mm c/c, joined by 9.5 mm diameter treated steel, with nylon spacers, according to the manufacturer's instructions.
- .5 Finish:
 - .1 Aluminum: mill finish.
- .6 Acceptable products:
 - .1 Cométal model AN-1100 foot grille
 - .2 Bolar model BA-1-3 foot grille
 - .3 Stena model S-250 to foot grille
 - .4 Or replacement product approved by addenda according to the instructions to the bidders.

2.3 DRAIN PANS

- .1 Gauge 20 stainless steel metal sheet, welded seam joints. Of dimensions indicated and adjusted those of the grille.

2.4 ACCESSORIES

- .1 Coating for metal surfaces in contact with concrete: alkalis resistant bituminous paint

PARTIE 3 - EXÉCUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

- .1 Before proceeding to the installation of the flexible pavements, make sure that the state of the surfaces/supports first set up on the terms of other sections or contracts and the flatness variations are acceptable and allow for the realization of the works in accordance to the manufacturer's written instructions
 - .1 Inform the departmental representative immediately of any unacceptable conditions detected.
 - .2 Have the installation surfaces approved by the technical representative of the supplier of foot grilles.
- .2 Provide, otherwise, a report showing the deficiencies or the approval of the control desk inspector before starting the installations
- .3 Start installation works only after having corrected the unacceptable conditions and received the written approval of the control desk inspector of the partition's supplier. Installing the grilles without this approval, this contractor alone will be responsible for repairing the entire work including the works of other sections and of the latter

3.3 INSTALLATION

- .1 Coordinate the installation of the foot grilles with their drain pans and accessories with the levels of the adjoining floor finishes and any other movable element of the building such as the doors.
- .2 Install the foot grilles, the drain pans and accessories in accordance with the manufacturer's instructions.
- .3 Coat the metal surface in contact with concrete with coats of alkalis resistant bituminous paint.
- .4 Install frames and other pieces to be installed in concrete during the pour.
- .5 Install the drain pans.

- .6 Install the intermediate supports, fix them to the frame.
- .7 Set in place the foot grilles. Make the required adjustments to eliminate any movement.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with section 01 74 11 – Cleaning.
 - .1 Once the installation completed, clean the site in order to eliminate the dirt and trash, attributable to the construction and the environment.
 - .2 Once the installation completed, clean the drain pans and the foot grilles following the method recommended by the manufacturer.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION OF FINISHED SURFACES

- .1 Protect the finished surfaces up to the moment of final inspection and the date when the warranty period begins. Refer to the general conditions.
- .2 After removing the protective elements, make the cleaning as prescribed previously.

FIN DE SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 09 30 13 Ceramic tiling

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI A208.1-09, Particleboard.
- .2 American National Standards Institute (ANSI)/Business and International Furniture Manufacturers Association (BIFMA) International
 - .1 ANSI/BIFMA X5.1-11, American National Standard for Office Furnishings, General Purpose Office Chairs - Tests.
 - .2 ANSI/BIFMA X5.6-10, American National Standard for Office Furnishings - Panel Systems.
 - .3 BIFMACMD-1-09, BIFMA Chair Measuring Device.
- .3 ASTM International
 - .1 ASTM C297/C297M-04(2010), Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions.
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-44.227-2008, Freestanding Office Desk Products and Components.
 - .2 CAN/CGSB-44.232-2008, Task Chairs for Office Work Environments.
- .6 CSA International
 - .1 CSA C22.2 No.9.0-96(R2011), General Requirements for Luminaires.
 - .2 CAN/CSA-C22.2 No.203-M91(R2010), Modular Wiring Systems for Office Furniture.
 - .3 CAN/CSA-Z809-08, Sustainable Forest Management.
- .7 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .8 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .9 Public Works and Government Services Canada (PSPC) - Industrial and Commercial Products and Standardization Services Sector - Government Purchase Description (GPD)
 - .1 PSPC-GPD-6-February 1999, Side Chairs with Metal Frame.
- .10 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2010-2014]Standard.
- .11 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
- .12 Underwriters' Laboratories Canada (ULC)
 - .1 CAN/ULC-S102-2010 Standard Method of Test for Surfaces Burning Characteristics of Building Materials and Assemblies.
- .13 Underwriters' Laboratories (UL)
 - .1 UL 1286-2008(R2011), Standard for Office Furnishings.

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 furniture 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 and 01 35 43 - Environmental Procedures.
- .3 Samples:
 - .1 Submit one samples finishes

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 furniture for incorporation into manual.
- .3 Supply part numbers of furniture to allow for replacement of worn or damaged furniture parts.
- .4 Supply instructions detailing procedures for repairing or replacing worn furniture parts.

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 furniture from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 WARRANTY

- .1 For works in the present section, the 12 month warranty period prescribed in the general conditions is extended to 5 years.
- .2 Provide a written document jointly signed, issued by the manufacturer and the installer in the name of Canada certifying that the works in the present section will meet all the established performance requirements in normal use conditions for a five (5) year period.
- .3 The warranty will cover among others, the finishes, the fading and the delamination.
- .4 The warranties must include the fast correction of any defect upon reception of a written notice

from the departmental representative to this effect. The repairing works must include workmanship, materials, equipments, and in the case of manufactured elements, the supplying and installation of new replacement parts, all of it free of charge and to the departmental representative liking. The warranties must also include the repairing or the replacement of the other components of the building (and its finishes) and any other works of the departmental representative, damaged or moved during the repairing of the defects to the work.

- .5 The manufacturer must give the written assurance that the replacement parts will remain available for a period of at least five (5) years after ending the production of a product.
- .6 The warranties must be worded so that so as to favour the repairing of the furniture rather than its replacement.

2 PRODUCTS

2.1 TYPES OF SEATS

- .1 Waiting room seat conform to DAG-6 description.
 - .1 Fixed back fixed seat, attached type seats (quantities according to indications on plans)
 - .2 Armrest: chair with no armrest.
 - .3 Perforated metal seat and back. Steel is treated for an increase resistance to corrosion.
 - .4 Aluminum extrusion main beam supporting all the structure and lending itself to modular integration of several functions among which the assembly of the seats (linear installation, back to back, etc.)
 - .5 Extrusion aluminum seats supports
 - .6 Zinc alloy moulded adjustable caps and skids.
 - .7 Anti-slide pads to provide under the skids.
 - .8 Concrete slabs anchoring recommended by the manufacturer.
- .2 Finish
 - .1. All the seats components must be coated with thermosetting baked powder paint, colours to the choosing of the departmental representative in the Manufacturer's basic standard.
- .3 Acceptable products:
 - .1 Artopex Passemger seat distributed by MAB Profil
 - .2 Arcanas Option Bernu seat distributed by Atmosphere
 - .3 Spec furniture Traffic seat distributed by Distrimar

2.2 FABRICATION

- .1 Manufacture furniture to allow for dismantling and replacing of worn or defective components and recycling options following first use.
 - .1 Fabricate furniture to allow for remanufacturing or refurbishing of furniture following first use.
 - .2 Seal exposed surfaces of particleboard constructed with urea formaldehyde adhesives to contain formaldehyde emissions.
- .2 Chair marking: to CAN/CGSB-44.232.
- .3 Chair labelling: to CAN/CGSB-44.232.

3 EXECUTION

3.1 INSTALLATION

- .1 Assemble the seats and their structure upon reception on site, according the manufacturer's instructions.
- .2 Locate on site the seats' final position with the departmental representative. Set the seats leveled and make the adjustments to eliminate any movement.
- .3 Join the seats between them according to the indications and on plans and the manufacturer's recommendations and methods.
- .4 Anchor the seats legs to the concrete slab with the anchorages recommended and provided by the seats' manufacturer. Be careful not to splinter the ceramic tiling. Follow the manufacturer's instructions.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
 - .2 Perform cleaning after installation furniture according to the method recommended by the manufacturer.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION OF THE FINISHED SURFACES

- .1 Protect the finished surfaces up to the moment of final inspection and the date when the warranty period begins. Refer to the general conditions.
- .2 After removing the protective elements, make the cleaning as prescribed previously.

END OF SECTION

1. GENERAL

1.1 WORK IN AN EXISTING BUILDING

1.1.1 General :

1.1.1.1 The Contractor shall take note that it will be his responsibility to remove all existing mechanical equipment not reused following this work. The costs for this work will be included in his estimate.

1.2 OTHER SPECIALITIES

1.2.1 The Contractor shall carefully consult the drawings of the other specialities before submitting his quote in order to note the modifications to the existing building and to coordinate his work.

1.3 UNUSED PIPING AND DUCTS

1.3.1 When existing pipes or ducts are no longer used after modification, these and all supports shall be removed in their entirety.

1.4 OBSTACLES

1.4.1 All displacements and / or obstructions will be carried out by the present Contractor as instructed by the Departmental Representative.

1.5 DEMOLITION WORK

1.5.1 The following demolition work shall be carried out by the Contractor concerned by this work.

1.5.1.1 Waterproof the existing unused connections and outlets on piping and master ducts.

1.5.1.2 Use plugs made of the same material and size as the piping and master ducts.

1.5.1.3 All other work required.

1.5.2 All materials, appliances and equipment resulting from the demolition shall remain the property of the Owner and the Contractor shall dispose of them at a place determined by this one depending of the case.

2. PRODUCTS

2.1.1 Not applicable.

3. EXECUTION

3.1.1 Not applicable.

END OF SECTION

1.1 DOCUMENTS/SAMPLES TO BE SUBMITTED

- 1.1.1 The shop drawings must show or indicate the following:
 - 1.1.2.1 assembly details;
 - 1.1.2.2 the necessary space to allow the use and maintenance of apparatus;
- 1.1.2 Submit the following documents with the shop drawings and data sheets:
 - 1.1.1.1 detailed drawings of podia, supports/hangers, and anchor bolts;
 - 1.1.2.2 data relating to the acoustic power of systems and apparatus, if applicable;
 - 1.1.2.3 performance curves indicating operating points;
 - 1.1.2.4 a document issued by the manufacturer attesting that the products in question are current models;
 - 1.1.2.5 a certificate of compliance to the pertinent codes.
- 1.1.3 In addition to the transmittal letter, specify the number of the section and article in question.
- 1.1.4 Documents/elements to be handed in at work completion
 - 1.1.4.1 The use and maintenance manual must be approved, before final inspection, by the Departmental Representative, who will keep the final copies.
 - 1.1.4.2 The use sheets must include the following:
 - 1.1.4.2.1 diagrams of control/regulation circuits for each system, including the climate control/regulation circuit;
 - 1.1.4.2.2 a description of each system and its control/regulation devices;
 - 1.1.4.2.3 a description of the operation of each system under various loads, with a schedule of set point changes and an outline of seasonal changes;
 - 1.1.4.2.4 instructions concerning the use of each system and each component;
 - 1.1.4.2.5 a description of measures to be taken in case of failure of apparatus/equipment;
 - 1.1.4.2.6 a table of valving apparatus and a flow diagram;
 - 1.1.4.2.7 the colour code.
 - 1.1.4.3 The maintenance sheets must include the following:
 - 1.1.4.3.1 instructions concerning the maintenance, repair, use, and troubleshooting of each component;
 - 1.1.4.3.2 an implementation schedule specifying the frequency and duration of task execution, as well as the necessary tools for executing the tasks.
 - 1.1.4.4 The performance sheets must include the following:
 - 1.1.4.4.1 performance data provided by the manufacturer of the apparatus/ equipment, specifying the working point for each one, to be taken down once the activation is finished;
 - 1.1.4.4.2 the results of performance tests of the apparatus/equipment;
 - 1.1.4.4.3 all other particular performance data specified elsewhere in the contractual documents;
 - 1.1.4.4.4 TAB (Testing, Adjusting, and Balancing) reports, in accordance with the stipulations of Section 23 05 93 - Testing, Adjusting, and Balancing of HVAC

systems.

1.1.4.5 Approval

1.1.4.5.1 For the purposes of approval, submit to the Departmental Representative two (2) copies of the preliminary version of the use and maintenance manual. Unless otherwise instructed by the Departmental Representative, the sheets must not be submitted individually.

1.1.4.5.2 Make the required changes to the use and maintenance manual and resubmit it to the Departmental Representative.

1.1.4.6 Additional Information

1.1.4.6.1 Prepare sheets with additional information and append them to the use and maintenance manual if, during the aforementioned training sessions, such sheets are deemed necessary.

1.1.4.7 Documents to keep on site

1.1.4.7.1 The Departmental Representative will provide one (1) reproducible set of mechanical drawings for progressively indicating all changes made over the course of the project.

1.1.4.7.2 Transfer the information recorded on the copy to the drawings in such a way that they show the mechanical systems and apparatus as they are actually installed.

1.1.4.7.3 Use a different-coloured pen with indelible ink for each system.

1.1.4.7.4 Keep these drawings on site and make them available to the concerned persons for reference and verification purposes.

1.1.4.8 As-built drawings

1.1.4.8.1 Before proceeding with TAB (Testing, Adjusting, and Balancing of HVAC systems) operations, complete the as-built drawings.

1.1.4.8.2 Identify each drawing in the lower-right corner, in letters at least 12mm tall, as follows: "AS-BUILT DRAWING: THIS DRAWING HAS BEEN REVIEWED AND SHOWS THE MECHANICAL SYSTEMS/APPARATUS AS THEY ARE ACTUALLY INSTALLED". (Signature of the Contractor) (Date).

1.1.4.8.3 Submit the drawings to the Departmental Representative for approval, and make the necessary corrections according to his instructions.

1.1.4.8.4 Carry out the testing, adjusting, and balancing of HVAC systems with the as-built drawings in hand.

1.1.4.8.5 Submit the reproducible copies of the completed as-built drawings along with the use and maintenance manual.

1.1.4.9 Submit sets of as-built drawings, which will be attached to the definitive TAB report.

1.2 QUALITY CONTROL

1.2.1 Quality control: in accordance with Section 01 45 00 - Quality Control.

1.3 MAINTENANCE

1.3.1 Provide the following spare parts:

1.3.1.1 one (1) set of packing for each pump;

1.3.1.2 one (1) gasket packing for each size of pump;

1.3.1.3 one (1) head gasket for each heat exchanger;

1.3.1.4 one (1) glass tube for each level indicator;

1.3.1.5 one (1) cartridge or one (1) set of filters for each filter or battery of filters, in addition to those that will be installed before the definitive acceptance of the facility.

1.3.2 Provide a kit with all special tools necessary for the maintenance of the apparatus/equipment, in accordance with the recommendations of the manufacturers.

1.3.3 Provide one (1) commercial-quality grease gun, grease, and adaptors for all categories of grease and grease fittings used.

1.4 TRANSPORTATION, STORAGE, AND MAINTENANCE

1.4.1 Waste management and disposal

1.4.1.1 Construction/demolition waste management and disposal: sort and recycle waste with a view to reusing and recycling it in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.5 ADDITIONAL GENERAL INSTRUCTIONS

1.6.1 Refer to Section 21 05 02.

2 PRODUCTS

2.1 Not applicable.

3 EXECUTION

3.1 REPAIR /REFURBISHING

3.1.1 Dress and retouch surfaces whose painted finish has been damaged, and ensure that the new finish corresponds to the original finish.

3.1.2 Refurbish all surfaces whose finish has been too greatly damaged to merely require a coat of primer and retouching.

3.2 CLEANING

3.2.1 Clean the inside and outside of all elements, apparatus, and systems, including screens and filters, and vacuum inside air conduits and air treatment apparatus.

3.3 ON-SITE QUALITY CONTROL

3.3.1 On-site testing: carry out the following tests in accordance with Section 01 45 00 - Quality Control and submit the reports according to the requirements stated in the DOCUMENTS/SAMPLES TO BE SUBMITTED section from PART 1.

3.3.2 On-site inspections carried out by the manufacturer

3.3.2.1 Obtain a written report from the manufacturer confirming the compliance of the work to the specified criteria regarding the maintenance, implementation, and application of products as well as the protection and cleaning of the structure, and submit this report in accordance with the DOCUMENTS/SAMPLES TO BE SUBMITTED section from PART 1.

3.3.2.2 The manufacturer must formulate recommendations regarding the use of the product(s) and make periodic visits to verify whether the implementation has been carried out according to his recommendations.

3.3.2.3 Anticipate site visits in accordance with the QUALITY ASSURANCE section from PART 1.

3.4 DEMONSTRATION

- 3.4.1 The Departmental Representative will use certain apparatus, equipment, and systems for testing purposes before they have been accepted. Provide the necessary labour, equipment, and instruments for carrying out testing.
- 3.4.2 Provide the tools, equipment, and services of qualified instructors to ensure that use and maintenance personnel are trained, during normal work hours, with respect to the operation, control/regulation, adjustment, diagnosis of problems / troubleshooting, and maintenance of apparatus, equipment, and systems, before these items are accepted.
- 3.4.3 When specified elsewhere in Division 22 or Division 23, manufacturers must demonstrate the operation of apparatus, equipment, and systems, and guarantee the associated training of the personnel.
- 3.4.4 Training material must include the use and maintenance manual, as-built drawings, and audio-visual aids.
- 3.4.5 The requirements relating to the number of hours of training necessary are indicated in each pertinent section.

3.5 PROTECTION

- 3.5.1 Using appropriate elements, prevent dust, dirt, and other foreign matter from entering through the openings of apparatus, equipment, and systems.

END OF SECTION

1. GENERAL

1.1 GENERALITIES

- 1.1.1 This section covers topics common to all sections on mechanics.
- 1.1.2 The sections on the architectural specifications are an integral part of this section.
- 1.1.3 General Instructions:
 - 1.1.3.1 Above all, these instructions define the distinctive features that must be followed, and do not mention the usual design elements that one usually expects to find in plans and specifications.
 - 1.1.3.2 In the case of disagreement between standards, codes and the present instructions, the strictest and most rigorous requirements must be met.
- 1.1.4 Inspection of the Specifications:
 - 1.1.4.1 The bidder must carefully study the structural, architectural and design plans and specifications in order to ensure that the work under this contract may be satisfactorily executed, as indicated on the plans. Before starting work, examine the work done by other specialty contractors and report to the ministerial representative any defect or any obstacle to executing the work described in these specifications or affecting the required guarantee.
 - 1.1.4.2 No additional indemnity will be granted to the contractor for the consequences of his failure to carry out this inspection.
- 1.1.5 Startup:
 - 1.1.5.1 Install and start up the systems covered by these specifications in such a way that they perform the functions for which they were designed.
- 1.1.6 It is the responsibility of the contractors to verify from competent authorities that their choices of materials and systems respond to the requirements of the codes and regulations in effect.

1.2 PRIVATE SERVICES

- 1.2.1 Known Facilities:
 - 1.2.1.1 Consult the ministerial representative before starting work, and comply with his written instructions.
 - 1.2.1.2 Once the facilities have been located, any damage caused during excavation work and any resulting repair and replacement fees are the responsibility of these presents.

1.3 COORDINATION

- 1.3.1 Avoid conflicts by coordinating work with work from other sections.
- 1.3.2 Position the distribution networks, equipment and materials in such a way as to limit obstacles during the course of the work and keep as much work space as possible.
- 1.3.3 In the case of an obstacle at work, the ministerial representative must approve any changes of equipment, regardless of what is planned in the implementation schedule. It will be the contractor's responsibility to have such changes approved and to report them to the ministerial representative before making them.

1.4 REGULATIONS AND STANDARDS

- 1.4.1 Conform with all laws, codes and regulations in effect governing the construction trade concerned, according to the National Building Code 2010; National Plumbing Code 2010; Canadian Standards Association (CSA); Canadian General Standards Board (CGSB); Underwriters Laboratories of Canada (ULC).
- 1.4.2 Obtain and pay for all required permits, licences or inspection certificates.
- 1.4.3 Present certificates from competent authorities attesting that the structures comply with the requirements.

1.5 PLANS AND SPECIFICATIONS

- 1.5.1 All contractual documents complement each other, and any instructions from one document are just as executory as if they appeared in all documents.
- 1.5.2 If contradictions arise between the various contractual documents, the documents will be interpreted according to the following order:
 - 1.5.2.1 the contract;
 - 1.5.2.2 instructions to bidders and bidder notice;
 - 1.5.2.3 general conditions;
 - 1.5.2.4 technical specifications;Moreover, complementary documents have precedence over the documents that they complete.
- 1.5.3 The plans serve only to guide the contractor and his sub-contractors as to the approximate number and location of conduits, pipes or other objects.
- 1.5.4 For purposes of work execution and in the event of an obstacle to overcome, the position of a duct, pipe, grill, diffuser, piece of equipment, regulation element, etc. may be moved within a radius of three (3) metres from the indicated location at no additional cost.

1.6 EQUIPMENT: REQUIREMENTS CONCERNING SETUP

- 1.6.1 To preserve uniformity, use only products from a single manufacturer when equipment of the same type or category is required, unless otherwise specified.
- 1.6.2 Follow the manufacturer's recommendations regarding safety, possibilities of inspection, maintenance and repair.
- 1.6.3 Ensure that maintenance and disassembly can be carried out with-out harming construction elements or other facilities.
- 1.6.4 Plan means for accessing equipment for maintenance purposes, including lubricated-for-life bearings.
- 1.6.5 When possible, align the edges of pieces of equipment, rectangular cleanouts and other similar items with the walls of the building.

1.7 RESPONSIBILITY DURING TEMPORARY TESTING

- 1.7.1 Protect the structure against loss or damage until it is accepted.
- 1.7.2 During temporary use, the guarantee period will not be affected.
- 1.7.3 The Departmental Representative may use facilities and equipment for testing purposes before accepting them. Supply the labour, equipment and instruments necessary for testing.
- 1.7.4 Clean and refurbish the facilities and equipment used and return them to a fully operational state

before accepting them and isolating equipment that may be damaged.

- 1.7.5 Prevent dust, dirt and other foreign matter from entering through the openings of the facilities and equipment during their temporary use.

1.8 ELECTRICAL FACILITIES AND APPARATUS

- 1.8.1 Electrical work must be performed in conformance with the stipulations of the Québec electrical code, last edition, according to the instructions in the following paragraph.
 - 1.8.1.1 Electrical equipment must bear CSA approval. Obtain special inspection labels required by the competent provincial authority.

1.9 MOTORS

- 1.9.1 All motors will be high-energy performance.
- 1.9.2 According to the instructions, provide and install the motors necessary for the operation of the mechanical apparatus and facilities.
- 1.9.3 If waiting for the stipulated motor delays the delivery or installation of an apparatus, install a provisional motor of the same type. No apparatus will be definitively accepted before the stipulated motor has been installed.
- 1.9.4 Unless otherwise indicated, use 1,750 rpm motors, following guidelines.
- 1.9.5 Single-phase motors with less than 1/2 hp, 120 V, speed according to guidelines, continuous running, built-in overload protection, flexible mounting plates, unless otherwise indicated in the specifications.
- 1.9.6 Motors with a power equal to or greater than 1/2 hp: EEMAC Class B, three-phase, 600 V, induction, squirrel-cage, speed according to guidelines, continuous running, sheltered, ball bearing, maximum heating of 40°C, unless otherwise indicated in the specifications.
- 1.9.7 Motors with 30 hp or more are equipped with thermistor thermal protection. Motors with 125 hp or more are equipped with RTD thermal protection.
- 1.9.8 Single-phase two-speed motors will have two starting windings and two running windings.
- 1.9.9 Three-phase, two-speed motors will have two windings.

1.10 SCREWS AND BOLTS

- 1.10.1 Use ordinary commercial hardware with current sizes and models and whose material and finish are suitable for the needs and are similar in all respects.

1.11 BELT DRIVE

- 1.11.1 Adjust reinforced belts on pulleys appropriate for the drive mechanism. All belts on apparatus with multiple belts must be matched.
- 1.11.2 Unless otherwise indicated, use cast iron or steel pulleys attached to the shaft using removable keys.
- 1.11.3 Motors with a power less than or equal to 7.5 kW: use standard drive pulleys adjustable to plus or minus 10%. The indicated speed in rpm must correspond to the median set point in the range.
- 1.11.4 Motors with a power greater than 7.5 kW: use a keyway pulley with a two-part spelter socket, having fixed pitch, unless otherwise stipulated for an apparatus in particular. Provide a pulley of approved dimensions to ensure balanced rotation.
- 1.11.5 Drive mechanisms must have a nominal capacity equal to at least 1.5 times the one indicated on the motor's rating plate. Maintain off-axis stress of primary drive shafts within the design limits established by the manufacturer.

- 1.11.6 The motor must be mounted on sliding adjustable plates allow the distance between pulleys to be adjusted.
- 1.11.7 Using a gauge calibrated to this effect, adjust belt tension in conformance with the recommendations of the manufacturers: first before start-up, then after the first 100 hours of operation.

1.12 PROTECTIVE GRATINGS

- 1.12.1 Equip exposed drives with protective gratings.
- 1.12.2 Grills must have the following characteristics:
 - 1.12.2.1 expanded metal trellis soldered to a steel frame;
 - 1.12.2.2 upper and lower parts in galvanized sheet metal at least 1.2 mm thick;
 - 1.12.2.3 holes 38 mm in diameter along the axis of the two shafts so that a tachometer may be inserted into them;
 - 1.12.2.4 removable to enable maintenance.
- 1.12.3 Plan means for lubricating the drives and using the test instruments without having to remove the protective grills.
- 1.12.4 Place the belt guards in such a way as to allow the motors to be moved for adjusting the tension of the belts.
- 1.12.5 Provide and install flexible, removable, U-shaped coupling guards in galvanized mild steel at least 1.6 mm thick.
- 1.12.6 If necessary, protect the suction sides and outlet sides of the ventilators using a grill made of metal wire or galvanized expanded metal, with a grid spacing of 19 mm. The net free surface of the protective grill must not be lower than 80% of the ventilator's suction or outlet port section.

1.13 SUPPORTS FOR PIECES OF EQUIPMENT

- 1.13.1 The contractor must provide all accessories and plywood necessary for installing electrical and mechanical equipment.

1.14 HOLES AND SLEEVES FOR OPENINGS

- 1.14.1 Except for the perforations indicated on structure and architecture plans, all others will be made by the contractor concerned.
- 1.14.2 Drilling work includes all drilling of foundations, the envelope and interior floors and walls, as well as all drilling necessary for installing equipment, conduits and their supports, insertions, bolts, etc.
- 1.14.3 Place sleeves in locations where the piping crosses masonry or concrete structures or fire-resistant structures, according to guidelines.
- 1.14.4 All sleeves, insertions, bolts, etc., will be installed before the walls and floors have been built and the concrete poured.
- 1.14.5 Use 40 Series steel pipes for sleeves and before installing them, apply a coat of dry zinc paint (accepted product: Sico "Corrostop").
- 1.14.6 Openings and materials must have sufficient dimensions for thermal and acoustic insulation to be installed and must allow for thermal movement. Openings and sleeves must be completely independent of the piping or the ventilation ducting that will be subsequently installed.
- 1.14.7 If additional drilling proves necessary, it could be carried out after having submitted a written request and obtained the authorization of the Departmental Representative and/or project manager and/or structural consultant.

- 1.14.8 At openings of exterior walls and watertight basins, use sleeves with flanges attached to the centre by a continuous weld.
- 1.14.9 Dimensions: leave a free annular space of at least 12 mm between the sleeve and the ducting without heat insulation or between the sleeve and the heat insulator.
- 1.14.10 Lay sleeves in such a way that they are flush with concrete surfaces, masonry and poured concrete floors and extend 50 mm beyond all other types of floors.
- 1.14.11 The contractor must fill all gaps around pipes, using pre-fabricated packing, when sleeves pass through foundation walls, exterior walls, concrete walls, walls of watertight basins and flagstones with a water-repellent membrane.

Acceptable products are of "Link Seal" type.
- 1.14.12 All piping and ventilation ducts passing through a roof must be equipped with counterflashing provided and installed by the specialty contractor concerned. Flashing and casing around pipes and ducts are including in this section of the specifications.
- 1.14.13 Any drilling made in the building envelope, floors, or interior walls must be watertight in compliance with the ministerial representative's instructions to maintain the quality of sound-proofing, insulation and/or fireproofing. The ministerial representative may call for products other than those proposed in the above subsections. The specialty contractor must conform to the approval and final decision of the ministerial representative.
- 1.14.14 All drilling in steel beams must be co-ordinated between the specialty contractor and the structural contractor and the final details will be specified on the structural shop drawings according to specific needs.

1.15 ESCUTCHEONS

- 1.15.1 Place escutcheons where the piping passes through finished walls, partitions, floors and ceilings.
- 1.15.2 Use nickel or chromed bronze escutcheons, one-piece or split type, equipped with lock screws.
- 1.15.3 The outer diameter of an escutcheon must be greater than that of the opening or sleeve that it covers.
- 1.15.4 When a sleeve extends beyond a finished floor, the escutcheon must hide the extension of the sleeve.

1.16 HIDDEN STRUCTURES

- 1.16.1 No structure can be concealed without approval.
- 1.16.2 If the specialty contractor happens to break this clause, he may be obligated to uncover the hidden structures. The resulting fees will be charged to the offender, whether the work had been well executed or not.

1.17 TESTING

- 1.17.1 Give written warning 24 hours before testing dates.
- 1.17.2 Do not heat-proof or cover structures before they have been tested and approved.
- 1.17.3 Carry out testing in the presence of the responsible persons and the Departmental Representative's representative.
- 1.17.4 Assume all costs, including those for retesting and restoration.
- 1.17.5 Piping:
 - 1.17.5.1 Carry out hydrostatic testing on piping networks using a pressure equal to 1.5 times the network's working pressure, or at least 860 kPa; choose the higher of these two values.

- 1.17.5.2 Unless otherwise indicated, put the network under pressure and ensure that no leakage occurs during a 4-hour period.
- 1.17.5.3 Carry out tests of waste piping and ventilation in conformance with the requirements of the National Building Code and competent authorities.
- 1.17.5.4 Carry out tests in conformance with the instructions stipulated in the pertinent sections of the specifications.
- 1.17.5.5 Before proceeding with the tests, isolate or disconnect all pieces of equipment or other material not designed for resisting test pressures.

1.18 MATERIALS

- 1.18.1 Provide new materials, equipment and sets, of recognized quality and design, of recent model, whose characteristics are known and whose replacement parts are available on demand.
- 1.18.2 These materials will be in conformance with applicable standards and will bear the required seals for their use, including: CSA, CEMA, ASTM, ASME, UL, AWWA, CGSR, BNQ, etc.

1.19 ACCESS PANELS

- 1.19.1 Provide and install access panels allowing access to covered mechanical equipment for putting it into operation, inspecting it and maintaining it. Install the panels according to the instructions of the pertinent sections of the specifications.
- 1.19.2 Access panels: flush-mounted maintenance panels measuring 600 mm × 600 mm and opening to 180°, with round edges, covered hinges, screw bolts and anchor locks.
 - 1.19.2.1 In the case of ordinary surfaces: steel panels covered with primer.
 - 1.19.2.2 In the case of special surfaces, for example surfaces with panes or marble surfaces: stainless steel panels.
- 1.19.3 Provide and install access panels in ceilings, ventilation conduits and furred partitions in order to allow the maintenance of fire dampers, vent dampers, humidification nozzles, electric coils, swing valves, joints, siphons, motors, rheostats, safety devices, control devices, fire protection devices or any other accessory requiring maintenance or periodic inspection.
- 1.19.4 In the case of tile, wooden, or concrete floors, access panels must have a finish chosen by the ministerial representative.
- 1.19.5 Access panels must have the same fire resistance and/or the same acoustic output as the wall or ceiling in which they are placed.

Architectural access panels will obey the criteria for wall composition established by the ministerial representative. Co-ordinate the choice of steel panels with the ministerial representative.
- 1.19.6 All necessary access panels or access doors in all architectural components must be provided by the mechanical contractor and installed by the general contractor. They must be adapted to the construction type and colour and finished at the choice of the ministerial representative.
- 1.19.7 Provide access panels in mechanical shafts or other architectural partitions. See plan for location. These panels will be left to the specialty contractors concerned, who will install them. They will measure 600 mm × 600 mm when required for main mechanical shafts. Co-ordinate the model of access panels with the types of surface in which they must be installed.
- 1.19.8 Provide and install access panels in ventilation ducts.

1.20 DIELECTRIC FITTINGS

- 1.20.1 Plan for dielectric fittings for joining pipes and equipment made of different metals.
- 1.20.2 Fittings compatible with the network type and capable of withstanding the network's nominal pressure.
- 1.20.3 Use union fittings for joining pipes whose nominal diameter is equal to or less than DN 2 and dielectric flanges for joining pipes whose nominal diameter is greater than DN 2.

1.21 DIAMETER OF ACCESSORIES FOR PIPE NETWORKS

- 1.21.1 All accessories such as check valves, flexible hoses, closing valves, etc. must have the same diameter as the pipes and not of the pump connections.

1.22 TRAINING OF OPERATION AND MAINTENANCE PERSONNEL

- 1.22.1 Provide tools, equipment and the services of qualified instructors to ensure that operation and maintenance personnel are properly trained for operating, controlling, adjusting, diagnosing and maintaining all systems and equipment, during normal work hours and before the systems and equipment have been accepted and delivered.
- 1.22.2 When specified by the stipulations of divisions 21, 22 and 23, manufacturers must give demonstrations and provide training for personnel.
- 1.22.3 Training courses must be based on the operation and maintenance manual and drawings as built.
- 1.22.4 The requirements relating to the number of hours of training necessary are indicated in each pertinent section.

1.23 SPECIFIED PRODUCTS

- 1.23.1 When the drawings and specifications mention the names of equipment manufacturers and catalogue numbers corresponding to specified products, the bidder is obliged to present his bid with the specified materials and equipment.
- 1.23.2 If the bidder wishes to present alternatives, he is obliged to attach to his bid a list of equivalents, indicating the following for each product: brand, model number, technical characteristics and credit amount if applicable. Any equivalent presented after bids have been tendered will be rejected.
- 1.23.3 The contractor will be obliged to have his equivalences approved by the ministerial representative, who will be the only judge accepting or refusing the proposed equivalences. If the ministerial representative rejects a proposed equivalence, the contractor will be obliged to provide the specified products without additional remuneration, including any fees incurred. This can go as far as defraying the ministerial representative's cost for analyzing these requests for equivalence.
- 1.23.4 Ten (10) days after the contract is awarded, and before placing any orders for materials, provide the ministerial representative with the list of manufacturers of the chosen equipment for his approval.

1.24 CONTRACT TIME

- 1.24.1 The general contractor has full responsibility for co-ordinating the project and following the implementation schedule. If the project is not complete by the date set by the contractual documents, the contractor must pay the ministerial representative, as damages for having prolonged the ministerial representative's duties, all costs incurred during the excess period for work supervision, including costs for movement, living expenses and lodging.

2 MATERIAL

- 2.1 Not applicable.

3 EXECUTION

3.1 Not applicable.

END OF SECTION

1. GENERAL INFORMATION

1.1 REFERENCES

All must be in accordance with the "National Plumbing Code of Canada 2010" and the requirements of municipal authorities.

1.2 REGULATORY ORGANIZATION REQUIREMENT

Sanitary appliances, toilet seats and fittings, hoses and fittings shall be CSA marked, new and free from imperfections.

The electrical equipment must be labeled with the CSA and the ULC certifying that it meets the test standards of these organizations and that it has been entered on their approval lists.

2. PRODUCTS

2.1 MATERIALS

2.1.1 TABLE 22 BRONZE FAUCETS

TABLE 22C

BRONZE FAUCETS (ref.: 22 11 16)

TYPE	DESCRIPTION	BRAND	THREADED	WELDED	FLANGED
Ball valve 2 inches or less	- 150 psi steam and 600 W.O.G. - Standard ASTM B - 584 - Teflon seat	Nibco Watts Milwaukee Apollo MAS	T -585-66 LF	S-585-66-LF	With 66 SS
Ball valve purge	- 4 137 kPa - Plug and chain	Nibco Kitz Toyo NH	T -585-80 LF HC 68AC 5046 1969Cap	S-585-70 LF HC	

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- 1.1.1 The works of the present section include, but without limiting itself to it: the supply, the handling, the transport, the implementation and the installation of all the systems and the accessories described farther and/or on the plans, every that must be operational for:
- 1.1.1.1 System of generation cold and hot water distribution.

1.2 REFERENCES

- 1.2.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)
- 1.2.1.1 ANSI/ASME B16.15, Cast Bronze Threaded Fittings, Classes 125 and 250.
- 1.2.1.2 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
- 1.2.1.3 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- 1.2.1.4 ANSI/ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- 1.2.2 ASTM International Inc.
- 1.2.2.1 ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- 1.2.2.2 ASTM B 88M, Standard Specification for Seamless Copper Water Tube (Metric).
- 1.2.3 American National Standards Institute/American Water Works Association (ANSI)/ (AWWA)
- 1.2.3.1 ANSI/AWWA C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- 1.2.4 Canadian Standards Association (CSA International): CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.
- 1.2.5 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
- 1.2.5.1 MSS-SP-67, Butterfly Valves.
- 1.2.5.2 MSS-SP-70, Gray Iron Gate Valves, Flanged and Threaded Ends.
- 1.2.5.3 MSS-SP-71, Gray Iron Swing Check Valves, Flanged and Threaded Ends.
- 1.2.5.4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.
- 1.2.6 National Research Council (NRC)/Institute for Research in Construction: NRCC 38728, National Plumbing Code of Canada (NPC).
- 1.2.7 Unless otherwise specified, to execute the works according to the requirements of the Code of plumbing of the province of Quebec, last edition, Codes Canadian of the plumbing and in the regulations (payments) of the city or the concerned body.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- 1.3.1 Subject documents and samples required according to general sections 21 05 01, 21 05 02-Prescriptions.
- 1.3.2 Data sheets: submit data sheets required as well as documentation of the manufacturer concerning the piping, the joins and the products of waterproofness. These index cards also have to indicate the rate of emission of COV of adhesives and solvents during the application and the period of cure.

- 1.3.3 At the request of the Departmental Representative, submit the samples of the product or one of its components described in the present section.
- 1.3.4 Documents / elements to be handed to the completion of the works
 - 1.3.4.1 Supply the index cards of exploitation, maintenance and required spare parts and join them to the manual worker mentioned in general sections 21 05 01, 21 05 02 -Prescriptions.
 - 1.3.4.2 Provide reports of on-site signed controls by the Contractor with respect to facility monitoring, testings and commissioning. Inform the Departmental Representative at least 48 hours before proceeding starting up.

1.4 INSURANCE OF THE QUALITY

- 1.4.1 Reliability of the technical data: the data pulled from catalogs and documentation of the manufacturers will have to be reliable data, based on trial results having been made by the manufacturers or, on their behalf, by independent laboratories, and having allowed to certify the conformity of elements with the requirements of the codes and the existing standards.

2 PRODUCTS

2.1 MATÉRIAUX/MATÉRIELS DURABLES

- 2.1.1 Requirements for sustainable development: materials and conforming products in sections general sections 21 05 00.01, 21 05 00.02.
- 2.1.2 Select materials and products containing recycled materials or with characteristics associated with the efficient use of resources.
- 2.1.3 Adhesives and sealants: in accordance with sections 21 05 00.01, 21 05 00.02 – general requirements. Use sealants, adhesives, printing products, finishes and paints that are as less toxic as possible but that meet the needs of the work.
 - 2.1.3.1 The VOC content of adhesives and sealants must be less than that indicated in the Green Seal GS-36 and SCAQMD Regulation 1168.

2.2 PIPES / TUBES

- 2.2.1 Pippings of hot water and cold water (distribution, supply) situated inside the building.
 - 2.2.1.1 To install above ground: copper tubes forged, of the type L, corresponding in the standard ASTM B 88M.

2.3 FITTINGS

- 2.3.1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.
- 2.3.2 Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15.
- 2.3.3 Cast copper, solder type: to ANSI/ASME B16.18.
- 2.3.4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- 2.3.5 Joins of equal nominal diameter or upper to DN 2: in tips grooved by rolling, corresponding to the standard B242 CSA.

2.4 JOINTS

- 2.4.1 Rubber sealing gasket, latex-free 1,6 mm in thickness: conforming to the standard AWWA C111 / A21.11.

- 2.4.2 Bolts with hexagonal head, nuts and washers: heavy series, corresponding to standard ASTM A 307.
- 2.4.3 Weld / brasure: brass pipe (tips) DN 2 and less and faucets will be welded with the unleaded weld of type (chap) "AQUASOL". Joints on pipes (tips) DN 2 ½ and more and faucets will be welded with the weld in type SILFOS's money (type SILFOS's silver, chap SILFOS's money, chap SILFOS's silver).
- 2.4.4 Ribbon in teflon: for screwed joints.
- 2.4.5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM gasket.
- 2.4.6 Dielectric connections between dissimilar metals; complying to standard ASTM F492: with thermoplastic liner.

2.5 BALL VALVES

- 2.5.1 Faucets with spherical turning point (bend), of equal nominal diameter or lower than DN 2, to screw
 - 2.5.1.1 Faucets of class 150, category 4 137 kPa.
 - 2.5.1.2 Bronze body, spherical shutter in chrome-plated brass or stainless steel, side dish (of adjustable waterproofness in PTFE, press-side dish (press-filling) in brass, sits in PTFE Bunan, steel lever.
 - 2.5.1.3 Acceptable products: see picture of the section 22 00 03 and/or in the plan.
- 2.5.2 Faucets with spherical turning point, of equal nominal diameter or lower than DN 2, to weld
 - 2.5.2.1 Faucets corresponding to the standard ANSI/ASME B16.18, the class 150, the category 4 137 kPa.
 - 2.5.2.2 Bronze body, spherical shutter in chrome-plated brass or stainless steel, side dish (filling) of adjustable waterproofness in PTFE, press-side dish (press-filling) in brass, sits in teflon, PTFE Bunan, steel lever, with adapters threading NPT / COPPER.
 - 2.5.2.3 Acceptable products: see picture (board) of the section 22 00 03 and/or in the plan.
- 2.5.3 For all the faucets with spherical turning point (bend), installed (settled) on the recirculation of domestic hot water, to supply plates (patches) of location for indication of the position.

2.6 DRAIN VALVE

- 2.6.1 Faucet of diameter of at least DN ¾, unless otherwise specified. Bronze body with a tip female thread and a male tip for join with intestine including cork and necklace.
- 2.6.2

Pipe to be drained away	Pipe and faucet For emptying
DN 2 and less	DN 3/4
DN 2½ and DN 3	DN 1
DN 4 and more	DN 1½
- 2.6.3 Acceptable products: see the picture (board) of the section 22 00 03.

3 EXECUTION

3.1 APPLICATION

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

3.2 INSTALLATION

- 3.2.1 Unless opposite indications, link the piping with devices, sanitary and other, according to the instructions of the manufacturers.
- 3.2.2 Install the piping near walls and ceilings so as to reduce as much as possible the space reserved for the fur and to clear as much as possible the area of installation. Group pipes left visible and to install them in a parallel to walls.
- 3.2.3 Cut the tubes square, rid them of any foreign matter and trim the extremities; clean the inside of joins; join the elements without sticking them.
- 3.2.4 Install a shut-off valve on the bypass lines as well as on the supply lines for the sanitary equipment and appliances.
- 3.2.5 Provide equipment and chemicals for disinfection and disinfect the network in accordance with the requirements of competent authorities.
- 3.2.6 Supply and install a threaded tap for hose or drain valve to drain the entire system.

3.3 INSTALLATION OF THE PIPING

- 3.3.1 Install the piping according to the requirements of the Canadian Code of the plumbing, the provincial Code of the plumbing and the competent local authority.
- 3.3.2 Install the piping according to the present section.
- 3.3.3 Cut the tubes square, rid them of any foreign matter then trim and clean the extremities; clean the fittings of joins; join elements without jamming them.
- 3.3.4 Assemble the piping by means of joins made according to the standards ANSI.
- 3.3.5 Install the piping of cold water distribution below the piping of hot water distribution, of recirculation of hot water and any other piping of hot water, and at a certain distance of these, to be able to maintain the cold water in a temperature as low as possible.
- 3.3.6 Unless otherwise specified, link the piping with the sanitary and other facilities according to the written instructions of the manufacturer.
- 3.3.7 Install piping near walls and ceilings in order to optimize as much as possible the space in the room. Group the exposed pipes and install them parallel to the walls.
- 3.3.8 A pressure gauge graduated from 0 to 1100 kPa shall be installed on the main line of the system. Install a manometer valve between the main line and the pressure gauge.
- 3.3.9 Supply and install drain valves at the bottom of all risers, at the low points of the systems and at the locations indicated on the drawings s.

3.4 FITTING

- 3.4.1 Isolate the bypass lines and the supply lines equipment and the sanitary facilities using faucets with ball valve.

3.5 PRESSURE TESTS

- 3.5.1 Conform to general sections 21 05 01, 21 05 02-Prescriptions concerning the results of the works.
- 3.5.2 A minimum pressure of 860 kPa or 150% of design pressure shall be maintained without leakage for a period of at least two hours throughout the hot and cold water piping. This test should be carried out with cold water.
- 3.5.3 If it is impossible to test the entire installation at once, it may be divided into several parts and each of them shall be tested as described above.
- 3.5.4 All the joints shall be subjected to mechanical shocks with appropriate tools.
- 3.5.5 These tests, which meet or exceed the requirements of the Plumbing Code of the Province of Québec, must be carried out in the presence of the plumbing inspectors or the Departmental Representative. In addition, submit the signed and dated test results to the Departmental Representative.

3.6 FLUSHING AND CLEANING

- 3.6.1 Rinse the system during an eight hour period. Rinse outlets during two hours.

3.7 PRE-START-UP INSPECTIONS

- 3.7.1 Systems to be complete, prior to flushing, testing and start-up.
- 3.7.2 Verify that system can be completely drained.
- 3.7.3 Ensure that pressure booster systems are operating properly.
- 3.7.4 Ensure that water hammer arrestors, expansion compensators are installed properly.

3.8 START-UP

- 3.8.1 Timing: start up after:
 - 3.8.1.1 Pressure tests have been completed.
- 3.8.2 Provide continuous supervision during start-up.
- 3.8.3 Start-up procedures:
 - 3.8.3.1 Establish circulation and purge air.
 - 3.8.3.2 Check pressurization to ensure proper operation and to prevent water hammer, gas expansion and/or cavitation.
 - 3.8.3.4 Bring slowly HWS storage tank up to design temperature.
 - 3.8.3.5 Monitor HWS and HWC piping contraction/expansion movements of hot water piping (distribution / supply / recirculation).
- 3.8.4 Rectify start-up deficiencies.

3.9 PERFORMANCE VERIFICATION

- 3.9.1 Scheduling: Verify system performance after pressure and leakage tests and disinfection are completed, and Certificate of Completion has been issued by authority having jurisdiction.
- 3.9.2 Procedures:
 - 3.9.2.1 Verify that flow rate and pressure meet Design Criteria.
 - 3.9.2.2 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.

3.9.2.3 Make sure that the network meets health and safety requirements.

3.9.2.4 Check for proper operation of water hammer arrestors. Run an outlet for 10 seconds, then shut off water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.

3.9.3 Reports:

3.9.3.1 In accordance with sections 21 05 01, 21 05 02- general Prescriptions submit reports and schematics using report forms as specified in sections 21 05 01, 21 05 02-Prescriptions.

3.9.3.2 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

3.10 EXPLOITATION

3.10.1 Coordinate operation and maintenance requirements including, cleaning and maintenance of specified materials and products with sections 21 05 01, 21 05 02-Prescriptions.

END OF SECTION

1 GENERAL

1.2 REFERENCES

- 1.2.1 ASTM International Inc.
 - 1.2.1.1 ASTM B 32, Standard Specification for Solder Metal.
 - 1.2.1.2 ASTM B 306, Standard Specification for Copper Drainage Tube (DWV).
 - 1.2.1.3 ASTM C 564, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- 1.2.2 Canadian Standards Association (CSA International).
 - 1.2.2.1 CSA B67, Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
 - 1.2.2.2 CAN/CSA-B70, Cast Iron Soil Pipe, Fittings and Means of Joining.
 - 1.2.2.3 CAN/CSA-B125, Plumbing Fittings.
 - 1.2.2.4 CSA-B602, Joins of evacuation of piping.
- 1.2.3 Green Seal Environmental Standards (GSES): Standard GS-36, Commercial Adhesives.
- 1.2.4 South Coast Air Quality Management District (SCAQMD), California State: SCAQMD Rule 1168, Adhesive and Sealant Applications.
- 1.2.5 Code of plumbing of Quebec, last edition (publishing).
- 1.2.6 Underwriters Laboratories of Canada (ULC): ULC S201.2, Join of evacuation of piping.

1.3 ACTION AND INFORMATION SUBMITTALS

- 1.3.1 Provide submittals in accordance with sections 21 05 01, 21 05 02-Prescriptions.
- 1.3.2 Data sheets: provide data sheets required as well as specifications and documentation of the manufacturer concerning piping, joins and sealants. These records must indicate the VOC emission rate of adhesives and solvents during the application and curing period.
- 1.3.3 At request of the Departmental Representative, submit the samples of the product or one of its components described in the present section.
- 1.3.4 Documents / elements to be submitted upon completion of the work
 - 1.3.4.1 Provide the required operating and maintenance records and join them to the manual referred to in sections 21 05 01, 21 05 02-Prescriptions.
 - 1.3.4.2 Provide reports of on-site inspections carried out and signed by the manufacturer and the Contractor with respect to the monitoring of the installation and start-up. Notify the Departmental Representative at least 48 hours prior to start-up and testings.

1.4 QUALITY INSURANCE

- 1.4.1 Reliability of technical data: technical data drawn from the manufacturers' documentation must be reliable data, confirmed by tests carried out by the manufacturers themselves, or on their behalf, by independent laboratories, certifying the conformity of the elements of the codes and the existing standards.

2 PRODUCTS

2.1 SUSTAINABLE MATERIAL

- 2.1.1 Sustainable Requirements: materials and products in accordance with Section 21 05 01, 21 05

02-Prescriptions.

- 2.1.2 Choose products and materials with recycled content or resource efficient characteristics.
- 2.1.3 Adhesives and sealants: in accordance with sections 21 05 01, 21 05 02-general Prescriptions. The VOC rate must be lesser than that indicated in the standard Green Seal GS 36 and in the SCAQMD regulation 1168.

2.2 COPPER TUBE AND FITTINGS

- 2.2.1 Sanitary, storm drain and DWV vent pipes intended for above ground installation and related fittings shall conform to the standard ASTM B 306.
 - 2.2.1.1 Fittings
 - 2.2.1.1.1 Cast brass: according to the standard CAN / CSA-B125.
 - 2.2.1.1.2 Wrought copper: according to the standard CAN / CSA-B125.
 - 2.2.1.2 Solder: lead/tin, 50/50, according to the standard ASTM B 32 of type (chap) 50A.

2.3 CAST IRON PIPING AND FITTINGS

- 2.3.1 Sanitary and cast-iron ventilation pipes with a nominal diameter equal to or greater than DN 2, intended to be buried in the ground and associated fittings shall comply with CAN / CSA -B70 and covered with a layer of protective coating (resistant bituminous coating)
 - 2.3.1.1 Joints:
 - 2.3.1.1.1 Mechanical joints: Neoprene or butyl rubber compression gaskets: to CAN/CSA-B70 or ASTM C564
 - 2.3.1.1.1.2 Stainless steel clamps.
 - 2.3.1.1.2 Hub and spigot:
 - 2.3.1.1.2.1 Caulking lead: to CSA B67.
 - 2.3.1.1.2.2 Cold caulking compounds.
- 2.3.2 Above ground sanitary and vent have to be in accordance with the standard CAN / CSA-B70
 - 2.3.2.1 Joints:
 - 2.3.2.1.1 Mechanical joints: Neoprene or butyl rubber compression gaskets with stainless steel clamps.
 - 2.3.2.1.2 Interlocking joints
 - 2.3.2.1.2.1 Joint lead : conform with standard CSA B67.
 - 2.3.2.1.3 Cast-iron couplings: couplings with neoprene fittings with stainless steel nuts and bolts.

2.4 URINAL VENTILATION AND DRAIN PIPE

- 2.4.1 All exhaust and vent pipes under the overflow level of a urinal shall not be made of copper, in accordance with the National Plumbing Code. The material used shall be PVC DWV XFR.

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 INSTALLATION

- 3.2.1 Install the piping according to the section 23 05 05 - Installation of the piping as well as in the prescriptions of the present section.
- 3.2.2 Unless otherwise indicated, install the components in accordance with the requirements of the Canadian Plumbing Code, the Provincial Plumbing Code and local authorities.
- 3.2.3 In the case of interlocking pipes, install the piping to be buried on a bed of clean, washed sand, 150 mm thick and shaped so that it can conform to the shape of the female ends. Observe the slope, lines and levels indicated. Backfill with a layer of washed sand 150 mm thick.
- 3.2.4 Install exposed piping parallel to and adjacent to the walls to maximize the available space in the installation area.
- 3.2.5 Plug pipes and fittings with plugs or caps so that no debris enters the interior during work

3.3 VENT

- 3.3.1 Provide a complete venting vent system for the sanitary drainage system. The horizontal pipework of the vents shall have a slope of 1 mm per meter towards the drains.
- 3.3.2 Extend vents without decreasing size up to 600 mm above the roof and increase them by a diameter from this joint. Make the change in diameter using long conical fittings.

3.4 FLASHING

- 3.4.1 Where pipes pass through the roof, provide and install a sealed prefabricated flashing made of copper, with EPDM seals at the ends and at the base (as appropriate) and of appropriate length depending on the type of cover, for Hoses up to 150 mm Ø. Coordinate with the covering workmanship for a perfect sealing of these flashings. Be sure to specify the correct type of trim depending on the type of roof membrane used.
- 3.4.2 Acceptable product
 - 3.4.2.1 For perpendicular installation: Thaler, models MEF-1.
 - 3.4.2.2 For installation with angle: Thaler, models SJ-45.

3.5 TESTING

- 3.5.1 Pressure test buried systems before backfilling.
- 3.5.2 Hydraulically test to verify grades and freedom from obstructions and to make sure slope is appropriate.
- 3.5.3 Tests the piping as prescribed in sections 21 05 01, 21 05 02-Prescriptions and this section.
- 3.5.4 All hose openings and mouths of the complete installation must be perfectly sealed. The entire installation (including rising vents, connections to fittings, horizontal drains and main ducts) must be filled with water to the highest level. Water should be maintained at this level for at least two hours. If it is impossible to test the whole installation at once, it may be divided into several parts and each of them tested in the manner described above. However, the water column must be at least 3 m higher than the tested part of the system.
- 3.5.5 Piping must always be tested to the roof.
- 3.5.6 These tests, which meet or exceed the requirements of the Québec Plumbing Code, must be carried out in the presence of the plumbing inspectors or the Departmental Representative. Submit the signed and dated test results to the Departmental Representative.

3.6 PERFORMANCE VERIFICATION

- 3.6.1 Cleaning vents:

- 3.6.1.1 Ensure that the manholes are accessible and that their inspection stamp is located in a suitable place.
- 3.6.1.2 Open manholes, cover with linseed oil and re-seal.
- 3.6.1.3 Verify that cleanout rods can probe as far as the next cleanout, at least.
- 3.6.2 Make sure that siphons are well primed and that they retain their water guard.
- 3.6.3 Make sure that the existing sanitary facilities are well anchored, that they are linked with the network and well ventilated.
- 3.6.4 Apply an appropriate identification label on the various piping as recommended of the section 23 05 53.01 - Identification of networks and mechanical devices.

END OF SECTION

1. GENERAL

1.1 EXTENT OF WORK

- 1.1.1 This section specifies the requirements for the Ventilation discipline concerning the results of the work.

The 21, 23 et 25 divisions are an integral part of this section.

- 1.1.2 Carry out the work in accordance with the requirements of the specific sections specific to HVAC installations bearing the numbers 23 31 13.01 to 23 33 46.

- 1.1.3 Carry out the work in accordance with the requirements of the general sections:

1.1.3.1 Antivibration systems and devices for HVAC piping and apparatus, section 23 05 48.

1.1.3.2 Material identification, section 23 05 53.

- 1.1.4 Carry out the work in accordance with the requirements of the sections specific to specialized subcontractors, namely:

1.1.4.1 Insulation of conducts, section 23 07 13.

1.1.4.2 Balancing and testing of networks and aeraulic systems, section 23 05 93.

1.1.4.3 The control and command system, section 25 00 08 and 25 01 00.

1.1.4.4 Seismic protection system –P2 type building, section 23 05 49.

- 1.1.5 Carry out all additional work required to implement HVAC systems as planned.

1.2 RELEVANT NOTES

- 1.2.1 Cleaning: Clean the interior and exterior of all components, devices and systems, including filters. Vacuum the inside of air ducts and air handling equipment.

1.3 LIST OF WORKSHOP DRAWINGS TO BE SUBMITTED

- 1.3.1 The list of shop drawings to be submitted for approval is enclosed in appendix « A ».

1.4 ON SITE QUALITY CONTROL

- 1.4.1 Control and testing required

1.4.1.1 Manufacturer control

1.4.1.1.1 Seismic protection system, section 23 05 49.

1.4.1.2 Testing to be carried out by the Contractor

1.4.1.2.1 Aeraulic balancing, section 23 05 93.

1.4.1.2.2 Control and command system, division 25.

END OF SECTION

APPENDIX A

LIST OF WORKSHOP DRAWING TO BE SUBMITTED

CONTRACTOR :		PROJECT TITLE :	Blanc-Sablon Airport Terminal/ R.075371.001
SPECIALITY :	VENTILATION		
PROJECT MANAGER :		PROJECT N°:	112259.002

DESCRIPTION	ESTIMATE SECTION NUMBER	DRAWING RECEIVED		REFUSE OR REVIEW AND RESOLVE		REVIWED AND ANNOTATED		REVIWED		COUL. BY ARCH.
		BY	DATE	BY	DATE	BY	DATE	BY	DATE	
Electric coils										
Thermostats										
Grids and diffusers										
Door grids										
Shutters										
Hoods										
Anti-return flap										
Exhaust fan (VE-1)										
Humidifier										
Fireproof shutters										
Metal air ducts and supports										
Balancing registers										
Motorized shutters										
Flexible air ducts										
Heat insulation air ducts										
Control (equipements and diagrams)										
Seismic design										

Note: All shop drawings must be sent in one and same package.

Prepared by:	
Date:	

1. GENERAL

1.1 SUMMARY OF WORK

- 1.1.1 Clean all supply and return ducts of the ventilation system of the terminal and all components installed in the ducts such as air flow control valves, heating coils, fireproof shutters, motorized shutters, balancing flaps, etc.
- 1.1.2 Install access hatches every 30 meters or where required to allow complete cleaning of the air duct and its accessories.
- 1.1.3 Apply a sealant on the present acoustic insulation approximately on the last 5 meters of the two return ducts. .

1.2 RELATED WORK

- 1.2.1 Carry out all related work such as the dismantling of ceilings and their relocation, the protection and movement of furniture, the protection of counters, floors or other equipment.
- 1.2.2 The Contractor shall take the necessary steps to ensure the integrity of the installed ventilation systems. Report any issues to the Departmental Representative.

1.3 STANDARDS AND REFERENCES

- 1.3.1 Mechanical Cleaning of Non-Porous Air Conveyance Components (NADCA, ACR-2002).
- 1.3.2 Cleaning Fibrous Glass Insulated Air Duct Systems (NAIMA).
- 1.3.3 Solvents, detergents and others (Workplace Hazardous Materials Information System Regulations (WHMIS).
- 1.3.4 Prevention guide against microbial proliferation in ventilation systems of the IRSST.

1.4 QUALIFICATIONS

- 1.4.1 The work must be carried out by a contractor specialized in the cleaning of ventilation equipment and ducts. (CVCA).
- 1.4.2 The Contractor shall use the equipment and products specified in this specification.

1.5 OTHER CONSIDERATIONS

- 1.5.1 These documents have been prepared in order to define the objectives to be achieved and should not be considered specifically as an implementing directive. Plans are shown schematically. The Contractor shall carry out the cleaning work according to the facilities and according to the physical characteristics of the building.
- 1.5.2 The work shall be carried out in accordance with the state of the art announced in NADCA ACR 2002, NAIMA, IRSST and according to the manufacturer's specifications.
- 1.5.3 All work must be done expeditiously before the building is delivered to the owner. All service cuts required must be coordinated with the owner.

1.6 DOCUMENTS / SAMPLES TO SUBMIT

- 1.6.1 Submit required documents and samples in accordance with sections 21 05 00.01, 21 05 00.02 and 21 05 00.03 – General requirements.
- 1.6.2 Data sheets: submit required data sheets as well as the manufacturer's documentation concerning cleaning products.
- 1.6.3 Documents / elements to be submitted when the work is completed.

- 1.6.3.1 Provide reports of on-site controls by the cleaning specialist. Advise the Departmental Representative at least 48 hours before cleaning.
- 1.6.3.2 Provide a report describing the general condition of each system and its cleaned ducts, as described in section « Exécution ».
- 1.6.4 Upon completion of the clean-up, the Contractor shall provide two preliminary copies of the report for analysis and comments by the Departmental Representative and shall make the presentation with all relevant explanations. The report should include pictures before and after cleaning. Once the adjustments have been completed, the Contractor will provide three complete copies of the final report.

2. PRODUCTS

2.1 SUSTAINABLE MATERIALS

- 2.1.1 Sustainable development requirements: materials and products complying with sections 21 05 00.01, 21 05 00.02 and 21 05 00.03 – General requirements.
- 2.1.2 Select materials and products containing biodegradable materials or characteristics associated with the efficient use of resources.

2.2 EQUIPMENT USED

- 2.2.1 The equipment used shall have no effect on the integrity of the ducts or equipment installed.

2.3 PROPER OPERATION

- 2.3.1 A demonstration of the proper operation of the equipment use is required before the work begins for approval by the Departmental Representative.

2.4 ACCESS DOORS

- 2.4.1 Low-pressure ducts (pressure 500 Pa and less and speed less than 10 m/s)
 - 2.4.1.1 In rectangular ducts of 300 mm or more and round ducts of 450 mm or more, install 450 mm x 250 mm insulated access doors, model Nailor 0820 or equivalent.
 - 2.4.1.2 In rectangular ducts less than 300 mm x 300 mm and round ducts of less than 450 mm, install insulated access doors of 300 mm x 150 mm.
- 2.4.2 Medium and high pressure pipes (pressure greater than 500 Pa and speed greater than 10 m/s)
 - 2.4.2.1 In round ducts of 450 mm or more, install insulated access doors of 450 mm x 250 mm, with screwed rivets.
 - 2.4.2.2 In round ducts of less than 450 mm, install insulated access doors of 300 mm x 150 mm, with screwed rivets.

2.5 BRUSHES (MANUAL OR MOTORIZED)

- 2.5.1 Use specially designed and fashioned brushes for ducts and equipment to ensure complete and continuous contact on the walls.
- 2.5.2 Motorized brushes will be used primarily for the cleaning of HVAC ducts, with the exception of ducts covered with sound insulation inside.

2.6 COMPRESSED AIR EQUIPMENT

- 2.6.1 For the cleaning of acoustic lined ducts, only use a motorized and remote control device designed for this purpose; thus showing that this appliance won't damage the lining. The appliance must be equipped with a compressed air device which pushes dirt and dust towards the vacuum cleaners

at the end of each section. Operation of the appliance should be mentioned continuously and adjusted to ensure that the acoustic lining is not damaged.

2.7 DUST COLLECTORS OR VACUUM COLLECTORS

- 2.7.1 All vacuum cleaners or collectors shall be equipped with built-in HEPA filters which shall be maintained in perfect condition (efficiency of 99.9 % filters for dust at 0.3 mm according to ASHRAE tests).

2.8 CLEANING PRODUCTS

- 2.8.1 All used cleaning products must comply with current standards and laws.
- 2.8.2 All products used must have the least amount of polluting or damaging effects on the equipment, premises and indoor environment, or be intoxicating, irritating, carcinogenic (mutagenic or teratogenic or uncomfortable to occupants).
- 2.8.3 The Contractor shall provide Material Safety Data Sheets (MSDS) for each product used for approval and ensure that they are available at the workplace.
- 2.8.4 The recommended product is Javel water (5 to 6 % diluted 250 ml in four liters of water).

3. EXECUTION

3.1 MANUFACTURER INSTRUCTIONS

- 3.1.1 Compliance: comply with the requirements, recommendations and written specifications of the cleaning specialist, including any technical reports available, instructions for handling, storing and installing products and to data sheet indications.

3.2 COORDINATION

- 3.2.1 The Contractor shall provide to the Departmental Representative with a work plan specifying the methods and equipment to be used, the work schedule, the delimitation of the different zones of intervention of the occupancy and ducts rate or cleaning system.
- 3.2.2 The Contractor shall immediately notify the Departmental Representative of any defect or problem encountered which may prevent the Contractor from operating or carrying out a part of his work.
- 3.2.3 At the end of the work, the Contractor shall provide for a visit with the Departmental Representative to observe the cleaning results.

3.3 CLEANING CRITERIA AFTER CLEANING

- 3.3.1 For ducts without any acoustic lining, meet NADCA ACR 2002 standards, of 0,75 mg/100 cm² (dust test).
- 3.3.2 For all the components of ventilation units as well as for the components integrated into the air duct system, airflow control valves, coils, reheating, flaps, etc., à thin film or uniformly distributed particles are acceptable.

3.4 CLEANING PREPARATION

- 3.4.1 Mark all adjustable flaps or other air-balancing devices and record their position so that they can be replaced as originally after cleaning.

3.5 CLEANING

- 3.5.1 Isolate the duct sections before starting the cleaning.

- 3.5.2 Clean all of the accessories, parts and all other elements of the same section of the system so that the dust from a section being cleansed cannot pass through a section that has been cleaned.
- 3.5.3 For a system with recirculation of air, that is to say of type « H », follow the following sequence:
 - 3.5.3.1 Air return ducts, from the grids to the fan.
 - 3.5.3.2 Air evacuation, from the system to the evacuator.
 - 3.5.3.3 New air intake, from the shutter and the roof up to the system.
 - 3.5.3.4 Mixing or recirculation system to the air distribution.
 - 3.5.3.5 Air supply from the system to the diffusers.
- 3.5.4 For a 100 % fresh air system, start with the air intake, and then clean the system and finally the air ducts from the system to the diffusers.
- 3.5.5 Always store negative ducts when cleaning with the help of vacuum cleaners or sufficient power collectors.
- 3.5.6 Clean all the components of the unit and all components of each system, ie fans, deflectors, diffusers, grids, filter holders, shutters, boxes, fireproof shutters, balancing flaps or unit, especially in angles and where dirt and dust can accumulate.
- 3.5.7 Pay special attention to probes and test equipment located in and on ventilation systems, if these prevent the cleaning, remove and subsequently reinstall them. Dirty sensors should be cleaned.
- 3.5.8 In the case of heating and cooling coils and other heat exchange elements, these components shall be cleaned by brushing them with a vacuum cleaner and, if necessary, by spraying and pressure rinsing. The condensation tanks will also be cleaned. Straighten the coil fins if required. Pay particular attention not to wet the acoustic insulation of adjacent boxes, if applicable.
- 3.5.9 The manual cleaning operations are permitted only in the case of individual components of the system such as fan blades, flaps, controls and deflectors.
- 3.5.10 All of the components of the system will be cleaned in the same working period to avoid contamination. Components that have been washed with detergent will be rinsed with water and dried in air before re-use. Protect electrical equipment and fan bearings.

3.6 REPAIR OF DAMAGED EQUIPMENT

- 3.6.1 If acoustic insulation is damaged during cleaning, it must be repaired using the sealant for the insulation. This sealant should be applied wherever required inside the ducts, either by brush or mechanical sprayer.

3.7 REPORT

- 3.7.1 The report must particularly include:
 - 3.7.1.1 Name and address of the cleaned installation and cleaning date.
 - 3.7.1.2 Name and address of the cleaning Contractor.
 - 3.7.1.3 Description of the ventilation systems, together with drawings or diagrams showing all of the points of the system that have been cleaned.
 - 3.7.1.4 Comments describing the general condition of each system and the defects and repairs to be carried out.
 - 3.7.1.5 A red annotated copy of the HVAC plans locating and identifying all cleaned elements (coils, boxes, flaps, etc.) and also indicating the location of the installed and new access doors.
- 3.7.2 Report presentation

3.7.2.1 Reports shall include an index, a title page and be presented in two bound copies and placed in ring binders.

3.7.2.2 The Contractor shall submit the reports to the Departmental Representative for approval.

3.8 WORK COMPLETION

3.8.1 The work will be considered completed once the reports have been accepted by the Departmental Representative. The payment of work will be authorized only after the acceptance of the reports.

3.9 WARRANTY OF DUCT CLEANLINESS

3.9.1 The Departmental Representative may hire an external firm to validate the quality of the work carried out.

3.9.2 If one of the sections verified does not meet the standards and cleanliness requirements of the specification, then the Contractor shall resume full cleaning of each non-compliant system to the satisfaction of the Departmental Representative. Inspection costs will then be invoiced to the Contractor and deducted from the sums owed to him for each new inspection made necessary.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- 1.1.1 The present section specifies the general requirements on the installation of the piping and the started.

1.2 REFERENCES

- 1.2.1 Canadian General Standards Board (CGSB): CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- 1.3.1 Provide submittals in accordance with sections 21 05 01, 21 05 02-Prescriptions.

2 EXECUTION

2.1 APPLICATION

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

2.2 CONNECTIONS TO EQUIPMENT

- 2.2.1 In accordance with manufacturer's instructions unless otherwise indicated.
- 2.2.2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.
- 2.2.3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

2.3 CLEARANCES

- 2.3.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.
- 2.3.2 Provide space for disassembly, removal of equipment and components, if necessary, without interrupting operation of other system, equipment components. The space shall be of a size conforming to the drawings or to the manufacturer's recommendations, whichever is greater.

2.4 DRAIN

- 2.4.1 Install piping with grade in direction of flow except as indicated.
- 2.4.2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.
- 2.4.3 Pipe each drain valve discharge separately to above floor drain. Discharge to be visible.
- 2.4.4 Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

2.5 DIELECTRIC COUPLINGS

- 2.5.1 General: compatible with system, to suit pressure rating of system.
- 2.5.2 Use dielectric couplings where dissimilar metals are joined..
- 2.5.3 NPS 2 and under: isolating unions or bronze valves.

2.6 PIPEWORK INSTALLATION

- 2.6.1 Screwed fittings jointed with Teflon tape.
- 2.6.2 Protect openings against entry of foreign material.
- 2.6.3 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.
- 2.6.4 Assemble piping using fittings manufactured to ANSI standards.
- 2.6.5 Saddle type branch fittings may be used on mains if branch line is no larger than half size of main. Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.
- 2.6.6 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.
- 2.6.7 Install concealed pipework to minimize furring space, maximize headroom, conserve space.
- 2.6.8 Install, except where indicated, to permit separate thermal insulation of each pipe.
- 2.6.9 Group piping wherever possible and as indicated.
- 2.6.10 Ream pipes, remove scale and other foreign material before assembly.
- 2.6.11 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.
- 2.6.12 Provide for thermal expansion as indicated.
- 2.6.13 Valves
 - 2.6.13.1 Install in accessible locations.
 - 2.6.13.2 Remove interior parts before soldering.
 - 2.6.13.3 Install with stems above horizontal position unless indicated.
 - 2.6.13.4 Valves accessible for maintenance without removing adjacent piping.
 - 2.6.13.5 Use ball valves at branch take-offs for isolating purposes except where specified.

2.7 SLEEVES

- 2.7.1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated.
- 2.7.2 Material: schedule 40 black steel pipe.
- 2.7.3 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.
- 2.7.4 Installation
 - 2.7.4.1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.
 - 2.7.4.2 Other floors: terminate 25 mm above finished floor.
 - 2.7.4.3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.
- 2.7.5 Sealing
 - 2.7.5.1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.
 - 2.7.5.2 Elsewhere, provide space for firestopping. Maintain fire rating integrity
 - 2.7.5.3 Sleeves installed for future use: fill with lime plaster or other easily removable filler.
 - 2.7.5.4 Ensure no contact between copper pipe or tube and sleeve.

2.8 ESCUTCHEONS

- 2.8.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.
- 2.8.2 Construction: one piece type with set screws. Chrome or nickel plated brass or type 302 stainless steel.
- 2.8.3 Sizes: outside diameter to cover opening or sleeve. Inside diameter to fit around pipe or outside of insulation if so provided.

2.9 PREPARATION FOR FIRE STOPPING

- 2.9.1 Install firestopping within annular space between pipes, ducts, insulation and adjacent fire separation in accordance with 21 00 05.
- 2.9.2 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

2.10 FLUSHING OUT OF PIPING SYSTEMS

- 2.10.1 Effectuer les travaux conformément à la section 23 08 02 – Nettoyage et mise en route des réseaux de tuyauterie d'installation mécanique.
- 2.10.2 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

2.11 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

- 2.11.1 Advise Departmental Representative 48 hours minimum prior to performance of pressure tests.
- 2.11.2 Pipework: test as specified in relevant sections of heating, ventilating and air conditioning work.
- 2.11.3 Maintain specified test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant mechanical sections.
- 2.11.4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.
- 2.11.5 Conduct tests in presence of Departmental Representative.
- 2.11.6 Pay costs for repairs or replacement, retesting, and making good. Departmental Representative to determine whether repair or replacement is appropriate.
- 2.11.7 Insulate or conceal work only after approval and certification of tests by Departmental Representative.

2.12 EXISTING SYSTEMS

- 2.12.1 Connect into existing piping systems at times approved by Departmental Representative.
- 2.12.2 Request written approval by Departmental Representative 10 days minimum, prior to commencement of work.
- 2.12.3 Be responsible for damage to existing plant by this work.
- 2.12.4 Clean place daily.

END OF SECTION

1 GENERAL

1.2 REFERENCES

- 1.2.1 American Society of Mechanical Engineers (ASME)
 - 1.2.1.1 ASME B31.1, Power Piping.
 - 1.2.1.2 ANSI/MSS-SP-58, Pipe Hangers and Supports – Materials, Design and Manufacture.
- 1.2.2 ASTM International
 - 1.2.2.1 ASTM A 125, Standard Specification for Steel Springs, Helical, Heat-Treated.
 - 1.2.2.2 ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - 1.2.2.3 ASTM A 563, Standard Specification for Carbon and Alloy Steel Nuts.
- 1.2.3 Factory Mutual (FM)
- 1.2.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
 - 1.2.4.1 MSS SP 58, Pipe Hangers and Supports - Materials, Design and Manufacture.
 - 1.2.4.2 MSS SP 69, Pipe Hangers and Supports - Selection and Application.
 - 1.2.4.3 MSS SP 89, Pipe Hangers and Supports - Fabrication and Installation Practices.
- 1.2.5 Underwriter's Laboratories of Canada (ULC)

1.3 CALCULATION CRITERIA

- 1.3.1 Design requirements (calculation criteria)
 - 1.3.1.1 Piping support shall be made in accordance with manufacturers' recommendations, using common parts, components and assemblies.
 - 1.3.1.2 Maximum nominal loads shall be determined based on indications for the allowed stresses constraints in standards ASME B31.1 or MSS SP 58.
 - 1.3.1.3 Supports, guides and anchorages shall not transmit too much heat to structural members.
 - 1.3.1.4 Supports and suspensions shall be designed to support piping, air ducts and mechanical appliances under operating conditions, permit contraction and expansion of the supported elements and prevent excessive stress on the devices to which they are connected.
 - 1.3.1.5 Supports and suspensions shall be vertically adjustable after installation and during commissioning of installations. The adjustment must be in accordance with MSS SP 58.
- 1.3.2 Calculation criteria - Earthquake overloads: supports, suspensions, platforms and footbridges shall be designed to withstand earthquake overloads in accordance with the requirements of section 23 05 48.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- 1.4.1 Provide documents and samples in accordance with sections 21 05 01, 21 05 02 - General Prescriptions.
- 1.4.2 Submit shop drawings and data sheets for:
 - 1.4.2.1 Bases, hangers and supports.
 - 1.4.2.2 Connections to equipment and structure.
 - 1.4.2.3 Structural Assemblies.

- 1.4.2.4 Collars for rising columns.
- 1.4.2.5 Saddles and protective shields.
- 1.4.2.6 Bracing parts.
- 1.4.3 Upon request of Departmental Representative, submit products samples or component described in the present section.
- 1.4.4 Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- 1.4.5 Manufacturers' Instructions: Provide manufacturer's installation instructions.
- 1.4.6 Documents / elements to be submitted upon completion of work
 - 1.4.6.1 Provide maintenance data for incorporation into manual specified in sections 21 05 01, 21 05 02-Prescriptions.
 - 1.4.6.2 Provide reports of on-site control signed by the Contractor with respect to facility monitoring and quality control.

1.5 QUALITY CONTROL

- 1.5.1 Reliability of technical data: Reliability of technical data: data from manufacturers' catalogs and documentation should be reliable data, based on test results that have been performed by the manufacturers themselves or on their behalf by independent laboratories, and certified that the elements comply with the requirements of the applicable codes and standards.

2 PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

- 2.1.1 Materials and products in accordance with sections 21 05 01, 21 05 02-general Prescriptions.
- 2.1.2 Choose products and materials with recycled content or resource efficient characteristics whenever possible.

2.2 GENERAL

- 2.2.1 Fabricate hangers, supports and sway braces in accordance ANSI B31.1 and MSS SP 58.
- 2.2.2 Use components for intended design purpose only. Do not use for rigging or erection purposes.
- 2.2.3 Supports and suspensions shall be secured to the framing elements. If there are no framing elements or if the anchors are not in the right place, supply and install all necessary additional structural elements ("J" profiles or steel angles).

2.3 PIPE HANGERS

- 2.3.1 Finishes:
 - 2.3.1.1 Pipe hanger and supports: galvanizing or zinc rich paint is normally required only under conditions where corrosion is likely.
 - 2.3.1.2 Elements: use electro-plating galvanizing process or hot dipped galvanizing process.
 - 2.3.1.3 Ensure steel hangers in contact with copper piping are copper plated and epoxy coated.
- 2.3.2 Upper attachment structural: suspension from lower flange of I-Beam:
 - 2.3.2.1 Cold piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.
 - 2.3.2.1.1 Rod: 9 mm UL listed, 13 mm FM approved.

- 2.3.2.1.2 Accepted products: Anvil FIG 93, Tailor, Erico.
- 2.3.3 Upper attachment structural: suspension from upper flange of I-Beam:
 - 2.3.3.1 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, FM approved and conform to MSS SP 69. Accepted products: Anvil FIG 93, Tailor, Erico.
- 2.3.4 Steel beams
 - 2.3.4.1 Cold pipe with diameter DN 2 maximum: steel backing plate, with two locking nuts. Acceptable products: Anvil FIG 60, Tailor, Erico.
- 2.3.5 Steel profiles or angle (inferior wing)
 - 2.3.5.1 Cold pipe with diameter DN 2 maximum: "C" bracket, malleable cast iron, in compliance with standard MSS-SP58, type 23, approved ULC. Acceptable products: Anvil FIG 86, Tailor, Erico.
- 2.3.6 Steel profiles or angle (superior wing)
 - 2.3.6.1 Cold pipe with diameter equal to or less than DN 2: bracket "C" (for beam top), malleable cast iron, in compliance with standard MSS-SP58, type 19, approved by ULC. Acceptable products: Anvil FIG 93, Tailor, Erico.
- 2.3.7 Upper attachment to concrete
 - 2.3.7.1 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.
 - 2.3.7.2 Concrete inserts: wedge shaped body with knockout protector plate, approved by the UL, approved by the FM and corresponding to the standard MSS SP 69 for piping diameter DN ¾ to DN 8. Acceptable products: Anvil FIG 281, Tailor, Erico.
 - 2.3.7.3 Carbon steel plate with bracket, for surface mounting, with forged steel seamless nut, and at least two expansible pins and two bolts for each suspension. Acceptable products: Anvil FIG 49, nut with eye, FIG 290, Tailor, Erico.
- 2.3.8 Shop and field-fabricated assemblies
 - 2.3.8.1 Steel brackets.
 - 2.3.8.2 Sway braces for seismic restraint systems conform to section 23 05 49.
- 2.3.9 Hanger rods: threaded rod material conform to standard MSS SP 58.
 - 2.3.9.1 Ensure that hanger rods are subject to tensile loading only.
 - 2.3.9.2 Provide linkages where lateral or axial movement of pipework is anticipated.
 - 2.3.9.3 Do not use 22 mm or 28 mm rod. Acceptable products: Anvil FIG 146, Tailor, Erico.
- 2.3.10 Support elements: conform to standard MSS SP 58
 - 2.3.10.1 For steel piping: galvanized carbon steel elements.
 - 2.3.10.2 For copper piping: black steel elements with copper finish.
 - 2.3.10.3 Protective shields shall be provided for hot insulated pipes. Acceptable products: Anvil FIG 260, Tailor, Erico.
 - 2.3.10.4 Support elements must be oversized.
- 2.3.11 Adjustable clevis: conform to standard MSS SP 69, UL listed and FM approved, clevis bolt with nipple spacer and vertical adjustment nuts and a lock nut for cold or hot copper piping with horizontal movement no greater than 300 mm in length.
 - 2.3.11.1 Ensure "U" has hole in bottom for riveting to insulation shields. Acceptable products: Anvil

FIG CT-65, Tailor, Erico.

2.3.12 Non-metallic piping: adjustable clevis conform to standard MSS SP 69, typifies 9. Accepted products: Anvil FIG CT-69, Tailor, Erico.

2.3.13 Type of media

2.4 RISER CLAMPS

2.4.1 Steel or cast iron pipe: galvanized carbon steel to MSS SP 58, type 42, UL listed, FM approved. Accepted products: Anvil FIG 261, Tailor, Erico.

2.4.2 Steel or cast iron pipe: galvanized carbon steel to MSS SP 58, type 42. Accepted products: Anvil FIG CT-121, Tailor, Erico.

2.4.3 Non-metallic piping: carbon steel to MSS ST 69. Accepted products: Anvil FIG 261, Tailor, Erico.

2.4.4 Bolts: to ASTM A 307.

2.4.5 Nuts: to ASTM A 563.

2.5 INSULATION PROTECTION SHIELDS

2.5.1 Insulated hot and cold piping

2.5.1.1 64 kg / m³ density insulation plus insulation protection shield to MSS SP 69, galvanized sheet carbon steel; length designed for maximum 3 m span. Accepted products: Anvil FIG 167, Tailor, Erico.

2.6 CONSTANT SUPPORT SPRING HANGERS

2.6.1 Springs: alloy steel to ASTM A 125, shot peened, magnetic particle inspected, with ±5% spring rate tolerance, tested for free height, spring rate, loaded height and provided with Certified Mill Test Report (CMTR).

2.6.2 Load adjustability: 10% minimum adjustability each side of calibrated load. Adjustment without special tools. Adjustments not to affect travel capabilities.

2.6.3 Provide upper and lower factory set travel stops.

2.6.4 Provide load adjustment scale for field adjustments.

2.6.5 Total travel to be actual travel + 20%. Difference between total travel and actual travel 25 mm minimum.

2.6.6 Individually calibrated scales on each side of support calibrated prior to shipment, complete with calibration record.

2.7 VARIABLE SUPPORT SPRING HANGERS

2.7.1 Vertical movement: 13 mm minimum, 50 mm maximum, use single spring pre-compressed variable spring hangers.

2.7.2 Vertical movement greater than 50 mm: use double spring pre-compressed variable spring hanger with [2] springs in series in single casing.

2.7.3 Variable spring hanger complete with factory calibrated travel stops. Provide certificate of calibration for each hanger.

2.7.4 Steel alloy springs: to ASTM A 125, shot peened, magnetic particle inspected, with +/-5 % spring rate tolerance, tested for free height, spring rate, loaded height and provided with CMTR.

2.8 EQUIPMENT SUPPORTS

2.8.1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel

meeting requirements for Structural Steel for Buildings. Submit calculations with shop drawings.

2.8.2 Supply and install all metal supports required for equipment, heat exchangers, tanks and accessories mentioned in drawings and specification for present section.

2.8.3 Supports shall be made of metal sections welded and constructed in accordance with good engineering practice and in accordance with standards of the provincial codes for this work. This work will have to be carried out by skilled labour.

2.9 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

2.9.1 Provide templates to ensure accurate location of anchor bolts.

2.10 OTHER EQUIPMENT SUPPORTS

2.10.1 Fabricate equipment supports from structural grade steel meeting requirements of section - Structural Steel for Buildings.

2.10.2 Submit structural calculations with shop drawings.

3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

3.2.1 Install in accordance with:

3.2.1.1 Manufacturer's instructions and recommendations.

3.2.1.2 All hot or cold piping supports shall be installed outside the heat insulator.

3.2.2 Vibration Control Devices: Install on piping systems at pumps, boilers, chillers, cooling towers, and as indicated.

3.2.3 Clamps on riser piping:

3.2.3.1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.

3.2.3.2 Bolt-tightening torques to industry standards.

3.2.3.3 Steel pipes: install below coupling or shear lugs welded to pipe.

3.2.3.4 Cast iron pipes: install below joint.

3.2.4 Clevis plates: Attach to concrete with 4 minimum concrete inserts, one at each corner.

3.2.5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

3.2.6 Use approved constant support type hangers where:

3.2.6.1 Vertical movement of pipework is 13 mm or more,

3.2.6.2 Transfer of load to adjacent hangers or connected equipment is not permitted.

3.2.7 Use variable support spring hangers where:

3.2.7.1 Transfer of load to adjacent piping or to connected equipment is not critical.

3.2.7.2 Variation in supporting effect does not exceed 25% of total load.

3.3 HANGER SPACING

- 3.3.1 Plumbing piping: meet the most rigorous requirements to Canadian Plumbing Code, Provincial Code or authority having jurisdiction.
- 3.3.2 Fire protection: to applicable fire code.
- 3.3.3 Gas and fuel oil piping: up to NPS 1/2: every 1.8 m.
- 3.3.4 Copper piping: up to NPS 1/2: every 1.5 m.
- 3.3.5 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.
- 3.3.6 Within [300] mm of each elbow.
- 3.3.7 Pipework greater than NPS 12: to MSS SP 69.

Maximal pipe size: NPS	Maximum spacing steel	Maximal spacing copper
Up to 1¼	2,1 m	1,8 m
1½	2,7 m	2,4 m
2	3,0 m	2,4 m
2½	3,7 m	3,0 m

3.4 HANGER INSTALLATION

- 3.4.1 Install hanger so that rod is vertical under operating conditions.
- 3.4.2 Adjust hangers to equalize load.
- 3.4.3 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

- 3.5.1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
- 3.5.2 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

- 3.6.1 Adjust hangers and supports:
 - 3.6.1.1 Ensure that rod is vertical under operating conditions.
 - 3.6.2.2 Equalize loads.
- 3.6.2 Adjustable clevis:
 - 3.6.2.1 Tighten hanger load nut securely to ensure proper hanger performance.
 - 3.6.2.2 Tighten upper nut after adjustment.
- 3.6.3 C-clamps: Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
- 3.6.4 Beam clamps: Hammer jaw firmly against underside of beam.

END OF SECTION

1 GENERAL

1.1 REFERENCES

- 1.1.1 Code of construction of Quebec.
- 1.1.2 ASHRAE – A Practical Guide to Seismic Restraint.
- 1.1.3 SMACNA – Seismic Restraint Manual Guide Lines for Mechanical Systems.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- 1.2.1 Submittals: in accordance with section 21 05 01, 21 05 02-Prescriptions.
- 1.2.2 Datasheets: Submit manufacturer's printed product literature and datasheet. Include product characteristics, performance criteria, and limitations.
- 1.2.3 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of Québec, Canada.
- 1.2.4 Provide separate shop drawings for each isolated system, system shop drawings complete with performance and product data.
- 1.2.5 Upon Departmental Representative request, submit product samples or one of components described in the present section.
- 1.2.6 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- 1.2.7 Instructions: submit manufacturer's installation instructions.
- 1.2.8 Documents / elements to be submitted upon completion of work: provide the required operating, maintenance and spare parts sheets and attach them to the manual mentioned in general sections 21 05 01, 21 05 02-Prescriptions.
- 1.2.9 Provide reports of on-site sign-in checks by the Contractor and the manufacturer regarding the monitoring of the facility.

1.3 QUALITY ASSURANCE

- 1.3.1 Reliability of technical data: technical data drawn from the manufacturers' documentation must be reliable data, confirmed by tests carried out by the manufacturers themselves or on their behalf by independent laboratories and certifying the conformity of requirements to codes and standards .

2 PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

- 2.1.1 Requirement regarding sustainable development: materials and products corresponding to general sections 21 05 01, 21 05 02-Prescriptions.
- 2.1.2 Choose products and materials with recycled content or resource efficient characteristics whenever possible.

2.2 GENERAL

- 2.2.1 Size and shape of bases type and performance of vibration isolation as indicated.

2.3 ELASTOMERIC PADS

- 2.3.1 Type EP1 - neoprene waffle or ribbed; 9 mm minimum thick; 50 durometer; maximum loading 350 kPa.

- 2.3.2 Type EP2 - rubber waffle or ribbed; 9 mm minimum thick; 30 durometer natural rubber; maximum loading 415 kPa.
- 2.3.3 Type EP3 - neoprene-steel-neoprene; 9 mm minimum thick neoprene bonded to 1.71 mm steel plate; 50 durometer neoprene, waffle or ribbed; holes sleeved with isolation washers; maximum loading 350 kPa.
- 2.3.4 Type EP4 - rubber-steel-rubber; 9 mm minimum thick rubber bonded to 1.71 mm steel plate; 30 durometer natural rubber, waffle or ribbed; holes sleeved with isolation washers; maximum loading 415 kPa.

2.4 ELASTOMERIC MOUNTS

- 2.4.1 Type M1 - colour coded; neoprene in shear; maximum durometer of 60; threaded insert and two bolt-down holes; ribbed top and bottom surfaces.

2.5 SPRINGS

- 2.5.1 Design stable springs: ratio of lateral to axial stiffness is equal to or greater than 1.2 times ratio of static deflection to working height. Select for 50% travel beyond rated load. Units complete with levelling devices.
- 2.5.2 Ratio of height when loaded to diameter of spring between 0.8 to 1.0.
- 2.5.3 Cadmium plate for outdoor 100% relative humidity installations
- 2.5.4 Colour code springs.

2.6 SPRING MOUNT

- 2.6.1 Zinc or cadmium plated hardware; housings coated with rust resistant paint.
- 2.6.2 Type M2 - stable open spring: support on bonded 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad.
- 2.6.3 Type M3 - stable open spring: 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad, bonded under isolator and on isolator top plate; levelling bolt for rigidly mounting to equipment.
- 2.6.4 Type M4 - restrained stable open spring: supported on bonded 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad; built-in resilient limit stops, removable spacer plates.
- 2.6.5 Type M5 - enclosed spring mounts with snubbers for isolation up to 950 kg maximum.
- 2.6.6 Performance: as indicated.

2.7 HANGERS

- 2.7.1 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.
- 2.7.2 Type H1 - neoprene - in-shear, moulded with rod isolation bushing which passes through hanger box.
- 2.7.3 Type H2 - stable spring, elastomeric washer, cup with moulded isolation bushing which passes through hanger box.
- 2.7.4 Type H3 - stable spring, elastomeric element, cup with moulded isolation bushing which passes through hanger box.
- 2.7.5 Type H4 - stable spring, elastomeric element with precompression washer and nut, with deflection indicator.
- 2.7.6 Performance: as indicated.

2.8 ACOUSTIC BARRIERS FOR ANCHORS AND GUIDES

- 2.8.1 Acoustic barriers: between pipe and support, consisting of 25 mm minimum thick heavy duty duck and neoprene isolation material.

2.9 HORIZONTAL THRUST RESTRAINT

- 2.9.1 Spring and elastomeric element housed in box frame; assembly complete with rods and angle brackets for equipment and ductwork attachment; provision for adjustment to limit maximum start and stop movement to 9 mm.
- 2.9.2 Arrange restraints symmetrically on either side of unit and attach at centerline of thrust.

2.10 STRUCTURAL BASES

- 2.10.1 Type B1 - Prefabricated steel base: integrally welded on sizes up to 2400 mm on smallest dimension, split for field welding on sizes over 2400 mm on smallest dimension and reinforced for alignment of drive and driven equipment; without supplementary hold down devices; complete with isolation element attached to base brackets arranged to minimize height; pre-drilled holes to receive equipment anchor bolts; and complete with adjustable built-in motor slide rail where indicated.
- 2.10.2 Type B2 - Steel rail base: structural steel, positioned for alignment of drive and driven equipment; without supplementary hold down devices; complete with isolation element attached to base brackets arranged to minimize height; and pre-drilled holes to receive equipment anchor bolts.
- 2.10.3 Bases to clear housekeeping pads by 25 mm minimum.

2.11 TABLE OF INSULATORS

- 2.11.1 For the mechanical elements located in mechanical rooms as well as on the roof, refer to the following table which indicates the minimums required for certain equipment including 5 meters of ducts downstream and upstream to the equipment.

– System ventilation (breakdown)	Type = M4	Deflection =	38 mm
– Ventilators	Type = H4 ou M4	Deflection =	38 mm
– Piping (*)	Type = H4	Deflection =	38 mm

Acceptable products: Grinnel, Vibron, Mason.

* According to the indications in the plans.

3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- 3.2.1 Install vibration isolation equipment in accordance with manufacturers' instructions and adjust mountings to level equipment.
- 3.2.2 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.
- 3.2.3 Unless indicated otherwise, support piping connected to isolated equipment with spring mounts or

- spring hangers with 25 mm minimum static deflection as follows:
- 3.2.3.1 Up to NPS4: first 3 points of support. NPS5 to NPS8: first 4 points of support. NPS10 and Over: first 6 points of support.
 - 3.2.3.2 First point of support: static deflection of twice deflection of isolated equipment, but not more than 50 mm..
 - 3.2.4 Where isolation is bolted to floor use vibration isolation rubber washers.
 - 3.2.5 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.

END OF SECTION

1 GENERAL

1.1 REFERENCES

- 1.1.1 Code of construction of Quebec.
- 1.1.2 ASHRAE: A Practical Guide to Seismic Restraint.
- 1.1.3 SMACNA: Seismic Restraint Manual Guide Lines for Mechanical Systems.

1.2 PARTICULARITY - CHARACTERISTICS OF PARASISMIC PROTECTION SYSTEMS

- 1.2.1 Seismic protection systems shall be compatible with the following and be fully integrated:
 - 1.2.1.1 Design, supply and install a complete seismic attachment system for mechanical and electrical equipment, insulated against vibration and not insulated against vibration, and related systems.
 - 1.2.1.2 Provide a complete and functional seismic fastening system designed by a professional engineer, certified in the province of Quebec and a specialist in the design of seismic fastening systems.
 - 1.2.1.3 The earthquake resistant system shall be fully integrated and compatible with noise reduction requirements and the anti-vibration system of mechanical and electrical equipment and related systems, as specified in the drawings and elsewhere.
 - 1.2.1.4 The earthquake resistant system shall be compatible with the mechanical design, electrical design and structural design of the building.

1.3 MANUFACTURER QUALIFICATION

- 1.3.1 Provide anti-vibration devices including seismic shock absorbers, separate seismic shock absorbers, slack cable attachment equipment and other fasteners from manufacturers that regularly produce the same equipment.
- 1.3.2 The ENTIRE earthquake resistant system shall be supplied by the same supplier.
- 1.3.3 Acceptable products: Korfund-Sampson, Tecoustics, Vibra-Sonic Control and Vibron.

1.4 ACTION AND INFORMATION SUBMITTALS

- 1.4.1 The Contractor shall submit to the Departmental Representative, for approval, the 100% complete construction documents sealed by a seismic design engineer, prepared in accordance with the quality and size standards which constitute these tender documents. These must contain in full the execution drawings, lists of equipment, design calculations, drawings and specifications which are used for the detailed design of earthquake resistant systems.
- 1.4.2 Upon completion of construction, the contractor shall provide the Departmental Representative with the complete set of original and revised construction documents to reflect the conditions of the system as built.
- 1.4.3 The Contractor shall waive all ownership and copyright claims for models, drawings, drawings, details and specifications in favor of the Department of National Defense which becomes the sole owner.
- 1.4.4 Submit documents and samples required according to general sections 21 05 01, 21 05 02-Prescriptions.
- 1.4.5 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of Québec, Canada.
- 1.4.6 Submit design data including:

- 1.4.6.1 Full details of design criteria s.
- 1.4.6.2 Design calculations (including restraint loads resulting from seismic forces in accordance with National Building Code, detailed work sheets, tables).
- 1.4.6.3 Separate shop drawings for each SRS and devices for each system, equipment.
- 1.4.6.4 Identification of location of devices.
- 1.4.6.5 Lists of the various types of seismic protection devices and systems and their related components.
- 1.4.6.6 Details of fasteners and attachments to structure, anchorage loadings, attachment methods.
- 1.4.6.7 Installation procedures and instructions.
- 1.4.6.8 Design calculations including restraint loads to NBC and Supplement.
- 1.4.6.9 Detailed work sheets, tables, detailed work sheets. Simplified, conservative assumptions may be acceptable.
- 1.4.7 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- 1.4.8 Instructions: submit manufacturer's installation instructions.
- 1.4.9 Closeout Submittals
 - 1.4.9.1 Reports of the on-site signature checks carried out by the specialist Departmental Representative in respect with the design of seismic systems relating to installation supervision.
 - 1.4.9.2 Required documents, which include instructions for control of seismic protection devices and systems, to be attached to manual referred to in sections 21 05 00.01, 21 05 00.02-General requirements..

1.5 QUALITY ASSURANCE

- 1.5.1 Reliability of technical data: Technical data taken from the manufacturers' documentation must be reliable data, confirmed by tests carried out by the manufacturers themselves or on their behalf by independent laboratories and certifying the conformity to the requirements of the applicable codes and standards.

2 PRODUCTS

2.1 MANUFACTURER

- 2.1.1 SRS from one manufacturer regularly engaged in SRS production.

2.2 GENERAL

- 2.2.1 SRS to provide gentle and steady cushioning action and avoid high impact loads.
- 2.2.2 SRS to restrain seismic forces in every direction.
- 2.2.3 Fasteners and attachment points to resist same load as seismic restraints.
- 2.2.4 SRS of piping systems compatible with:
 - 2.2.4.1 Expansion, anchoring and guiding requirements.
 - 2.2.4.2 Equipment vibration isolation and equipment SRS.
- 2.2.5 SRS utilizing cast iron, threaded pipe, other brittle materials not permitted.

- 2.2.6 Attachments to RC structure
 - 2.2.6.1 Use high strength mechanical expansion anchors.
 - 2.2.6.2 Drilled or power driven anchors not permitted.
 - 2.2.6.3 Acceptable products: Hilti type HSL.
- 2.2.7 Seismic control measures not to interfere with integrity of firestopping.

2.3 SRS FOR STATIC EQUIPMENT, SYSTEMS

- 2.3.1 Floor-mounted equipment, systems
 - 2.3.1.1 Anchor equipment to equipment supports.
 - 2.3.1.2 Anchor equipment supports to structure.
 - 2.3.1.3 Use size of bolts scheduled in approved shop drawings.
- 2.3.2 Suspended equipment, systems
 - 2.3.2.1 Use one or combination of following methods:
 - 2.3.2.1.1 Install tight to structure.
 - 2.3.2.1.2 Cross-brace in every direction.
 - 2.3.2.1.3 Brace back to structure.
 - 2.3.2.1.4 Slack cable restraint system.
 - 2.3.2.2 SCS to prevent sway in horizontal plane, "rocking" in vertical plane, sliding and buckling in axial direction.
 - 2.3.2.3 Precautionary measures to be taken to ensure suspension rods can withstand the compression load and buckling.
 - 2.3.2.4 The earthquake protection system shall have a smooth and regular damping effect attributable to an elastomeric material or other means to prevent high impact loads.
 - 2.3.2.5 Acceptable products of slack cables: Grinnel, Korfund-Sampson, Tecoustics, Vibra-Sonic control, Vibron.

2.4 SRS FOR VIBRATION ISOLATED EQUIPMENT

- 2.4.1 Floor mounted equipment, systems
 - 2.4.1.1 Use one or combination of following methods.
 - 2.4.1.1.1 Vibration isolators with built-in snubbers.
 - 2.4.1.1.2 Vibration isolators and separate snubbers.
 - 2.4.1.1.3 Built-up snubber system approved by an engineer, consisting of structural elements and elastomeric layer.
 - 2.4.1.2 SRS not to jeopardize noise and vibration isolation systems. Provide 4-8 mm clearance between seismic restraint snubbers and equipment during normal operation of equipment and systems.
 - 2.4.1.3 SRS to resist complete isolator unloading.
 - 2.4.1.4 Cushioning action: gentle and steady by utilizing elastomeric material or other means in order to avoid high impact loads.
 - 2.4.1.5 Acceptable products: Korfund-Sampson, Tecoustics, Vibra-Sonic Control, Vibron.
- 2.4.2 Suspended equipment, system:

- 2.4.2.1 Use one or combination of following methods s:
 - 2.4.2.1.1 Slack cable restraint system.
 - 2.4.2.1.2 Brace back to structure via vibration isolators and snubbers.
- 2.4.2.2 SCS to prevent sway in horizontal plane, "rocking" in vertical plane, sliding and buckling in axial direction.
- 2.4.2.3 Hanger rods to withstand compressive loading and buckling.
- 2.4.2.4 Use elastomer materials or similar to avoid high impact loads and provide gentle and steady cushioning action.
- 2.4.2.5 Acceptable products of slack cable systems: Grinnel, Korfund-Sampson, Tecoustics, Vibra-Sonic Control, Vibron.

3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- 3.2.1 Attachment points and fasteners: To withstand same maximum load that seismic restraint is to resist and in every direction.
- 3.2.2 Slack Cable Systems (SCS):
 - 3.2.2.1 Connect to suspended equipment so that axial projection of wire passes through centre of gravity of equipment.
 - 3.2.2.2 Use appropriate grommets, shackles, other hardware to ensure alignment of restraints and to avoid bending of cables at connection points.
 - 3.2.2.3 Piping systems: provide transverse SCS at 10 m spacing maximum, longitudinal SCS at 20 m maximum or as limited by anchor/slack cable performance.
 - 3.2.2.4 Small pipes may be rigidly secured to larger pipes for restraint purposes, but not reverse.
 - 3.2.2.5 Orient restraint wires on ceiling hung equipment at approximately 90 degrees to each other (in plan), tie back to structure at maximum of 45 degrees to structure.
 - 3.2.2.6 Adjust restraint cables so that they are not visibly slack but permit vibration isolation system to function normally.
 - 3.2.2.7 Tighten cable to reduce slack to 40 mm under thumb pressure. Cable not to support weight during normal operation.
- 3.2.3 Install SRS at least 25 mm from equipment, systems, services.
- 3.2.4 Adjust protective cables to allow normal operation of the anti-vibration system but are not visibly slack.
- 3.2.5 Miscellaneous equipment not vibration-isolated: Bolt through house-keeping pad to structure.
- 3.2.6 Co-ordinate connections with other disciplines.
- 3.2.7 Vertical tanks:
 - 3.2.7.1 Anchor through house-keeping pad to structure.
 - 3.2.7.2 Provide steel bands above centre of gravity.
- 3.2.8 Horizontal tanks: Provide at least two straps with anchor bolts fastened to structure.

3.3 FIELD QUALITY CONTROL

3.3.1 Manufacturer's Field Services:

3.3.1.1 Arrange with manufacturer's representative to review work of this Section and submit written reports to verify compliance with Contract Documents.

3.3.1.2 Manufacturer's Field Services: consisting of product use recommendations and periodic site visits to review installation, scheduled as follows:

3.3.1.2.1 Once during the installation.

3.3.1.2.2 Upon completion of installation.

3.3.1.3 Submit manufacturer's reports to the Departmental Representative within 7 days of manufacturer representative's following visit to installation.

3.3.2 Inspection and Certification:

3.3.2.1 SRS: inspected and certified by Seismic Engineer upon completion of installation.

3.3.2.2 Provide written report to the Departmental Representative with certificate of compliance.

3.3.3 Commissioning documentation: Upon completion and acceptance of report, hand over to Departmental Representative complete set of construction documents, revised to show "as-built" conditions.

END OF SECTION

1 GENERAL

1.1 REFERENCES

- 1.1.1 Canadian Gas Association (CGA): CSA/CGA B149.1, Natural Gas and Propane Installation Code.
- 1.1.2 Canadian General Standards Board (CGSB)
 - 1.1.2.1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.
 - 1.1.2.2 CAN/CGSB-24.3, Identification of Piping Systems.
- 1.1.3 National Fire Protection Association (NFPA)
 - 1.1.3.1 NFPA 13, Standard for the Installation of Sprinkler Systems.
 - 1.1.3.2 NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- 1.2.1 Submittals: in accordance with general sections 21 05 01, 21 05 02-Prescriptions.
- 1.2.2 Product data to include paint colour chips, other products specified in this section.
- 1.2.3 Submit samples to include nameplates, labels, tags, lists of proposed legends.

2 PRODUCTS

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

- 2.1.1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.
- 2.1.2 Lettering and numbers raised or recessed.
- 2.1.3 Information to include, as appropriate:
 - 2.1.3.1 Equipment: manufacturer's name, model, size, serial number, capacity.
 - 2.1.3.2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

- 2.2.1 Colours:
 - 2.2.1.1 Hazardous: red letters, white background.
 - 2.2.1.2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).
- 2.2.2 Material and other manufacturing characteristics: plates 3 mm thick, laminated or white anodized aluminum, in the matte finish, with square corners, letters accurately aligned and machine engraved into core.
- 2.2.3 Sizes: Conform to following table:

Size	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

2.2.3.1 Use maximum of 25 letters/numbers per line.

2.2.4 Locations

2.2.4.1 Terminal cabinets, control panels: Size #6.

2.2.4.2 Equipment in Mechanical Room: Size #9.

2.2.5 Identification for PWGSC Preventive Maintenance Support System (PMSS):

2.2.5.1 Use arrangement of Main identifier, Source identifier, Destination identifier.

2.2.5.2 Equipment in Mechanical Room:

2.2.5.2.1 Main identifier: size #9.

2.2.5.2.2 Source and Destination identifiers: size #6.

2.2.5.2.3 Terminal cabinets, control panels: size #5.

2.2.5.3 Equipment elsewhere: sizes as appropriate.

2.3 EXISTING IDENTIFICATION SYSTEMS

2.3.1 Apply existing identification system to new work.

2.3.2 Use where existing identification system does not include new mechanical systems installed as part of the work of this contract.

2.3.3 Before starting work, obtain written approval of identification system from Departmental Representative.

2.4 IDENTIFICATION OF PIPING SYSTEMS

2.4.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

2.4.2 Water supply network is "UNDRINKABLE" and must have all standards required identifications.

2.4.3 Pictograms: Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.

2.4.4 Legend: Block capitals to sizes and colours listed in CAN/CGSB 24.3.

2.4.5 Arrows showing direction of flow:

2.4.5.1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.

2.4.5.2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.

2.4.5.3 Use double-headed arrows where flow is reversible.

2.4.6 Extent of background colour marking:

2.4.6.1 To full circumference of pipe or insulation.

2.4.6.2 Length to accommodate pictogram, full length of legend and arrows.

2.4.7 Materials for background colour marking, letters (legend), arrows:

2.4.7.1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.

2.4.7.2 Other pipes: pressure sensitive plastic-coated cloth or 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.

2.4.8 Colours and Legends:

2.4.8.1 Where not listed, obtain direction from Departmental Representative.

2.4.8.2 Colours for legends, arrows: to following table.

2.4.8.3 Background colour marking and legends for piping systems.

CONTENT	BACKGROUND COLOUR	LEGEND
Domestic hot water supply	Green	Domestic hot water supply
Domestic cold water supply	Green	Domestic cold water supply
Plumbing vent	Green	Sanitary vent

2.5 IDENTIFICATION DUCTWORK SYSTEMS

2.5.1 Brass tags with 12 mm stamped identification data filled with black paint.

2.5.2 Colours: back, or co-ordinated with base colour to ensure strong contrast.

2.6 VALVES, CONTROLLERS

2.6.1 Brass tags with 12 mm stamped identification data filled with black paint.

2.6.2 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.

2.7 IDENTIFICATION OF NETWORKS AND DEVICES OF COMMAND / REGULATION

2.7.1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in section 25 01 00.

2.7.2 Inscriptions to include function and (where appropriate) fail-safe position.

2.8 LANGUAGE

2.8.1 Identification in French and English

2.9 VALVES AND HVAC MARKINGS

- 2.9.1 Plastic markers type "pin", 22 mm in diameter and 12 mm tip to locate the concealed elements behind the suspended ceilings.
- 2.9.2 Markers will have colors specific to the different specialties: fire protection (red), plumbing (green), heating (yellow), cooling (blue), control units (orange), ventilation (white). Provide the Departmental Representative with the benchmark color schemes specific to each specialty

3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- 3.2.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.
- 3.2.2 Provide ULC and/or CSA registration plates as required by respective agency.

3.3 NAMEPLATES

- 3.3.1 Locations: In conspicuous location to facilitate easy reading and identification from operating floor.
- 3.3.2 Standoffs: Provide for nameplates on hot and/or insulated surfaces.
- 3.3.3 Protection: Do not paint, insulate or cover.

3.4 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

- 3.4.1 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.
- 3.4.2 Adjacent to each change in direction.
- 3.4.3 At least once in each small room through which piping or ductwork passes.
- 3.4.4 On both sides of visual obstruction or where run is difficult to follow.
- 3.4.5 On both sides of separations such as walls, floors, partitions.
- 3.4.6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.
- 3.4.7 At beginning and end points of each run and at each piece of equipment in run.
- 3.4.8 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.
- 3.4.9 Identification easily and accurately readable from usual operating areas and from access points. 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 LOCATION OF VALVES IDENTIFICATION ELEMENTS

- 3.5.1 Attach labels with closed "S" chains or hooks of non-ferrous metal on valves except those connected to sanitary fixtures or heating radiators and unless they are nearby and in view of the equipment to which they are connected to.

- 3.5.2 Install a copy of the block diagram and list of valves, framed under the anti-reflective glass, at the location determined by the Departmental Representative. Also insert a copy (smaller size, if necessary) in each of the operation and maintenance manuals.
- 3.5.3 Number in the order the valves of each network.

END OF SECTION

1 GENERAL

1.1 SUMMARY

- 1.1.1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.
- 1.1.2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

1.2 QUALIFICATIONS OF TAB PERSONNEL

- 1.2.1 Following the award of the contract, submit the Departmental Representative the list of persons who will be responsible for carrying out the test, adjustment and balancing operations.
- 1.2.2 Provide documentation confirming personnel qualifications, successful experience. Entrepreneur must be a member of AABC or NEBB
- 1.2.3 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved.
- 1.2.4 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.
- 1.2.5 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.
- 1.2.6 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.
- 1.2.7 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.
 - 1.2.7.1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.
 - 1.2.7.2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

1.3 PURPOSE OF TAB

- 1.3.1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads
- 1.3.2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.
- 1.3.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.
- 1.3.4 Supply and install pulleys and belts required for testing, preliminary and final balancing.

1.4 EXCEPTIONS

- 1.4.1 TAB of systems and equipment regulated by codes, standards to satisfaction of authority having jurisdiction.

1.5 CO-ORDINATION

- 1.5.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.
- 1.5.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.6 START-UP

- 1.6.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.
- 1.6.2 Follow special start-up procedures specified elsewhere in divisions 21, 22, 23, 25.

1.7 OPERATION OF SYSTEMS DURING TAB

- 1.7.1 Operate systems for length of time required for TAB and as required by Departmental Representative for verification of TAB reports.

1.8 START OF TAB

- 1.8.1 Notify Departmental Representative 7 days prior to start of TAB.
- 1.8.2 Start TAB when building is essentially completed, including:
 - 1.8.2.1 Installation of ceilings, doors, windows, other construction affecting TAB.
 - 1.8.2.2 Application of weatherstripping, sealing, and caulking.
 - 1.8.2.3 Pressure, leakage, other tests specified elsewhere in Divisions 21, 22, 23 and 25 have been completed.
 - 1.8.2.4 Provisions for TAB installed and operational.
 - 1.8.2.5 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
 - 1.8.2.5.1 Proper thermal overload protection in place for electrical equipment.
 - 1.8.2.5.2 Air systems:
 - 1.8.2.5.2.1 Filters in place, clean.
 - 1.8.2.5.2.2 Duct systems clean.
 - 1.8.2.5.2.3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
 - 1.8.2.5.2.4 Correct fan rotation.
 - 1.8.2.5.2.5 Fire, smoke, volume control dampers installed and open.
 - 1.8.2.5.2.6 Coil fins combed, clean.
 - 1.8.2.5.2.7 Access doors, installed, closed.
 - 1.8.2.5.2.8 Outlets installed, volume control dampers open.

1.9 REGULATION DIFFERENCES COMPARED WITH THE THEORETICAL VALUES

- 1.9.1 Do TAB to following tolerances of design values.
 - 1.9.1.1 HVAC SYSTEMS: the more 10 %, minus 5 %.

1.10 ACURACY TOLERANCES

- 1.10.1 Measured values accurate to within plus or minus 2% of actual values.

1.11 INSTRUMENTS

- 1.11.1 Prior to TAB, submit to Departmental Representative list of instruments used together with serial numbers.
- 1.11.2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.
- 1.11.3 Calibrate within 3 months of TAB. Provide certificate of calibration to Departmental Representative.

1.12 TAB REPORT

- 1.12.1 Format in accordance with the requirements of the standard or reference document used for TAB operations.
- 1.12.2 TAB report to show results in SI units and to include:
 - 1.12.2.1 Project record drawings.
 - 1.12.2.2 System schematics.
- 1.12.3 Submit 6 copies of the TAB report to the Department Representative, for verification and approval, in French, in D-ring binders, complete with index tabs.

1.13 VERIFICATION

- 1.13.1 Reported results subject to verification by the Departmental Representative.
- 1.13.2 Provide personnel and instrumentation to verify up to 30 % of reported results.
- 1.13.3 Number and location of verified results as directed by Departmental Representative.
- 1.13.4 Pay costs to repeat TAB as required to satisfaction of Departmental Representative.

1.14 SETTINGS

- 1.14.1 After TAB is completed to satisfaction of the Departmental Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.
- 1.14.2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

1.15 COMPLETION OF TAB

- 1.15.1 TAB considered complete when final TAB report received and approved by the Departmental Representative.

1.16 AIR SYSTEMS

- 1.16.1 Standard: TAB to most stringent of the AABC or the NEBB.
- 1.16.2 Do TAB of systems, equipment, components, controls specified in divisions 21, 22, 23 and 25.
- 1.16.3 Qualifications: personnel performing TAB current member in good standing of AABC or NEBB qualified to standards of AABC or NEBB.
- 1.16.4 Measurements: to include as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.
- 1.16.5 Locations of equipment measurements: to include as appropriate:

1.16.5.1 Inlet and outlet of dampers, filter, coil, humidifier, fan, other equipment causing changes in conditions.

1.16.5.2 At controllers, controlled device.

1.16.6 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

1.18 OTHER TAB REQUIREMENTS

1.18.1 General requirements applicable to work specified to present article:

1.18.1.1 Qualifications of TAB personnel: as for air systems specified this section.

1.18.1.2 Quality assurance: as for air systems specified this section.

1.18.2 Building pressure conditions: Adjust HVAC systems, equipment, controls to ensure specified pressure conditions during winter, summer design conditions, at all times.

1.18.3 Zone pressure differences: Adjust HVAC systems, equipment, controls to establish specified air pressure differentials, with systems in every possible combination of normal operating modes

2. PRODUCTS

2.1 DRIVES

2.1.1 Possible changes of pulleys and belts in order to obtain the specified flow rates are part of the present section.

3. EXECUTION

3.1.1 Not used.

END OF SECTION

1. **GENERAL**

1.1 **DEFINITION**

1.1.1 Definitions

1.1.1.1 For the purposes of this section, the following definitions shall apply:

1.1.1.1.1 « Concealed » elements: insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.

1.1.1.1.2 « Exposed » elements: elements that are not concealed (as defined above).

1.1.1.1.3 Insulation system: insulation material, fasteners, jackets and other accessories.

1.1.2 Codes TIAC

1.1.2.1 CRD : Code Round Ductwork.

1.1.2.2 CRF : Code Rectangular Finish.

1.2 **REFERENCES**

1.2.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

1.2.1.1 ANSI/ASHRAE/IESNA 90.1, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.2.1.2 ASTM International Inc.

1.2.1.2.1 ASTM B 209M, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

1.2.1.2.2 ASTM C 335, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

1.2.1.2.3 ASTM C 411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

1.2.1.2.4 ASTM C 449/C 449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

1.2.1.2.5 ASTM C 547, Standard Specification for Mineral Fiber Pipe Insulation.

1.2.1.2.6 ASTM C 553, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

1.2.1.2.7 ASTM C 612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

1.2.1.2.8 ASTM C 795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

1.2.1.2.9 ASTM C 921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

- 1.2.1.3 Canadian General Standards Board (CGSB)
 - 1.2.1.3.1 CAN/CGSB-51.10-92, mineral fiber thermal insulation, panels.
 - 1.2.1.3.2 CAN/CGSB-51.11-92, Mineral fiber insulation mattress .
 - 1.2.1.3.3 CGSB 51-GP-52Ma, Vapour barrier, jacket and facing material for pipe, duct and equipment thermal insulation.
- 1.2.1.4 Green Seal Environmental Standards (GSES) : Standard GS-36, Commercial Adhesives.
- 1.2.1.5 South Coast Air Quality Management District (SCAQMD), California State: SCAQMD Rule 1168, Adhesive and Sealant Applications.
- 1.2.1.6 Thermal Insulation Association of Canada (TIAC), National Insulation Standards.
- 1.2.1.7 Underwriters Laboratories of Canada (ULC)
 - 1.2.1.7.1 CAN/ULC-S102, Method of test for surface burning characteristics of building materials and assemblies.
 - 1.2.1.7.2 CAN/ULC-S701, Standard for thermal insulation, polystyrene, boards and pipe covering.

1.3 DOCUMENTS / SAMPLES TO SUBMIT

- 1.3.1 Submit required documents and samples in accordance with sections 21 05 00.01, 21 05 00.02– General requirements.
- 1.3.2 Data sheet: provide manufacturer's printed product literature and datasheets for duct insulation, and include product characteristics, performance criteria, physical size, finish and limitations. Also indicate the VOC emission rate of adhesives and solvents during application and curing period.
- 1.3.3 Certificates: submit the documents signed by the manufacturer, certifying that the products, materials meet the physical characteristics and performance criteria requirements.
- 1.3.4 Manufacturer's instructions: Provide manufacture's written duct insulation jointing recommendations and special handling criteria, installation sequence, cleaning procedures.
- 1.3.5 Documents / elements to provide during the completion of the work
 - 1.3.5.1 Provide signed control reports carried out on-site by the Contractor and the manufacturer relating to the monitoring of the facility.
 - 1.3.5.2 Provide the required operating and maintenance records and enclose them to the manual referred to in sections 21 05 00.01, 21 05 00.02– General requirements.

1.4 PARTICULARITY

- 1.4.1 The Insulating Contractor shall ensure that the Mechanical Contractors have insulated equipment.
- 1.4.2 Unless otherwise specified « concealed » insulation does not require any finish and / or covered other than the factory-integrated one. On the other hand, the joints must be perfectly sealed.
- 1.4.3 All « exposed » insulations shall be finished and / or covered.
- 1.4.4 Use and location :

Refer to the list of applications for the different types of insulation shown in Part 3 of this section for details on their location and use.
- 1.4.5 Insulators shall continue through bulkheads and floors when the ducts pass through the bulkheads.

- 1.4.6 The insulation shall be carried out in accordance with good engineer practice by an expert installer in the field and shall be a member of the TIAC.

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 Storing and protection

- 1.5.1.1 Protect materials and equipment from weather and damage that may be caused by people's movements, equipment and vehicles.

- 1.5.1.2 Protect materials and equipment against all damage.

- 1.5.2 Store materials and equipment at the temperatures and under the conditions required by the manufacturer.

2. PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

- 2.1.1 Sustainable development requirements: materials, equipment and products in accordance with sections 21 05 00.01, 21 05 00.02—General requirements.

- 2.1.2 Select materials / equipment and products containing recycled materials or with characteristics associated with the efficient use of resources.

- 2.1.3 Adhesives and sealants: in accordance with sections 21 05 00.01, 21 05 00.02— General requirements. Use the least toxic sealants, adhesives and finishing products but that will meet the needs of the work.

- 2.1.3.1 The VOC content of adhesives and sealants shall be less than that specified in the Green Seal GS-36 Standard and SCAQMD Rule 1168.

- 2.1.3.2 Paint: VOC content of not more than 250 g / L according to GS-11 Standards and according to SCAQMD Rule 1113.

2.2 SUPERFICIAL COMBUSTION CHARACTERISTICS

- 2.2.1 According to standard CAN/ULC-S102.

- 2.2.1.1 Flame propagation index: not more than 25.

- 2.2.1.2 Smoke index: not more than 50.

2.3 INSULATION MATERIALS

- 2.3.1 Mineral fibre: as specified includes glass fibre, rock wool, slag wool.

- 2.3.2 The thermal conductivity factor (factor « k ») shall not exceed the prescribed values at an average temperature of 24 °C, according to tests carried out in accordance with ASTM C 335.

- 2.3.3 Thermal insulation with code number TIAC CER/1, CER/2: rigid mineral fiber panels complying with ASTM C 612 standard, density: (3 lbs/pi³ not exposed, 6 lbs/pi³ exposed) with or without factory-installed vapor retarder envelope and in compliance with CGSB 51-GP-52Ma standard.

- 2.3.4 Insulation with code number TIAC CEF/1, CEF/2: mineral fiber mattress, with or without a factory-installed vapor retarder, in compliance with CGSB 51-GP-52Ma standard.

- 2.3.4.1 Mineral fiber mattress: in compliance with standard ASTM C 553.

- 2.3.4.2 Vapor retarder: in compliance with standard CGSB 51-GP-52Ma.

- 2.3.4.3 Maximum « k » factor: in compliance with standard ASTM C 553.

- 2.3.4.4 Use additional fasteners to support the insulation under the duct if it has a width greater than 600 mm according to the recommendation in compliance with the FRD-7 system.

- 2.3.4.5 Type of support and spacing: according to the recommendations of the FRD-7 system.
- 2.3.4.6 The complete installation must be carried out in accordance with the recommendations in order to reach the FDR-7 system.
- 2.3.4.7 Product data sheets: Full details of the FRD-7 system must be included.

2.4 JACKETS

- 2.4.1 Canvas jackets: cotton 220 g/m², plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
- 2.4.2 Lagging adhesive: compatible with insulation
 - 2.4.2.1 VOC content of more than 50 g/L, according to Green Seal GS-36 standard and SCAQMD rule 1168.
 - 2.4.2.2 Use of low VOC products.

2.5 PRODUCT ACCESSORIES

- 2.5.1 Vapor retarder lap adhesive :
 - 2.5.1.1 Water based, fire retardant type, compatible with insulation.
 - 2.5.1.1.1 VOC content of more than 50 g/L, according to Green Seal GS-36 standard and SCAQMD rule 1168.
 - 2.5.1.1.2 Use of low VOC products.
- 2.5.2 Indoor Vapour Retarder Finish: Vinyl emulsion type acrylic, compatible with insulation.
- 2.5.3 Insulating cement: hydraulic setting on mineral wool, to ASTM C 449.
- 2.5.4 Tape: aluminum, self-adhesif, 50 or 75 mm wide minimum.
- 2.5.5 Contact adhesive : quick-setting.
 - 2.5.5.1 VOC content of more than 50 g/L, according to Green Seal GS-36 standard and SCAQMD rule 1168.
 - 2.5.5.2 Use of low VOC products.
- 2.5.6 Canvas adhesive: washable.
 - 2.5.6.1 VOC content of more than 50 g/L, according to Green Seal GS-36 standard and SCAQMD rule 1168.
 - 2.5.6.2 Use of low VOC products.
- 2.5.7 Tie wire: 1,5 mm thick stainless steel.
- 2.5.8 Banding: 0, 5 mm thickness, 12 mm wide stainless steel
- 2.5.9 Fasteners: 4 mm diameter pins with 35 mm diameter clips, length to suit thickness of insulation.

3. EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PRE-INSTALLATION REQUIREMENTS

- 3.2.1 Pressure test ductwork systems complete, witness and certify.

3.2.2 Ensure surfaces are clean, dry, and free from foreign material.

3.3 INSTALLATION

3.3.1 Install in accordance with TIAC National Standards.

3.3.2 Apply materials in accordance with manufacturer's instructions and as indicated.

3.3.3 Use layers with staggered joints when required nominal thickness exceeds 75 mm.

3.3.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes. Ensure hangers, and supports are outside vapour retarder jacket.

3.4 DUCTWORK INSULATION

AIR DUCT (application)	INSULATION THICKNESS mm (po) (see note 4) RANK	TYPE	JACKETS
.1 The exposed rectangular air ducts of a length of 5 m (16 ft) from the roof or exterior wall on the main duct or junction.	50 1	CER/1 CER/2	A
.2 Concealed, round or oval air ducts of a length of 5 m (16 ft.) from the roof or exterior wall on the main duct and junction.	50 1	CEF/2	-
.3 The exposed rectangular new air ducts, from the louvres to the heating coil.	25 2	CER/1 CER/2	A
.4 Concealed rectangular new air ducts, from the louvres to the heating coil.	50 1	CER/1 CER/2	-
.5 New round or oval air ducts, from the louvres to the heating coil.	50 1	CEF/2	A

Jacket:

A- Cover up the exposed duct with a canvas jacket see sections 2.4.1 and 2.4.2.

B- Cover up the duct with an aluminum jacket see section 2.4.3.

C- Cover up the ducts with stainless steel jacket see section 2.4.4.

D- Cover up the exposed exterior ducts with a self-adhesive membrane « Alumaguard » see section 2.4.5.

Note :

1- Raised joints, the thickness of the insulation on the joints must be of the same thickness as the straight sections and without air chamber.

- 2- Duct support, the support must be covered with insulation of the same thickness.
- 3- Support rods, cover the rods with flexible insulating supports with vapor retarder.
- 4- For double row insulation, provide overlapping joints.

END OF SECTION

1 GENERAL

1.1 REFERENCES

- 1.1.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE): ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).
- 1.1.2 American Society for Testing and Materials International (ASTM)
 - 1.1.2.1 ASTM B 209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate [Metric].
 - 1.1.2.2 ASTM C 335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
 - 1.1.2.3 ASTM C 411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - 1.1.2.4 ASTM C 449/C 449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - 1.1.2.5 ASTM C 533, Calcium Silicate Block and Pipe Thermal Insulation.
 - 1.1.2.6 ASTM C 547, Mineral Fiber Pipe Insulation.
 - 1.1.2.7 ASTM C 795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 - 1.1.2.8 ASTM C 921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
 - 1.1.2.9 ASTM A167, Specification for Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet and Strip.
- 1.1.3 Canadian General Standards Board (CGSB)
 - 1.1.3.1 CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
 - 1.1.3.2 CGSB 51 GP 9M, Thermal insulation, mineral fiber sheaths, for pipes and cylindrical conduits.
 - 1.1.3.3 CGSB 51 GP 11M, Mineral fiber insulation mattress, for pipes, ducts, machinery and boilers.
 - 1.1.3.4 CAN/CGSB 51.12 M, Thermal insulation and finishing cement.
 - 1.1.3.5 CAN/CGSB 51.40 M, Thermal, flexible, elastomeric, unicellular, sheet and tubular insulation.
 - 1.1.3.6 CGSB 51 GP 53M, Polyvinyl chloride sheaths for insulated pipes, pipes and conduits.
 - 1.1.3.7 CAN/CGSB-51.60.53, Polyvinyl chloride sheaths for insulated cylindrical containers and conduits.
 - 1.1.3.8 CAN4 S102, Surface burning characteristics of building materials and assemblies.

- 1.1.3.9 ANSI/NFPA 90A, Air Conditioning and Ventilating Systems, Installation.
- 1.1.3.10 ANSI/NFPA 90B, Warm Air Heating and Air Conditioning Systems.
- 1.1.4 Health Canada / system of information about hazardous materials used in the work (SIMDUT): identification sheets (FS).
- 1.1.5 Manufacturers' Trade Associations: Thermal Insulation Association of Canada (TIAC): National Insulation Standards (C2004).
- 1.1.6 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.
- 1.1.7 CSA HA Series M CSA Standards for Aluminum and Aluminum Alloys.

1.2 DEFINITIONS

- 1.2.1 For purposes of this section:
 - 1.2.1.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
 - 1.2.1.2 "EXPOSED" - will mean "not concealed" as specified.
 - 1.2.1.3 Spaces such as room of mechanics, electric room, boiler room, lean-to, tunnel and/or gallery and any space of this nature are considered occupables.
 - 1.2.1.4 "Material" means any component used for the insulation including, besides the jacket or the insulating material itself, the glues, the ribbons, the coverings (collections), adorns vapors, jacketings, sealings, ties, coated and any necessary product to complete the works.
 - 1.2.1.5 "Network" means piping including accessories, garnish, etc. such as valves, elbows, pumps, tees, etc., which are incorporated.
 - 1.2.1.6 "Domestic" means drinkable and not used exclusively to this end.
 - 1.2.1.7 "Waste water" means any waters of evacuation except rainwaters.
 - 1.2.1.8 "Throats" means drain of floor, drain of roof, funnel, etc., connected with a pipe of evacuation of waste water, or with a piping of rainwater.
 - 1.2.1.9 "Condensat" means water resulting from the condensation of the vapor which returns to the boiler in the vapor via diverse progresses. In this water, can be added by some softened water, drinking water or vapor without losing this definition. Also mean water generated in an air conditioning system.
- 1.2.2 TIAC ss:
 - 1.2.2.1 CRF: Code Rectangular Finish.

1.2.2.2 CPF: Code Piping Finish.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- 1.3.1 Subject documents and samples required according to sections 21 05 01, 21 05 02- general Prescriptions.
- 1.3.2 Data sheets: Submit manufacturer's printed product literature, specifications and datasheet. Include product characteristics, performance criteria, and limitations and the finish. They also have to indicate the VOC emission rate of adhesives and solvents during application and curing period.
- 1.3.3 Samples
 - 1.3.3.1 Upon request by the Departmental Representative, submit samples required by the product described in the present section.
 - 1.3.3.2 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix label beneath sample indicating service.
- 1.3.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- 1.3.5 Instructions: submit manufacturer's installation instructions.
- 1.3.6 Have the documentation provided by the manufacturer concerning the methods of laying the insulation, the manufacturing details of insulation elements for pipes, fittings and valves approved as well as the recommendations for the joints execution.
- 1.3.7 Documents / items to be returned upon completion of works
 - 1.3.7.1 Provide the required operating and maintenance records and join them manual mentioned in sections 21 05 01, 21 05 02 general Prescriptions.
 - 1.3.7.2 Provide reports of signed on-site inspections performed by supplier and contractor for facility monitoring.

1.4 QUALITY ASSURANCE

- 1.4.1 Reliability of technical data
 - 1.4.1.1 Data from manufacturer's catalogs and documentation have to be reliable data, based on test results which have been carried out by the manufacturers themselves or, on their behalf, by independent laboratories, and having allowed certifying elements conformity to the requirements of codes and the existing standards.
 - 1.4.1.2 The installer must be an expert in the workfield.

1.5 PARTICULARITY

- 1.5.1 The insulation Contractor must confirm with the mechanics contractor the kind of piping and equipment to insulate.
- 1.5.2 Unless otherwise specified, "concealed" insulation does not have to be subject to a finish and/or other covering other than that integrated in the factory. On the other hand, joints must be perfectly sealed.
- 1.5.3 All the "visible" insulation have to be finished and/or covered.

- 1.5.4 Use and location: refer to list of application of the various types of insulations shown in part 3 of the present section to obtain precision for details on their location and use.
- 1.5.5 Insulation has to continue through partitions and floors when the piping crosses these.
- 1.5.6 Insulation must be carried out in accordance with good engineering practice by an expert installer in the field and a member of the ACIT.
- 1.5.7 Unless otherwise specified in Table A in this section, all piping shall be insulated over its entire length.

1.6 DELIVERY, STORAGE AND HANDLING

- 1.6.1 Storage and protection
 - 1.6.1.1 Protect from weather, construction traffic.
 - 1.6.1.2 Protect against damage.
 - 1.6.1.3 Store at temperatures and conditions required by manufacturer.

2 PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

- 2.1.1 Choose products and materials with recycled content or resource efficient characteristics whenever possible. If applicable, verify with the manufacturer the pre-consumption and post-consumer recycled content of the products offered.
- 2.1.2 Adhesives and sealants:
- 2.1.3 Use least toxic sealants, adhesives, sealers and finishes necessary to comply with the requirements of the project.
 - 2.1.3.1 The VOC content of adhesives and sealants must be less than that specified in the Green Seal GS-36 standard and SCAQMD regulation 1168.
 - 2.1.3.2 Paint: VOC of up to 250 g / L according to GS-11 standard according to SCAQMD regulation number 1113.

2.2 FIRE AND SMOKE RATING

- 2.2.1 In accordance with CAN4 S102, the materials used shall have a maximum flame spreading rating of 25 and maximum smoke developed rating of 50.

2.3 GENERAL

- 2.3.1 Materials shall have been tested according to ASTM C411.
- 2.3.2 Pre-molded PVC coverings for fittings, elbows and all piping in mechanical rooms.

2.4 TABLE 1

2.4.1 Thickness of insulating material according to the temperatures of networks, according to CMNE B.

Vapour pressure Saturated (kPa or condensat)	Temperature of the fluid (°C)	Thickness of the minimal insulation (mm)			
		Nominal diameter of pipes (DN)			
		1 and less	1 ¼ in 2	2½ in 4	5 and more
827 and more	177 and more	64	64	76	89
104 in 826	122-176	51	64	64	89
0 in 103	94-121	38	38	51	51
Pumped Condensate	61-93	25	25	38	38
--	30-60	25	25	38	38
--	21-29	25	25	25	38
--	5-20	25	25	25	25
--	Less of 5	25	38	38	38
Condensate in low-pressure gravity		25	38	51	51

2.5 TYPE P-1 INSULATION: MINERAL FIBERS; PREFORMED WITH VAPOUR RETARDER, SERVICE TEMPERATURE BETWEEN 4 °C À 200 °C

2.5.1 Usages: type P-1 insulation for pipes and fittings. Service temperature between 4 °C à 200 °C.

2.5.2 Materials

2.5.1.1 Rigid mineral envelope conforming to CGSB 51 GP 9M, with vapor barrier, jacket and coating material conforming to standard CGSB 51 GP 52M.

2.5.2.2 Acceptable products: Manson, Alley-K APT, Knauf and Johns's Manville.

2.5.2.3 Insulation with a thermal conductivity "K" of not more than 0.034 W / m °C at an average temperature of 24 °C when tested in accordance with the requirements ASTM C335.

2.6 TYPE P-2 INSULATION: FLEXIBLE IN MINERAL FIBERS, WITH VAPOUR RETARDER; SERVICE TEMPERATURE (T) UNTIL 85 °C

2.6.1 Materials

2.6.1.1 Mattress of mineral fibers (for insulation of pipings) in compliance with the standard CGSB 51-GP-9M with vapour retarder, jacket and cover material corresponding to the standard CGSB 51-GP-52M.

2.6.1.2 Acceptable products: Manson Alley Wrap FSK, Knauf and some teed type Of John Manville.

2.6.2 Thickness of the insulation: refer to the picture 1, the art. 2.4.

2.7 TYPE P-3 FLEXIBLE INSULATION, IN ELASTOMER, SERVICE TEMPERATURE (T) BETWEEN 0 °C AND 100 °C

2.7.1 Uses: Insulation of the type (P-3 for pipes) and joins installed in rooms with mechanical installations and outside above ground level, used in the case of the following networks: (supply) of cold domestic water

2.7.2 Materials

2.7.2.1 Flexible insulation, in elastomer, unicellular, in sheet leaf and tubular, in compliance with the standard CAN / ONGC 51.40 M80.

2.7.2.2 Inside: paint when apparent inside, the insulating material will be covered with an

appropriate white paint, two coats of thickness such as Armstrong finished Armaflex WB.

2.7.2.3 Thermal conductivity coefficient "K" not exceeding 0,036 W/m °C at an average temperature of 24 °C when tested according to the requirements of the standard ASTM C335.

2.7.2.4 Permeability to water vapor in perm / po: 0.05: in compliance with the standard ASTM E965.

2.7.2.5 Acceptable products: Armstrong Armaflex AP, equivalent: Insul-Tube.

2.7.3 Thickness of the insulation: 13 mm or such as indicated.

2.8 ADHESIVES, RIBBONS AND FASTENERS

2.8.1 Use glues with very low content in COV.

2.9 ADHESIVES FOR SEALING VAPOR BARRIER OVERLAPPING

2.9.1 Water-based adhesive, flame resistant, compatible with heat-insulating material.

2.10 VAPOR BARRIER COATING FOR INTERIOR PIPINGS

2.10.1 Acrylic vinyl emulsion, compatible with heat-insulating material.

2.11 JACKETS

2.11.1 Vinyl polyvinyl chloride jacket (PVC)

2.11.1 Jackets used on all elements in mechanical rooms except for steam piping.

2.11.2 Apply a PVC liner to the pipe insulation and fasten it with the required fasteners to 100 mm center to center.

2.11.3 Cover the longitudinal and circumferential joints with a tight fitting trim strip.

2.11.4 The PVC liner shall have a thickness of 0.15 mil, fire index 25 and smoke index 50.

2.11.5 Acceptable product: Proto or approved equivalent.

2.11.2 Canvas

2.11.2.1 Jackets used on exposed elements other than mechanical rooms: cotton canvas, plain weave, approved by the "ULC", with a mass of 220 g / m².

2.11.2.2 Jackets used on tap fittings and hidden fittings: solid-woven cotton canvas, approved by ULC, with a mass of 120 g / m².

2.11.2.3 Acceptable product: Alpha Maritex 3451-RW, Clairmont Diplag 60, S. Fattal Thermocanvas.

2.12 ENVELOPES AND REMOVABLE PREFABRICATED INSULATION

2.12.1 Uses: expansion joints faucet factory.

2.12.2 Design: Designed to allow free movement of expansion joints and to be removed and replaced periodically without risk of damage to the adjacent insulation.

2.12.3 Insulation

2.12.3.1 Mold to conform the shape of elements to be insulated.

2.12.3.2 Same thickness as adjacent jacket.

2.12.3.3 Water cooling installations: including a vapor barrier.

2.12.3.4 Wrap: aluminum 1,3 mm in thickness.

2.13 FITTINGS AND ELBOWS

2.13.1 Insulate joints and elbows with miter cut pipe insulation sections. Alternatively, insulate the fittings and elbows with a tight fitting flexible insulation of the same thickness as the rigid insulation on the pipe.

3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

3.2.1 Install in accordance with TIAC National Standards.

3.2.2 Put the insulating material only once the ended compulsory and the results approved by the Departmental Representative. Make sure that the surfaces of the insulation and the elements to be insulated are clean and dry during the installation of the insulation and during the application of a filler of finish. Put the insulation and the accessories and apply fillers of finish according to the recommendations of the manufacturer and the present prescriptions.

3.2.3 In the case of piping covered with insulation and vapor barrier, install a high-density insulation where protective shields are provided for insulated pipes. The vapor barrier must not be punctured to allow the elements of the supports to pass through or be interrupted at the location of the sleeves, fittings and supports.

3.2.4 When the insulation is susceptible to be damaged by shocks due to its proximity to access doors, doors, access plates, etc., protect it with a steel pre-wired steel sheath of 1.3 mm (18 gauge).

3.2.5 Install the heat-insulating material so as to produce a smooth and uniform surface.

3.2.6 For the heat-insulating material, apply the coatings and finishing products in accordance with the recommendations and precautions of the insulating, adhesive and coating manufacturers.

3.2.7 All supports of all types of piping, hot or cold, shall be installed completely outside the heat insulator.

3.2.7.1 For insulated piping of an insulator of elastomer or soft mineral fibers, a rigid material of the "Foamglass" or "Styrofoam" type is used on each support and a steel saddle of an appropriate length is installed to distribute weight.

3.2.7.2 For insulated piping of preformed mineral fiber insulation or other rigid material, the insulating material shall be extended to each support and a steel saddle of an appropriate length shall be installed to distribute the weight

3.2.7.3 This material shall be supplied and installed by the heat insulation contractor. The steel supports and saddles shall be provided and installed by each relevant mechanical contractor to the satisfaction of the Insulation contractor.

- 3.2.8 Install a high compressive strength insulation suitable for operating conditions where no insulation shield can be installed.

3.3 INSULATION

- 3.3.1 Install insulation according to the standards ANSI / NFPA 90A and ANSI / NFPA 90B.
- 3.3.2 Preformed insulation: use a shell insulation for pipes with a diameter of DN ½ or less, and a heat insulator in shells or curved segments for pipes larger than DN ½.
- 3.3.3 Multi-thickness insulation: offset the abutment joints of each insulation thickness.
- 3.3.4 Vertical pipings of diameter upper to DN 3: use supports of insulation which will be welded or screwed on pipes, directly over the lowest join, then in 4,5 m of interval.
- 3.3.5 Expansion joints of the insulation: cut very straight the extremity of every thickness of insulation, according to the instructions of the manufacturer. Leave a space of 25 mm between both successive sections and fill with flexible insulation in type P-2's mineral fibers without compressing that this.
- 3.3.6 Seal and end the visible extremities of the insulation and others with some insulating cement.
- 3.3.7 Expansion joints of the piping: allow the free dilation / contraction of the expansion joint without risk to damage the insulation or its cover.
- 3.3.8 Flanges for fitting orifice plates, flanges and fittings to the inlet and outlet of appliances, expansion joints, valves, valves and other items requiring periodic maintenance: leave these parts uncovered and cut the adjacent insulation Bevelled at the studs and nuts so that these elements can be removed without damaging the insulation.
- 3.3.9 Do not put insulation on the following elements:
- 3.3.9.1 Chrome pipes, valves and fittings.
- 3.3.9.2 Unions and flange connections of heating systems at 48 °C and below.

3.4 FIXATION (BINDING) OF THE INSULATION

- 3.4.1 Secure each heat insulating section with end tapes and intermediate tapes at intervals of not more than 900 mm.

3.5 APPLICATION TABLE FOR INSULATION

- 3.5.1 Refer to the TABLE A.

This enumeration, without being exhaustive, includes in a general way the list of application of the various types of insulating material and the jacketing required on the various pipings within the framework of the project.

TABLE A

JACKET FOR PIPING

PIPING	OPERATING TEMPERATURE	LOCATION	TYPE	JACKET
Domestic hot water	60 °C		P-1	PVC
Domestic cold water	5-20 °C		P-3	PVC
Vent		3 m inside the thermal envelope	P-2	
Steam			P-1	Canevas
Condensate			P-1	Canevas

3.6 QUALITY CONTROL

3.6.1 Controls made on the spot by the manufacturer

3.6.1.1 Make arrangements for the manufacturer of the products supplied under this section to review work relating to the handling, installation / application, protection and cleaning of his product or products, And submit written reports, in an approved format, that will verify whether the work was done under the terms of the contract.

3.6.1.2 The manufacturer shall make recommendations on the use of the product (s) and carry out a start-up and inspection to verify compliance with the instructions.

END OF SECTION

1. GENERAL

1.1 REFERENCES

- 1.1.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).
- 1.1.2 American Society for Testing and Materials International, (ASTM)
 - 1.1.2.1 ASTM A 480/A 480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
 - 1.1.2.2 ASTM A 635/A 635M, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.
 - 1.1.2.3 ASTM A 653/A 653M, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- 1.1.3 Department of Justice Canada Canada (Jus): Canadian Environmental Protection Act (LCPE), 1999, ch. 33.
- 1.1.4 Health Canada/ Workplace Hazardous Materials (WHMIS): Material Safety data Sheets (MSDS).
- 1.1.5 National Fire Protection Agency Association (NFPA)
 - 1.1.5.1 NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems.
 - 1.1.5.2 NFPA 90B, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
 - 1.1.5.3 NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
- 1.1.6 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
 - 1.1.6.1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2nd Edition and Addendum No. 1.
 - 1.1.6.2 SMACNA HVAC Air Duct Leakage Test Manual.
 - 1.1.6.3 IAQ Guideline for Occupied Buildings Under Construction, 1st Edition.
- 1.1.7 National Air Duct Cleaners Association: Assessment, cleaning and restoration of HVAC systems ACR 2002 (NADCA).

1.2 DOCUMENTS / SAMPLES TO SUBMIT

- 1.2.1 Submit shop drawings and product data in accordance with Section 21 05 00.01, 21 05 00.02– General requirements.
- 1.2.2 Data sheets: submit the required technical data sheets and the manufacturer's product documentation. The data sheets must indicate the characteristics of the products, the performance criteria, the dimensions, the limits and the finish. They must also indicate the VOC emission rate of adhesives and solvents during application and curing period.
- 1.2.3 Shop drawings and technical data sheets should cover the following:
 - 1.2.3.1 Sealants.
 - 1.2.3.2 Tape.
 - 1.2.3.3 Proprietary joints.
 - 1.2.3.4 Fittings.
- 1.2.4 At the request of the Departmental Representative, submit samples of the product or one of its components described in this section.

- 1.2.5 Documents / elements to provide during the completion of the work
 - 1.2.5.1 Provide the required operating, maintenance and spare parts sheets and enclose them to the manual referred to in sections 21 05 00.01, 21 05 00.02– General requirements
 - 1.2.5.2 Provide signed control reports carried out on-site by the Contractor relating to the monitoring of the installation and start-up. Notify the Departmental Representative at least 48 hours before starting the work.

1.3 QUALITY ASSURANCE

- 1.3.1 Reliability of technical data: data from the manufacturer's catalogs and documentation shall be reliable data, based on test results which have been carried out by the manufacturers themselves or, on their behalf, by independent laboratories and certified that the elements comply with the requirements of the applicable codes and standards.

1.4 INDOOR AIR QUALITY MANAGEMENT PLAN (IAQ)

- 1.4.1 Indoor air quality management plan (IAQ)
 - 1.4.1.1 Develop and implement an Indoor Air Quality (IAQ) Management Plan in accordance with Section 21 05 00.01, 21 05 00.02–General requirements.
 - 1.4.1.2 During construction meet or exceed the requirements of SMACNA IAQ Guideline for Occupied Buildings under Construction « Indoor Air Quality Guideline for Occupied Buildings under Construction ».

1.5 DELIVERY, STORAGE AND HANDLING

- 1.5.1 Protect on site stored or installed absorptive material from moisture damage.

2. PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

- 2.1.1 Sustainable development requirements: materials and products in accordance with sections 21 05 00.01, 21 05 00.02– General requirements.
- 2.1.2 Choose products and materials with recycled content or resource efficient characteristics.
- 2.1.3 Tape and sealants: in accordance with sections 21 05 00.01, 21 05 00.02– General requirements. Use least toxic sealants, adhesives, sealers and finishes necessary to comply with the requirements of the project. The VOC content of adhesives and sealants shall be less than that specified in the Green Seal GS-36 Standard and SCAQMD Rule 1168

2.2 SEAL CLASSIFICATION

- 2.2.1 The seal classification of the ducts shall be determined according to the data in the table below.

Maximum Pressure Pa	Seal Class (SMACNA)
500	C
250	C
125	C

- 2.2.2 Class C: transverse joints and connections made air tight with gaskets, sealant, tape or combination thereof. Longitudinal seams unsealed.

2.3 SEALANT

- 2.3.1 Sealant : oil resistant, water borne, polymer type flame resistant duct sealant. Temperature range of -30 °C to 93 °C. Use of low VOC products.

2.4 TAPE

2.4.1 Tape: polyvinyl treated, open weave fiberglass tape, of 50 mm wide. Use of low VOC products.

2.5 DUCT LEAKAGE

2.5.1 In accordance with SMACNA HVAC Air Duct Leakage Test Manual.

2.6 FITTINGS

2.6.1 Fabrication : to SMACNA.

2.6.2 Radiused elbows

2.6.2.1 Rectangular horizontal duct: standard radius or as indicated; (short radius with single thickness turning vanes) centreline radius 1, 5 times width of duct.

2.6.2.2 Rectangular vertical duct: standard radius or as indicated (short radius with single thickness turning vanes); centreline radius 0, 75 times width of duct.

2.6.2.3 Round ducts

2.6.2.3.1 Horizontal elbow of standard radius or as indicated (short radius elbow); centreline radius 1, 5 times width of duct.

2.6.2.3.2 Vertical elbow of standard radius or as indicated (short radius elbow); centreline radius 0, 75 times width of duct..

2.6.3 Branches

2.6.3.1 Rectangular main and branch: with radius on branch with centerline radius corresponding to indications or 45 degrees entry on branch.

2.6.3.2 Provide volume control damper in branch duct near connection to main duct.

2.6.3.3 Main duct branches with splitter damper.

2.6.4 Transitions

2.6.4.1 Diverging : 20° maximum included angle

2.6.4.2 Converging : 30° maximum included angle

2.6.5 Offsets: Radiused elbows as indicated.

2.6.6 Obstruction deflectors: maintain full cross-sectional area. Maximum included angles as for transitions.

2.7 FIRE STOPPING

2.7.1 Retaining angles around duct, on both sides of fire separation in accordance with sections 21 05 00.01, 21 05 00.02–General requirements.

2.7.2 Fire stopping material and installation must not distort duct.

2.8 GALVANIZED STEEL AIR DUCT

2.8.1 Lock forming quality: to ASTM A 653/A 653M, zinc coating Z90.

2.8.2 Thickness, fabrication and reinforcement: ASHRAE and SMACNA.

2.8.3 Joints : to l'ASHRAE and SMACNA, proprietary manufactured duct joint.

2.8.4 Use : All project ducts.

2.9 HANGERS AND SUPPORTS

2.9.1 Strap hangers: of same material as duct [but next sheet metal thickness heavier than duct. Maximum size duct supported by strap hanger: 500 mm.

2.9.2 Hanger configuration: to l'ASHRAE and SMACNA.

Angles and suspension rods: galvanized steel angles retained by galvanized steel rods, as indicated in the table below:

Duct Size (mm)	Angle Size (mm)	Rod Size (mm)
Up to 750	25 x 25 x 3	6
751 à 1 050	40 x 40 x 3	6
1 051 à 1 500	40 x 40 x 3	10
1 501 à 2 100	50 x 50 x 3	10
2 101 à 2 400	50 x 50 x 5	10
2 401 and over	50 x 50 x 6	10

2.9.3 Upper hanger attachments

2.9.3.1 For concrete: manufactured concrete inserts.

2.9.3.2 For steel joist: manufactured joist clamp.

2.9.3.3 For steel beams: manufactured beam clamps.

3. EXECUTION

3.1 INSTALLATION

3.1.1 Perform the work in accordance with the requirements of the standard NFPA 90A, standard NFPA 90B, ASHRAE and SMACNA standard, and according to indications and for each part of the work.

3.1.2 Do not break continuity of insulation vapour barrier with hangers or rods.

3.1.2.1 Insulate strap hangers 100 mm beyond insulated duct and ensure diffuser is fully seated.

3.1.3 Support risers in accordance with ASHRAE and SMACNA.

3.1.4 Install breakaway joints in ductwork on sides of fire separation.

3.1.5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.

3.1.6 Manufacture duct in lengths and diameter to accommodate installation of acoustic duct lining.

3.2 CLEAN MEASURES

3.2.1 General : The Ventilation Contractor shall take all preventive measures to ensure that the interior of all new equipment, components and ventilation ducts after installation at the site is free of dust and oil and complies To the National Air Duct Cleaners Association (NADCA) ACR 2002 standard of 0.75 mg / 100 cm².

3.2.2 In-house cleaning of all other ducts, ducts and accessories of other systems prior to dispatch to the site.

3.2.3 Install sealing membranes on all ducts and accessories of ventilation and air conditioning systems before they are sent to the site. The sealing membranes will only be removed one at a time when installing each of the duct sections. During duct installation, the seal at each end of the ducts shall be left in place by the Contractor until the next seal is made.

- 3.2.4 Prior to start-up, samples shall be taken from the Departmental Representative to verify the cleanliness of the ventilation systems. However, if deficiencies are retained, the Ventilation Contractor will be responsible for correcting these deficiencies by cleaning components, equipment, or sections of ducts that are deficient by a cleaning contractor and recognized by NADCA.

3.3 HANGERS

- 3.3.1 Strap hangers: install in accordance with SMACNA.
- 3.3.2 Angle hangers: complete with locking nuts and washers.
- 3.3.3 Hanger spacing: in accordance with the following:

<u>Duct Size</u>	<u>Spacing</u>
(mm)	(mm)
to 1 500	3 000
1 501 and over	2 500

3.4 WATERTIGHT DUCT

- 3.4.1 Provide watertight duct for:
- 3.4.1.1 The vertical ducts and bottom of the vertical ducts under the exhaust fans.
- 3.4.1.2 Plenums and ducts for new air intakes and combustion air intakes.
- 3.4.1.3 Upstream and downstream duct-mounted humidifiers over a distance of at least 3 000 mm.
- 3.4.1.4 All ducts indicated.
- 3.4.2 Form bottom of horizontal duct without longitudinal seams.
- 3.4.2.1 Solder or weld joints of bottom and side sheets.
- 3.4.2.2 Seal other joints with duct sealer.
- 3.4.3 Fit base of riser with 150 mm deep drain sump and 32 mm drain connected, with deep seal trap and valve trap primer and discharging to pen funnel drain as indicated.

3.5 KITCHEN

- 3.5.1 Not applicable.

3.6 SEALING

- 3.6.1 Apply sealant to outside of joint to manufacturer's recommendations.
- 3.6.2 Bed tape in sealant and recoat with minimum of one coat of sealant to manufacturers recommendations.

3.7 LEAKAGE TESTS

- 3.7.1 When requested in this specification, refer to section 23 05 94 – Pressure testing of aeraulic networks. The absence of section 23 05 94 does not release the Contractor as to the waterproofing of the ducts to the required case. If in doubt, the Departmental Representative may require testing at no additional cost.
- 3.7.2 Perform waterproof tests in accordance to HVAC Duct Leakage Test Manual of the SMACNA.
- 3.7.3 Do leakage tests in sections.
- 3.7.4 Perform preliminary leakage tests (for air leakage) according to the instruction, to verify the quality of the work.

- 3.7.5 Do not install additional ductwork until trial test has been passed.
- 3.7.6 Test section minimum of 30 m long with not less than three branch takeoffs and two 90 degrees elbows.
- 3.7.7 Do not insulate or conceal ducts before completing the required tests.

END OF SECTION

1. GENERAL

1.1 REFERENCES

- 1.1.1 Health Canada/ Workplace Hazardous Materials Information System (WHMIS) : Material Safety Data Sheet (MSDS).
- 1.1.2 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) : SMACNA – HVAC Duct Construction Standards – Metal and Flexible.

1.2 DOCUMENTS / SAMPLE FOR SUBMITTAL

- 1.2.1 Provide required documents and samples in accordance with sections 21 05 00.01, 21 05 00.02–General requirements.
- 1.2.2 Data sheet
 - 1.2.2.1 Submit manufacturer's printed product literature, specifications and data sheet. Indicate the following:
 - 1.2.2.1.1 Flexible connections.
 - 1.2.2.1.2 Duct access doors.
 - 1.2.2.1.3 Turning vanes.
 - 1.2.2.1.4 Instrument test ports.
- 1.2.3 At the Departmental Representative's request, submit samples of the product or one of its components described in the following section.
- 1.2.4 Instructions: submit manufacturer's installation instructions.
- 1.2.5 Closeout submittals: provide operating, maintenance and spare parts data sheet required and incorporate them into the manual specified in sections 21 05 00.01, 21 05 00.02–General requirements

1.3 QUALITY ASSURANCE

- 1.3.1 Reliability of technical data: data from the manufacturer's catalogs and documentation shall be reliable data, based on test results which have been carried out by the manufacturers themselves or, on their behalf, by independent laboratories and certified that the elements comply with the requirements of the applicable codes and standards.

2. PRODUCTS

2.1 GENERAL

- 2.1.1 The accessories must be manufactured in accordance with HVAC Duct Construction Standards of SMACNA.

2.2 FLEXIBLE CONNECTIONS

- 2.2.1 Frame: galvanized sheet metal frame 3 mm thick with fabric clenched by means of double locked seams.
- 2.2.2 Flexible connections: Fire resistant, self-extinguishing, neoprene coated glass fabric, temperature rated at -40 °C to +90 °C, density of 1.3 kg/m².

2.3 ACCESS DOORS IN DUCTS

- 2.3.1 Non-Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame..
- 2.3.2 Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.
- 2.3.3 Gaskets: neoprene or foam rubber.
- 2.3.4 Hardware
 - 2.3.4.1 Doors measuring up to 300 mm aside: two sash locks complete with safety chain.
 - 2.3.4.2 Doors measuring between 301 mm and 450 mm aside: four sash locks complete with safety chain.
 - 2.3.4.3 Doors measuring between 451 mm and 1 000 mm aside: piano hinge and minimum two sash locks.
 - 2.3.4.4 Doors measuring more than 1 000 mm aside: piano hinge and two handles operable from both sides

2.4 TURNING VANES.

- 2.4.1 Factory or shop fabricated double thickness with trailing edge to recommendations of SMACNA and as indicated.

2.5 SPIN-IN COLLARS

- 2.5.1 Conical galvanized sheet metal spin-in collars with lockable butterfly damper.
- 2.5.2 Sheet metal thickness to co-responding round duct standards.

3. EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- 3.2.1 Flexible connections
 - 3.2.1.1 Install in following locations:
 - 3.2.1.1.1 Inlets and outlets to supply air units and fans.
 - 3.2.1.1.2 Inlets and outlets of exhaust and return air fans.
 - 3.2.1.1.3 At indicated locations.
 - 3.2.1.2 Length of connection: 100 mm.
 - 3.2.1.3 Minimum distance between metal parts when system in operation: 75 mm.
 - 3.2.1.4 Install in accordance with recommendations of SMACNA.
 - 3.2.1.5 When fan is running:
 - 3.2.1.5.1 Ducting on sides of flexible connection to be in alignment.
 - 3.2.1.5.2 Ensure slack material in flexible connection.

3.2.2 Access doors

3.2.2.1 Dimensions

3.2.2.1.1 300 mm x 450 mm in the case of an inspection door or according to the dimension (s) of the ducts.

3.2.2.1.2 As indicated.

3.2.2.2 Locations

3.2.2.2.1 Where required to allow access and maintenance of smoke evacuation dampers and fire dampers.

3.2.2.2.2 Where required to allow access to air flow control registers.

3.2.2.2.3 Where required to allow access to fresh air intake and evacuation plenums.

3.2.2.2.4 Where required to allow access to humidification nozzles.

3.2.2.2.5 Where required to allow access to devices requiring periodic maintenance.

3.2.2.2.6 Where required, as required by the Code.

3.2.2.2.7 Where required for access to reheating batteries.

3.2.2.2.8 In the other places indicated.

3.2.3 Turning vanes

3.2.3.1 Install in accordance with recommendations of SMACNA and as indicated.

END OF SECTION

1. GENERAL

1.1 REFERENCES

- 1.1.1 Sheet Metal and Air Conditioning National Association (SMACNA): SMACNA, HVAC Duct Construction Standards, Metal and Flexible.
- 1.1.2 Health Canada/ Workplace Hazardous Materials Information System (WHMIS): Material Safety Data Sheets (MSDS).

1.2 DOCUMENTS / SAMPLES SUBMITTALS

- 1.2.1 Submit required documents and samples in accordance with sections 21 05 00.01, 21 05 00.02—General requirements.
- 1.2.2 Data sheets: submit the required technical data sheets and the manufacturer's product documentation. The data sheets must indicate the characteristics of the products, the performance criteria, the dimensions, the limits and the finish.
- 1.2.3 At the request of the Departmental Representative, submit samples of the product or one of its components described in this section.
- 1.2.4 Instructions: submit manufacturer's installation instructions
- 1.2.5 Documents / elements to provide during the completion of the work : provide the maintenance sheets and technical data and enclose them to the manual referred to in sections 21 05 00.01, 21 05 00.02 – General requirements.

1.3 QUALITY ASSURANCE

- 1.3.1 Reliability of technical data: data from the manufacturer's catalogs and documentation shall be reliable data, based on test results which have been carried out by the manufacturers themselves or, on their behalf, by independent laboratories and certified that the elements comply with the requirements of the applicable codes and standards.

2. PRODUCTS

2.1 GENERAL

- 2.1.1 The dampers must be manufactured according with SMACNA standards.

2.2 AIR DISTRIBUTION DAMPERS « SPLITTER DAMPER » « EXTRACTION BLADE »

- 2.2.1 Blade register fabricated from same material as duct but one sheet metal thickness heavier, with appropriate stiffening.
- 2.2.2 Blade made of single or double thickness construction.
- 2.2.3 Control rod with locking device and position indicator.
- 2.2.4 Rod configuration to prevent end from entering duct.
- 2.2.5 Picot mechanism made of piano hinge.
- 2.2.6 Folded leading edge.

2.3 SINGLE BLADE DAMPER « MANUAL BLADE »

- 2.3.1 Blade damper fabricated from same material as duct, but one sheet metal thickness heavier. V-groove stiffened.

- 2.3.2 Size and configuration to recommendations of SMACNA, except maximum height 100 mm as indicated.
- 2.3.3 Locking quadrant with shaft extension to accommodate air duct insulation thickness.
- 2.3.4 Inside and outside nylon end bearings.
- 2.3.5 Channel frame of same material as adjacent duct, complete with angle stop.

2.4 MULTI-BLADED DAMPERS « MANUAL BLADE »

- 2.4.1 Dampers factory manufactured of material compatible with duct.
- 2.4.2 Opposed blade: configuration, metal thickness and construction to recommendations of SMACNA.
- 2.4.3 Maximum blade height: 100 mm.
- 2.4.4 Bearings: self-lubricating nylon.
- 2.4.5 Linkage: shaft extension with locking quadrant.
- 2.4.6 Channel frame of same material as adjacent duct, complete with angle stop.

3. EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- 3.2.1 Install where indicated.
- 3.2.2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
- 3.2.3 Locate balancing dampers in each branch duct, for supply, return and exhaust systems.
- 3.2.4 Runouts to registers and diffusers: install single blade damper located as close as possible to main ducts.
- 3.2.5 Install dampers to prevent all vibrations.
- 3.2.6 Ensure damper operators are observable and accessible.

END OF SECTION

1. GENERAL

1.1 REFERENCES

- 1.1.1 ANSI/NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.
- 1.1.2 CAN4-S112, Fire Test of Fire Damper Assemblies.
- 1.1.3 CAN4-S112.2, Standard Method of Fire Test of Ceiling Firestop Flap Assemblies.
- 1.1.4 Fusible Links for Fire Protection Service.

1.2 TECHNICAL DATA SHEETS

- 1.2.1 Submit the required technical sheets according section 21 05 01.
- 1.2.2 Indicate the following :
 - 1.2.2.1 Fire dampers;
 - 1.2.2.2 Smoke dampers;
 - 1.2.2.3 Fire stop flaps;
 - 1.2.2.4 Operators;
 - 1.2.2.5 Fusible links.

1.3 MAINTENANCE DATA SHEETS

- 1.3.1 Provide the necessary data sheets and enclose them to the manual indicated in section 21 05 01.

1.4 MAINTENANCE AND SPARE PRODUCTS / MATERIAL

- 1.4.1 Provide maintenance and spare products / material in accordance with the requirements of section 21 05 01.
- 1.4.2 Provide the following :
 - 1.4.2.1 Six fuse links of each type.

1.5 REALIABILITY OF TECHNICAL DATA

- 1.5.1 Data from manufacturers' catalogs and documentation shall be reliable data, based on test results which have been carried out by the manufacturers themselves or on their behalf by independent laboratories, compliance with the requirements of applicable codes and standards.

2. PRODUCTS

2.1 FIRE DAMPERS

- 2.1.1 Fire dampers shall be of type A, B, C, meet requirements, labelled ULC or UL and respond to the Fire Commissioner of Canada (CIC), provincial fire authority standard ANSI/NFPA 90A; Fire damper assemblies fire tested in accordance with standard CAN4-S112.
- 2.1.2 Mild steel dampers, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation on which they are mounted.
- 2.1.3 Fire dampers to hinged; offset, round or square; multi-blade hinged; sized to maintain full duct cross section on which they are mounted.
- 2.1.4 Fusible link actuated, weighted to close and lock in closed position when released or having negator-spring-closing operator for multi-leaf type or roll door type in horizontal position with vertical air flow.

- 2.1.5 40 x 40 x 3 mm built on retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.
- 2.1.6 For the dynamic type flaps specified in the drawings, provide an electrothermal bond: dual sensitivity, melting when the ambient temperature reaches 74 degrees Celsius and when subjected to an external electrical impulse of low intensity and short duration; this device must be approved and bear the ULC or UL label.
 - 2.1.6.1 Acceptable product: Nailor brand electrothermal bond, ETL model or approved equivalent.
- 2.1.7 Acceptable product:
 - 2.1.7.1 Circular ducts: model IBD 20, 40 or 60, Ruskin LR style with integrated sleeve, Nailor, Controlled Air or equivalent approved.
 - 2.1.7.2 Rectangular ducts made of galvanized steel: model IBD 20, 40 or 60, Ruskin style B with integrated sleeve, Nailor, Controlled Air or equivalent approved.

2.2 FIRE STOP DAMPERS

- 2.2.1 The fire smoke flaps shall be ULC listed and labelled and fire tested in accordance with CAN4-S112.2 standard.
- 2.2.2 Construct of minimum 1.5 mm thick sheet steel with 1.6 mm thick non-asbestos ULC listed insulation and corrosion-resistant pins and hinges.
- 2.2.3 Flaps held open with fusible link conforming to ULC-s505 and close at 74 degrees C as indicated.

3. EXECUTION

3.1 INSTALLATION

- 3.1.1 Install in accordance with ANSI/NFPA 90A and in accordance with conditions of ULC listing.
- 3.1.2 Carry out the work without reducing the fire resistance of the firewalls in which the appliances are mounted.
- 3.1.3 After completion of the work, obtain approval of complete installation from authority having jurisdiction before concealing items that do not remain apparent.
- 3.1.4 Install an access door adjacent to each damper.
- 3.1.5 Coordinate with the installer of the fire stopping and smoke screen.
- 3.1.6 Install appliances and access doors easily accessible.

3.2 TESTING

- 3.2.1 Carry out tests on each fire damper in accordance with standard NFPA 90A-2002.
 - 3.2.1.1 The fuse must be removed.
 - 3.2.1.2 Verify that the flap closes at 100%.
 - 3.2.1.3 Verify the latch operation.
 - 3.2.1.4 Lubricate all moving parts.
 - 3.2.1.5 Reinstall fuse.

END OF SECTION

1. GENERAL

1.1 REFERENCES

- 1.1.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)
- 1.1.2 Department of Justice Canada (Jus)
 - 1.1.2.1 Canadian Environmental Protection Act, 1999 (CEPA), ch. 33.
 - 1.1.2.2 Transportation of Dangerous Goods Act (TDGA), 1992, ch. 34.
- 1.1.3 Health Canada/ Workplace Hazardous Materials Information System (WHMIS)
 - 1.1.3.1 Material Safety Data Sheets (MSDS).
- 1.1.4 National Fire Protection Association (NFPA)
 - 1.1.4.1 NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems.
 - 1.1.4.2 NFPA 90B, Standard for Installation of Warm Air Heating and Air-Conditioning Systems.
- 1.1.5 Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA)
 - 1.1.5.1 SMACNA HVAC Duct Construction Standards - Metal and Flexible.
 - 1.1.5.2 SMACNA IAQ Guideline for Occupied Buildings under Construction, 1st Edition.
- 1.1.6 Underwriters' Laboratories Inc. (UL)
 - 1.1.6.1 UL 181, Standard for Factory-Made Air Ducts and Air Connectors.
- 1.1.7 Underwriters' Laboratories of Canada (ULC)
 - 1.1.7.1 CAN/ULC-S110, Fire Tests for Air Ducts..

1.2 DOCUMENTS / SAMPLES FOR SUBMITTAL

- 1.2.1 Submit required documents and samples in according with sections 21 05 00.01, 21 05 00.02– General requirements.
- 1.2.2 Data sheet
 - 1.2.2.1 Data sheets: submit the required technical data sheets and the manufacturer's product documentation. The data sheets must indicate the characteristics of the products, the performance criteria, the dimensions, the limits and the finish. They must also indicate the VOC emission rate of adhesives and solvents during application and curing period.
- 1.2.3 The technical data sheets should cover the following :
 - 1.2.3.1 Thermal properties.
 - 1.2.3.2 Friction loss.
 - 1.2.3.3 Acoustical loss.
 - 1.2.3.4 Waterproof.
 - 1.2.3.5 Fire resistance.
- 1.2.4 At the request of the Departmental Representative, submit samples of the product or one of its components described in this section.
- 1.2.5 Instructions: submit installation instructions provided by the manufacturer.
- 1.2.6 Documents / elements to provide during the completion of work

- 1.2.6.1 Provide the required operating, maintenance and spare parts sheets and enclose them to the manual referred 21 05 00.01, 21 05 00.02–General requirements.

1.3 QUALITY ASSURANCE

1.3.1 Reliability of technical data

- 1.3.1.1 Data from the manufacturer's catalogs and documentation shall be reliable data, based on test results which have been carried out by the manufacturers themselves or, on their behalf, by independent laboratories and certified that the elements comply with the requirements of the applicable codes and standards.

1.4 DELIVERY, STORAGE AND HANDLING

- 1.4.1 Protect on site stored or installed absorptive material from moisture damage.

2. PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

- 2.1.1 Sustainable development requirements: materials and products in accordance with sections 21 05 00.01, 21 05 00.02– General requirements.
- 2.1.2 Choose products and materials with recycled content or resource efficient characteristics.
- 2.1.3 Adhesives and sealants: in accordance with sections 21 05 00.01, 21 05 00.02- General requirements. Use the least toxic sealants, adhesives, printing products, finishes and paints necessary to comply with the requirements of the project.
 - 2.1.3.1 The VOC content of adhesives and sealants shall be less than that specified in the Green Seal GS-36 Standard and SCAQMD Rule 1168.

2.2 GENERAL

- 2.2.1 The ducts must be factory fabricated, in accordance with CAN/ULC-S110 standards.
- 2.2.2 Pressure drop coefficients listed below are based on relative sheet metal duct pressure drop coefficient of 1.00.
- 2.2.3 Flame spread rating not to exceed 25. Smoke developed rating not to exceed 50.

2.3 METALLIC – UNINSULATED DUCTS

- 2.3.1 Spiral wound flexible aluminum duct.
- 2.3.2 Performance
 - 2.3.2.1 Waterproof: Factory tested to 2, 5 kPa.
 - 2.3.2.2 Maximum relative pressure drop coefficient: 3.
 - 2.3.2.3 Acceptable product : Flexmaster # T/L or equivalent.
 - 2.3.2.4 Use : Distribution fittings.

2.4 METALLIC - INSULATED

- 2.4.1 Spiral wound flexible aluminum duct with factory applied, 25 mm thick flexible glass fiber thermal insulation with vapor barrier and vinyl jacket, as indicated.
- 2.4.2 Performance
 - 2.4.2.1 Waterproof: Factory tested to 2,5 kPa.
 - 2.4.2.2 Maximum relative pressure drop coefficient: 3.

2.4.2.3 Acceptable product: Flexmaster # T/L-T.

2.4.2.4 Use : Not applicable.

3. EXECUTION

3.1 MANUFACTURER INSTRUCTIONS

3.1.1 Compliance: Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets

3.2 FLEXIBLE DUCT INSTALLATION

3.2.1 Install flexible air ducts in accordance with CAN/ULC-S110, UL-181, NFPA 90A, NFPA 90B standards and of SMACNA.

3.2.2 Flexible air ducts shall have a minimum and maximum length of between 1 and 2 meters.

3.3 DUCT WATERPROOF TEST

3.3.1 Refer to section 23 05 94 – Pressure testing of aerualic networks.

END OF SECTION

1. GENERAL

1.1 GENERALITIES

- 1.1.1 AMCA Publication 99, Standards Handbook last edition.
- 1.1.2 ANSI/AMCA 210-1999, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating last edition.
- 1.1.3 AMCA 300 last edition, Reverberant Room Method for Sound Testing of Fans.
- 1.1.4 AMCA 301, Methods for Calculating Fan Sound Ratings from Laboratory Test Data, last edition.
- 1.1.5 ANSI/ASHRAE51, Laboratory Method of testing fans for rating, last edition.
- 1.1.6 Canadian General Standards Board (CGSB)
 - 1.1.6.1 CAN/CGSB 1.181-last edition, Ready-Mixed Organic Zinc-Rich Coating.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- 1.2.1 Shop drawings: Submit shop drawings and product data in accordance with Section 21 05 01.
- 1.2.2 Fan performance curves showing point of operation, BHP kW and efficiency and sound rating data at point of operation.
- 1.2.3 Indicate: Motors, sheaves, bearings, shaft details.

1.3 OPERATION AND MAINTENANCE DATA

- 1.3.1 Provide operation and maintenance data for incorporation into manual specified in Section 21 05 01.

1.4 MAINTENANCE MATERIALS

- 1.4.1 Furnish list of individual manufacturer's recommended spare parts for equipment, include: bearings and seals, addresses of suppliers, list of specialized tools necessary for adjusting, repairing or replacing.

1.5 PREFABRICATED ELEMENTS

- 1.5.1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards in force.

2. PRODUCTS

2.1 FANS GENERAL

- 2.1.1 Characteristics of appliances: flow rate, total static pressure, mechanical power (bhp), effective power (W), efficiency, rotation speed per minute, power consumption, dimensions, model, sound intensity level and others, as per indications.
- 2.1.2 Fans: balanced statically and dynamically, and constructed in accordance with requirements of AMCA 99.
- 2.1.3 Sound intensity: AMCA (Air Moving and Conditioning Association) 301; Tested in accordance with AMCA 300. Fans must bear the AMCA label confirming the level of sound intensity.
- 2.1.4 Performance: established as a function of ANSI/ACMA210 and ANSI/ASHRAE51.
- 2.1.5 Motors:

- 2.1.5.1 Sizes as indicated.
- 2.1.5.2 Type as indicated.
- 2.1.6 Accessories and hardware: matched sets of V-Belt drives, adjustable slide rail motor bases, belt guards, coupling guards fan and outlet safety screens as indicated and as specified.
- 2.1.7 Factory primed before assembly in colour standard to manufacturer.
- 2.1.8 Scroll casing drains: as indicated.
- 2.1.9 Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.
- 2.1.10 Vibration isolation: to Section 23 05 48.
- 2.1.11 Flexible connections: to Section 23 33 00.

2.2 CENTRIFUGAL FANS

- 2.2.1 Fan wheels :
 - 2.2.1.1 Welded aluminum construction.
 - 2.2.1.2 Maximum operating speed of centrifugal fans not more than 50% of first critical speed.
 - 2.2.1.3 Air foil forward curved or backward inclined blades, as indicated.
- 2.2.2 Bearings: heavy duty split pillow-block flange mounted grease lubricated ball or roller self-aligning type with oil retaining, dust excluding seals and a certified minimum rated life of 200,000 hours.
- 2.2.3 Housings:
 - 2.2.3.1 Volute with inlet cones: fabricated steel for wheels 300 mm or greater, cast iron, steel or aluminum, for smaller wheels, braced, and with welded supports.
 - 2.2.3.2 For horizontally and vertically split housings provide flanges on each section for bolting together, with gaskets of non-oxidizing non-flammable material.
 - 2.2.3.3 Provide bolted latched airtight access doors with handles.
- 2.2.4 Variable volume control devices:
 - 2.2.4.1 Mounted by fan manufacturer.
 - 2.2.4.2 Variable Speed Drives: according to indication.

2.3 CABINET FANS – GENERAL PURPOSE

- 2.3.1 Fan characteristics and construction: as centrifugal fans.
- 2.3.2 Cabinet hung single or multiple wheel with DWDI centrifugal fans in factory fabricated casing complete with vibration isolators and seismic control measures, motor, V-belt drive and guard outside casing.
- 2.3.3 Fabricate casing of zinc coated or phosphate treated steel of thickness as indicated reinforced and braced for rigidity. Provide removable panels for access to interior. Paint uncoated, steel parts with corrosion resistant paint to CAN/CGSB 1.181. Finish inside and out, over prime coat, with rust resistant enamel.
- 2.3.4 Type: as indicated on drawings.

3. EXECUTION

3.1 FAN INSTALLATION

- 3.1.1 Install fans as indicated, complete with resilient mountings specified in Section 23 05 48, flexible electrical leads and flexible connections in accordance with Section 23 33 00.
- 3.1.2 Provide sheaves and belts required for final air balance.
- 3.1.3 Bearings and extension tubes to be easily accessible.
- 3.1.4 Access doors and access panels to be easily accessible.

END OF SECTION

1. GENERAL

1.1 TECHNICAL SPECIFICATIONS

1.1.1 Submit data sheets in accordance with requirements of the section 21 05 01.

1.1.2 The data sheets should specify the following:

1.1.2.1 Capacity;

1.1.2.2 Throw and terminal velocity;

1.1.2.3 Noise criteria;

1.1.2.4 The pressure drop;

1.1.2.5 Neck velocity (coller).

1.2 SAMPLES

1.2.1 Submit the required samples in accordance with the requirements of the section 21 05 01. Provide the necessary operating and maintenance records and enclose them to the manual referred to in section 21 05 01.

1.3 PREFABRICATED ELEMENTS

1.3.1 Grids, registers and diffusers of the same generic type must come from the same manufacturer.

1.4 SUPPLEMENTARY MATERIALS

1.4.1 Provide maintenance / replacement materials / equipment in accordance with the requirements of section 21 05 01.

1.4.2 Also provide the following :

1.4.2.1 Keys for volume control adjustment;

1.4.2.2 Keys for air flow pattern adjustment.

1.5 RELIABILITY OF TECHNICAL DATA

1.5.1 Technical data from the manufacturer's catalogs and documentation shall be reliable data, based on test results carried out by the manufacturer's themselves or, on their behalf, by independent laboratories certify the compliance of the elements with the requirements of the applicable codes and standards.

2. PRODUCTS

2.1 GENERAL

2.1.1 Products whose characteristics meet the requirements for flow, pressure drop, terminal velocity, spray range, noise level and neck velocity (coller).

2.1.2 Frame

2.1.2.1 Full perimeter gaskets.

2.1.2.2 Mounting frame for all frames mounted in a partition or wall of plaster or gypsum board and the other frames indicated.

2.1.3 Concealed fixing devices.

2.1.4 Apparent maneuvering devices.

2.1.5 White color.

2.2 SUPPLY GRILLES AND REGISTERS

2.2.1 See specification on drawings.

2.2.2 Acceptable product: Titus, Nailor, E.H. Price or approved equivalency.

2.3 RETURN AND EXHAUST GRILLES AND REGISTERS

2.3.1 See specifications on drawings.

2.3.2 Acceptable product: Titus, Nailor, E.H. Price or approved equivalency.

2.4 DIFFUSERS

2.4.1 See specifications on drawings.

2.4.2 Acceptable product: Titus, Nailor, E.H. Price or approved equivalency.

2.5 DOOR GRID

2.5.1 See specifications on drawings.

2.5.2 Acceptable product: Titus, Nailor, E.H. Price or approved equivalency.

3. EXECUTION

3.1 INSTALLATION

3.1.1 Install grilles, registers and diffusers in accordance with the manufacturer's instructions.

3.1.2 Where fasteners are visible, use stainless steel flat head screws and embed them in countersunk holes.

3.1.3 In gymnasiums and similar premises, use bolts to fix the equipment in place.

3.1.4 In gymnasiums and similar rooms and at other places indicated, the grilles, the registers and diffusers must be equipped with a concealed safety chain.

END OF SECTION

1. GENERAL

1.1 REFERENCES

- 1.1.1 ANSI/NFPA 96, Vapour Removal from Cooking Equipment, last edition.
- 1.1.2 ASTM E90, Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions, last edition.

1.2 TECHNICAL SPECIFICATIONS

- 1.2.1 Submit the data sheets in accordance with the general requirements of section 21 05 01.
- 1.2.2 The data sheets should cover the following:
 - 1.2.2.1 The pressure drop;
 - 1.2.2.2 Face area;
 - 1.2.2.3 Free area.

1.3 RELIABILITY OF TECHNICAL DATA

- 1.3.1 Technical data from the manufacturer's catalogs and documentation shall be reliable data, based on test results which have been carried out by the manufacturers themselves on their behalf by independent laboratories and which have certified the compliance with the requirements of applicable codes and standards.

1.4 TEST REPORTS

- 1.4.1 Submit data from an independent laboratory confirming that the acoustic and aerodynamic performances in compliance with standard ASTM E90.

2. PRODUCTS

2.1 GRAVITY ROOF OUTSIDE AIR INTAKES AND RELIEF VENTS

- 2.1.1 Construction: Factory-made elements, aluminum, galvanized steel, glass fiber reinforced polyester, stainless steel or polyvinyl chloride (PVC), hinged on the frame.
 - 2.1.1.1 Birdscreen: incorporate, made of copper wire, aluminum or stainless steel of 2,7 mm de diameter.
 - 2.1.1.2 Backdraft dampers: with blades mounted horizontally or vertically on two (2) or four (4) faces.
 - 2.1.1.3 Maximum throat velocity at inlet constriction point: 3, 3 m/s.
 - 2.1.1.4 Maximum pressure drop across the element: 15 Pa static pressure, pressure side
 - 2.1.1.5 Maximum velocity in the damper area: 1, 5 m/s.
 - 2.1.1.6 Shape : as indicated.
- 2.1.2 Birdscreens
 - 2.1.2.1 Incorporated birdscreen, made of copper wire, aluminum or stainless steel of 2,7 mm in diameter; with mesh of 12 mm pressure side or 19 mm admission side.

2.2 GOOSENECK HOODS

- 2.2.1 Wall thickness: As required by ASHRAE and SMACNA.
 - 2.2.1.1 Hoods connected to kitchen hoods: according to ANSI/NFPA 96 standards.

- 2.2.1.2 Hoods mounted elsewhere: in accordance with the requirements of ASHRAE and SMACNA.
- 2.2.2 Manufacturing: as required by ASHRAE and SMACNA.
 - 2.2.2.1 Hoods connected to kitchen hoods: according to ANSI/NFPA 96 standards.
 - 2.2.2.2 Hoods mounted elsewhere: in accordance with the requirements ASHRAE and SMACNA.
- 2.2.3 Joints: as required by ASHRAE and SMACNA or prefabricated duct joint of registered mark. The prefabricated, flanged, proprietary flange joints shall be considered class A seal.
- 2.2.4 Supporting elements: as indicated.
- 2.2.5 Birdscreen: incorporate, made of copper wire, aluminum or stainless steel of 2, 7 mm in diameter, with mesh of 2 mm pressure side or 19 mm admission side.
- 2.2.6 Backdraft dampers: with blades mounted horizontally or vertically on two 2 or four 4 faces.
- 2.2.7 Louvre fixed or adjustable blades, in aluminum
- 2.2.8 See specifications on drawings.

3. EXECUTION

3.1 INSTALLATION

- 3.1.1 Install louvers, air intakes and other vents as recommended by the manufacturer and SMACNA.
- 3.1.2 Strengthen and bracket the elements as indicated.
- 3.1.3 Fix the elements securely in the openings that have been used for this purpose. Caulk around the perimeter to ensure a good seal.

END OF SECTION

1. GENERAL

1.1 REFERENCES

- 1.1.1 NFPA: in accordance with NFPA 211 « Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances ».
- 1.1.2 UL: in accordance with applicable portion of « UL safety standards », provide products that have been UL listed and have the approval label.
- 1.1.3 SMACNA: in accordance with « SMACNA Low Pressure Duct Standards for fabricated breeching and smoke pipe ».
- 1.1.4 AWS: in accordance with « AWS Structural Welding Code for welder's qualifications, welding details, and workmanship standards ».
- 1.1.5 ASHRAE: in accordance with « ASHRAE Equipment Handbook for Chimney, Gas Vent, and Fireplace Systems, material requirements and design criteria ».

1.2 ACTION AND INFORMATION SUBMITTALS

1.2.1 Product data

- 1.2.1.1 Submit the required technical data sheets and manufacturers' specifications and documentation for the products in accordance with 21 05 01. Specify product characteristics, performance criteria and constraints.
 - 1.2.1.1.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 21 05 01.

1.2.2 Shop drawings

- 1.2.2.1 Submit shop drawings in accordance with section 21 05 01.
 - 1.2.2.1.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Québec, Canada.
- 1.2.2.2 Drawings must indicate following:
 - 1.2.2.2.1 methods of sealing sections;
 - 1.2.2.2.2 methods of expansion;
 - 1.2.2.2.3 manchons de raccordement et de traversée;
 - 1.2.2.2.4 bases/Foundations;
 - 1.2.2.2.5 supports;
 - 1.2.2.2.6 guy details;
 - 1.2.2.2.7 rain caps.
- 1.2.2.3 Quality assurance submittals: submit following in accordance with 21 05 01.
 - 1.2.2.3.1 Certificates: submit the documents signed by the manufacturer, certifying that the products and materials meet the requirements concerning physical characteristics and performance criteria.
- 1.2.2.4 Quality assurance submittals
 - 1.2.2.4.1 Submit operation and maintenance data for incorporation into manual specified in section 21 05 01.

1.3 QUALITY ASSURANCE

- 1.3.1 Regulatory Requirements: work to be performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial regulations.
- 1.3.2 Health and safety.

1.4 DELIVERY, STORAGE AND HANDLING

- 1.4.1 Packing, shipping, handling and unloading
 - 1.4.1.1 Deliver, store and handle in accordance with section 21 05 01.
- 1.4.2 Waste Management and Disposal
 - 1.4.2.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling.

2. PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

- 2.1.1 Choose products and materials with recycled content or resource efficient characteristics whenever possible.

2.2 CHIMNEY

- 2.2.1 Jacket
 - 2.2.1.1 Rigid duct and 316 stainless steel fittings approved CAN / ULC C959-RD-1 and ANSI / UL 103.
- 2.2.2 Positive-pressure stainless steel breeching (connecting pipes).
 - 2.2.2.1 Manufacturers: Subject to conformity and requirements, supply double-sided stainless steel chimneys of following type :
 - 2.2.2.1.1 Lining.E Inc. chiminey IPPL2 model or approved equivalent.
- 2.2.3 The factory prefabricated product shall be manufactured in accordance with NFPA211. This system shall be designed and installed to form a leakproof gas assembly. It shall be UL tested and certified in accordance with UL103 and ULC-S604-M91 to withstand positive pressure up to 60 °C and shall bear the UL approval label only and shall be designed to compensate thermal expansion due to gas flow. A 2 "thick high temperature mineral wool insulation will be installed in the factory between the inside and outside of the chimney. Clearances to combustible materials will be specified in the installation instructions.
- 2.2.4 The gasket assembly shall be of the male / female type with a flanged flange seal and a V-band. An internal sleeve at the joint will serve for quick alignment of parts and will serve as a long-term seal protection against condensation and temperature. Sealing will be done through the inner wall. Unclutched joints are not acceptable.
- 2.2.5 The double-walled product shall consist of a 304 stainless steel internal wall of 20 gauge (0.9017 mm). The outer wall will be made of stainless steel 304 of 24 gauge (0.6070 mm). The materials and construction of the modular sections will be in accordance with the conditions of UL approval of the product.
- 2.2.6 The complete outlet nozzle system shall be supplied by a single manufacturer.
- 2.2.7 The chimney and the breeching shall be guaranteed against any malfunction due to defective equipment and / or a manufacturing defect for a period of 10 years from the date of delivery.

2.2.8 Drawings "As Built" of the project drawn to scale shall be provided by the manufacturer. The system must be installed as shown in the manufacturer's drawings and in accordance with the manufacturer's 10-year warranty and recognized engineering practices.

2.2.9 The inside diameter of the chimney and breeching shall be verified by the manufacturer's calculations. The calculation should be technically recognized and should follow the ASHRAE calculation method and demonstrate the flow characteristics inside the inner wall.

2.2.10 Technical support

2.2.10.1 The prefabricated modular system shall be provided by a sales organization that assumes the design, installation and coordination of the service and provides the Departmental Representative with unified responsibility during and following the warranty.

2.3 ACCESSORIES

2.3.1 Cleanouts: bolted, gasketed type, full size of breeching, as indicated.

2.3.2 Barometric dampers: single or double acting, 70% of full size of breeching area.

2.3.3 Hangers and supports: in accordance with recommendations of Sheet Metal and Air Conditioning Contractors National Association Inc. (SMACNA) as indicated.

2.3.4 Rain cap.

2.3.5 Expansion sleeves with heat resistant caulking, held in place as indicated.

3. EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.1.2 The Contractor shall, at its expense, be certified as a chimney installer, follow the manufacturer's certificate and provide the Departmental Representative with the document attesting successful completion of the certification, this certification will provide the Departmental Representative with an extended warranty on products.

3.2 INSTALLATION – GENERAL

3.2.1 Follow manufacturer's and SMACNA installation recommendations for shop fabricated components.

3.2.2 Suspend breeching at 1.5 m centres and at each joint.

3.2.3 Support chimneys at bottom, roof and intermediate levels as indicated.

3.2.4 Install thimbles where penetrating roof, floor, ceiling and where breeching enters masonry chimney. Pack annular space with heat resistant caulking.

3.2.5 Install flashings on chimneys penetrating roofs, as indicated.

3.2.6 Install rain caps and cleanouts, as indicated.

3.3 INSTALLATION – REFRACTORY LINED STEEL CHEMINEY

3.3.1 Grind welds smooth to form appearance of single tube.

3.3.2 Seal insulating refractory at top of stack.

3.3.3 Pack annular space around breeching at entry tee with heat resistant caulking.

3.3.4 Route to the drain line connected to the drain connection.

- 3.3.5 On completion, paint one coat of rust inhibitive primer and two coats of heat resisting paint of colour, make and quality approved by Departmental Representative..

3.4 FIELD QUALITY CONTROL

- 3.4.1 Verification requirements include :
- 3.4.1.1 Materials and ressources;
 - 3.4.1.2 Storage and collection of recyclables;
 - 3.4.1.3 Construction waste management;
 - 3.4.1.4 Resource reuse;
 - 3.4.1.5 Recycled content;
 - 3.4.1.6 Local/regional materials;
 - 3.4.1.7 Low-emitting materials.

3.5 CLEANING

- 3.5.1 Proceed in accordance with section 21 05 01.
- 3.5.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.6 INSTALLATION OF DOUBLE WALL, CHIMNEY AND WHEEL CONNECTORS

- 3.6.1 The system must be installed in accordance with the manufacturer's installation instructions. The joints of the sections must be made with the inside and outside band supplied by the manufacturer as well as the appropriate high temperature sealant. The holes in the combustible walls and attic must be protected by the parts manufactured and designed for this purpose by the manufacturer.
- 3.6.2 When installed in accordance with the manufacturer's installation instructions, the chimney must support 1.5 times its own weight per linear foot of conduit.

END OF SECTION

1. GENERAL

1.1 REFERENCES

- 1.1.1 American Boiler Manufacturer's Association (ABMA).
- 1.1.2 American National Standards Institute (ANSI): ANSI Z21.13/CSA 4.9, Gas-Fired Low-Pressure Steam and Hot Water Boilers.
- 1.1.3 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME): ANSI/ASME Boiler and Pressure Vessel Code, Section IV
- 1.1.4 Canadian Standards Association (CSA)/CSA International
 - 1.1.4.1 CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.
 - 1.1.4.2 CSA B139, Installation Code for Oil Burning Equipment.
 - 1.1.4.3 CSA B140.7, Oil Burning Equipment: Steam and Hot-Water Boilers.
- 1.1.5 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
- 1.1.6 Health Canada / Workplace Hazardous Materials Information System (WHMIS): Material Safety Data Sheets (MSDS).

1.2 DOCUMENTS / SAMPLES TO SUBMIT

- 1.2.1 Submit required documents and samples in accordance with section 21 05 00.02 – General Requirements.
- 1.2.2 Data sheets: submit the required technical data sheets and the manufacturer's documentation for the products. The data sheets indicate the characteristics of the products, the performance criteria, the dimensions, the limits and the finish.
- 1.2.3 Shop drawings
 - 1.2.3.1 The drawings shall show or indicate the following:
 - 1.2.3.1.1 General arrangement showing terminal points, instrumentation test connections;
 - 1.2.3.1.2 Clearances for operation, maintenance, servicing, tube cleaning, tube replacement;
 - 1.2.3.1.3 Foundations with loadings, anchor bolt arrangements;
 - 1.2.3.1.4 Piping hook-ups;
 - 1.2.3.1.5 Equipment electrical drawings;
 - 1.2.3.1.6 Burners and controls;
 - 1.2.3.1.7 All miscellaneous equipment;
 - 1.2.3.1.8 Flame safety control system;
 - 1.2.3.1.9 Breeching and stack configuration;
 - 1.2.3.1.10 Stack emission continuous monitoring system to measure CO, O₂, NO_x, SO₂, stack temperature and smoke density of flue gases.
 - 1.2.3.2 Technical data shall include the following:
 - 1.2.3.2.1 Boiler efficiency at 25 %, 50 %, 75 %, et 100 % and 110 % of design capacity.
 - 1.2.3.2.2 Radian heat lost at 100 % design capacity.

- 1.2.4 At the request of the Departmental Representative, submit the samples of the product or one of its components described in this section.
- 1.2.5 Certificates: submit certificates signed by the manufacturer certifying that the materials comply with the specified performance characteristics and physical properties.
- 1.2.6 Instructions: submit manufacturer's installation instructions.
- 1.2.7 Test reports: submit test reports from recognized independent laboratories, certifying that the products, materials meet the requirements for physical characteristics and performance criteria.
- 1.2.8 Closeout submittals
 - 1.2.8.1 Submit the required operation, maintenance and spare parts data sheets and incorporate them in the manual specified in section 21 05 00.02 – General Requirements

Maintenance records must indicate or include the following:
 - 1.2.8.1.1 The name of the manufacturer, type, year of manufacture, flow or power and serial number of the appliances.
 - 1.2.8.1.2 Operation and maintenance details.
 - 1.2.8.1.3 The list of recommended spare parts and the adresse of the manufacturer's representatives.
 - 1.2.8.1.4 A list of special tools required for adjusting, repairing and replacing parts.
 - 1.2.8.2 Provide signed control reports carried out on-site by the manufacturer and the Contractor relating to the monitoring of the installation and start-up. Notify the Departmental Representative at least 48 hours before getting started.

1.3 QUALITY ASSURANCE

- 1.3.1 Reliability of technical data: data from the manufacturer's catalogs and documentation shall be reliable data, based on test results which have been carried out by the manufacturers themselves or, on their behalf, by independent laboratories and certified that the elements comply with the requirements of the applicable codes and standards.

2. PRODUCTS

2.1 SUSTAINABLE MATERIALS AND PRODUCTS

- 2.1.1 Sustainable development requirements: materials and products in accordance with section 21 05 00.02 – General Requirements.
- 2.1.2 Choose products and materials with recycled content or resource efficient characteristics whenever possible.
- 2.1.3 Adhesives and sealers: in accordance with section 21 05 00.02 – General Requirements. Use least toxic sealants, adhesives, sealers and finishes necessary to comply with the requirements of the project.
 - 2.1.3.1 The VOC content of adhesives and sealants shall be less than that specified in the Green Seal GS-36 standard and SCAQMD regulation 1168.
 - 2.1.3.2 Paint: VOC content of up to 250 g / L according to GS-11 standard according to SCAQMD regulation 1113.

2.2 GENERAL

- 2.2.1 Provide and install a hot water packaged boiler complete with an oil burner and necessary accessories and controls, having been subjected to a heating test, ready to be connected to a

water supply, return and drain, electrical power, and flue gas exhaust only for the oil boiler, designed and constructed in accordance with the requirements of section IV of the ASME code and CSA B-51.

2.2.2 Boiler / burner package and boiler / coil package to bear ULC label.

2.3 HOT WATER BOILER WITH OIL (CH-1)

Characteristics

2.3.1 See specifications on drawings.

3. EXECUTION

3.1 MANUFACTURER INSTRUCTIONS

3.1.1 Compliance: comply with the manufacturer's written recommendations specifications, including product technical bulletins, instructions for handling, storing and installation instructions and datasheets.

3.2 INSTALLATION

3.2.1 Install in accordance with ANSI/ASME Boiler and Pressure Vessels Code Section IV, regulations having jurisdiction, except where specified otherwise, and manufacturers recommendations.

3.2.2 Make required piping connections to inlets and outlets recommended by boiler manufacturer.

3.2.3 Maintain clearances as indicated or if not indicated, as recommended by manufacturer for operation, servicing and maintenance without disruption of operation of any other equipment/system.

3.2.4 Mount unit level [using specified vibration isolation in Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.

3.2.5 The manufacturer's representative shall ensure the start-up of the boilers and the adjustment of the burner controls for the boilers. In addition to the boiler inspections, adjustments and tests, he must also give operating personnel instructions on the maintenance and operation of the equipment.

3.2.6 Pipe hot water relief valves full size to nearest drain.

3.2.7 Pipe blowdown / drain to blowdown tank / floor drain.

3.2.8 Oil fired installations - in accordance with CAN/CSA-B139.

3.3 FIELD QUALITY CONTROL

3.3.1 Field quality control by the manufacturer:

3.3.1.1 Make arrangements for the manufacturer of the products supplied under this section to review the work relating to the handling, installation / application, protection and cleaning of his product or products. Submit written reports in an approved format that will verify whether the work was done under the terms of the contract.

3.3.1.2 The manufacturer shall make recommendations on the use of the product (s) and carry out a start-up and a visit to verify that the implementation has been carried out according to his instructions.

3.3.1.3 Provide site visits in the following steps:

3.3.1.3.1 Once the products have been delivered and stored on the site and the preparatory and other preliminary work has been completed, but before the beginning of the work's implementation which is covered by this section.

- 3.3.1.3.2 Once during the work's progression, meaning once it has been completed at 60 %.
 - 3.3.1.3.3 Once the work has been completed and cleaning done.
 - 3.3.1.4 Get the inspection reports within three days of the site visit and return them immediately to the Departmental Representative.
- 3.3.2 Performance Monitoring
 - 3.3.2.1 In accordance with the requirements of sections 21 05 00.01 and 21 05 00.02 – General requirements, as regard to the general requirements and in accordance with the requirements of this section.
 - 3.3.2.2 Time of execution: once the ERE operations of the aeraulic networks have been completed.
- 3.3.3 Commissioning
 - 3.3.3.1 The manufacturer must :
 - 3.3.3.1.1 Certify installation.
 - 3.3.3.1.2 Start up and commission installation.
 - 3.3.3.1.3 Carry out on-site performance.
 - 3.3.3.1.4 Demonstrate operation and maintenance.
 - 3.3.3.1.5 An authorized representative of the manufacturer shall start the boiler.
 - 3.3.3.2 Provide the Departmental Representative at least 48 hours' notice prior to inspections, tests and demonstrations. Submit a written report of inspections and test results.
- 3.3.4 An authorized representative of the manufacturer will start the boiler; adjust the burner, the operation and safety controls. He will produce a report demonstrating the efficiency, % O₂, % CO₂, % CO, excess air and stack gas temperature. .
- 3.3.5 Commissioning reports
 - 3.3.5.1 In accordance with the requirements of sections 21 05 00.01 and 21 05 00.02 – General requirements for reporting and in accordance with the requirements of this section. Reports should cover the following:
 - 3.3.5.1.1 Results of performance monitoring, presented of form approved for this purpose.
- 3.3.6 Product information

3.4 DEMONSTRATION OF THE OPERATION OF THE EQUIPMENT

- 3.4.1 In accordance with the requirements of sections 21 05 00.01 and 21 05 00.02 – General requirement for the training of operating and maintenance personnel and in accordance with the requirements of this section.

END OF SECTION

1 GENERAL

1.1 REFERENCES

- 1.1.1 Canadian Standards Association (CSA International).

1.2 PRODUCT DATA

- 1.2.1 Data sheets.

- 1.2.1.1 Submit product data in accordance with Section 01 33 00 and 26 05 00. Specify product characteristics, performance criteria and constraints.

- 1.2.1.1.1 Submit in two (2) copies WHMIS MSDS - Material Safety Data Sheets in accordance with Sections 01 33 00 and 26 05 00. Precise characteristics and performance criteria and limitations.

- 1.2.2 Shop drawings:

- 1.2.2.1 Submit shop drawings according sections 01 33 00 and 26 05 00

- 1.2.2.1.1 Submitted shop drawings whenever required must be sealed and signed by an Engineer, accredited member of OIQ.

- 1.2.2.2 The shop drawings must show or indicate the following

- 1.2.2.2.1 The devices, power and related connections.

- 1.2.2.2.2 The dimensions, construction details of internal and external parts, the recommended installation details for the supports in proposed structural steel and the size and location of the holes for the mounting bolts.

- 1.2.2.2.3 The finished, the thickness of the sheet metal housing and special trim.

- 1.2.2.2.4 The control system for thermostat if incorporated.

- 1.2.2.2.5 The surface temperature of the housing.

- 1.2.3 Samples:

- 1.2.3.1 Submit samples in accordance with section 01 33 00 and 26 05 00.

- 1.2.3.2 Submit samples required of 1200 mm section of the shell showing fastening methods and the tie-up to the adjacent section.

- 1.2.4 Quality insurance: submit documents in accordance with 01 33 00 and 26 05 00

- 1.2.4.1 Include manufacturers' certificates proving compliance with product characteristics, performance criteria, physical size.

- 1.2.4.2 Submit manufacturers' installation instructions.

- 1.2.4.2.1 DCC representative will provide one (1) copy of installation instructions prepared by system supplier.

- 1.2.5 Documents/Pieces to be provided at the end of works

- 1.2.5.1 Submit maintenance and data sheets and to include in the manual mentioned in section 01 78 00 and 26 05 00.

1.3 QUALITY INSURANCE

1.3.1 Health and safety:

- 1.3.1.1 Apply all necessary means for safety during construction in accordance with section 01 35 30.

1.4 TRANSPORT, STORAGE AND HANDLING

1.4.1 Packaging, transport, handling and unloading

- 1.4.1.1 Transport, store and handle materials in accordance with written manufacturers' instructions and section 01 61 00

1.4.2 Waste management and disposal

- 1.4.2.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal, and with Waste Reduction Workplan.

2 PRODUCTS

2.1 BASEBOARD HEATHER

- 2.2.1 Commercial electric baseboard heaters, sturdy construction, impact and rust resistant (aluminum front) with linear heat protection in full length and with automatic reset.
- 2.2.2 Heaters: Thermal power 275 W / ft, complete with junction box at both ends. Full length heating element provided with aluminium fins and resistance element contained in mineral insulation and under stainless steel sheet.
- 2.2.3 Elements: mineral insulated stainless steel sheath with non metallic regularly placed supports in order to allow for expansion.
- 2.2.4 Shell: inclined return and discharge 1 mm steel plate, 1,6 mm front panel with 2 coats of baked enamel paint, white color provided with incorporated deflector and cable tray at the base.
- 2.2.5 Blind sections and connection elements shall be provided with cable tray and colors and shall match with the baseboards.

2.2 CONTROLS

- 2.3.1 As indicated, built-in or wall mounted thermostats.
- 2.3.2 Electronic two poles thermostat: as indicated.
- 2.3.3 Relay transformers or SCR in order to avoid power demand higher than the thermostat cut off.

2.3 MANUFACTURERS

- 2.3.1 Acceptable manufacturers:
 - 2.3.1.1 Ouellet Canada.
 - 2.3.1.2 Dimplex/Chromalox.
 - 2.3.1.3 Stelpro Design.

3 EXECUTION

3.1 MANUFACTURERS' INSTRUCTIONS

- 3.1.1 Compliance: Comply with prescriptions, recommendations and return specifications of manufacturers including any technical instruction relative to handling storage and installation.

3.2 INSTALLATION

- 3.2.1 Install baseboards according manufacturers' instructions.
- 3.2.2 As required, remove knock outs from the shell and provide insulation sleeves between adjacent baseboards.
- 3.2.3 Install grounding wire in the baseboards blind sections and connecting pieces to make sure that the grounding is maintained.
- 3.2.4 Make power and control connections. Install thermostats in locations indicated.
- 3.2.5 Make sure that there is enough room around the equipments to allow maintenance.
- 3.2.6 Should the final location of equipment differ from the intended one or the required room insufficient, consult DCC representative before installation and follow his instructions.
- 3.2.7 Clean fin tubes and straight them out as required.

3.3 FIELD QUALITY CONTROL

- 3.3.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- 3.3.2 Make sure baseboards and controls operate properly.

3.4 CLEANING

- 3.4.1 Proceed to cleaning in accordance with section 01 74 11 – Cleaning.
- 3.4.2 As soon as installation and performance control are completed, remove from the site any unusable matters, waste, tools and equipments.

END OF SECTION

1 GENERAL

1.1 SEISMIC MOUNTING

- 1.1.1 Supply and install all necessary equipment for seismic mounting as described in section 26 10 00.

1.2 REFERENCES

- 1.2.1 Canadian Standards Association (CSA International): CSA C22.2 No.46, Electric Air-Heaters.

1.3 SHOP DRAWINGS AND DATA SHEETS

- 1.3.1 Submit shop drawings and data sheets in accordance with Section 01 33 00 - Submittal Procedures and 26 05 00 – Common Work Results For Electrical
- 1.3.2 Submit product data sheets for unit heaters. Include:
- 1.4.2.1 Product characteristics.
 - 1.4.2.2 Performance criteria.
 - 1.4.2.3 Mounting methods.
 - 1.4.2.4 Physical size.
 - 1.4.2.5 kW rating, voltage, phase.
 - 1.4.2.6 Cabinet material thicknesses.
 - 1.4.2.7 Limitations.
 - 1.4.2.8 Colour and finish.
- 1.3.3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section [02 61 33 - Hazardous Materials]. WHMIS acceptable to Labour Canada, and Health Canada and Human Resources Development Canada -Health.
- 1.3.4 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence, cleaning procedures.

1.4 CLOSEOUT SUBMITTALS

- 1.4.1 Provide operation and maintenance data for unit heaters for incorporation into manual specified in Section 01 78 00 - Closeout Submittals and 26 05 00 - Common Work Results For Electrical.

1.5 WASTE MANAGEMENT AND DISPOSAL

- 1.5.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal, and with Waste Reduction Workplan.
- 1.5.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- 1.5.3 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.
- 1.5.4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by DCC Representative.

- 1.5.5 Collect, package and store existing unit heaters for either reuse, recycling or rebuilding and return to recycler in accordance with Waste Management Plan.

2 PRODUCTS

2.1 MANUFACTURERS

- 2.1.1 Ouellet Canada, Dimplex/Chromalox, Stelpro Design..

2.2 SUSPENDED UNIT HEATERS

- 2.2.1 Unit heater with adjustable louvers finished to match cabinet as indicated.
- 2.2.2 Fan type unit heaters with built-in high-heat limit protection, fan-delay switches.
- 2.2.3 Fan motor permanently lubricated ball bearing type with resilient mount and built-in fan motor thermal overload protection.
- 2.2.4 Hangers: as indicated.
- 2.2.5 Elements mineral insulated copper coated stainless steel sheath with continuous helical brazed fins.
- 2.2.6 Cabinet: steel at 1,6 mm thick, treated with phosphate and finished with 2 coats baked enamel paint in beige colour. Fitted with 4 brackets for rod or wall mounting.

2.3 CONTROLS DEVICES, REGULATIONS

- 2.3.1 As indicated, provide remote-controlled thermostats or wall-mounted thermostats
- 2.3.2 Built in thermostat and support controls.
- 2.3.3 Wall mounted thermostats following divisions 23 and 25.

3 EXECUTION

3.1 INSTALLATION

- 3.1.1 Suspend unit heaters from ceiling or mount on wall as indicated.
- 3.1.2 Install thermostats in locations [indicated].
- 3.1.3 Make power and control connections.
- 3.1.4 For the heating system to work efficiently and conserve energy, it is important to mount thermostats at appropriate locations. The thermostat will respond to the temperature of the wall and surrounding air and it should not be placed in the following areas: on an outside wall, a wall exposed to direct sunlight, near a window or door or near internal heat sources.

3.2 FIELD QUALITY CONTROL

- 3.2.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- 3.2.2 Test cut-out protection when air movement is obstructed.
- 3.2.3 Test fan delay switch to assure dissipation of heat after element shut down.

3.2.4 Test unit cut-off when fan motor overload protection has operated.

3.2.5 Ensure heaters and controls operate correctly.

END OF SECTION

1. GENERAL

1.1 WORKSHOP DRAWINGS AND TECHNICAL SPECIFICATIONS

1.1.1 Submit shop drawings and data sheets in accordance with requirements of section 21 05 01.

1.2 ACTION AND INFORMATION SUBMITTALS

1.2.1 Submit product data in accordance with section 21 05 01 and incorporate them into the manual 21 05 01.

1.3 SUPPLEMENTARY MATERIALS

1.3.1 Provide maintenance / replacement materials / equipment in accordance with section 21 05 01.

1.3.2 Provide a list of spare parts recommended by each manufacturer, a list of suppliers where they can be purchased, and a list of special tools needed to adjust, repair and replace these parts, and incorporated into the operations and maintenance manual.

1.4 RELIABILITY OF TECHNICAL DATA

1.4.1 Data from manufacturers' catalogs and documentation shall be reliable data, based on test results which have been carried out by the manufacturers themselves or on their behalf by independent laboratories, compliance with the requirements of applicable codes and standards.

2. PRODUCTS

2.1 HUMIDIFIERS

2.1.1 CSA-certified and ULC-certified devices.

2.1.2 See specifications on drawings.

3. EXECUTION

3.1 INSTALLATION

3.1.1 Install in accordance with manufacturer's instructions.

3.1.2 Humidifier and evaporator media to be new and clean when project is accepted.

3.1.3 Install humidistat as indicated.

3.1.4 Water service overflow drain: to manufacturers' recommendation.

3.1.5 Install where easily accessible.

3.1.6 Install access doors or panels in adjacent ducting.

3.1.7 When installing in ducting, provide waterproof duct up and downstream in accordance with section 23 31 14.

3.1.8 Install capped drain connection at low point in duct.

END OF SECTION

1. GENERAL POINTS

1.1 REFERENCES

- 1.1.1 Canadian Standards Association (CSA)/CSA International
 - 1.1.1.1 CSA C22.10-10, Canadian Electrical Code with Quebec modifications, First part (21st edition), Safety standard related to electrical installations.
 - 1.1.1.2 CSA C22.10, Code de construction du Québec – Chapitre V – Électricité, 2010.
 - 1.1.1.3 CAN/CSA-C22.3 number 1, Overhead systems.
 - 1.1.1.4 CAN3-C235, Recommended voltages for systems having alternating currents from 0 to 50 000 V.
- 1.1.2 Electronic and Electrical Manufacturers' Association of Canada (EEMAC)
 - 1.1.2.1 EEMAC 2Y-1, Light Gray Colour for Indoor Switch Gear.
- 1.1.3 Health Canada – Workplace Hazardous Materials Information System (WHMIS)
 - 1.1.3.1 Material safety data sheet.

1.2 DESIGN REQUIREMENTS

- 1.2.1 Operating voltages must be in accordance with standard CAN3-C235.
- 1.2.2 The motors, electrical heating devices, control/regulation devices and distribution devices have to operate in the proper manner at a frequency of 60 Hz and within the limits established in the above mentioned standard.
 - 1.2.2.1 The materials must be capable of operating without sustaining any damage under the extreme conditions of this standard.
- 1.2.3 Operational and display language: make provisions for the identification and display of identification signs in English and French for control devices.

1.3 DOCUMENTS/SAMPLES TO BE SUBMITTED

- 1.3.1 Submit the required documents and samples in accordance with section 01 33 00 - Documents and samples to be submitted.
- 1.3.2 Submit, for examination purposes, the single-line schematics framed under plexiglass and place them in the designated areas.
 - 1.3.2.1 Electrical distribution networks: in the main room of electrical facilities.
 - 1.3.2.2 Electrical production and distribution networks: in the power plant rooms.
- 1.3.3 Shop drawings
 - 1.3.3.1 The shop drawings must display the seal and signature of an engineer recognized and competent to work in Canada.
 - 1.3.3.2 Submit five (5) copies of the drawings and data sheets to the ministerial representative.
 - 1.3.3.3 If changes are needed, notify the ministerial representative before they are executed.
- 1.3.4 Quality control: in accordance with section 01 45 00 - Quality control.
 - 1.3.4.1 Make provisions for CSA certified equipment and materials.
 - 1.3.4.2 In the case where it is not possible to obtain CSA certified equipment and materials, submit the proposed equipment to the ministerial representative for approval purposes, before delivering them to the site.

- 1.3.4.3 Submit the test results of the installed systems and electrical instruments.
- 1.3.4.4 Permits and rights: in accordance with the general conditions of the contract.
- 1.3.4.5 Once the work has been completed, submit a balance report pertaining to loads in accordance with article LOAD BALANCING, from PART 3.
- 1.3.4.6 Once the work has been completed, submit to the Client representative and the ministerial representative the acknowledgement of receipt delivered by the competent authority.

1.4 QUALITY ASSURANCE

- 1.4.1 Quality assurance: in accordance with section 01 45 00 - Quality assurance.
- 1.4.2 Qualifications: the electrical work must be executed by certified and qualified electricians, a master electrician or by a contractor-electrician who holds a licence issued by the province in which the work will take place.

1.5 TRANSPORT, STORAGE AND HANDLING

- 1.5.1 Schedule for equipment deliveries: hand in a delivery schedule to the ministerial representative in the two (2) weeks following the contract assignment.
- 1.5.2 Construction/demolition waste management and disposal: in accordance with section 01 74 21 - Construction/demolition waste management and disposal

1.6 START-UP OF THE INSTALLATION

- 1.6.1 Instruct the operational personnel on how to use the facility, its equipment and components and on how to maintain it.
- 1.6.2 Hire and pay for the services of an engineer independent of the manufacturing plant who will monitor the start-up of the installation, verify, adjust, balance and calibrate the various elements and who will instruct the operational personnel about door control system.
- 1.6.3 Provide these services for a duration that is 4 hours, taking into account of necessary visit required to start-up the equipment and to have the operational personnel become familiar with all aspects of their maintenance and functioning.

2. PRODUCTS

2.1 MATERIALS/EQUIPMENT

- 2.1.1 Provide the materials and equipment in accordance with section 01 61 00 – General requirements regarding products.
- 2.1.2 The equipment must be CSA certified. In cases where this is not possible, submit the replacement equipment and materials to the inspection authorities before delivering them to the site, in accordance with article DOCUMENTS/ELEMENTS TO BE SUBMITTED, from PART 1.
- 2.1.3 Command/control panels and all components must be factory assembled.

2.2 ELECTRIC MOTORS, EQUIPMENT AND COMMAND/CONTROLS

- 2.2.1 Verify the responsibilities pertaining to installation and coordination so that there may be motors, equipment and command/controls, in accordance with specifications.

2.3 CAUTION SIGNS

- 2.3.1 Caution signs: 175 mm x 250 mm.

2.4 CABLING PARKING STANDS

- 2.4.1 Make certain that the thimbles, terminals and screws and cabling terminations are as suitable for the copper conductors as for the aluminum ones.

2.5 IDENTIFICATION OF MATERIAL

- 2.5.1 In order to identify electrical material, use identification signs in accordance to the following specifications:

2.5.1.1 Identification signs: 3 mm thick plastic lamicaid etching plates, with white mat finish coloured front and black web, mechanically attached with tapping screws, with inscriptions in properly aligned letters, etched into the plate's web.

2.5.1.2 Format in accordance with the following table.

FORMAT FOR IDENTIFICATION PLATES

Format 1	10 x 50 mm	1 line letters	3 mm high
Format 2	12 x 70 mm	1 line letters	5 mm high
Format 3	12 x 70 mm	2 lines letters	3 mm high
Format 4	20 x 90 mm	1 line letters	8 mm high
Format 5	20 x 90 mm	2 lines letters	5 mm high
Format 6	25 x 100 mm	1 line letters	12 mm high
Format 7	25 x 100 mm	2 lines letters	6 mm high

- 2.5.1.3 The inscriptions on the identification plates must be approved by the Minister's representative before being made.
- 2.5.1.4 The identification plates for terminal board boxes and junction boxes must display the network characteristics and/or the voltage.
- 2.5.1.5 The identification plates for the isolating switches, starters and contactors must indicate the device controlled and voltage.
- 2.5.1.6 The identification plates for the terminal board boxes and pull boxes must display the network and voltage.
- 2.5.1.7 The identification plates for the transducers must display the strength as well as the primary and secondary voltages.

2.6 CABLING IDENTIFICATION

- 2.6.1 The two-phase conductor extremities for each feeder and for each branch circuit must be permanently identified in a smear proof manner using numbered or coloured plastic tape.
- 2.6.2 Preserve the order of phases and the same colour code for the entire installation.
- 2.6.3 The colour code must be in accordance with standard CSA C22.1.
- 2.6.4 Use communication cables made with conductors that have a uniform colour registration throughout the network.

2.7 IDENTIFICATION OF CONDUITS AND CABLES

- 2.7.1 Assign a colour code to conduits, boxes and metal sheathed cables.
- 2.7.2 Apply plastic tape or paint, for recognition purposes, on cables or conduits every 15 m and at wall bushings, ceilings and floors.
- 2.7.3 The base colour bands must be 25 mm in length and those for complementary colours must be 20 mm thick.

	Base Colour	Complementary colour
Up to 250 V	yellow	
Up to 600 V	yellow	green
Up to 5 kV	yellow	blue
Up to 15 kV	yellow	red
Telephone	green	
Other communication networks	green	blue
Fire alarm	red	
Emergency communication	red	blue
Other security systems	red	yellow

2.8 FINISH

- 2.8.1 The metallic covering surfaces must be fished in the shop and coated with an anti-rust layer, inside and outside, and with at least two layers of finishing enamel paint.
- 2.8.1.1 The electrical devices installed outdoors must be painted in a "machine green" colour.
- 2.8.1.2 The communication and distribution device cabinets must be painted a pale grey colour in accordance with standard EEMAC 2Y-1.

3. EXECUTION

3.1 INSTALLATION

- 3.1.1 Unless otherwise specified, execute all of the installation in accordance with standard CSA C22.1.
- 3.1.2 Unless otherwise specified, install the overhead and underground systems in accordance with standard CSA C22.3 number 1.

3.2 LABELS, IDENTIFICATION PLATES AND NAME PLATES

- 3.2.1 Make certain that CSA labels and identification and name plates are visible and legible once the materials have been installed.

3.3 INSTALLATION OF CONDUITS AND CABLES

- 3.3.1 Install conduits and sleeves before the concrete is poured.
- 3.3.1.1 Concrete work rail sleeves: series 40 steel pipe, being of a diameter that allows the unobstructed passage of the conduit and that surpasses the concrete surface by 50 mm on each side.

- 3.3.2 When plastic sleeves are used for wall or bushings that have a fire endurance rating, remove them before installing the conduits.
- 3.3.3 Install cables, conduits and connections that have to be embedded or coated by placing them carefully against the building's framework so as to minimize the thickness of the backfill.

3.4 PLACEMENT OF OUTLETS AND ELECTRICAL OUTLETS

- 3.4.1 Place the outlets and electrical outlets in the designated areas in accordance with section 26 05 32 – Outlet, junction and accessory boxes.
- 3.4.2 Do not install outlets or electrical outlets back to back in a wall; leave a horizontal space of at least 150 mm between boxes.
- 3.4.3 The location of outlets and electrical outlets can be changed without additional costs or credit, as long as the move does not exceed 3,000 mm and that notification is given before the move.
- 3.4.4 Place light switches near doors, on the handle side.
 - 3.4.4.1 In mechanical facility rooms and elevator machinery rooms, place the switches near doors, on the handle side.

3.5 HEIGHT OF MOUNTING

- 3.5.1 Unless otherwise specified or stipulated, measure material mounting heights from the coated floor surface up to the device's axis.
- 3.5.2 In the case where the mounting height is not specified, consult competent persons before commencing the installation.
- 3.5.3 Unless otherwise specified, install material at the following heights.
 - 3.5.3.1 Light switches: 1,400 mm.
 - 3.5.3.2 Wall outlets
 - 3.5.3.2.1 General: 300 mm.
 - 3.5.3.2.2 Above continuously heating base-board units: 200 mm.
 - 3.5.3.2.3 Above counter tops or their back splashes: 175 mm.
 - 3.5.3.2.4 In mechanical facility rooms: 1,400 mm.
 - 3.5.3.3 Panelboards: in accordance with the Code or specifications.
 - 3.5.3.4 Telephone and intercom outlets: 300 mm.
 - 3.5.3.5 Wall outlets for telephones and intercoms: 1,500 mm.
 - 3.5.3.6 Fire alarms: 1,400 mm.
 - 3.5.3.7 Fire alarm bells: 2,100 mm.
 - 3.5.3.8 Television outlets: 300 mm.
 - 3.5.3.9 Wall-mounted speakers: 2,100 mm.
 - 3.5.3.10 Clock outlets: 2,100 mm.
 - 3.5.3.11 Door bell buttons: 1,500 mm.

3.6 COORDINATION OF PROTECTIVE DEVICES AND ARC FLASH

- 3.6.1 Make certain that circuit protective devices such as overload releases, relays and fuses are installed, that they are of the proper calibre and are adjusted to the required values.
- 3.6.2 With submitting drawings shop, include coordination study for main protection devices.

- 3.6.3 Installation should be in accordance with article 2-306 «Protection contre les arcs et les chocs électriques» of the Quebec Construction Code chap. V – Electricity.

3.7 ONSITE QUALITY CONTROL

3.7.1 Load balancing

- 3.7.1.1 Measure the phase current for the panelboards under nominal loads (lighting) at the moment the work is received. Spread out the branch circuit connections so as to obtain the best balance of current between phases and make note of the modifications made to the original connections.
- 3.7.1.2 Measure the phase voltages of devices and adjust the transducer outlets so as to obtain a voltage that is within 2 % of the devices' nominal voltages.
- 3.7.1.3 Once the measurements have been completed, hand in the load balancing report stipulated in article DOCUMENTS/SAMPLES TO BE SUBMITTED, from PART 1. This report must specify the current of conditions under normal loads recorded on the phases and the neutral conductor panelboards, dry-type transformers and motor control centres. Specify the time and date on which the load was measured, as well as the circuit voltage at the time of measurement.

3.7.2 Execute the testing of the following elements, in accordance with section 01 45 00 – Quality control.

- 3.7.2.1 Generating facilities and electrical distribution, including phase, voltage and grounding control, and the balancing of loads.
- 3.7.2.2 Circuits originating from distribution panelboards.
- 3.7.2.3 Lighting systems and control/regulation devices.
- 3.7.2.4 Motors, heating devices and related control/regulation devices, including the control of sequential operations of systems if need be.
- 3.7.2.5 Fire alarm system and communication network.
- 3.7.2.6 Insulation resistance measurements.
- 3.7.2.6.1 Measure, using a 500 V megohmmeter, the insulating value of circuits, distribution feeders and equipment having a nominal voltage greater than 350 V.
- 3.7.2.6.2 Measure, using a 1,000 V megohmmeter, the insulating value of circuits, feeders and equipment having a nominal voltage between 350 V and 600 V.
- 3.7.2.6.3 Verify the resistance to earth value before turning on the current.

3.7.3 Execute the testing in the presence of the ministerial representative.

3.7.4 Provide the measuring devices, the indicators, equipment and personnel required to execute tests during the work execution and upon completion of the work.

3.8 CLEANING

- 3.8.1 Clean and touch up painted surfaces in the shop that have been scratched or damaged during operations and installations; use a paint that is of the same type and colour as the original paint.
- 3.8.2 Clean hooks, supports, fasteners and other visible fastening devices, and apply a finishing coat to protect against rust.

END OF SECTION

1 GENERALITIES

1.1 THIS SECTION INCLUDE

- 1.1.1 The studies must be provided to the ministerial representative before reception of the final authorization for the distribution equipment's shop drawings.
- 1.1.2 The studies should imply all of the distribution network from the supplier power income and/or emergency supply to the smallest settable breaker that is part of the electrical distribution network. The normal connection to the supplier network as well as the ones associated to the maximum fault will be used in the study.
- 1.1.3 The studies must be done by a specialized enterprise and must be approved and signed by an engineer member in rule of O.I.Q. The titles and references of the or those in charge of the study must be presented to engineer for authorization prior the beginning of the study.

1.2 DATA COLLECTION FOR THE STUDY

- 1.2.1 The specialized enterprise must get all the data required for the study.
- 1.2.2 The specialized enterprise must get all the data quickly to insure the production of the studies to meet the planed schedule for shop drawings approval concerning the distribution equipment and/or before the authorization to precede with manufacturing.

2 PRODUCT

2.1 COORDINATION STUDY, SHORT CIRCUIT ESTIMATE AND PROTECTION RELAYS

- 2.1.1 The short circuit study will be done using a digital computer program that meet the latest IEEE and ANSI standard.
- 2.1.2 For the short circuit study, provide the calculation methods and hypotheses, the base unit used, the single line diagrams, the impedance data including the distributor's and/or client's network, the typical calculation, the calculation tables with the quantity, results, conclusions and recommendations. Calculate the value of opening and instantaneous short circuit (when adequate) considering a solid three phase's short circuit at each switch sets, primary and secondary terminals of the sub-station, of the low voltage switch gear, of the panel boards, of the motor control centers, of the distribution panels, of the appropriate secondary panel boards and other relevant network points. Provide a short circuit to ground study for the same network points including the data relative to single pole impedance. Include in the tables the default impedance, the X/R ratio, the asymmetric factors, the motors inputs, the short circuit value in kVA, and the defaults symmetrical and asymmetrical currents.
- 2.1.3 For the protective devices coordination study, provide the time-current curves with graphical illustration showing the proposed network coordination using full length standard log-log graphic. Attach to each curve the full title and the single line diagram with the legend showing the exact network parts considered on the showed curves. Include a detailed description of each protective device by identifying the type, the function, the manufacturer, and the time-current characteristics. Provide the recommended settings concerning the sensors, the dial set up, the start-up, the instantaneous and delays values.
- 2.1.4 The curves should also show the electrical distributor's and/or client's relays and fuses characteristics, the medium voltage network relays and fuses characteristics, the breakers relays of the low voltage equipment, the transformers characteristics, the motors and generators characteristics and the characteristics of any others load protective equipment on the network. Include at least all the protective devices up to the most important secondary distribution breaker

- and to each motor control centers and to each distribution panel main breakers'. Include all the set values for the protective's devices in case of a ground fault. Provide the allowance from the manufacturer and the damaging curves using a drawing showing the fuses characteristics. Show the full load current of the transformer and the 150%, 400% or 600% current, the magnetizing inrush transformer current, the ANSI holding parameters of the transformer, the symmetrical and asymmetrical meaningful fault currents'. Complete the protective devices curves by showing in a single point the maximum symmetrical or asymmetrical short circuit current that the devices can get.
- 2.1.5 Select every protection devices for the primary of DELTA-Y transformers so that the characteristic and the protection curve operate within the transformers' characteristic, including the 58% of the ANSI holding value to protect the secondary line- ground fault. Provide the damage curve of the transformer if the primary protection device characteristics' is not within the transformer's characteristics. Leave a 16% distance between the protective devices primary curves' of a transformer and the secondary protection devices' to insure the coordination and an adequate protection from a possible line-line fault at the secondary. Leave a 0.4 second space between the medium voltage protection curves and the other protection devices.
- 2.1.6 Provide all the calculations concerning the faults current cover in section for all proposed power sources or combination of them. Notice that the combination may include the feeding circuits, the big motors, or generators, existing or to come as per the single line diagram.
- 2.1.7 The titles and references of the/or/those in charge of the study must be presented for authorization prior the beginning of the study. Provide the studies using the proposed equipment to check up the required functional characteristics. Propose the study's results to Departmental Representative for approval. Do the changes and additions if required.
- 2.1.8 For the study's need, use the equipment loads form the contract documents.
- 2.1.9 The study must include the motor faults values. Indicate by writing to the Departmental Representative any circuit protective devices' that do not meet its calculated fault value.
- 2.1.10 Provide the starters set values of the cooling motors or get them from the mechanical contractor, incorporate and comment them in the study.
- 2.1.11 When an emergency generator is part of the furniture, include a coordination study phases and ground of the generator protective device. Provide the reducing and damage curves of the generator and its protective devices operating characteristics. Obtain from the manufacturer the information about the impedance, time constants and current pulse, show them in the study. Do not use typical values for the generator.
- 2.1.12 Check-up for adequate operation of ground fault relays for four wires networks that have more than one main breaker or when generators are provided, indicate the neutral grounding locations and the fault current path in case of a neutral ground fault.
- 2.1.13 For the motors feeders circuits, show the MCC full load current, the symmetrical and asymmetrical starting current of the biggest motor, the delay required to prevent protective devices from tripping on a single or a motors' group start-up.

2.2 STUDYS' REPORT

- 2.2.1 The electrical network studies' reports will be resumed in a final report. This final report will be presented in a PDF format.
- 2.2.2 The report will include the following sections:
- 2.2.2.1 Descriptions, object, bases and range of the study

- 2.2.2.2 Spread sheets showing breakers', fuses and other protective's devices' nominal values, in comparison with the corresponding calculated short-circuit values and related comments.
- 2.2.2.3 Protection devices' time-current coordination's curves, breakers' and relays' settings tables, fuses choices and related comments.
- 2.2.2.4 The faults currents calculation including terms' definition and an interpretation guide for the computers' print outs.

2.3 ARC FLASH FAULT CALCULATION

- 2.3.1 Using the above short circuit and coordination study, an Arc flash fault analyses will be done as per IEEE 1584 standard mathematical equations and showed in NFPA70E latest edition.
- 2.3.2 When adequate, the short circuit and fault clearing time of the protection equipment will be chosen using the short circuit calculations and coordination curves.
- 2.3.3 The minimum safe reach distance, the restricted reach distance, the prohibited reach distance, the energy level calculations' for the normal and emergency sub-stations, shielded bus-bars, motor control centers, main 600V distribution panels, transformers (bigger than 45kVA) and main 208V panels.
- 2.3.4 The working distance should be calculated in regard of 1.2 calorie per square centimeter energy's.
- 2.3.5 The study must include the minimum and maximum applicable values in regard to short circuit faults available including the motors contribution.
- 2.3.6 The study must be based in regard to the protective devices with a maximum fault clearing time of two (2) seconds as per IEEE 1584.
- 2.3.7 The report will include the following information's:
 - 2.3.7.1 Public supplier and/or client contribution's for three phases, phase-ground faults with X/R ratio.
 - 2.3.7.2 The reactive short circuit calculation's from motor contribution.
 - 2.3.7.3 The used cables, size, length, alloy, conduit length, etc.
 - 2.3.7.4 Used bus-bar types', sizes, quantity, alloys, length of conduits, etc.
 - 2.3.7.5 Primary and secondary transformers' voltage, size, impedance and coils configuration.
 - 2.3.7.6 Generators' contribution.
 - 2.3.7.7 Motors' contribution.
 - 2.3.7.8 Available fault level in symmetrical and asymmetrical kVA.
 - 2.3.7.9 Setting recommendations for the components short circuit protective devices.
 - 2.3.7.10 Energy level for each cabinet, panels, sub-stations, motor control centers, including the arc fault clearance time, the fault size, the minimum operation distance, the nominal safe distance, the required personnel protection level (PPE), the voltage level, the risk level and recommendations.

3 CARRYING OUT

3.1 ELECTRICAL DISTRIBUTOR AUTHORIZATION

- 3.1.1 Final report copies' will be submitted to Departmental Representative for studies and approval. The approved copies will be submitted to the Departmental Representative.

3.2 ON SITE SETTINGS

- 3.2.1 The contractor will set the protective devices' on site to leave the equipment in a final operation condition. The settings should match the result of the approved short circuit, protective devices and coordination studies.
- 3.2.2 The contractor will do on site and at his own charge the minor settings to the protective devices' and the required equipment modifications to insure conformity to the approved short circuit, protective devices and coordination studies .
- 3.2.3 90 mm x 125 mm minimum labels' will be provided for each equipment part of the studies as per IEEE 1584 standard. They will be orange for all level rating of 3 and less. For the level rating of 4, they must be red. No hand written labels will be accepted. The labels will indicate the component location, the operating voltage, the risk level, the energy at this point, the minimum working distance, the safe protection distance, the provider number including its reference.

3.3 INSPECTION OF SPECIALIST CONTRACTOR

- 3.3.1 At the end of construction the specialist contractor will verify the electrical installation and the protection settings.
- 3.3.2 The specialist contractor will transmit a conformity report signed and sealed by an engineer relative to his studies' recommendation of the installation

END OF SECTION

1 GENERAL

1.1 REFERENCES

- 1.1.1 Canadian Standards Association (CSA International)
 - 1.1.1.1 CAN/CSA-C22.2 No.18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
 - 1.1.1.2 CSA C22.2 No.65-Wire Connectors.
- 1.1.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
 - 1.1.2.1 EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
- 1.1.3 National Electrical Manufacturers Association (NEMA)

1.2 WASTE MANAGEMENT AND DISPOSAL

- 1.2.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- 1.2.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- 1.2.3 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.
- 1.2.4 Divert unused wiring materials from landfill to metal recycling facility as approved by the ministerial representative.

2 PRODUCT

2.1 MATERIALS

- 2.1.1 Pressure type wire connectors to: with current carrying parts of copper sized to fit copper conductors as required.
- 2.1.2 Fixture type splicing connectors with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- 2.1.3 Bushing stud connectors: to EEMAC 1Y-2 NEMA to consist of:
 - 2.1.3.1 Connector body and stud clamp for copper
 - 2.1.3.2 Clamp for stranded copper conductors.
 - 2.1.3.3 Clamp for stranded aluminum ACSR conductors
 - 2.1.3.4 Stud clamp bolts.
 - 2.1.3.5 Bolts for copper conductor or bar.
 - 2.1.3.6 Bolts for aluminum conductor bar.
 - 2.1.3.7 Sized for conductors and bars as indicated.

2.1.4 Clamps or connectors for armored cable, aluminum sheathed cable, mineral insulated cable, flexible conduit, non-metallic sheathed cable as required

2.1.5 Watertight approved for TECK Cable

3 EXECUTION

3.1 INSTALLATION

3.1.1 Install the connectors as per manufacturer's recommendations for bar connection.

3.1.2 Remove insulation carefully from ends of conductors and:

3.1.2.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

3.1.2.2 Install mechanical pressure type connectors and tighten screws [with appropriate compression tool recommended by manufacturer]. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

3.1.2.3 Install fixture type connectors and tighten. Replace insulating cap.

3.1.2.4 Install bushing stud connectors in accordance with EEMAC 1Y-2, NEMA.

3.1.2.5 Contractor must prove that each screw has been tightened as per manufacturer's recommendation.

END OF SECTION

1 GENERAL

1.1 REFERENCES

- 1.1.1 Canadian Electrical Code, part 1.
- 1.1.2 CSA C22.2 no 0.3, Testing methods for Electrical Cables and Wires.

1.2 PRODUCT DATA

- 1.2.1 Provide product data in accordance with Section 01 33 00 - Submittal Procedures et 26 05 00 – Electrical General Requirements.
- 1.2.2 perform electrical test methods in accordance with section 26 05 00 – Electrical General Requirements.

1.3 DELIVERY, STORAGE AND HANDLING

- 1.3.1 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2 PRODUCT

2.1 BUILDING WIRES

- 2.1.1 Where cables assemblies are specified to have a PVC overall covering it may be required to comply to the Vertical Tray Fire Test of CSA C22.2 No.0.3 for the applicable Building Code classification of the project as it relates to the actual installed location.
- 2.1.2 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.
- 2.1.3 Copper conductors: size as indicated, with 600 or 1000V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE or RWU90 XLPE.
- 2.1.4 Use insulated wiring of 1000 V for motors controlled by variable frequency.
- 2.1.5 An insulated GREEN conductor of minimum size 12 AWG is required.
- 2.1.6 Neutral supported cable: 1, 2, 3 phase insulated conductors of Copper or Aluminum and one neutral conductor of Copper or Aluminum steel reinforced, size as indicated. Type: NS75 or NS90 Insulation: Type NS-1 rated 300 V and Type NSF-2 flame retardant rated 600 V.

2.2 TECK 90 CABLE

- 2.2.1 NS-1, for rate voltage of 300 V and NSF-2, Fireproof for rate voltage of 600 V.
- 2.2.2 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.
 - 2.2.2.1 Grounding conductor: copper.
- 2.2.3 Circuit conductors: copper size as indicated.
- 2.2.4 Insulation: Cross-linked polyethylene XLPE. Rating: 600 V. Inner jacket: polyvinyl chloride material. Armour: galvanized steel.

- 2.2.5 Teck Cables used for control and communication not exceeding 300 V should be isolated at 600 V and should be of metal armour with galvanized steel tape. The conductors should be copper 12 gauge minimum or a gauge superior considering charges and voltage drop and the number of conductors per cable.
- 2.2.6 All Teck Cables will be of type 90 with exterior PVC sheathing. Comply with CAN/CSA-C22.2 no 131 and 174 for hazardous locations (HL) and Fire retardant (FT-4).
- 2.2.7 Teck Cables, when installed in cable trays, must meet the Canadian Electrical code, part1 as well as adjustment factors relevant to tables 5A and 5D.
- 2.2.8 Overall covering: thermoplastic polyvinyl chloride, [compliant to Building Code classification for this project].
- 2.2.9 Fastenings:
 - 2.2.9.1 One-hole steel straps to secure surface cables 50 mm and smaller. Two-hole steel straps for cables larger than 50 mm.
 - 2.2.9.2 Channel type supports for two or more cables at 1.5 mm centers.
 - 2.2.9.3 Threaded rods: 6 mm diameter to support suspended channels.
- 2.2.10 Connectors:
 - 2.2.10.1 Watertight, explosion-proof approved for TECK cable.

2.3 ARMoured CABLES

- 2.3.1 Conductors: insulated, copper size as indicated.
- 2.3.2 Type: AC90
- 2.3.3 Armour: interlocking type fabricated from galvanized steel aluminum strip.
- 2.3.4 Type: ACWU90, PVC, flame retardant jacket over armour and compliant to applicable National Building Code of Canada classification for this project - wet locations.
- 2.3.5 Connectors: anti short connectors.

2.4 ALUMINUM SHEATHED CABLE

- 2.4.1 Conductors: copper size as indicated.
- 2.4.2 Insulation: cross linked polyethylene type RA90, rated 600 or 1000V.
- 2.4.3 Sheath: aluminum applied to form continuous corrugated sheath.
- 2.4.4 Outer jacket: thermoplastic applied over sheath and to be compliant with the Building Code classification for this project, direct burial in wet or corrosive locations. PVC type, fire retardant and sun resistant.
- 2.4.5 Fastenings for aluminum sheathed cable:
 - 2.4.5.1 One hole aluminum or malleable iron straps to secure surface cables 25 mm and smaller. Two hole steel straps for cables larger than 25 mm. Use access plates, bushings, washers and clamps non ferrous cable with single core not incorporating more than 200A.

2.4.5.2 Channel type supports for two or more cables at 1 mm centers.

2.4.5.3 Threaded rods: 6 mm diameter to support suspended channels.

2.5 CONTROL CABLES

2.5.1 Type: LVT: 2 soft annealed copper conductors, sized as indicated. Thermoplastic insulation, thermoplastic jacket sheathing, and armor of closely wound aluminum wire.

2.5.1.1 Type: low energy 300 V control cable: stranded annealed copper conductors sized as indicated LVT: 2 soft annealed copper conductors, sized as indicated, PVC Insulation type TW or TWH.

2.5.1.2 Type: 600 V or less, stranded, annealed copper conductors, sizes as indicated. Insulated in PVC, type TW, TWH, RW90 (XLPE). PVC overall covering. All cable must conform to section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.

2.6 NON-METALLIC SHEATHED CABLE

2.6.1 Non-metallic sheathed copper cable type: NMD90XLPE, NMW, NMWU, size as indicated.

2.7 FIRE ALARM SYSTEM CABLES

2.7.1 Standards CSA C22.2, no 208 (latest edition)

2.7.2 Standards CSA FAS-105, 300 volts, FT-4

2.7.3 unshielded cable without armour

2.7.3.1 for conventional system none addressable.

2.7.3.2 installation in metal conduit, type EMT only, with identification under section 26 05 00.

2.7.4 unshielded cable with armour

2.7.4.1 for conventional systems non addressable.

2.7.4.2 Installation in ceilings and drywall with identification in accordance with section 26 05 00.

2.7.5 shielded cable without armour

2.7.5.1 for all conventional addressable systems.

2.7.5.2 Metal conduit installation type EMT only, with identification according to section 26 05 00

2.7.6 Shielded cable with armour

2.7.6.1 for all conventional addressable systems.

2.7.6.2 identification according to section 26 05 00

2.7.7 Shielded cable with armour

2.7.7.1 For all systems, and in all places, except classified places, when used with appropriate connectors.

2.7.8 Provide approval for the type of cable in shop drawings.

2.8 FIRE RESISTANT WIRING

2.8.1 The sub-section applies to wiring installed outside confinement or service space that must have fire proofing, in accordance with the National Building Code of Canada 2010 requirements and standards ULC and CSA and municipal regulations for

2.8.1.1 Powered electrical circuits such as:

2.8.1.1.1 Emergency lighting (power panels and emergency first fixture if it is located on another floor area)

2.8.1.1.2 Fire pump

2.8.1.1.3 Emergency power

2.8.1.1.4 Fireman Lift (elevator)

2.8.1.1.5 Fire alarm station and control (high building)

2.8.1.1.6 Voice communication (high building)

2.8.1.1.7 Other charges according to indications

2.8.2 Polymer sheathed type conductors

2.8.2.1 copper conductors, size as indicated

2.8.2.2 low-smoke emission sheaths, halogen free (XLPO)

2.8.2.3 2-hour smoke resistant conductors complies with C22.2 no 38 and ULC S139-00

2.8.2.4 tools and accessories:

2.8.2.4.1 Use tools and accessories necessary to complete the installation of the wiring in accordance with the requirements and recommendation of the manufacturer.

2.8.2.5 Supply data sheet for approval

2.8.2.6 Acceptable products :

2.8.2.6.1 Tyco Thermal Controls Raychem «RHW» approved ULC RW75 in humid areas and dry areas and approved CSA R90 in dry areas

2.8.2.6.2 Draka «Lifeline R90» approved CSA R90 in dry areas.

2.8.3 Mineral insulated cable

2.8.3.1 copper conductors, size as indicated

2.8.3.2 copper sheathing for interior use and/or dry areas

2.8.3.3 stainless steel copper sheathing for external use, in wet and corrosive locations.

2.8.3.4 conductors having a 2-hour fire resistance ULC S139-00.

2.8.3.5 Tools and accessories:

2.8.3.5.1 Use tools and accessories necessary to complete the cable installation in accordance with the requirements and recommendations of the manufacturer.

2.8.3.6 Supply data sheet for approval

2.8.3.7 Acceptable products :

2.8.3.7.1 Tyco Thermal Controls Pyrotenax 1850

2.8.4 Fire alarm cables

2.8.4.1 Copper conductors, size as indicated.

2.8.4.2 low-smoke emission sheaths, halogen free (XLPO)

2.8.4.3 2-hour smoke resistant conductors comply with FAS105-FT4 and comply with C22.2 no 208 and ULC S139-00.

2.8.4.4 tools and accessories: Use tools and accessories necessary to complete the cable installation in accordance with the requirements and recommendations of the manufacturer.

2.8.4.5 Supply data sheet for approval

2.8.4.6 Acceptable products : Tyco Thermal Controls Raychem «CI»

2.9 CONDUCTORS EXPOSED TO SUNLIGHT

2.9.1 Insulated wires and power cables directly exposed to sunlight have to be protected specifically approved for such use and be labeled accordingly.

2.10 NUAL CONDUCTORS

2.10.1 The use of conductive aluminum alloy NUAL is accepted for branch circuits 100A or more for projects with wiring inside electrical metallic tubing, rigid metallic conduits and/or in rigid PVC. It will be the responsibility of the contractor to calculate the diameter of the pipe to meet the quantity laid down by Canadian Electrical Code, part 1.

3 EXECUTION

3.1 FIELD QUALITY CONTROL

3.1.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

3.1.2 Perform test's using method appropriate to site conditions and approval from the ministerial representative and local authority having jurisdiction over installation.

3.1.3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

3.2.1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).

3.2.2 Cable Color Coding: to Section 26 05 00 Common Work Results for Electrical.

3.2.3 Conductor length for parallel feeders to be identical.

3.2.4 Lace or clip groups of feeder cables at distribution centers, pull boxes, and termination points.

- 3.2.5 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.
- 3.2.6 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.
- 3.2.7 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.

3.3 INSTALLATION OF BUILDING WIRES

- 3.3.1 Unless otherwise stated, all wiring must be under conduit.
- 3.3.2 Use the types of conduits or pipe in accordance to the requirements of the respective section.

3.4 INSTALLATION OF TECK90 CABLE (0-1000 V)

- 3.4.1 Install cable as indicated securely supported by staples, straps or hangers.
- 3.4.2 when there are 2 cables in the same course, bind them in a «U».
- 3.4.3 When there are two cables on the same path in the building, Teck cables must be installed in cable shelves.
- 3.4.4 Cable terminations in accordance with section 26 05 20 - Wire and Box Connectors 0 - 1000V.

3.5 INSTALLATION OF ARMOURED CABLES

- 3.5.1 In ceilings and drywall, the contractor may use armored cables AC-90 between light fixtures so that the length between fixtures and junction boxes do not exceed 3000mm.
- 3.5.2 In the ceilings and drywall, the contractor may use armored cables AC-90 between plugs on the same circuit so that the length of cable used between two plugs or between two junction boxes does not exceed 6000mm.
- 3.5.3 A maximum of groups of 3 cables wherever possible. Support at each 1.5 meters. Cables should follow structural lines of the building. No horizontal cables in the wall will be accepted.
- 3.5.4 Use of armored cable AC-90, apparent on the surface is prohibited.
- 3.5.5 Terminate cables in accordance with section 26 05 20- Wire and Box Connectors 0-1000V.

3.6 INSTALLATION OF ALUMINUM SHEATHED CABLE

- 3.6.1 Group cables wherever possible on channels.
- 3.6.2 Support at each 1.5 meters. Cables should follow structural lines of the building. No horizontal cables in the wall will be accepted.

3.7 INSTALLATION OF CONTROL CABLES

- 3.7.1 Install control cables in conduit as indicated.
- 3.7.2 Ground control cable shield.

3.8 CABLE INSTALLATION FOR FIRE ALARM

- 3.8.1 Install cables as recommended by manufacturer.

3.8.2 Ground control cable shield.

3.8.3 Connect cable shield at one end only, or the starting end and ensure the continuity of grounding the shield.

3.9 CABLE INSTALLATION, WITH FIRE RESISTANT WIRING

3.9.1 Install all wiring having a degree of fire resistance in threaded rigid steel conduits

3.9.2 Lay cables and /or as not to decrease the clearance of the room and using as little space as possible.

3.9.3 Conceal the cables and /or ducts except those installed in the mechanical and electrical rooms and premises unfinished.

3.9.4 At the ends of cables, insert bare ends of the conductors in thermoplastic sleeves.

3.9.5 Lay sleeves at entrance and exit of cables embedded in concrete structures cast in place or masonry.

3.9.6 Unless otherwise indicated, it is prohibited to make splices in cables. If required, make in areas that are dry and accessible.

3.9.7 Identify cables every 3 meters and on both sides as they pass through walls and floors using tape indicator with the reference « 120V cable », « 600V cable ».

3.9.8 Finish the installation with end fittings (factory-made) and in accordance with the requirements and recommendations of the manufacturer.

END OF SECTION

1 GENERAL

1.1 REFERENCES

- 1.1.1 Canadian Standards Association, (CSA International)
- 1.1.2 Grounding equipment based on CSA C22.2 No. 41.
- 1.1.3 CAN/CSA Z32, Electrical Safety and Essential Electrical Systems in Health Care Facilities.

1.2 WASTE MANAGEMENT AND DISPOSAL

- 1.2.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- 1.2.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- 1.2.3 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.
- 1.2.4 Divert unused metal materials from landfill to metal recycling facility as approved by the ministerial representative.
- 1.2.5 Fold up metal banding, flatten and place in designated area for recycling.

2 PRODUCT

2.1 EQUIPMENT

- 2.1.1 Clamps for grounding of conductor: size as required to electrically conductive underground water pipe.
- 2.1.2 Copper conductor: minimum 6 m long for each concrete encased electrode, bare, stranded, tinned, soft annealed, size as indicated.
- 2.1.3 Rod electrodes: copper clad steel 19 mm diameter by 3 m long.
- 2.1.4 Plate electrodes: copper, surface area 0.2 m², 1.6 mm thick.
- 2.1.5 Grounding conductors: bare stranded copper, tinned, soft annealed size as indicated.
- 2.1.6 Insulated grounding conductors: green, type RWU-90 when ground or surroundings are humid and type RW-90 in other areas, size as indicated.
- 2.1.7 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.
- 2.1.8 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
 - 2.1.8.1 Grounding and bonding bushings.
 - 2.1.8.2 Protective type clamps.
 - 2.1.8.3 Bolted type conductor connectors.
 - 2.1.8.4 Thermit welded type conductor connectors.
 - 2.1.8.5 Bonding jumpers, straps.

2.1.8.6 Pressure wire connectors.

2.1.8.7 Compression connectors

2.1.9 Junction box (access) brand name «SYNERTECH» or approved equivalent.

2.2 MANUFACTURER

2.2.1 Accepted Products: Thomas & Betts, Cadwell or Thermoweld or Burndy.

3 EXECUTION

3.1 INSTALLATION GENERAL

- 3.1.1 Install complete permanent, continuous grounding system including, electrodes (minimum 3 per site), conductors, connectors, as indicated, to satisfy the requirements of the ministerial representative and local authorities.
- 3.1.2 Install connectors in accordance with manufacturer's instructions.
- 3.1.3 Protect exposed grounding conductors from mechanical injury.
- 3.1.4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process.
- 3.1.5 Use mechanical connectors for grounding connections to equipment provided with lugs.
- 3.1.6 Soldered joints not permitted unless they complete the installation of a compression joint.
- 3.1.7 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- 3.1.8 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.
- 3.1.9 Install separate ground conductor to outdoor lighting standards.
- 3.1.10 Make grounding connections in radial configuration only, with connections terminating at street side of water pipe. Avoid loop connections.
- 3.1.11 Bond single conductor, metallic armored cables to cabinet at supply end, and provide non-metallic entry plate at load end.
- 3.1.12 Ground secondary service pedestals.

3.2 SYSTEM AND CIRCUIT GROUNDING

- 3.2.1 Install system and circuit grounding connections to neutral of primary 347/600 V system, secondary 120/208 V, 120/240 V system.

3.3 EQUIPMENT GROUNDING

- 3.3.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centers, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting.

3.4 GROUNDING BUS

- 3.4.1 Install copper grounding bus mounted on insulated supports on wall of electrical room.
- 3.4.2 Ground items of electrical equipment in electrical room to ground bus with individual bare stranded copper connections, size as indicated.

3.5 FIELD QUALITY CONTROL

- 3.5.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- 3.5.2 Perform ground continuity and resistance tests using method appropriate to site conditions and approval from the engineer DCC Representative and local authority having jurisdiction over installation. Provide a copy of the results to the engineer. Tests should be performed by a specialized firm and signed by an engineer.
- 3.5.3 Perform tests before energizing electrical system.
- 3.5.4 Disconnect ground fault indicator during tests.

END OF SECTION

1 GENERAL

1.1 WASTE MANAGEMENT AND DISPOSAL

- 1.1.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- 1.1.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- 1.1.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- 1.1.4 Divert unused metal materials from landfill to metal recycling facility as approved by the ministerial representative.
- 1.1.5 Fold up metal banding, flatten and place in designated area for recycling.

2 PRODUCT

2.1 SUPPORT CHANNELS

- 2.1.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted, suspended, or set in poured concrete walls and ceilings.
- 2.1.2 Installation accessories such as threaded rods, bolts, washers, nuts, spring nuts, etc., or steel plated, chrome or zinc.
- 2.1.3 Galvanized products according to CAN/CSA-G164 standards.
- 2.1.4 Fasteners used outdoors or in wet areas must be stainless steel.
- 2.1.5 Fasteners, brackets and installation accessories must conform to the requirements of section 26 10 00 – Seismic Mountings.

3 EXECUTION

3.1 INSTALLATION

- 3.1.1 Refer to Section 01 61 00 - Common Product Requirements for fastenings and supports.
- 3.1.2 Secure equipment to hollow, solid, masonry, tile and plaster surfaces with lead anchors or nylon shields.
- 3.1.3 Secure equipment to poured concrete with expandable inserts.
- 3.1.4 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- 3.1.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- 3.1.6 Fasten exposed conduit or cables to building construction or support system using straps.
 - 3.1.6.1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
 - 3.1.6.2 Two-hole steel straps for conduits and cables larger than 50 mm.
 - 3.1.6.3 Beam clamps to secure conduit to exposed steel work.

- 3.1.7 Suspended support systems.
 - 3.1.7.1 Support individual cable or conduit runs with 6 mm Ø threaded rods and spring clips.
 - 3.1.7.2 Support 2 or more cables or conduits on channels supported by 6 mm Ø threaded rod hangers where direct fastening to building construction is impractical.
- 3.1.8 For surface mounting of two or more conduits use channels at 1 m on centre spacing.
- 3.1.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- 3.1.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- 3.1.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- 3.1.12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of DCC Representative.
- 3.1.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.
- 3.1.14 Coat with galvanized parts all surfaces that are scratched, altered or cut.

END OF SECTION

1 GENERAL

1.1 REFERENCES

1.1.1 Canadian Standards Association (CSA International)

1.1.1.1 CSA C22.1-[06], Canadian Electrical Code, Part 1, current edition.

1.1.1.2 Splitters are referenced to comply with CSA C22.2 No. 76.

1.1.1.3 Junction and pull boxes are referenced to comply with CSA C22.2 No. 40.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

1.2.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures and 26 05 00 – Common Work Results For Electrical.

1.2.2 Product Data:

1.2.2.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.2.3 Provide shop drawings: in accordance with Section 26 05 00 - Common Work Results For Electrical.

1.3 DELIVERY, STORAGE AND HANDLING

1.3.1 Waste Management and Disposal:

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

1.4 ELECTRICAL EQUIPMENT PROTECTED BY SPRINKLERS

1.4.1 Supply and install the equipment in accordance with section 26 05 00 - Common Work Results For Electrical.

2 PRODUCT

2.1 SPLITTERS

2.1.1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

2.1.2 Terminations: main and branch lugs, connection blocks to match required size and number of incoming and outgoing conductors as indicated.

2.1.3 Spare Terminals: minimum three spare terminals or lugs on each connection or lug block sized less than 400 A.

2.2 JUNCTION AND PULL BOXES

2.2.1 Construction: welded steel enclosure.

2.2.2 Covers Flush Mounted: 25 mm minimum extension all around.

2.2.3 Covers Surface Mounted: 150 x 150, must be fitted with hinges.

2.3 CABINETS

- 2.3.1 Type E Empty: Sheet steel enclosure for surface mounting with sides and folded edges overlapping fitted with hinged door, handle, lock and a latch.
- 2.3.2 Type T Terminal: surface return flange, flush overlapping sides mounting as indicated containing 19 mm thick, sheet steel backboard.
- 2.3.3 Cabinets for transformers in steel sheets, for surface mounting with lock and padlock device, standard knockouts, removable backplate, as indicated.

2.4 CONNECTIONS

- 2.4.1 Insulated metal bushings and connectors with nylon insulated groove, size no. 8 AWG or more.
- 2.4.2 Pressure pads to prevent debris to penetrate the outlets.
- 2.4.3 Access fittings for pipes up to 35 mm in diameter and pull boxes for larger conduits.
- 2.4.4 Locking nuts and insulated metal bushings on sheet metal box.

3 EXECUTION

3.1 SPLITTER INSTALLATION

- 3.1.1 Mount plumb, true and square to building lines.
- 3.1.2 Extend splitters full length of equipment arrangement except where indicated otherwise.

3.2 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

- 3.2.1 Install pull boxes in inconspicuous but accessible locations.
- 3.2.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.
- 3.2.3 Install terminal block as indicated in Type T cabinets.
- 3.2.4 Only main junction and pull boxes are indicated. Install additional pull boxes so as not to exceed 30 m of conduit run between pull boxes or 4-90 degree elbows.
- 3.2.5 Supply thermal blocks in the junction boxes containing more than 4 joints.

3.3 IDENTIFICATION

- 3.3.1 Equipment Identification: to Section 26 05 00- Common Work Results for Electrical.
- 3.3.2 Identification Labels: size 2 indicating system name voltage and phase or as indicated.

END OF SECTION

1 GENERAL

1.1 REFERENCES

1.1.1 Canadian Standards Association (CSA International)

1.1.1.1 CSA C22.1, Canadian Electrical Code, Part 1, 20th Edition.

1.1.1.2 Outlet boxes, conduit boxes and fittings are based on CSA C22.2 No. 18.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

1.2.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures and Section 26 05 00 – Common work results for electrical

1.2.2 Submit samples for floor box in accordance with Section 01 33 00 - Submittal Procedures and Section 26 05 00 – Common work result for electrical.

1.3 DELIVERY, STORAGE AND HANDLING

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

1.3.2 Waste Management and Disposal:

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

2 PRODUCT

2.1 OUTLET AND CONDUIT BOXES GENERAL

2.1.1 Size boxes in accordance with the Canadian Electrical Code, part 1.

2.1.2 102 mm square or larger outlet boxes as required.

2.1.3 Gang boxes where wiring devices are grouped.

2.1.4 Blank cover plates for boxes without wiring devices.

2.1.5 347 V outlet boxes for 347 V switching devices.

2.1.6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 GALVANIZED STEEL OUTLET BOXES

2.2.1 One-piece electro-galvanized construction. Single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

2.2.2 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

2.2.3 102 mm square or octagonal outlet boxes for lighting fixture outlets.

2.2.4 102 mm extension and plaster rings for flush mounting devices in finished plaster or tile walls.

2.3 MASONRY BOXES

- 2.3.1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

- 2.4.1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5 FLOOR BOXES

- 2.5.1 Concrete tight electro-galvanized sheet steel floor boxes with adjustable finishing rings to suit floor finish with brass brushed aluminum faceplate. Device mounting plate to accommodate short or long ear duplex single receptacles. Minimum depth: 73 mm for receptacles and communication outlets.
- 2.5.2 Adjustable, watertight, concrete tight, cast floor boxes with openings drilled and tapped for [16, 21 and 27] mm conduit. Minimum size: 73 mm deep.

2.6 CONDUIT BOXES

- 2.6.1 Cast FS or FD aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.7 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE

- 2.7.1 Electro-galvanized, sectional, screw ganging steel boxes, minimum size 76 x 50 x 63 mm with two double clamps to take non-metallic sheathed cables.

2.8 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE

- 2.8.1 Bushing and connectors with nylon insulated throats for no 8 AWG caliber and up.
- 2.8.2 Knock-out fillers to prevent entry of debris.
- 2.8.3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.
- 2.8.4 Double locknuts and insulated bushings on sheet metal boxes.

2.9 SERVICE FITTINGS

- 2.9.1 'High tension' receptacle fitting made of 2 piece stainless steel or die-cast aluminum with brushed aluminum or satin aluminum housing finish for 1 single, 1 duplex or two duplex receptacles. Bottom plate with two knockouts for centered or offset installation. 12 x 102 mm extension piece as indicated.
- 2.9.2 Pedestal type 'low tension' fitting made of 2 piece stainless steel or die cast aluminum with brushed aluminum or satin aluminum housing finish to accommodate one or two amphenol jack connectors.

3 EXECUTION

3.1 INSTALLATION

- 3.1.1 Support boxes independently of connecting conduits.
- 3.1.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

- 3.1.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- 3.1.4 Provide correct size of openings in boxes for conduit, mineral insulated and armored cable connections. Do not install reducing washers.
- 3.1.5 Vacuum clean interior of outlet boxes before installation of wiring devices.
- 3.1.6 Identify systems for outlet boxes as required.

END OF SECTION

1 GENERAL

1.1 DUCTS LOCATION

1.1.1 All ducts are not shown on the drawings. Those who are represented are on a schematic form.

1.2 SEISMIC FASTENERS

1.2.1 Supply and install all necessary equipment for seismic mountings as indicated in Section 26 10 00 – Seismic Fasteners.

1.3 ELECTRICAL APPARATUS PROTECTED BY SPRAY NOZZLES

1.3.1 Provide and install material in accordance with Section 26 05 00 – General Requirements.

1.4 REFERENCES

1.4.1 Canadian Standards Association (CSA International).

1.4.1.1 CAN/CSA-C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.

1.4.1.2 CSA C22.2 No. 45, Rigid Metal Conduit.

1.4.1.3 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

1.4.1.4 CSA C22.2 No. 83, Electrical Metallic Tubing.

1.4.1.5 CSA C22.2 No. 211.2, Rigid PVC Unplasticized Conduit.

1.4.1.6 CAN/CSA-C22.2 No. 227.3, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada.

1.4.2 Canadian Electrical Code, part 1

1.5 ACTION AND INFORMATIONAL SUBMITTALS

1.5.1 Submit required samples and documents in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – General Requirements.

1.5.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

1.6 WASTE MANAGEMENT AND DISPOSAL

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

1.6.2 Place materials defined as hazardous or toxic waste in designated containers.

1.6.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

2 PRODUCT

2.1 CONDUITS

- 2.1.1 Rigid metallic conduits: in accordance with standard CSA C22.2 no 45, threaded galvanized steel.
- 2.1.2 Epoxy coated conduits: in accordance with standard CSA C22.2 no 45, with zinc coating and anti-corrosive finishing coat with an epoxy based resin, inside and outside.
- 2.1.3 Electrical metallic tubing (EMT): in accordance with standard CSA C22.2 no 83, equipped with "Raintight" connectors.
- 2.1.4 Rigid PVC conduits: in accordance with standard CSA C22.2 no 211.2.
- 2.1.5 Flexible metal conduit: to CSA C22.2 no 56, liquid-tight flexible metal.
- 2.1.6 FRE conduit: CSA C22.2
- 2.1.7 Flexible PVC conduit: to CAN/CSA-C22.2 no 227.3.

2.2 CONDUIT FASTENINGS

- 2.2.1 One hole steel straps to secure surface conduits 50 mm and smaller.
 - 2.2.1.1 Two hole steel straps for conduits larger than 50 mm.
 - 2.2.1.2 Use stainless steel fasteners when installed outside or in damp locations.
- 2.2.2 Beam clamps to secure conduits to exposed steel work.
- 2.2.3 Channel type supports for two or more conduits at 2 m on centre.
- 2.2.4 Threaded rods, 6 mm diameter, to support suspended channels.
- 2.2.5 Quantities and dimensions mentioned above for various fasteners are a minimum and must meet the requirements of the section on seismic fasteners.

2.3 CONDUIT FITTINGS –GENERAL

- 2.3.1 Connectors: to CAN/CSA C22.2 no 18 manufactured for use with conduit specified. Coating: same as conduit.
- 2.3.2 Ensure factory "ells" where 90 degrees bends for 25mm and larger conduits.
- 2.3.3 Watertight connectors and couplings for EMT.
 - 2.3.3.1 Set-screws are not acceptable.
- 2.3.4 Ferrules for fittings in boxes, when required, Canadian electrical code, part 1

2.4 EXPANSION FITTINGS

- 2.4.1 Provide expansion fittings required for all conduits:
 - 2.4.1.1 Embedded in concrete and crossing expansion joints through the building;
 - 2.4.1.2 Apparent and undergoing significant changes in temperature;
 - 2.4.1.3 Exceeds the limit allowed by the manufacturers.

2.4.2 Weatherproof expansion fittings with internal bonding assembly suitable for 200mm linear expansion.

2.4.3 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19mm deflection.

2.4.4 Weatherproof expansion fittings for linear expansion at entry of panel.

2.5 FISH CORD

2.5.1 Polypropylene 6 mm.

2.6 BONDING

2.6.1 IN all conduits other than those mentioned in 2.1.1, a green insulated conductor with a minimum calibre of 12 AWG must be installed.

2.7 CONDUITS EXPOSED TO SUN LIGHT

2.7.1 Non-metallic pipes that are entirely exposed to sunlight have to be specifically approved for this usage and be marked in accordance.

3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

3.2.1 Install the visible conduits so as to diminish the part's head-way and by using the least amount of space possible.

3.2.2 Conceal conduits except those which are installed in mechanical and electrical facility rooms.

3.2.3 Use electrical metallic tubes (EMT) with tight connectors in technical rooms, warehouses, service garages etc. and standard fittings for ordinary locations.

3.2.4 Use rigid PVC conduits in underground facilities.

3.2.5 Use rigid threaded galvanized steel conduit in places classified explosion proof, in tunnels and wetlands.

3.2.6 Use epoxy coated conduit in corrosive or saline installations.

3.2.7 Use over a maximum length of 3m flexible metallic conduits when connecting to motors, transformers and equipment capable of vibration located in dry areas, incandescent bulbs, built-in and without pre-threaded outlet box, mounted fluorescent light fixture connection, projecting or built-in, works or elements in movable metal partitions.

3.2.8 Use flexible metal conduit and liquid-tight connections when connecting to motors and / or equipment which may vibrate or transformers located in damp or wet or corrosive environments.

3.2.9 Use explosion proof flexible connections for connection to explosion proof motors.

3.2.10 Install waterproof connections on conduits installed in dangerous locations. Fill them with sealing compound.

- 3.2.11 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- 3.2.12 Mechanically bend steel conduit over 21mm diameter.
- 3.2.13 Use conduits of at least 21 mm for lighting and power circuits.
- 3.2.14 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- 3.2.15 Install fish cord in empty conduits.
- 3.2.16 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- 3.2.17 Dry conduits out before installing wire.
- 3.2.18 For every flush-mounted panel, install three Ø 27 mm conduits from panel into ceiling space and three Ø 27 mm conduits from panel into the lower floor ceiling space (if applicable) . If no ceiling was provided for in these parts, install conduits as high as possible between the floor and the structure or provide an access door 300 x 600 mm to 300 mm above the panel.

3.3 VISIBLE CONDUITS

- 3.3.1 Unless indicated otherwise, install the conduits parallel or perpendicular to the building's layout lines.
- 3.3.2 Behind infrared or gas radiators, install conduits by leaving a space of 1.5m.
- 3.3.3 Make the conduits pass through the wings of the steel framework elements, if needed.
- 3.3.4 In locations where this is not possible, group the conduits into U-bend stirrups.
- 3.3.5 Unless otherwise specified, the conduits should not cross through framework elements.
- 3.3.6 In the case of conduits placed parallel to steam or hot water pipes, make provisions for a lateral space of at least 75mm; also make provisions for a space of at least 25mm in the case of crossings.
- 3.3.7 Install PVC expansion joints on conduit when installed in places where the temperature varies from 10 degrees and more. It must have an expansion joint for each length of 7.5m and 15m between each joint.

3.4 CONCEALED CONDUITS

- 3.4.1 Install conduits parallel or perpendicular to the building's layout lines.
- 3.4.2 It is forbidden to install horizontal conduits in masonry walls.
- 3.4.3 It is forbidden to embed the conduits into terrazzo works and concrete toppings.
- 3.4.4 No horizontal conduits will be accepted in drywall. Only vertical conduits will be tolerated.

3.5 CONDUITS IN CAST-IN-PLACE CONCRETE

- 3.5.1 Do not install conduits in concrete structures unless otherwise specified in the shop drawings and specifications.
- 3.5.2 Locate to suit reinforcing steel. Install in centre one third of slab.
- 3.5.3 Protect conduits at their exit points from a concrete work.

- 3.5.4 Install sleeves where conduits pass through slab or wall.
- 3.5.5 Before covering a concrete work with a water repellent membrane, install oversized joints in the locations where conduits have to pass through the latter. Apply a cold compound between the joints and conduits.
- 3.5.6 Conduits in slabs: minimum slab thickness 4 times conduit diameter.
- 3.5.7 Encase conduits completely in concrete with minimum 25 mm concrete cover.
- 3.5.8 Organize conduits in slab to minimize cross-overs.
- 3.5.9 Aluminum conduits shall not be concealed in concrete structures.

3.6 CONDUITS UNDERGROUND

- 3.6.1 Slope conduits to provide drainage.
- 3.6.2 Waterproof the joints using a thick layer of bituminous paint.
- 3.6.3 Install conduit at 1 m from the surface or as directed.
- 3.6.4 The underground conduits shall be of rigid PVC 41 mm minimum.
- 3.6.5 The underground conduits must be surrounded by a 150 mm layer of fine sand unless otherwise stated.

3.7 FIREWALL CROSSING CONDUITS

- 3.7.1 Caulk all gaps between the firewall and the conduit. Fire resistance shall be equal to surface crossing. The product manufacturer shall make an inspection of the work and issue a certificate stating that the facilities are inspected and comply with its recommendations and meet the requirements of ULC fire resistance characteristics.

END OF SECTION

1 GENERAL

1.1 REFERENCES

- 1.1.1 Seismic protection measures must meet the requirements of the National Building Code of Canada.
- 1.1.2 The design must comply with the following:
 - 1.1.2.1 SMACNA, Seismic Restraint Manual Guidelines for Mechanical Systems.
 - 1.1.2.2 ANSI/NFPA 13, Installation of Sprinkler Systems
 - 1.1.2.3 National Building Code of Canada.
 - 1.1.2.4 Seismic project area.

1.2 SCOPE OF WORK

- 1.2.1 Design, supply and install a complete system of seismic isolated fasteners against vibration or non-insulated as required for electrical equipment and related systems.
- 1.2.2 The design will be done by a professional engineer licensed member of the APEGNB and specialist in seismic system and shall bear the seal and signature of the engineer.
- 1.2.3 The seismic fastening system must be fully integrated and compatible with the requirements of reducing noise and vibration system of electrical equipment and related systems as specified on the drawings and elsewhere.
- 1.2.4 The seismic fastening system must be compatible with the electrical design and the design of the building structure. Calculations must be based on chapter 4.
- 1.2.5 During or after the earthquake, the fixed material must not necessarily remain working as in normal use. However, it is absolutely necessary that seismic fixation system prevents occupants injuries that could be caused by electrical systems and materials.
- 1.2.6 Provide and install the following equipment:
 - 1.2.6.1 Anti-vibration devices with earthquake dampers.
 - 1.2.6.2 Earthquake dampers.
 - 1.2.6.3 Setting material relaxed cables.
 - 1.2.6.4 Any other equipment necessary to meet the needs for a complete assembly

1.3 SHOP DRAWING

- 1.3.1 Present shop drawings in accordance with Section 26 05 00 - General Requirements.
- 1.3.2 Provide shop drawings and separate datasheets for each system and fixing devices for the seismic equipment.
- 1.3.3 The shop drawings shall clearly define the performance techniques and calculations showing the relevant forces in the anchor points. These documents must be sealed by a professional engineer and earthquake fasteners licensee member of the APEGNB.

1.4 CONSTRUCTION DRAWINGS

- 1.4.1 Once construction is completed, the contractor shall submit to the ministerial representative full set of original building materials, revised to reflect the requirements of the system as built.
- 1.4.2 Provide documentation detailing the installation methods of the seismic fastening systems.

2 – PRODUCT

2.1 GENERAL

- 2.1.1 The size and shape of the bases and the performance characteristics of vibration devices must comply with the manufacturer's recommendations and instructions.
- 2.1.2 Carry out the fabrication and installation of protective devices against earthquakes as recommended by the National Building Code of Canada.
- 2.1.3 Seismic protection systems must be able to oppose the forces in all directions.
- 2.1.4 Fasteners and anchors must be able to withstand the same loads as the seismic protection devices.
- 2.1.5 The seismic fasteners installed on duct systems, bars and shelves sheathed cables should be compatible with the requirements of anchoring and guiding these networks.
- 2.1.6 Mechanical expansion anchors of high resistance should be used for the seismic protection to concrete structures.
- 2.1.7 The use of anchors and fasteners installed to nailer gun or holes drilled for this purpose is prohibited.
 - 2.1.7.1 Acceptable Products: Hilti HSL-type.
- 2.1.8 The use of materials made of cast iron or threaded pipe or other brittle materials is prohibited.
- 2.1.9 Seismic protection devices installed on ductwork, bus ducts, cable shelves and other related clips attached to equipment must be compatible with the vibration and seismic devices for component.
- 2.1.10 Seismic protection devices must not interfere with the operation of the firewall devices or compromise the integrity.
- 2.1.11 The whole system of seismic fasteners must be supplied by a single manufacturer and supplier.
- 2.1.12 Acceptable suppliers: Korfund Dynamics, Vibro-Acoustics, Noise Kinectics Conrol, Tecoustics, Vibra-Sonic controls.

2.2 SEISMIC MOUNTING FOR STATIC EQUIPMENT FIXATIONS (EQUIPMENT THAT DO NOT REQUIRE VIBRATION SUPPORT)

- 2.2.1 Equipment installed on the floor:
 - 2.2.1.1 Attach the hardware to support, which must be attached to the frame, using the sizes of bolts shown on the shop drawings of these systems.
- 2.2.2 Suspended material, including networks of electrical conduit, bus ducts, cable shelves and similar related systems:

2.2.2.1 Use one or more of the following methods, depending on site conditions:

2.2.2.1.1 Attach the material securely to the frame.

2.2.2.1.2 Strengthen the material in all directions.

2.2.2.1.3 Strengthen the attachment points of the equipment to the structure.

2.2.2.1.4 Secure the material with relaxed cables.

2.2.2.2 The attachment of ductwork, bus ducts and cable shelves by relaxed cables prevents swaying motion in the horizontal level, the swing in the vertical level and the slip and buckling in the axial direction.

2.2.2.3 Care must be taken to ensure that the suspension rods can withstand the compressive load and none flammable.

2.2.2.4 Seismic protection system must exercise due to an elastomeric material or other means soft and smooth damping effect, to prevent high impact loads.

2.3 ATTACHMENTS FOR SEISMIC ISOLATED EQUIPMENT VIBRATION FIXATIONS

2.3.1 Equipment installed on the ground:

2.3.1.1 Apply one or more of the following methods, depending on site conditions:

2.3.1.1.1 Use anti-vibration devices with integrated dampers.

2.3.1.1.2 Use separate devices in addition to vibration dampers.

2.3.1.1.3 Use a cushioning system made from structural element compound and an elastomeric layer, with the approval of the ministerial representative.

2.3.2 Seismic protection devices should in no way interfere with the action of acoustic and vibration systems. Provide a clearance of 4 to 8 mm in normal operating conditions of the equipment and systems between the shocks of earthquake protection devices and equipment

2.3.3 Incorporate seismic vibration protection systems devices to prevent complete discharge of these.

2.3.4 The damping effect exercised due to an elastomeric material or other means should be soft and smooth to prevent high impact loads.

3 – EXECUTION

3.1 INSTALLATION

3.1.1 Attach the protection devices by the relaxed cable suspended ceiling material so that the axial projection of cables passes through the center of gravity of the material.

3.1.2 Install cables using wireway, assembly terminals and other hardware to ensure proper alignment of the protective devices and prevent bending cables to the mounting points.

3.1.3 Orient fastening cables attached to the ceiling suspended material so that they do an approximately 90 degrees between them (in the plane), then attach them to the ceiling where the slab so they do with the latter an angle not exceeding 45 degrees.

3.1.4 A minimum clearance of 25 mm shall be provided between the seismic protection devices and other equipment and service element.

- 3.1.5 Adjust the protection cables so as to enable the normal operation of the vibration system but without being visibly relaxed.
- 3.1.6 Bolted to the frame all other equipment that is not insulated against vibration.
 - 3.1.6.1 Install vibration devices in accordance with manufacturers' instructions and specialized engineer and adjust the pads so that the devices are level.
 - 3.1.6.2 Make sure the connection of electrical wiring to remote devices does not diminish the flexibility of the vibration isolation system and the pipes running through walls or floors do not transmit vibrations.
 - 3.1.6.3 When the vibration devices are bolted to the floor, use vibration rubber washers.
 - 3.1.6.4 It is forbidden to set the devices for protection against earthquakes with anchors or fasteners installed to nailer gun or holes drilled for this purpose.
 - 3.1.6.5 Provide seismic ties to all ducts with a diameter of 63 mm or more and install more than 300 mm from the structural ceiling.
 - 3.1.6.6 Install lateral attachments to a maximum of 12.2 m c / c.
 - 3.1.6.7 Install longitudinal ties to a maximum of 24.4 m c / c.
 - 3.1.6.8 Attach the hanging devices and integrated into a suspended ceiling devices using relaxed cables.

3.2 INSPECTION

- 3.2.1 At the completion of the work the specialist engineer will carry out an inspection of the seismic systems. He will issue a report or a signed letter certifying compliance of seismic installations as specified standards and various manufacturers' recommendations.

END OF SECTION

1 GENERAL

1.1 REFERENCES

1.1.1 Canadian Standard Association (CSA International).

1.2.1.1 CSA C22.2 No 29, Panelboards and Enclosed Panelboards.

1.2 SHOP DRAWINGS AND PRODUCT DATA

1.2.1 Submit shop drawings and product data in accordance with Sections 26 05 00 – General Requirements and 01 33 00 – Submittal Procedures.

1.2.2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimensions.

1.3 PANELBOARDS DESCRIPTION

1.3.1 To see panelboards description, refer to Section 26 05 05 – Scope of work, Specific Clauses, Descriptions and Lists.

1.4 SEISMIC FASTENERS

1.4.1 Provide and install all necessary seismic fasteners in accordance with Section 26 10 00.

1.5 ELECTRIC GEAR PROTECTED BY SPRINKLERS

1.5.1 Provide and install materials in accordance with Section 26 05 00 – General Requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

1.6.1 Separate and recycle waste materials in accordance with Section 01 74 00 – Construction/Demolition Waste Management and Disposal.

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

1.6.3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

1.6.4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by the ministerial representative.

2 – PRODUCT

2.1 PANELBOARDS

2.1.1 Panelboards of one manufacturer.

2.1.1.1 Install circuit breakers in panelboards before shipment.

2.1.1.2 In addition to CSA requirements, manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

2.1.2 250V and 600V Panelboards: bus and breakers rated as indicated on shop drawings. A symmetrical interrupting capacity 22 000 A or as indicated.

2.1.3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

- 2.1.4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.
- 2.1.5 Two keys for each panelboards and key panelboards alike.
- 2.1.6 Copper or aluminum bus with neutral of same ampere rating as mains.
- 2.1.7 All tables must have bar grounding.
- 2.1.8 Mains: suitable for bolt-on breakers.
- 2.1.9 Trim with concealed front bolts and hinges.
- 2.1.10 The front panel must be fitted with hinged left and right retaining bolts (door in door) to facilitate access for maintenance personnel.
- 2.1.11 Trim and door finish: baked grey enamel.
- 2.1.12 For all unused spaces, install devices for adding breakers later.

2.2 SERIAL PROTECTION

- 2.2.1 The panels must be downstream full value or integrated protective equipment value with protection upstream. If the manufacturer decides to go with the second option, he must provide proof from testing laboratory certifying the proper functioning of equipment and indicate on a nameplate the testing current (kA rms. Bal.) of protection device equipment with specific upstream bypass arrangements eligible, the designation of the panel and voltage, as mentioned in section 14-014 of Canadian Electrical Code, part 1
- 2.2.2 No integral protection (series) will be accepted for capacity of more than 400A.
- 2.2.3 No integral protection (serial) will be accepted on the network emergency.
- 2.2.4 No integral protection (series) will be accepted if the sum of the rated currents of motors connected directly between the devices connected in series is greater than 1% of rated breaking capacity of the downstream circuit breaker.

2.3 CUSTOM BUILT PANELBOARDS ASSEMBLIES

- 2.3.1 125 mm relay section on one or both sides of panels as indicated for installation of low voltage remote control switching components.
- 2.3.2 Double stack panels as indicated.
- 2.3.3 Contactors in mains as indicated.
- 2.3.4 Feed through lugs as indicated.
- 2.3.5 Isolated ground bus.

2.4 BREAKERS

- 2.4.1 Breakers: to Section 26 28 21 – Moulded Case Circuit Breakers.
- 2.4.2 Breakers with thermal and magnetic stripping in panelboards except as indicated otherwise.
- 2.4.3 Main breaker: separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

- 2.4.4 Lock-on devices for receptacles, fire alarm clock outlet, emergency, door supervisory, intercom, stairway, exit and night light circuits.

2.5 EQUIPEMENT IDENTIFICATION

- 2.5.1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results – Electrical.
- 2.5.2 Nameplate for each panelboard size 4 engraved as indicated.
- 2.5.3 Nameplate for each circuit in distribution panelboards size 2 as indicated.
- 2.5.4 Complete circuit directory with typewritten legend showing location and load of each circuit.

3 – EXECUTION

3.1 INSTALLATION

- 3.1.1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.
- 3.1.2 Install surface mounted on panelboards on plywood backboards. Where practical, group panelboards on common backboards.
- 3.1.3 Mount panelboards to height specified in Section 26 05 00 – Common Work Results – Electrical or as indicated.
- 3.1.4 Connect all circuits to load elements.
- 3.1.5 Connect neutral conductors to common neutral bus with respective neutral identified.
- 3.1.6 When there are distribution panels installed side by side, boxes must be welded together and be of same size, lids must be separated, doors of the same size and must be perfectly aligned.
- 3.1.7 Provide each circuit taken at 120 VAC and services of its own neutral conductor, do not use common neutral multi-circuit. The derivations of lighting can be provided with a common neutral with Canadian Electrical Code, part 1.
- 3.1.8 Each time the panel will be installed flush, install three Ø 27 mm empty ducts into the ceiling space and three Ø 27 mm ducts into the ceiling space of the lower floor (if applicable). If no ceiling was provided, finish the ducts as high as possible between the floor's structures or provide an access door 300 x 600 mm to 300 mm above the panel.
- 3.1.9 The connection of branch lines to the panel should be made on the sides of the distribution panels. Only the supply conduits can be connected to the top or bottom.

END OF SECTION

1 GENERAL

1.1 REFERENCES

- 1.1.1 Canadian Standards Association (CSA International).
 - 1.1.1.1 CSA-C22.2 No. 42, General Use Receptacles, Attachment Plugs and Similar Devices.
 - 1.1.1.2 CSA-C22.2 No. 42.1, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
 - 1.1.1.3 CSA-C22.2 No. 55, Special Use Switches.
 - 1.1.1.4 CSA-C22.2 No. 111, General-Use Snap Switches (National standard, with UL 20, current edition).

1.2 SHOP DRAWINGS AND PRODUCT DATA

- 1.2.1 Submit shop drawings and product data in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – General Requirements.
- 1.2.2 Submit a set of drawings for each model of electrical outlets and switches specified.
- 1.2.3 The drawings shall clearly identify the following:
 - 1.2.3.1 Manufacturer
 - 1.2.3.2 Model
 - 1.2.3.3 Description
 - 1.2.3.4 Amperage and voltage
 - 1.2.3.5 Nema Configuration
 - 1.2.3.6 Catalog Number
 - 1.2.3.7 Color
 - 1.2.3.8 Performance
 - 1.2.3.8.1 Electrical
 - 1.2.3.8.2 Mechanical
 - 1.2.3.8.3 Environmental
 - 1.2.3.9 Material:
 - 1.2.3.9.1 Front
 - 1.2.3.9.2 Rear body
 - 1.2.3.9.3 Contact
 - 1.2.3.10 Dimensions

1.3 WASTE MANAGEMENT AND DISPOSAL

- 1.3.1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- 1.3.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- 1.3.3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- 1.3.4 Divert unused metal and wiring materials from landfill to metal recycling facility proposed by Consultant and approved by ministerial representative.

2 – PRODUCT

2.1 SWITCHES

- 2.1.1 Switches: single pole, double pole, three-way or four-way switches, 15 or 20 amp, 120-277 V ac or 347 V ac as indicated.
- 2.1.2 Manually-operated general purpose ac switches with following features:
 - 2.1.2.1 Terminal holes approved for No. 10 AWG wire.
 - 2.1.2.2 Silver alloy contacts.
 - 2.1.2.3 Urea or melamine moulding for parts subject to carbon tracking.
 - 2.1.2.4 Suitable for back and side wiring.
 - 2.1.2.5 Toggles: in white.
- 2.1.3 Toggles operated fully rated for tungsten filament and fluorescent lamps, and up to 120% of rated capacity for motor loads.
- 2.1.4 For all of the installation, use only switches manufactured by a single manufacturer.
- 2.1.5 Accepted products:

	Hubbell	Leviton	Seymour
120V 15A 1 pole	HBL1201W	1201-2W	PS15AC1W
120V 20A 1 pole	HBL1221W	1221-2W	PS20AC1W
347V 15A 1 pole	HBL18201WCN	18201-W	PS371510W
347V 15A 1 pole	HBL18203WCN	18221-W	PS372010W

2.2 DIMMERS FOR INCANDESCENT BULBS

- 2.2.1 Dimmer compliant with CSA C22.2 no 184.1, allowing to vary the brightness on a palm between 0 % and 100 % following a quadratic curve consistent and continuous, and with following characteristics:
- 2.2.1.1 For installation in a single switch box.
- 2.2.1.2 Can be mounted without the need for bulk removal of side walls or decommissioning of electrical power to 1000 watts.
- 2.2.1.3 Circuit advanced semiconductors, providing a sinewave AC ballast low voltage magnetic shunt.
- 2.2.1.4 Two mobile parts:
- 2.2.1.4.1 Single pole or three-way switch, as indicated.
- 2.2.1.4.2 Long life potentiometer.
- 2.2.1.5 Controlled by switching on and off button without changing the preset light intensity.
- 2.2.1.6 Rated for 120 V AC, as indicated.
- 2.2.1.7 Providing a regulated voltage accuracy of $\pm 5\%$ lumen for a voltage variation of $\pm 10\%$.
- 2.2.1.8 No perceptible flicker at any point of adjustment range, and no perceptible hum.
- 2.2.1.9 RFI filter (audio, radio and television).
- 2.2.1.10 For operation at an ambient temperature of 0 ° C to 40 ° C.

2.3 OUTLETS

- 2.3.1 Outlets to 125 VAC, depending on the following accepted manufacturers:

	<u>Hubbell</u>	<u>Leviton</u>	<u>Pass & Seymour</u>
Single 15 A Conf. 5-15R	HBL5251	5251-W	5261
Double 15 A Conf. 5-15R	HBL5262W	5262-W	5262AW
Double 15 A Conf. 5-15R Emergency	HBL5262R	5262-R	5262ARED
Double 15 A Conf. 5-15R Computer Room	IG5262	5262-IG	IG5262
Double 20 A Conf. 5-20R	HBL5362W	5362-W	5362AW
Single 30 A Conf. 5-30R	HBL9308	5371	3802

	<u>Hubbell</u>	<u>Leviton</u>	<u>Pass & Seymour</u>
Single 15 A Lockable Conf. L5-15R	HBL4710	4710	4710
Double 15 A Lockable Conf. L5-15R	HBL4700	4700	4700
Single 20 A Lockable Conf. L5-20R	HBL2310	2310	L520-R
Double 15 A DDFT Conf. 5-15R	GF5262WA	7599-W	N/A
Double 20 A DDFT Conf. 5-20R	GF5362WA	7899-W	N/A
Double 15 A Hospital Grade Conf. 5-15R	HBL8200W	8200-W	8200W
Double 20 A Hospital Grade Conf. 5-20R	HBL8300W	8300-W	8300W
Double 15 A DDFT (Hospital Grade) Conf. 5-15R	GF8200WA	7599-HGW	1595-HGW
Double 20 A DDFT (Hospital Grade) Conf. 5-20R	GF8300WA	7899-HGW	2095-HGW
2.3.2 120/240 V ac outlets:			
	<u>Hubbell</u>	<u>Leviton</u>	<u>Pass & Seymour</u>
Single 30 A Conf. 14-30R	HBL9430A	278	3864
Single 50 A Conf. 14-50R	HBL9450A	279	3894
2.3.3 Outlets: white (except emergency network UPS, computer).			
2.3.4 Special network outlets:			
2.3.4.1 Red : Emergency network			
2.3.4.2 Blue: UPS network			

2.3.4.3 Orange (with isolated grounding) : Computer

2.4 SPECIAL WIRING DEVICES

2.4.1 Special wiring devices

2.4.1.1 Clock hanger outlets, 15 A, 125 V, 3 wire, grounding type, suitable for No. 10 AWG for installation in flush outlet box.

2.4.1.2 Lamps: as indicated, equipped with an LED lamp or neon of 0,04 W, 125 V red plastic, built-in.

2.4.1.3 Motion Detectors: as indicated, combine infrared and ultrasound for wall or ceiling complete with all necessary accessories for a complete assembly.

2.4.1.4 Tape clear plastic identification, typed in black, as indicated. Manufacturer accepted: E-Z-CODE Thomas & Betts.

2.5 COVER PLATES

2.5.1 Cover all devices and wiring boxes for telephone, cable and computer conduit systems with cover plates.

2.5.2 For the entire system, use only cover plates made by a single manufacturer: Hubbell, Leviton or Pass & Seymour.

2.5.3 Plate lids galvanized steel junction boxes for surface-mounted.

2.5.4 Plate covers nonmagnetic stainless steel (# 302) brushed vertically 1 mm thick for wiring devices hospital grade type mounted in outlet boxes or recessed surface.

2.5.5 Stainless steel cover plate (# 430) brushed vertically 1 mm thick for wiring devices mounted in outlet boxes or recessed surface.

2.5.6 Cover plate moulded aluminum, weatherproof, double-leaf spring with gaskets for electrical outlets doubles, as indicated.

2.5.7 Cast aluminum cover plate, spring, weather-resistant, with gaskets for electrical outlets and switches simple, as indicated.

2.5.8 Nylon or plastic plates, as indicated, the same color as the device wiring for homes.

2.6 JIFFY POLES

2.6.1 Service pin aluminum profile Satin gray finish with two 5-15R duplex receptacles wired at the factory for a tour that ends in between the ceilings by a flexible cord with plug and grounding the column exceeding 6 m, and two knockouts for telecommunication closed by a plate.

2.6.2 Pillars with two separate compartments for electricity and telecommunications are all accessible by a removable cover.

2.6.3 Outlets and telecommunications outlets shall be located on the same side of the column.

2.6.4 Attachment devices for suspended ceiling adjustable bar "T" or inverted concrete slab (as applicable) and low slip to the floor.

2.6.5 Dimensions: 2 1 / 8 in. x 2 1 / 8 x 9 '6"(height necessary to change depending on the height of the ceiling or slab as applicable).

2.6.6 Positioning of the outputs (the center axis of the device):

2.6.6.1 Outlets: 533 mm and 635 mm.

2.6.6.2 Telecommunication outlets: 278 mm and 381 mm.

3 – EXECUTION

3.1 INSTALLATION

3.1.1 Switches and dimmers:

3.1.1.1 Install single throw switches with handle in “UP” position when switch closed.

3.1.1.2 Install switches in gang type outlet box when more than one switch is required in one location.

3.1.1.3 Mount toggle switches and dimmers at height in accordance with Section 26 05 00 – Common Work Results – Electrical.

3.1.2 Outlets:

3.1.2.1 Install outlets in gang type outlet box when more than one outlet is required in one location.

3.1.2.2 Mount outlets at height, in accordance with Section 26 05 00 – Common Work Results – Electrical.

3.1.2.3 Where split outlets has one portion switched, mount vertically and switch upper portion.

3.1.3 Cover plates:

3.1.3.1 Protect stainless steel cover plates finish with paper or plastic film until painting and other work is finished.

3.1.3.2 Install suitable common cover plates where wiring devices are grouped.

3.1.3.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.1.3.4 Identify the panel number and circuit number corresponding to all devices and wiring junction boxes, using an adhesive tape white plastic type P-Touch. The adhesive tape shall exceed the width of the plate, 10 mm on each side, to return and paste in the back.

Lettering color:

Normal type network: black

Emergency type network: red

Other networks: to coordinate.

3.1.4 Jiffy poles:

3.1.4.1 Install the poles as indicated in the plan. Coordinate with the final development positions and orientations.

3.1.4.2 If necessary, change the height on site depending on the type of ceiling and its composition. The amendment will be made on the upper end of the column.

3.1.5 FS and FD box types:

- 3.1.5.1 Coordinate with the general contractor install recessed cans so that the surface of the box is flush with the wall surface. Provide a seal around the box before installing the cover plate.

3.1.6 General:

- 3.1.6.1 Outputs and dimmers location in accordance with Section 26 05 00 – General requirements, or as indicated.

END OF SECTION

1 GENERAL

1.1 REFERENCES

1.1.1 Canadian Standards Association (CSA International)

1.1.1.1 CSA-C22.2 No. 5-02, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, current edition).

1.2 SHOP DRAWINGS AND PRODUCT DATA

1.2.1 Submit shop drawings and product data in accordance with Sections 26 05 00 – General Requirements, and 01 33 00 – Submittal Procedures.

1.2.2 Include the characteristic curves established according to the constant time-current for circuit breakers with a capacity of 100 A or more, or with a breaking capacity of 22 000 A symmetrical and over, to the line voltage.

1.2.3 Provide all available data regarding the values of the capacity of power failure and short circuit I_{2t} maximum allowable values for all circuit breakers.

1.2.4 Provide the certificate of authenticity and fabrication of the circuit breaker.

1.3 AUTHENTICATION

1.3.1 Before proceeding with any installation of circuit breakers in a new or existing installation, the electrical contractor must submit three (3) copies of a certificate of authenticity from the manufacturer, in French, signed by the factory and the local representative of that manufacturer certifying that all circuit breakers are new and that they meet the standards and regulations. These certificates must be submitted to the ministerial representative for acceptance.

1.3.2 A delay in the production of the certificate of authentication will not justify an extension of the contract and no additional compensation.

1.3.3 Any work of manufacturing, assembly or installation should begin only after acceptance of the certificate of authentication by the ministerial representative. Failure to comply with this requirement, the ministerial representative and / or the client user has the right to mandate the manufacturer listed on the circuit breakers to authenticate all new circuit breakers under the contract, and that, at the expense of contractor electrician.

1.3.4 In general, the certificate of authentication must contain:

1.3.4.1 The name and address of the manufacturer and the person responsible for the authentication. The responsible person must sign and date the certificate;

1.3.4.2 The name and address of the licensed dealer and distributor of the person responsible for the count of the contractor.

1.3.4.3 The name and address of the contractor and the person in charge of the project.

1.3.4.4 The name and address of the building where the circuit breakers will be installed:

1.3.4.4.1 Project title (title of the specifications or plans);

1.3.4.4.2 Client's reference number;

1.3.4.4.3 List of circuit breakers in tabular form when required.

2 – PRODUCT

2.1 GENERAL REQUIREMENTS

- 2.1.1 Moulded case circuit breakers, switches, and devices for protection against ground fault, circuit breakers, fuse and protective accessories against the high fault currents.
- 2.1.2 Moulded Case Circuit Breakers, bolted or plug to the bus bars, quick-closing type and snap-action, manually operated and automatic, with compensation for an ambient temperature of 40°C.
- 2.1.3 Common-trip circuit breakers, equipped with a single handle for multi-pole circuits.
- 2.1.4 Breakers equipped with magnetic snap-action trips, designed to act only when the current value reaches the setting value.
- 2.1.5 Circuit breakers equipped with interchangeable trips, as indicated.

2.2 THERMAL MAGNETIC BREAKERS (DESIGN A)

- 2.2.1 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.

2.3 OPTIONAL FEATURES

- 2.3.1 Include:
 - 2.3.1.1 Shunt trip.
 - 2.3.1.2 Auxiliary switch.
 - 2.3.1.3 Motor-operated mechanism.
 - 2.3.1.4 Under-voltage release.
 - 2.3.1.5 On-off locking devices.
 - 2.3.1.6 Handle mechanism.

2.4 MANUFACTURERS

- 2.4.1 Accepted products: Cutler-Hammer, Siemens, Schneider Electric, GE.

3 – EXECUTION

3.1 INSTALLATION

- 3.1.1 Install circuit breakers as indicated.
- 3.1.2 Install locking devices on circuits listed in Section 26 24 16.01 – Panelboards Breaker Type.
- 3.1.3 The order in which circuit breakers should be installed in the panels must meet the one shown in the plans.
- 3.1.4 Make adjustments on electronic and magnetic triggers in accordance with the short-circuit coordination diagram in Section 26 05 15 – Study of coordination, verification, testing and commissioning.

END OF SECTION

1 GENERAL

1.1 REFERENCES

1.1.1 Canadian Standards Association (CSA International).

1.1.1.1 CAN/CSA C22.2 No. 4, Enclosed Switches.

1.1.1.2 CSA C22.2 No. 39, Fuseholder Assemblies.

1.2 SHOP DRAWINGS AND PRODUCT DATA

1.2.1 Submit shop drawings and product data in accordance with Sections 26 05 00 – General Requirements and 01 33 00 – Submittal Procedures.

1.3 HEALTH AND SAFETY

1.3.1 Do construction occupational health and safety in accordance with Section 01 70 12 – Health and Safety Requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

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

1.4.3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

1.4.4 Separate for reuse and recycling and place in designated containers steel, metal, and plastic waste in accordance with Waste Management Plan.

1.4.5 Fold up metal banding, flatten and place in designated area for recycling.

1.5 ELECTRICAL EQUIPEMENT PROTECTED BY SPRINKLERS

1.5.1 Provide and install materials in accordance with Section 26 05 00 – General Requirements.

2 – PRODUCT

2.1 DISCONNECT SWITCHES

2.1.1 Fused and non-fused switches, in CSA enclosure:

2.1.1.1 Type 1 for indoor use in ordinary locations.

2.1.1.2 Type 2 for outdoor use, where the envelope is exposed to fluid leaking.

2.1.1.3 Type 3R for outdoor use.

2.1.1.4 Type 4 for use where the envelope is exposed to direct water.

2.1.1.5 Type 5 for indoor use in locations where dust, lint, or particles are not dangerous, or are likely to be deposited or suspended in the atmosphere.

2.1.2 Possibility to lock in “closed” or “open” positions, with three locks.

2.1.3 Mechanical door with interlock, prohibiting the opening when the lever is in "closed" position.

- 2.1.4 Bypass mechanism allowing to open the enclosure when the switch is "ON".
- 2.1.5 Closing and abrupt cut-off mechanism.
- 2.1.6 "Open" and "Closed" indication on the enclosure lid.
- 2.1.7 Fuses: rating in accordance with Section 26 28 13.01.
- 2.1.8 Fuse holders: movable and suitable, without an adapter, to the type and fuse rating indicated.
- 2.1.9 A set of auxiliary contacts CSA certified is required when used for elevators, escalators, hoists, engine stairwell pressurization of a fire alarm or via a variable frequency drive. All auxiliary contacts shall be of type "open advanced".
- 2.1.10 At 120/240 V, single phase, three cords; to 120/208 V, three phase, four cords; and 347/600 V, three phase, four cords, the switches will be equipped with a solid neutral.
- 2.1.11 All switches must be provided by the same manufacturer.

2.2 EQUIPEMENT IDENTIFICATION

- 2.2.1 Nameplates provided and installed in accordance with Section 26 05 00 – General Requirements.
- 2.2.2 Indicate name of load controlled on size 4 nameplates.

2.3 MANUFACTURER

- 2.3.1 Accepted products: Cutler-Hammer, Siemens, Square D, and GE.
- 2.3.2 The switches manufacturer must be the same as the electrical distribution panels unless stated otherwise.

3 – EXECUTION

3.1 INSTALLATION

- 3.1.1 Install disconnect switches complete with fuses if applicable, as indicated.
- 3.1.2 Install contacts sets required by 2.1.9 and the necessary wiring (although not shown in plans) between the switches and the variable frequency drive upstream (connection in series with the termination of the variable frequency drive).

END OF SECTION

1 GENERAL

1.1 REFERENCES

- 1.1.1 American National Standards Institute (ANSI)
 - 1.1.1.1 ANSI C82.1, Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast.
 - 1.1.1.2 ANSI C82.4, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps Multi Supply Type.
- 1.1.2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)
 - 1.1.2.1 ANSI/IEEE C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
- 1.1.3 ASTM International Inc.
 - 1.1.3.1 ASTM F 1137, Standard Specification for Phosphate/ Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.
- 1.1.4 Canadian Standards Association (CSA International)
 - 1.1.4.1 ACNOR C22.2 no 9, for lighting.
 - 1.1.4.2 ACNOR C22.2 no 43, for cap screwed sockets.
 - 1.1.4.3 ACNOR C22.2 no 74, for discharge lamp sockets.
 - 1.1.4.4 ACNOR C22.2 no 4, for incandescent lamps.
 - 1.1.4.5 ACNOR C22.2 no 141, for emergency lighting.
- 1.1.5 ICES-005, Radio Frequency Lighting Devices.
- 1.1.6 Underwriters' Laboratories of Canada (ULC)
- 1.1.7 All lighting must comply with Canadian Electrical Code, part 1.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- 1.2.1 Provide submittals in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – General Requirements.
- 1.2.2 Quality assurance submittals: provide following in accordance with Section 01 45 00 – Quality Control
 - 1.2.2.1 Manufacturer's instructions: provide manufacturer's written installation instructions and special handling criteria, installation sequence, cleaning procedures, etc.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- 1.3.1 Submit shop drawings and product data in accordance with Sections 26 05 00 – General Requirements and 01 33 00 – Submittal Procedures.
- 1.3.2 The drawings must come from the company that makes the devices, and include in the same shipment, the drawings of lamps and ballasts with their characteristics.

- 1.3.3 During the presentation of shop drawings, submit data sheets indicating the mercury content of products used and calculations showing the ratio of mercury per lumen hour (hg / lm-hr) for all the lamps used the project.
- 1.3.4 Product Data:
 - 1.3.4.1 Provide manufacturer's printer product literature, specifications and datasheet, also include product characteristics, performance criteria, physical size, finish and limitations.
 - 1.3.4.2 The photometric data must be established by an independent testing laboratory, and must include: the total power consumption (in watts), the light intensity (in candelas), the spectral distribution, the luminous flux (lumens), the performance standard, the luminaire, the utilization factor, the type of lamp, the ballast type and a description of the company.
- 1.3.5 This data must include the following, if applicable: a table showing CVP rate and aircraft separation criteria.
- 1.3.6 For any product covered by the equity method agreed with this estimate; provide point by point calculations of local and external spaces.

1.4 DELIVERY, STORAGE AND HANDLING

- 1.4.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
- 1.4.2 Deliver materials to sit in original factory packaging, labelled with manufacturer's name and address.
- 1.4.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management Disposal.
- 1.4.4 Divert unused metal materials from landfill to metal recycling facility.
- 1.4.5 Disposal and recycling of the fluorescent lamps as per local regulations.
- 1.4.6 Disposal of old PCB filled ballasts.

1.5 EARTHQUAKE RESISTANT FIXING

- 1.5.1 Supply and install all necessary equipment for earthquake resistant fixing in accordance with Section 26 10 00 – Earthquake Resistant Fixing.

2 – PRODUCT

2.1 MATERIALS

- 2.1.1 Provide lighting interior and exterior devices described in Section 26 05 05, complete with all accessories required for installation and operation, such as ballasts, plaster frames, suspensions, gaskets, insulation, lamps, etc. Fluorescent lamp sockets coated with a silver plating to ensure positive contact of the lamps for a full installation.
- 2.1.2 All lamp and ballast must be from the same manufacturer. A minimum guarantee of three years for the whole must be provided by the manufacturer.
- 2.1.3 Accepted manufacturers:

- 2.1.3.1 Fluorescent luminaires: Cooper (Metalux), Peerless, Canlyte-CFI, Hubbell, Thomas et Day-Brite.
- 2.1.3.2 Incandescent luminaires: Lightolier, Halo, Prescolite, Hubbell.
- 2.1.3.3 LED luminaires: CFI, Thomas, Cooper, Cree.
- 2.1.3.4 HID luminaires: Lumec, Keene, Widelite, Prescolite, Hubbell et Day-Brite.
- 2.1.3.5 Explosion proof and corrosion proof luminaires: Appleton, Thomas & Betts, Crouse-Hinds, Ipex, Hubbell.

2.2 LAMPS

- 2.2.1 The lamps capacity shall not exceed the recommendations of the manufacturer of the device.
- 2.2.2 All lamps must be in place and in good condition at the date of provisional acceptance.
- 2.2.3 All incandescent lamps and tungsten halide that have burned in the three (3) months from the date of provisional acceptance will be replaced.
- 2.2.4 All fluorescent lamps and high intensity discharge bulbs burned in the 12 months from the date of provisional acceptance will be replaced.
- 2.2.5 Provide 5% of the total number of each type of lamps installed as spares (minimum one (1) lamp).
- 2.2.6 All chosen lamps must have a general average grade of 70 pictograms of mercury per lumen hour.
- 2.2.7 The lamps should be non-cycling at the end of life.
- 2.2.8 Supply and install all the lights required for each fixture. All lamps must come from the same manufacturer
- 2.2.9 Accepted products: Philips (ALTO I/II), G.E. (Ecolux) and Osram-Sylvania (Ecologic).
- 2.2.10 Fluorescent lamps, of ecological type, with appropriate marking:

Bulb shape and power, in watts	Base	Initial lumens (approx.)	Life length, in hours	Color temperature (approx.)	Minimum Color Rendering
T8-32	Miniature 2 pins	3,000	24,000	4,100° K	85

- 2.2.10.1 Unless indicated otherwise, fluorescent tubes will be of T-8 type, 32 W, 4100 ° K in general, 24 000 hours and a color rendering (CRI) of minimum 85 at low mercury content (green).

2.3 BALLASTS

- 2.3.1 Use instant start lamps and ballasts for areas where light fixtures are on most of the time. In areas where the switches are frequent, use quick start lamps and ballasts.
- 2.3.2 All ballasts must be equipped with removable connectors.
- 2.3.3 Fluorescent Lamp Ballasts: CBM and CSA certified, low power consumption, integrated circuit or integrated circuit graduation.

- 2.3.3.1 Rated voltage: 60 Hz, as indicated, designed for rapid start or instant.
- 2.3.3.2 Electronic type.
- 2.3.3.3 Fully boxed and designed for use at an ambient temperature of 40 ° C.
- 2.3.3.4 Power factor of at least 98% of the nominal luminous flux of lamps.
- 2.3.3.5 Current crest factor: 1.7 max.
- 2.3.3.6 Harmonic: overall harmonic distortion of less than 10%.
- 2.3.3.7 Electronic ballasts operating frequency: 20 kHz minimum.
- 2.3.3.8 Noise level: Class A.
- 2.3.3.9 Installation: remote or integrated to luminaire.
- 2.3.3.10 Ballast factor: 88% minimum.
- 2.3.3.11 Capacitor: thermal protection, free of PCB.
- 2.3.3.12 Thermal protection: self-healing of the coil.
- 2.3.3.13 Efficiency greater than 84 Lum / Watt.
- 2.3.3.14 Electronic ballasts should be of Class 3. Accepted products: Philips (Advance series Centium), GE, ULT (HP series) or equivalent Osram (QT series).

2.4 FINISHES

- 2.4.1 The finish and construction of fixtures must be UL listed and CSA certified to be the type of installation planned.
- 2.4.2 Unless otherwise indicated in the list of fixtures, box and reflectors must be 20 gauge cold-rolled steel. Metal surfaces of the box and the reflector should be covered with a layer of baked enamel finish free of pitting or defects.
- 2.4.3 Baked powder coating polyester:
 - 2.4.3.1 Reflectors and metal surfaces of the housing must have a high gloss finish coating in polyester powder paint and with a smooth, uniform and free of pinholes or other imperfections.
 - 2.4.3.2 The finish reflectors and other interior surfaces shall be as follows:
 - 2.4.3.2.1 Color: white, with 85% reflectance.
 - 2.4.3.2.2 Color fastness: yellowness index of 0.02 at the origin, and not more than 0.05 after exposure for 250 hours in an accelerated aging device "Atlas Fade-Ometer."
 - 2.4.3.2.3 Thickness of the paint film: average of at least 0.03 mm, and at no point less than 0.025 mm.
 - 2.4.3.2.4 Gloss: at least 80 units, measures taken to 60o at glossmeter Gardner.

- 2.4.3.2.5 Flexibility: the coating shall withstand a bend test around a mandrel 12 mm, and show no signs of cracking or flaking when viewed under a microscope at a magnification of about 10.
- 2.4.3.2.6 Adherence: a grid of 24 mm square, a square of 3 mm side is marked by a sharp razor blade embedded in the paint film to the substrate metal, cellulose adhesive tape is then applied to the grid and then departed: adhesion is considered satisfactory if the paint coating is not taking off.

2.4.4 Alzak finish:

- 2.4.4.1 Type of finish obtained on an aluminum sheet made from special alloys, high-gloss anodized and chemically in accordance with the requirements of Alcoa, in order to submit, as appropriate, the following characteristics:
 - 2.4.4.1.1 Type of finish designed for light commercial service: coating having a weight of at least 7.8 g/m²; reflectance of at least 83% in the case of specular surfaces, 80.5% in the case of semi specular surfaces and 75% in the case of diffuse surfaces;
- 2.4.4.2 Type of finish designed for normal industrial service: coating having a weight of at least 14.8 g/m²; reflectance of at least 82% in the case of specular surfaces, and at least 73% for diffuse surfaces;
- 2.4.4.3 Type of finish designed for heavy duty: coating having a weight of at least 21.8 g/m²; reflectance of at least 85% in the case of specular surfaces, and at least 65% in the case of diffuse surfaces.

2.5 OPTICAL CONTROL DEVICES

- 2.5.1 The louvers and lenses of fluorescent fixtures must be constructed of non-combustible materials such as acrylic (polymer of styrene derivatives are not accepted).

2.6 SAFETY SHUT-OFF

- 2.6.1 The fluorescent light fixtures that are powered at a voltage of 150 V or more must include:
 - 2.6.1.1 an isolating device integrated into the luminaire.
 - 2.6.1.2 a prominent and permanent identification, specifying the use of the isolating device, and the voltage rating of the luminaire.

3 – EXECUTION

3.1 INSTALLATION

- 3.1.1 Mounting height as shown in the drawings or determined by the ministerial representative on site.
- 3.1.2 Install fixtures until all work that are likely to damage or soiling are completed. The Contractor shall obtain approval from the ministerial representative prior to installation.
- 3.1.3 The lighting location is determined according to the reflected ceiling plans. Plans should not be interpreted to scale.
- 3.1.4 In the boiler, mechanical, refrigeration, ventilation, sub-stations, air conditioning rooms, and other places where there are pipes on the ceiling or ventilation ducts, install lights on rods of appropriate length so that the light beam is not obstructed by piping. No lighting shall be installed before the installation of all the equipment and piping.

- 3.1.5 Aluminum luminaires in direct contact with concrete must be coated with tar to contact points. Those installed outside must be "anodized aluminum" or stainless steel.
- 3.1.6 In a continuous row of fluorescent fixtures, all fixtures in the same row must be the same type. The fluorescent fixtures boxes installed in continuous rows are held together by the two 8-32 bolts and nuts.
- 3.1.7 Use all frames or hoops to cast even if not specifically requested in the list of luminaires.
- 3.1.8 Install lighting fixtures and supports and / or poles as indicated.
 - 3.1.8.1 Fixtures must be adequately supported for the type of ceiling system in which they are mounted.
 - 3.1.8.2 Install monitoring equipment as indicated.
 - 3.1.8.3 Install exterior lights in accordance with the manufacturer's instructions as indicated and in the presence of the engineer. In the darkness, turn the lights on and fix them in a permanent position.
- 3.1.9 Upon request of the engineer, before ordering lighting fixtures, the contractor shall supply and install on site a sample of each device and obtain approval from the engineer.

3.2 WIRING

- 3.2.1 Connect luminaires to lighting circuits:
 - 3.2.1.1 Install flexible or rigid conduit for luminaires as indicated in Sections 26 05 34 – Conduits, conduit fastenings and conduit fittings and 26 05 21 – Wires and cables.

3.3 LUMINAIRE SUPPORTS

- 3.3.1 The ceiling-mounted light fixtures must be supported independently of the backbone of the suspended ceiling as required with calculations of seismic protection.
- 3.3.2 The fluorescent fixtures mounted light strips must be supported at intervals of 1.2 m.

3.4 FLUORESCENT FIXTURES ANCHORS AND SUSPENSIONS

- 3.4.1 The fluorescent lights, placed directly under the surface of the concrete slabs, are held with bolts envelope self-drilling of 13 mm.
- 3.4.2 The fluorescent fixtures are suspended from ceilings using suspension rods.
- 3.4.3 The spacing between the suspension rods shall be as recommended by different manufacturers.
- 3.4.4 On the plans, the outputs for lighting are shown in the center of the fixture for the purpose of drawing. It is understood that the output power must be located on top of a media fixture.
- 3.4.5 The fluorescent fixtures mounted light strips (butt) must be supported at intervals of 1.20 m.
- 3.4.6 All fixtures installed at more than 4 m above the floor must be retained with a steel cable.

3.5 LUMINAIRE ALIGNMENT

- 3.5.1 Luminaires mounted light strips must be properly aligned so as to form a continuous straight band.

- 3.5.2 Individually mounted fixtures should be parallel or perpendicular to the lines of implantation of the building.

3.6 CLEANING

- 3.6.1 Clean in accordance with Section 01 74 11 – Cleaning.
- 3.6.2 Remove surplus materials, excess materials, rubbish, tools and equipment.
- 3.6.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/ Demolition Waste Management and Disposal.

3.7 TESTING

- 3.7.1 Perform tests in accordance with Section 26 05 00 – General Requirements.
- 3.7.2 Ensure good operation of all devices.

END OF SECTION

1 GENERAL

1.1 REFERENCES

1.1.1 Canadian Standards Association (CSA International)

1.2.1.1 CSA C22.2 No. 141, Unit Equipment for Emergency Lighting.

1.2 WASTE MANAGEMENT AND DISPOSAL

1.2.1 Separate and recycle waste materials in accordance with Section section 01 74 21 – Construction/Demolition Waste Management and Disposal.

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

1.2.3 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in accordance with Waste Management Plan.

1.2.4 Divert unused metal and wiring materials from landfill to metal recycling facility suggested by the Contractor and approved by the ministerial representative.

1.2.5 Dispose of unused batteries at official hazardous material collections site proposed by the Contractor and approved by the ministerial representative.

1.2.6 Fold up metal banding, flatten and place in designated area for recycling.

1.3 SHOP DRAWINGS AND PRODUCT DATA

1.3.1 Submit shop drawings and product data in accordance with Sections 26 05 00 – General Requirements and 01 33 00 – Submittal Procedures.

1.3.2 The product data sheets should indicate the device details, components, assembly method, power source and special accessories.

1.4 WARRANTY

1.4.1 Provide a written warranty, signed and issued to the owner, stating that the batteries for emergency lighting system are warranted against defective materials or workmanship for a period of 10 years. The replacement must be made free for the first five years, and with costs prorated over the next five years. This warranty is effective on the date of provisional acceptance of the work.

1.5 DELIVERY

1.5.1 Unless they are hermetically sealed, batteries must be dry.

2 – PRODUCT

2.1 MATERIALS

2.1.1 Supply voltage: 120 V c.a.

2.1.2 Output voltage: 24 V c.c. as indicated.

2.1.3 Operating time:

2.1.3.1 2 hours for high-rise buildings.

2.1.3.2 1 hour for residential care buildings who are not considered as high-rise building.

- 2.1.3.3 30 minutes for other buildings.
- 2.1.4 Battery: sealed, maintenance-free, with expected longevity of 10 years.
- 2.1.5 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.10V for plus or minus 10% input variations.
- 2.1.6 Switching circuit semiconductor.
- 2.1.7 Specially-designed integrated circuit, allowing self-monitoring of all functions on the device.
- 2.1.8 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.
- 2.1.9 Battery protection in low voltage circuit breaker.
- 2.1.10 Circuit protection in case of voltage drop.
- 2.1.11 15 minutes time delay relay.
- 2.1.12 Discharge cycles, programmed by integrated circuit, to ensure the best life conditions of the batteries and the emergency lights.
- 2.1.13 AC supply clamp.
- 2.1.14 DEL pilot lights in two color charger: semiconductor, life of 100,000 hours minimum, with "AC Power" and "high load regime" indications.
- 2.1.15 Separate indications for batteries, chargers, or DEL lamps failure.
- 2.1.16 Test button to allow, at any time, a 5 minutes audit of the device.
- 2.1.17 Projectors: mounted on the lighting box unit or remote-mounted adjustable through 360 degrees horizontally and 180 degrees vertically as indicated.
- 2.1.18 Box: can be mounted directly to the wall or on a shelf and including breakouts allowing connection of ductwork, with a detachable front panel or hinged for easy access to batteries.
- 2.1.19 Finish: white.
- 2.1.20 Accessories:
 - 2.1.20.1 AC power and DC output; terminal boards placed inside of the box.
 - 2.1.20.2 Tablet mounting.
 - 2.1.20.3 Cord and plug that can provide connection to AC.
 - 2.1.20.4 Suppression device.
- 2.1.21 Accepted products: Emergi-Lite (Thomas & Betts) « ESL », Lithonia, Lumacell (Thomas & Betts), Aim-Lite, Stanpro or Beghelli.

2.2 WIRING OF REMOTE HEADS

- 2.2.1 Conduits: EMT type, in accordance with Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.
- 2.2.2 Conductors: RW-90 type, in accordance with Section 26 05 21 – Wire and Cables 0-1000V sized in accordance with manufacturer's recommendations.

3 – EXECUTION

3.1 INSTALLATION

- 3.1.1 Install as indicated autonomous blocks lighting and projectors remotely mounted in accordance with CSA Standard C22.1.
- 3.1.2 Direct the spotlights as indicated.
- 3.1.3 Cut the cord to required length and replace the connector plug.
- 3.1.4 All remotely-mounted headlights, single or double, should be installed on the wall.
- 3.1.5 Connect exit signs to light blocks autonomous emergency lighting.
- 3.1.6 Install an electrical outlet 2 200 mm from the floor (if not mentioned on plans) near the connection unit.
- 3.1.7 Check operation of auto diagnostic system.

END OF SECTION

1 GENERAL

1.1 REFERENCES

- 1.1.1 Canadian Standards Association (CSA International)
 - 1.1.1.1 CSA C22.2 No. 141, Unit Equipment for Emergency Lighting.
 - 1.1.1.2 CSA C860, Performance of Internally-Lighted Exit Signs.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- 1.2.1 Provide submittals in accordance with Sections 01 33 00 – Submittal Procedures and 26 05 00 – General Requirements.
- 1.2.2 Submit required documents in accordance with Section 01 45 00 – Quality Control.
- 1.2.3 Submit manufacturer's printed literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.
- 1.2.4 Submit WHMIS MSDS – Material Safety Data Sheets in accordance with Section 02 61 33 – Hazardous Materials.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- 1.3.1 Submit shop drawings and product data in accordance with Sections 26 05 00 – General Requirements and 01 33 00 – Submittal Procedure.
- 1.3.2 Product data:
 - 1.3.2.1 Submit product data and specifications required and the manufacturer's documentation. The product data sheet should indicate the product characteristics, performance criteria, dimensions, constraints, and finishing.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

2 – PRODUCT

2.1 MATERIALS

- 2.1.1 Provide lighting fixtures described in terms and according the following characteristics:
 - 2.1.1.1 Inscription: Pictogram output.
 - 2.1.1.2 Power: ≤ 1.5 W.
 - 2.1.1.3 20 years duration and increased for the LED technology.
 - 2.1.1.4 Aluminum extruded box.
 - 2.1.1.5 Color: white or as indicated on the shop drawings.
 - 2.1.1.6 Number of sides: universal.
 - 2.1.1.7 Mounting: universal.

- 2.1.1.8 In accordance with CSA-C-860, current edition.
- 2.1.2 The indicators light output must have the following minimum specifications:
 - 2.1.2.1 Power: $\geq 90\%$;
 - 2.1.2.2 Total harmonic distortion: $\leq 35\%$;
 - 2.1.2.3 Luminance: ≥ 15 candela per square meter;
 - 2.1.2.4 Contrast: ≥ 0.5 .
 - 2.1.2.5 In accordance with CAN/CSA C860 and Energy Star standards, Canada's current edition.
- 2.1.3 All fixtures must be installed flat on the wall surface.
- 2.1.4 Provide wire guards on equipment, as directed.
- 2.1.5 Accepted products: Emergi-Lite (Thomas & Betts) « ESL », Lithonia, Lumacell (Thomas & Betts), Aim-Lite, Stanpro or Beghelli.

3 – EXECUTION

3.1 TESTS

- 3.1.1 Install light fixtures as indicated and in accordance with NBC 2010.
- 3.1.2 Connect the equipment indicators to normal and emergency circuits or to batteries powered units.
- 3.1.3 Make sure the circuit breaker exit signs is locked in closed ("live") position.

3.2 INSTALLATION

- 3.2.1 Perform test in accordance with Section 26 05 00 – General Requirements.
- 3.2.2 Ensure the proper functioning of all devices.

3.3 CLEANING

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

END OF SECTION

1. GENERAL

1.1 REFERENCES

- 1.1.1 American National Standards Institute (ANSI).
 - 1.1.1.1 ANSI/NFPA-329, Handling Underground Releases of Flammable and Combustible Liquids last edition.
 - 1.1.1.2 ANSI/API 650, Welded Steel Tanks for Oil Storage, last edition.
- 1.1.2 American Petroleum Institute (API).
 - 1.1.2.1 API RP 651, Cathodic Protection of Aboveground Petroleum Storage Tanks, last edition.
 - 1.1.2.2 API STD 653, Tank Inspection, Repair, Alteration, and Reconstruction, last edition.
- 1.1.3 American Society for Testing and Materials International (ASTM).
 - 1.1.3.1 ASTM C 618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete, last edition.
- 1.1.4 Canadian Council of Ministers of the Environment (CCME).
 - 1.1.4.1 CCME-PN1326, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products, last edition.
- 1.1.5 Department of Justice Canada (Jus).
 - 1.1.5.1 Canadian Environmental Protection Act (CEPA), last edition.
- 1.1.6 Canadian Standards Association (CSA)/CSA International.
 - 1.1.6.1 CAN/CSA-B139, Installation Code for Oil Burning Equipment, last edition.
- 1.1.7 The Master Painters Institute (MPI).
 - 1.1.7.1 Architectural Painting Specification Manual, last edition.
- 1.1.8 National Research Council/Institute for Research in Construction.
 - 1.1.8.1 NRCC 38727, National Fire Code of Canada (NFC), last edition.
- 1.1.9 Transport Canada (TC).
 - 1.1.9.1 Transportation of Dangerous Goods Act, (TDGA), last edition.
- 1.1.10 Underwriters' Laboratories of Canada (ULC).
 - 1.1.10.1 ULC/ORD-C58.9, Secondary Containment Liners for Underground and Aboveground Tanks, last edition.
 - 1.1.10.2 ULC/ORD-C58.12, Leak Detection Devices (Volumetric Type) for Underground Storage Tanks, last edition.
 - 1.1.10.3 ULC/ORD-C58.14, Leak Detection Devices (Nonvolumetric Type) for Underground Storage Tanks, last edition.
 - 1.1.10.4 ULC/ORD-C58.15, Overfill Protection Devices for Underground Tanks, last edition.
 - 1.1.10.5 ULC/ORD-C107.4, Ducted Flexible Underground Piping Systems for Flammable and Combustible Liquids, last edition.
 - 1.1.10.6 ULC/ORD-C107.7, Glass-Fibre Reinforced Plastic Pipe and Fittings, last edition.
 - 1.1.10.7 ULC/ORD-C107.19, Secondary Containment of Underground Piping, last edition.

- 1.1.10.8 ULC/ORD-C142.23, Aboveground Waste Oil Tanks, last edition.
- 1.1.10.9 ULC-S601, Aboveground Horizontal Shop Fabricated Steel Tanks, last edition.
- 1.1.10.10 CAN/ULC-S602, Aboveground Steel Tanks for Fuel Oil and Lubricating Oil, last edition.
- 1.1.10.11 CAN/ULC-S603.1, Galvanic Corrosion Protection Systems for Steel Underground Tanks, last edition.
- 1.1.10.12 ULC-S630, Aboveground Vertical Shop Fabricated Steel Tanks, last edition.
- 1.1.10.13 ULC-S652, Tank Assemblies for Collection of Used Oil, last edition.

1.2 ACTION AND INFORMATION SUBMITTALS

- 1.2.1 Submit shop drawings in accordance with Section 21 05 01.
- 1.2.2 Indicate details of construction, appurtenances, installation, leakage detection system.
- 1.2.3 Shop drawings to detail and indicate following as applicable to project requirements. Submit manufacturers product data to supplement shop drawings.
 - 1.2.3.1 Size, materials and locations of ladders, ladder cages, catwalks and lifting lugs.
 - 1.2.3.2 Tanks capacity.
 - 1.2.3.3 Size and location of fittings.
 - 1.2.3.4 Environmental compliance package accessories.
 - 1.2.3.5 Decals, type size and location.
 - 1.2.3.6 Accessories: provide details and manufacturers product data.
 - 1.2.3.7 Size, material and location of manholes.
 - 1.2.3.8 Size, materials and locations of railings, stairs, ladders and walkways.
 - 1.2.3.9 Finishes.
 - 1.2.3.10 Electronic accessories: provide details and manufacturers product data.
 - 1.2.3.11 Insulation types, locations and RSI values.
 - 1.2.3.12 Identification, name, address and phone numbers of corrosion expert where applicable.
Note: Grading drawings to be stamped by licenced corrosion expert.
 - 1.2.3.13 Piping, valves and fittings: type, materials, sizes, piping connection details, valve shut-off type and location, cathodic protection system complete with stamp of corrosion expert indicating that design complies with standards, Federal and Provincial regulations.
 - 1.2.3.14 Spill containment: provide description of method[s] and show sizes, materials and locations for collecting spills at connection point between storage tank system and delivery truck, rail car, or vessel.
 - 1.2.3.15 Tank heaters: provide details and manufacturers product data.
 - 1.2.3.16 Thermometers: provide details and manufacturers product data.
 - 1.2.3.17 Anchors: description, material, size and locations.
 - 1.2.3.18 Concrete: type, composition and strength.
 - 1.2.3.19 Size and location of site pads.
 - 1.2.3.20 Level gauging: type and locations, include:

1.2.3.20.1 Reporting systems, types of reports and report frequency.

1.2.3.20.2 Maximum number of tanks to be monitored.

1.2.3.20.3 Number of probes required and sizes.

1.2.3.20.4 Provide details and manufacturer's product data.

1.2.3.21 Ancillary devices: provide details and manufacturer's product data.

1.2.3.22 Leak detection system, type and locations, and alarm system.

1.2.3.23 Grounding and bonding: provide details of design, type, materials and locations.

1.2.3.24 Corrosion protection: provide details of design, type, materials and locations.

1.2.3.25 Field-erected AST overfill-protection systems: provide details of design, type, materials and locations.

1.2.3.26 Containment system for spills, overfills and storm runoff water: provide details, materials used, and locations.

1.2.4 Provide maintenance data for tank appurtenances and leakage detection system for incorporation into manual specified in Section 21 05 01.

2. PRODUCTS

2.1 TANKS: CONVENTIONAL STEELS

2.1.1 See specifications on drawings.

3. EXECUTION

3.1 INSTALLATION

3.1.1 Install tanks in accordance with CAN/CSA-B139 and National Fire Code of Canada and manufacturer's recommendations and CCME PN 1326.

3.1.2 Position tanks using lifting lugs and hooks, and where necessary use spreader bars. Do not use chains in contact with tank walls.

3.1.3 Install tanks using licensed, trained, certified installers.

3.1.4 Provide certification of installation to Departmental Representative.

3.2 FIELD QUALITY

3.2.1 Test tanks for leaks to requirements of CAN/CSA-B139 and in presence of authority having jurisdiction.

3.3 TOUCH-UP

3.3.1 Where coating is damaged, touch-up with original coating material. Apply materials in accordance with manufacturer's instructions and as indicated.

3.4 LEVEL GAUGE SYSTEM

3.4.1 Provide leak and vapour proof caulking at connections.

3.4.2 Shield capillary and tubing connections in heavy duty 50 mm polyethylene pipe.

3.4.3 Calibrate system.

3.5 LEAK DETECTION SYSTEM

3.5.1 Install in accordance with manufacturer's recommendations.

3.6 TESTING TANKS

3.6.1 Carry out the test in accordance with CAN/CSA-B139

END OF SECTION