

Project A

SPECIFICATIONS - ISSUED FOR TENDER

VOLUME 1 OF 3
ARCHITECTURAL + STRUCTURAL
JUNE 12, 2018

TABLE OF CONTENT

Division Section**VOLUME 1****DIVISION 01 - GENERAL REQUIREMENTS**

01 11 00	Summary of Work
01 14 00	Work Restrictions
01 21 00	Allowances
01 29 83	Payment Procedures for Testing Laboratory Services
01 31 19	Project Meetings
01 32 16.07	Construction Progress Schedule Bar (GANNT) Chart
01 33 00	Submittal Procedures
01 35 29.06	Health and Safety Requirements
01 35 43	Environmental Procedures
01 41 00	Regulatory Requirements
01 45 00	Quality Control
01 51 00	Temporary Utilities
01 52 00	Construction Facilities
01 56 00	Temporary Barriers and Enclosures
01 61 00	Common Product Requirements
01 71 00	Examination and Preparation
01 73 00	Work Execution
01 74 11	Cleaning
01 74 21	Construction/Demolition waste management and disposal
01 77 00	Closeout procedures
01 78 00	Closeout Submittals
01 79 00	Demonstration and training
01 91 13	General commissioning (CX) requirements
01 91 31	Commissioning (CX) plan
01 91 33	Commissioning Forms
01 91 41	Commissioning Training
01 91 51	Building management manual (BMM)

DIVISION 02 - EXISTING CONDITIONS

02 41 13	Selective Site Demolition (See Civil, vol. 3)
----------	---

DIVISION 03 - CONCRETE

03 10 00	Concrete Formwork
03 20 00	Concrete Reinforcing
03 30 00	Cast-In-Place Concrete
03 35 00	Concrete Floor Hardeners
03 35 05	Concrete Finishing

DIVISION 05 - METALS

05 12 23	Structural steel for buildings
05 50 00	Metal Fabrications

DIVISION 06 - WOOD, PLASTICS AND COMPOSITES

06 10 00	Rough Carpentry
06 40 00	Architectural Woodwork

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 11 13	Bituminous Dampproofing
07 21 13	Board Insulation
07 21 16	Blanket Insulation

TABLE OF CONTENT

07 21 29.03	Sprayed insulation polyurethane foam
07 26 16	Under Slab Vapor Barrier
07 27 00	Air Barriers
07 42 43	Composite Wall Panels
07 46 13	Preformed Metal Siding
07 52 16	Modified SBS Elastomeric Bituminous Membrane Roofing
07 62 00	Sheet Metal Flashing and Trim
07 72 00	Roof Accessories
07 72 69	Roof Anchors And Safety Restraints
07 81 00	Applied Fireproofing
07 84 00	Firestopping
07 92 00	Joint sealants

DIVISION 08 - OPENINGS

08 11 00	Metal Doors and Frames
08 14 16	Flush Wood Doors
08 31 00.01	Access doors Mechanical (See Mechanical, vol. 2)
08 50 00	Windows
08 71 00	Door Hardware
08 80 50	Glazing
08 90 00	Louvres and Vents

DIVISION 09 - FINISHES

09 21 16	Gypsum Board Assemblies
09 22 16	Non-structural Metal Framing
09 30 13	Ceramic Tiling
09 51 13	Acoustical Panel Ceilings
09 53 00.01	Acoustical Ceiling Suspension Assemblies
09 65 19	Resilient Tile Flooring
09 68 13	Tile carpeting
09 69 00	Access Flooring
09 90 00	Interior, Exterior Paints and Coatings

DIVISION 10 - SPECIALTIES

10 21 13.19	Plastic Toilet Compartments
10 22 13	Wire Mesh Partitions
10 28 10	Toilet and Bath Accessories
10 44 16.19	Portable Fire Extinguishers and Safety Blankets (See Mechanical, Vol. 2)

DIVISION 12 - FURNISHINGS

12 48 00	Entrance Floor Grilles
----------	------------------------

VOLUME 1 APPENDICES

IT Security Guidance (ITSG-02)
Wall Type 9, 9A and 9B Specification
RF Shielding Components
RF Test Procedure 18-3505-tp

TABLE OF CONTENT**VOLUME 2****DIVISION 08 - OPENINGS**

08 31 00.01 Access doors Mechanical

DIVISION 10 - SPECIALTIES

10 44 16.19 Portable Fire Extinguishers and Safety Blankets

DIVISION 21 - FIRE SUPPRESSION

21 05 01 Common Work Results For Mechanical
21 13 13 Wet Pipe Sprinkler Systems
21 13 16 Dry Pipe Sprinkler Systems
21 22 00 Clean Agent Fire Extinguishing Systems

DIVISION 22 - PLUMBING

22 11 16 Domestic Water Piping
22 13 17 Drainage Waste And Vent Piping - Cast Iron And Copper
22 13 18 Drainage Waste And Vent Piping - Plastic
22 30 05 Domestic Water Heaters
22 42 01 Plumbing Specialties And Accessories
22 42 01 Plumbing Specialties And Accessories
22 42 03 Commercial Washroom Fixtures

DIVISION 23 - HEATING, VENTILATING AND AIR-CONDITIONING (HVAC)

23 05 01 Use Of HVAC Systems During Construction
23 05 05 Installation Of Pipework
23 05 13 Common Motor Requirements For HVAC Equipment
23 05 23.01 Valves - Bronze
23 05 29 Hangers And Supports For HVAC Piping And Equipment
23 05 48 Vibration And Seismic Controls For HVAC
23 05 54 Mechanical Identification
23 05 93 Testing, Adjusting And Balancing For HVAC
23 05 94 Pressure Testing Of Ducted Air Systems
23 07 13 Duct Insulation
23 07 15 Thermal Insulation For Piping
23 11 23 Facility Natural Gas Piping
23 23 00 Refrigerant Piping
23 31 13.01 Metal Ducts - Low Pressure To 500 Pa
23 33 00 Air Duct Accessories
23 33 14 Dampers - Balancing
23 33 15 Dampers - Operating
23 33 16 Dampers - Fire And Smoke
23 33 46 Flexible Ducts
23 33 53 Duct Liners
23 34 24 Domestic Fans
23 36 00 Air Terminal Units
23 37 13 Diffusers, Registers And Grilles
23 37 20 Louvres, Intakes And Vents
23 73 11 Air Handling Units - Packaged
23 81 23 Computer Room Air Conditioning
23 82 19 Direct Expansion Fan Coil Units
23 84 13 Humidifiers

DIVISION 25 - INTEGRATED AUTOMATION

25 01 11 EMCS: Start-Up, Verification And Commissioning
25 01 12 EMCS: Training
25 05 01 EMCS: General Requirements

TABLE OF CONTENT

25 05 02 EMCS:	Submittals and Review Process
25 05 03 EMCS:	Project Record Documents
25 05 54 EMCS:	Identification
25 08 20 EMCS:	Warranty and Maintenance
25 10 01 EMCS:	Local Area Network (Lan)
25 30 01 EMCS:	Building Controllers
25 30 02 EMCS:	Field Control Devices
25 90 01 EMCS:	Site Requirements, Applications And Systems

DIVISION 26 - ELECTRICAL

26 05 01	Common Work Results
26 05 20	Wire and Box Connectors 0-1000 V
26 05 21	Wires and Cables (0-1000 V)
26 05 27	Grounding - Primary
26 05 28	Grounding - Secondary
26 05 29	Hangers and Supports for Electrical Systems
26 05 31	Splitters, Junction, Pull Boxes and Cabinets
26 05 32	Outlet Boxes, Conduit Boxes and Fittings
26 05 34	Conduits, Conduit Fastenings and Conduit Fittings
26 05 36	Cable Trays for Electrical Systems (Not Included)
26 05 43.01	Installation of Cables in Trenches and in Ducts
26 09 23.04	Lighting Control Devices LED/Fluorescent Dimming
26 12 16.01	Dry Type Transformers up to 600 V Primary
26 24 16.01	Panelboard Breaker Type
26 27 26	Wiring Devices
26 28 13.01	Fuses – Low Voltage
26 28 16.02	Molded Case Circuit Breakers
26 28 23	Disconnect Switches – Fused and Non-Fused
26 29 10	Motor Starters to 600 V
26 32 13.04	Diesel Electric Generating Units (Liquid Cooled)
26 33 53	Uninterruptible Power Systems Static (UPS)
26 36 23	Automatic Transfer Switches
26 50 00	Lighting
26 52 01	Unit Equipment for Emergency Lighting
26 53 00	Exit Lights
26 56 19	Roadway Lighting
26 82 33.02	Commercial Convector
26 82 39.01	Unit heaters – Electric

DIVISION 27 - COMMUNICATIONS

27 05 26	Grounding and Bonding for Communications Systems
27 05 28	Pathways for Communications Systems
27 10 05	Structured Cabling for Communications Systems
27 11 20	Terminals and Connectors for Communications Conductors - Entrance

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

28 31 02	Fire Alarm System
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VOLUME 2 APPENDICES

ANNEX A	Lighting Fixture List
ANNEX B	Distribution Panel Schedule

TABLE OF CONTENT

VOLUME 3

DIVISION 02 - EXISTING CONDITIONS

02 41 13 Selective Site Demolition

DIVISION 31 - EARTHWORK

31 00 99 Earthwork For Minor Works
31 23 16.26 Rock Removal
31 32 19.16 Geotextile Soil Stabilization
31 37 00 Rip-Rap

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 15 60 Roadway Dust Control
32 16 15 Concrete Walks, Curbs And Gutters
32 31 13 Chain-Link Fences And Gates
32 92 23 Sodding

DIVISION 33 - UTILITIES

33 05 16 Maintenance Holes And Catch Basin Structures
33 11 16 Site Water Utility Distribution Piping
33 31 13 Public Sanitary Utility Distribution Piping
33 41 00 Storm Utility Drainage Piping
33 42 13 Pipe Culverts
33 46 16 Subdrainage Piping

PART 1 GENERAL**1.1 WORK COVERED BY CONTRACT DOCUMENTS**

- .1 Work of this Contract comprises general construction of a building, located in Ottawa (East End), Ontario; and further identified as Building A.

1.2 CONTRACT METHOD

- .1 Construct Work under design-build contract.

1.3 WORK BY OTHERS

- .1 Work of Project executed prior to start of Work of this Contract, and which is specifically excluded from this Contract:
 - .1 Trees removal.

1.4 CONTRACTOR USE OF PREMISES

- .1 Unrestricted use of construction site until Substantial Performance.
- .2 Co-ordinate use of premises under direction of Departmental Representative.

1.5 EXISTING SERVICES

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 5 calendar days' notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian, vehicular traffic or owner's operations.
- .3 Provide alternative routes for personnel and vehicular traffic.
- .4 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
- .5 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .6 Provide temporary services when directed by Departmental Representative to maintain critical building and owner systems.
- .7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .8 Where unknown services are encountered, immediately advise Departmental 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.

Summary of Work

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

1.6 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.
 - .11 Other documents as specified.

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not used.

PART 3 EXECUTION**3.1 NOT USED**

- .1 Not used.

END OF SECTION

WORK RESTRICTIONS**PART 1 GENERAL****1.1 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.

1.2 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.

1.3 EXISTING SERVICES

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission
- .2 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.4 SPECIAL REQUIREMENTS

- .1 Submit Construction Progress Schedule - Bar (GANNT) Chart.
- .2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .3 Keep within limits of work and avenues of ingress and egress.
- .4 Ingress and egress of Contractor vehicles at site is limited to main site entrance posts.
- .5 Deliver materials outside of peak traffic hours 17:00 to 07:00 and 13:00 to 15:00 unless otherwise approved by Departmental Representative.

1.5 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 Refer to forms appended to this section

WORK RESTRICTIONS

- .3 Security escort:
- .1 Personnel employed on this project must be escorted when executing work in non-public areas during normal working hours. Personnel must be escorted in all areas after normal working hours.
 - .2 Submit an escort request to Departmental Representative at least 5 days before service is needed. For requests submitted within time noted above, costs of security escort will be paid for by Departmental Representative. Cost incurred by late request will be Contractor's responsibility.
 - .3 Any escort request may be cancelled free of charge if notification of cancellation is given at least 4 hours before scheduled time of escort. Cost incurred by late request will be Contractor's responsibility.
 - .4 Calculation of costs will be based on average hourly rate of security officer for minimum of 8 hours per day for late service request and of 4 hours for late cancellations.

1.6 BUILDING SMOKING ENVIRONMENT

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

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

Security Clearance Requirements (Law Enforcement Checks)

1. All personnel employed on this project will be subject to at a minimum, the Facilities Access Level 2 clearance requirements.
2. Prior to the commencement of the on-site activities, all personnel engaged in the execution of the work on the exterior or interior of an Government occupied and/or unoccupied building or outside on the grounds, shall have at a minimum, the requisite a Facilities Access Level 2 clearance.
3. As a result, immediately upon award of the contract, the Contractor shall prepare and submit the attached requisite forms, provided by the Departmental Representative (or failing that the Departmental Representative Project Manager), for each Contractor employee and sub-contractor employee to be engaged in the work on the exterior or interior of an occupied and/or unoccupied building or outside on the grounds. In addition, Contractor's employees and sub-contractor employees must include with their requisite forms, government issued documents (driver's license/photo identification and birth certificate), for each Contractor employee and sub-contractor employee engaged in the work on the project site as noted above.
4. To eliminate delays in the clearance process, all clearance documents completed by the Contractor's employees and sub-contractor employees must be reviewed by the Contractor to ensure that all requested information has been provided, prior to submitting documents to the department representative. Incomplete forms will be returned to the Contractor.
5. The Contractor's employees and sub-contractor employees shall only mobilize on site, once the requisite clearance has been granted.
6. The Contractor should batch the fully completed submissions, based on priority work on site and allow for a processing time in the project schedule for the review to occur (from the date the completed documents are received by the department representative). The inability to submit the fully completed requisite forms and documents will not be reason for an extension to the project schedule or additional compensation.
7. Contractor's employees and subcontractor employees with the requisite Facilities Access Level 2 clearance must be escorted at all times by **a Commissionaire escort hired by the department representative (at no cost to the Contractor) while RRS clearances are being processed**. Once the building is occupied contractors can only be escorted by a Commissionaire / not a Contractor with an RRS.
8. In order to obtain the Facility Access Level 2 Status clearance (FA2), the following documents and information must be completed / provided:
 1. Contractor Information Sheet (form attached)
 2. TBS 330-23E form (form attached)
 3. Photocopy of Driver's license (or government issued photo identification) and Birth Certificate (clear copy of both front and back of each document)
9. Work may commence upon granting of Facilities Access Level 2 clearances.
10. The Contractor shall give the department representative **72 hours' notice for work** to be carried out in occupied an building during periods outside of the normal working hours of **Monday to Friday, from 06:00 to 18:00 hours** (hours subject to change at the discretion of the department representative).
Contractor/Consultant Information Sheet for Facilities Access

PLEASE PRINT LEGIBLY / ALL INFORMATION MUST BE PROVIDED

**CONTRACTORS/CONSULTANTS MUST PROVIDE
THE FOLLOWING INFORMATION:**

1. Your Complete Legal Name: (First, Middle or "No Middle Name", Last Name)	
2. Name of Company That You Work For:	
3. Company Telephone Number:	
4. Project That You Are Working On: (Name of Project/Building/City/Province)	
5. Project Manager:	
6. Access Period (Start & End Dates): (If exact dates unknown, estimated dates)	

**CONTRACTORS/CONSULTANTS MUST PROVIDE PHOTOCOPIES OF
(Two pieces of ID must be provided):**

DOCUMENTS ATTACHED TO TBS 330-23E:	YES / NO
<p>1. Driver's License (clear copy, certified to be a true copy by individual other than applicant – does not have to be Notary Public – both front and back of document).</p> <p><i>Note: If you do not have a Driver's License, please provide other government issued photo identification (passport, treaty card).</i></p>	
<p>2. Birth Certificate (clear copy, certified to be a true copy by individual other than applicant – does not have to be Notary Public) – both front and back of document)</p> <p><i>Note: If you do not have a Birth Certificate, please provide other government issued identification (passport, treaty card, Firearms License).</i></p>	

Contractor/Consultant Information Sheet

Page 2 of 2

CONTRACTORS / CONSULTANTS - PLEASE NOTE THE FOLLOWING:

Should an Access tag/card be issued to you, please note the following;

- 1) You are the sole user of the access tag and it must be visibly worn while working on the site.
- 2) The access tag is non-transferrable / can not be used while working on projects other than the projects it was issued for.
- 3) The access tag must be returned to the Department Representative issuing office or site foreman (if approved) at the end of each day.
- 4) No access to areas that you have not been cleared will be allowed and if found in these areas your clearance will be revoked and you will be removed from the site.

Employee Signature:	Signed on Date:
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“EMPLOYER” TO REVIEW (not employee applicant of this form), COMPLETE AND SIGN:

In order to comply with Federal Government policies and guidelines, in relation to the collection of personal information, the employer requesting the security checks must be satisfied that he/she can confirm the identity of the applicant.

The employer (your supervisor or a colleague) **MUST:**

- 1) Request that their employees attend in person and provided two pieces of Identification.
- 2) ID **MUST** include full date of birth and name of the individual ie, Driver’s Licence - Birth Certificate, Passport, Firearms Licence. (One piece of ID must include the photograph and if using the Drivers Licence copy both the photo portion as well as the signature portion.)
- 3) If the employee has changed his/her name, ID **MUST** be provided with both the current as well as past names.

Type of ID:

1) _____ Number _____

2) _____ Number _____

Employers Name (First Name and Surname):	
Employers Signature:	Signed on Date:

**ADDITIONAL INSTRUCTIONS FOR COMPLETION OF
GOVERNMENT OF CANADA PERSONNEL SCREENING, CONSENT AND
AUTHORIZATION FORM (Form No. TBS 330-23E)**

NOTE:

All information requested on TBS 330-23E MUST be provided (do not leave any "blanks", provide partial information, and do not use any abbreviations - ie. CA for Canada). Failure to provide requested information will result in forms being returned to applicants.

Page 1 of Form:

Section A. Administrative Information: Do not complete (completed by the Department Representative).

Section B. Biographical Information: *To be completed by applicant:*

1. Surname: Your Last Name that you currently use - ie. "Smith"
2. Full Given Names (no initials):
 - a. Your First Name and Middle Name (s) ie. "Cameron John"

****If you do not have a middle name, state "no middle name" on the form.**

****Circle or underline your usual name used (whether you go by your first name or middle name).**
3. Family Name at Birth: Your Last Name when you were born - ie. "Smith" (do not include "Same")
4. All other names used: Abbreviation(s) of name(s) used (ie. "Dave"/David, "Charlie"/Charles) or nicknames.
5. Sex: Place "x" in box beside male or female.
6. Date of Birth: provide the Year, Month and Day you were born ie. 2012-01-01 (must provide all in this format)
7. Country of Birth: - the Country that you were born in ie. Canada (no abbreviations such as "CA")
8. Date of entry into Canada if born outside Canada: - ie. 2012-01-01 (Year, Month, Day format)
9. Daytime telephone number: Your telephone number that the Department Representative can reach you at in the daytime, including your area code.
10. E-mail address: Your e-mail address at work, or if you do not have one at work, your home e-mail address.
11. Residence(s): provide addresses where you have permanently or temporarily resided for the last five years, starting with the most current home address. Must be consecutive dates - no breaks in time periods.

****Do not fill in address in grey/shaded area beside "Home address"; fill in current address in the boxes under "Home address".**

**ADDITIONAL INSTRUCTIONS FOR COMPLETION OF
GOVERNMENT OF CANADA PERSONNEL SCREENING, CONSENT AND
AUTHORIZATION FORM (Form No. TBS 330-23E)**

- a. Apartment Number - fill in if you have one; if you do not live in an apartment, leave blank.
- b. Street Number - your house number ie. "421"
- c. Street Name - ie. "Smith Street/George Avenue; or "4th Street" if no name (no abbreviations)
**If you do not have a street address or you live on a farm/acreage, please provide your legal land descriptions (ie. SW-30-23-45-W4th) - NO POST OFFICE BOX NUMBERS.
- d. From - the year and month that you moved to your current / previous residence(s);
* * If you cannot recall the month, please state above the M - "unknown"
- e. To - "Present" or the year and month that you moved/vacated your previous residences (not current residence).
- f. City - the name of the city or town that you currently and previously resided in.
- g. Province or State - the name of the province or state that you currently and previously resided in (no abbreviations ie. "AB" or "SK").
- h. Postal Code - your current and previous postal codes.
- i. Country - the name of the country that you currently and previously resided in (no abbreviations).
- j. Telephone Number - your current and previous home telephone numbers, including area code.
Note: *If you do not have enough space on the attached form to list addresses for the last five years. please photocopy page J and complete Section B. listing:*

a.) Your Surname. b.) Full Given Names. c.) Family name at birth, d.) Sex, e.) Date of Birth, j). Country of Birth g.) additional addresses for the last five years (apartment No., Street Number, Street Name, City, Province, dates etc.).

12. Have you previously completed a Government of Canada security screening form?:

- a. "No" or
- b. "Yes" - if "Yes", please provide details. If you cannot recall some or all of the details (ie. year of screening, state "cannot recall").

13. Criminal Convictions:

- a. "No" OR
- b. "Yes" - if "Yes", please provide details. If you cannot recall some or all of the details (ie. date of conviction, state "cannot recall").

**ADDITIONAL INSTRUCTIONS FOR COMPLETION OF
GOVERNMENT OF CANADA PERSONNEL SCREENING, CONSENT AND
AUTHORIZATION FORM (Form No. TBS 330-23E)**

Page 2 of Form:

Top of Page 2: *To be completed by applicant:*

1. Surname (your last name) followed by a comma - ie. Smith,
2. Full given names - your first name and then your middle name
**If you do not have a middle name, state "no middle name" on the form.
**Circle or underline your usual name used (ie. whether you go by your first name or middle name).
3. Date of birth - provide - Year, Month, Day ie. 2012-01-01 (must provide all in this format / no blanks)

Section C. Consent and Verification: *To be completed by applicant:*

1. Initial under "Applicant's Initials" column - **numbers 1. to 5. (you must initial all boxes-1 to 5).**
 2. Read the Privacy Act Statement and sign above "Signature" and "Date (Y *IM/D*)"
- Section D. Review: do not complete (completed by Department Representative).
Section E. Approval: do not complete (completed by Department Representative).



PERSONNEL SCREENING, CONSENT AND AUTHORIZATION FORM

OFFICE USE ONLY		
Reference number	Department/Organization number	File number

NOTE: For Privacy Act Statement refer to Section C of this form and for completion instructions refer to attached instructions. Please typewrite or print in block letters.

A ADMINISTRATIVE INFORMATION (To be completed by the Authorized Departmental/Agency/Organizational Official)

New
 Update
 Upgrade
 Transfer
 Supplemental
 Re-activation

The requested level of reliability/security check(s)

Reliability Status
 Level I (CONFIDENTIAL)
 Level II (SECRET)
 Level III (TOP SECRET)

Other _____

PARTICULARS OF APPOINTMENT/ASSIGNMENT/CONTRACT

Indeterminate
 Term
 Contract
 Industry
 Other (specify secondment, assignment, etc.) _____

Justification for security screening requirement

Position/Competition/Contract number	Title	Group/Level (Rank if applicable)	
Employee ID number/PRI/Rank and Service number (if applicable)	If term or contract, indicate duration period	From	To
Name and address of department / organization / agency	Name of official	Telephone number ()	Facsimile number ()

B BIOGRAPHICAL INFORMATION (To be completed by the applicant)

Surname (Last name) _____ Full given names (no initials) underline or circle usual name used _____ Family name at birth _____

All other names used (i.e. Nickname) _____

Sex: Male Female

Date of birth: Y | | M | | D | |

Country of birth: _____

Date of entry into Canada if born outside Canada: Y | | M | | D | |

RESIDENCE (provide addresses for the last five years, starting with the most current):

Home address _____ Daytime telephone number () _____ E-mail address _____

1	Apartment number	Street number	Street name	Civic number (if applicable)	From Y M	To present
	City		Province or state	Postal code	Country	Telephone number ()

2	Apartment number	Street number	Street name	Civic number (if applicable)	From Y M	To Y M
	City		Province or state	Postal code	Country	Telephone number ()

Have you previously completed a Government of Canada security screening form? Yes No

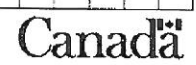
If yes, give name of employer, level and year of screening. _____ Y | |

CRIMINAL CONVICTIONS IN AND OUTSIDE OF CANADA (see instructions)

Have you ever been convicted of a criminal offence for which you have not been granted a pardon? Yes No

If yes, give details. (charge(s), name of police force, city, province/state, country and date of conviction)

Charge(s)	Name of police force	City
Province/State	Country	Date of conviction Y M D





PERSONNEL SCREENING, CONSENT AND AUTHORIZATION FORM

Surname and full given names	Date of birth	Y	M	D
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C CONSENT AND VERIFICATION (To be completed by the applicant and authorized Departmental/Agency/Organizational Official)

Checks Required (See Instructions)	Applicant's initials	Name of official (print)	Official's initials	Official's Telephone number
1. <input type="checkbox"/> Date of birth, address, education, professional qualifications, employment history, personal character references				()
2. <input type="checkbox"/> Criminal record check				()
3. <input type="checkbox"/> Credit check (financial assessment, including credit records check)				()
4. <input type="checkbox"/> Loyalty (security assessment only)				()
5. <input type="checkbox"/> Other (Law Enforcement Records Checks)				()

The Privacy Act Statement
 The information on this form is required for the purpose of providing a security screening assessment. It is collected under the authority of subsection 7(1) of the *Financial Administration Act* and the *Government Security Policy (GSP)* of the Government of Canada, and is protected by the provisions of the *Privacy Act* in institutions that are covered by the *Privacy Act*. Its collection is mandatory. A refusal to provide information will lead to a review of whether the person is eligible to hold the position or perform the contract that is associated with this Personnel Screening Request. Depending on the level of security screening required, the information collected by the government institution may be disclosed to the Royal Canadian Mounted Police (RCMP) and the Canadian Security Intelligence Service (CSIS), which conduct the requisite checks and/or investigation in accordance with the GSP and to entities outside the federal government (e.g. credit bureaus). It is used to support decisions on individuals working or applying to work through appointment, assignment or contract, transfers or promotions. It may also be used in the context of updating, or reviewing for cause, the reliability status, security clearance or site access, all of which may lead to a re-assessment of the applicable type of security screening. Information collected by the government institution, and information gathered from the requisite checks and/or investigation, may be used to support decisions, which may lead to discipline and/or termination of employment or contractual agreements. The personal information collected is described in Standard PIB PSU 917 (Personnel Security Screening) which is used by all government agencies, except the Department of National Defence PIB DND/PPE 834 (Personnel Security Investigation File), RCMP PIB CMP PPU 065 (Security/Reliability Screening Records), CSIS PIB SIS PPE 815 (Employee Security), and PWGSC PIB PWGSC PPU 015 (Personnel Clearance and Reliability Records) used for Canadian Industry Personnel. Personal information related to security assessments is also described in the CSIS PIB SIS PPU 005 (Security Assessments/Advice).

I, the undersigned, do consent to the disclosure of the preceding information including my photograph for its subsequent verification and/or use in an investigation for the purpose of providing a security screening assessment. By consenting to the above, I acknowledge that the verification and/or use in an investigation of the preceding information may also occur when the reliability status, security clearance or site access are updated or otherwise reviewed for cause under the Government Security Policy. My consent will remain valid until I no longer require a reliability status, a security clearance or a site access clearance, my employment or contract is terminated, or until I otherwise revoke my consent, in writing, to the authorized security official.

 Signature Date (Y/M/D)

D REVIEW (To be completed by the authorized Departmental/Agency/Organizational Official responsible for ensuring the completion of sections A, B and C)

Name and title	Telephone number
Address	Facsimile number

E APPROVAL (To be completed by authorized Departmental/Agency/Organizational Security Official only)

I, the undersigned, as the authorized security official, do hereby approve the following level of screening.

Reliability Status

Approved Reliability Status Not approved

 Name and title

 Signature _____
 Date (Y/M/D)

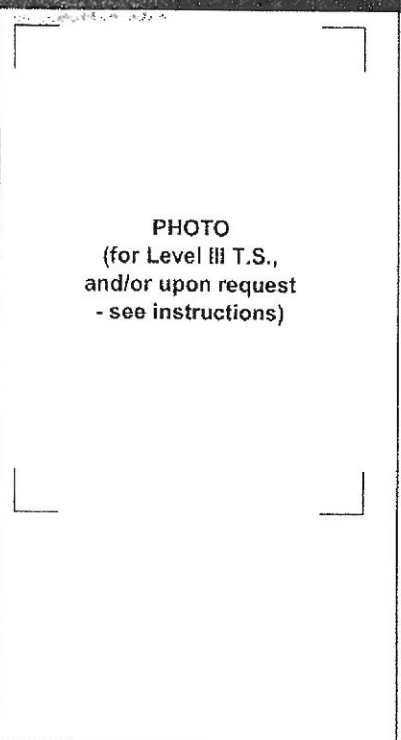
Security Clearance (if applicable)

Level I Level II Level III Not recommended

 Name and title

 Signature _____
 Date (Y/M/D)

Comments





INSTRUCTIONS FOR PERSONNEL SCREENING CONSENT AND AUTHORIZATION FORM TBS/SCT 330-23E (Rev. 2002/02)

Once completed, this form shall be safeguarded and handled at the level of Protected A.

General:

If space allotted in any portion is insufficient please use separate sheet using same format.

1. Section A (Administrative Information) Authorized Departmental/Agency/Organizational Official

The Official, based on instructions issued by the Departmental Security Officer, may be responsible for determining, based on five year background history, what constitutes sufficient verification of personal data, educational and professional qualifications, and employment history. References are to be limited to those provided on the application for employment or equivalent forms.

SUPPLEMENTAL INFORMATION REQUIREMENTS

Persons who presently hold a SECURITY CLEARANCE and subsequently marry, remarry or commence a common-law partnership, in addition to having to update sections of the *Security Clearance Form (TBS/SCT 330-60)*, are required to submit an original *Personnel Screening, Consent and Authorization Form*, with the following parts completed:

Part A - As set forth in each question

Part B - As set forth in each question, excluding CRIMINAL CONVICTIONS IN AND OUTSIDE OF CANADA.

Part C - Applicant's signature and date only are required

"Other". This should be used to identify if the security screening is for Site Access, NATO, SIGINT etc.

2. Section B (Biographical Information)

To be completed by the *applicant*. If more space is required use a separate sheet of paper. Each sheet must be signed.

Country of Birth - For "NEW" requests, if born abroad of Canadian parents, please provide a copy of your Certificate of Registration of Birth Abroad. If you arrived in Canada less than five years ago, provide a copy of the Immigration Visa, Record of Landing document or a copy of passport.

- List only criminal convictions for which a pardon has NOT been granted. Include on a separate attached sheet of paper, if more than one conviction. Applicant must include those convictions outside Canada.
- Offences under the *National Defence Act* are to be included as well as convictions by courts-martial are to be recorded.

3. Section C (Consent and Verification)

A copy of Section "C" may be released to institutions to provide acknowledgement of consent.

Criminal record checks (fingerprints may be required) and credit checks are to be arranged through the Departmental Security Office or the delegated Officer.

Consent: may be given only by an applicant who has reached the age of majority, otherwise, the signature of a parent or guardian is mandatory.

The age of majority is:

19 years in N.F.L.D., N.S., N.B., B.C., Yukon, Northwest Territories and Nunavut;

18 years in P.E.I., Que., Ont., Man., Sask. and Alta.

The applicant will provide initials in the " applicant's initials box".

The official who carried out the verification of the information will print their name, insert their initials and telephone number in the required space.

- Reliability Screening (for all types of screening identified within Section A): complete numbers 1 and 2 and 3 if applicable.
- Security Clearance (for all types of screening identified within Section A): complete numbers 1 to 4 and 5 where applicable.
- Other: number 5 is used only where prior Treasury Board of Canada Secretariat approval has been obtained.

4. Section D (Review)

To be completed by authorized Departmental/Agency/Organizational Official who is responsible for ensuring the completion of sections A to C as requested.

5. Section E (Approval)

Authorized Departmental/Agency/Organizational Security Official refers to the individuals as determined by departments, agencies, and organizations that may verify reliability information and/or approve/not approve reliability status and/or security clearances. Approved Reliability Status and Level I, II and III, as well as the signature of the authorized security official or manager are added for Government of Canada use only. Applicants are to be briefed, acknowledge, and be provided with a copy of the "Security Screening Certificate and Briefing Form (TBS/SCT 330-47)".
Note: Private sector organizations do not have the authority to approve any level of security screening.

Photographs: Departments/Agencies/Organizations are responsible for ensuring that three colour photographs of passport size are attached to the form for the investigating agency. Maximum dimensions are 50mm x 70mm and minimum are 43mm x 54mm. The face length from chin to crown of head must be between 25mm x 35mm. The photographs must be signed by the applicant and an authorized security official. The photographs must have been taken within the last six months. It is required for new or upgrade Level III security clearances for identification of the applicant during the security screening investigation by the investigating agency. The investigating agency may in specific incidents request a photograph for a Level I or II clearances when an investigation is required.

ALLOWANCES**PART 1 GENERAL****1.1 CASH ALLOWANCES**

- .1 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.
- .2 Contract Price, and not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.
- .3 Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.
- .4 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.
- .5 Include progress payments on accounts of work authorized under cash allowances in Consultant's monthly certificate for payment.
- .6 Prepare schedule jointly with Departmental Representative and Contractor to show when items called for under cash allowances must be authorized by Departmental Representative for ordering purposes so that progress of Work will not be delayed.
- .7 Amount of each allowance, for Work specified in respective specification Sections is as follows:
 - .1 Section 03 30 00 Case-in-place concrete, include allowance as identified in the contract BA03 for purchase of special aggregate.

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

PAYMENT PROCEDURES FOR TESTING LABORATORY SERVICES**PART 1 GENERAL****1.1 APPOINTMENT AND PAYMENT**

- .1 Departmental 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 Departmental 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 Departmental Representative to verify acceptability of corrected work.

1.2 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 Departmental 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 Departmental Representative.

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 ADMINISTRATIVE**

- .1 Consultant must schedule and administer project meetings throughout the progress of the work.
- .2 Consultant must distribute written notice of each meeting four days in advance of meeting date.
- .3 Departmental Representative must provide physical space and make arrangements for meetings.
- .4 Consultant must preside at meetings.
- .5 Consultant must record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .6 Consultant must reproduce and distribute copies of minutes within five days after meetings and transmit to meeting participants and affected parties not in attendance.
- .7 Representatives of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of the party that each represents.

1.2 PRECONSTRUCTION MEETING

- .1 Within 15 days after award of contract, consultant must request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Owner, Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Consultant must establish time and location of meeting and notify parties concerned a minimum of 5 days before meeting.
- .4 Consultant must incorporate mutually agreed variations to contract documents into agreement, prior to signing.
- .5 Agenda to include:
 - .1 Appointment of official representatives of Work participants.
 - .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 and colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 Requirements for temporary facilities, site signage, offices, storage sheds, utilities and fences in accordance with Section 01 52 00 - Construction Facilities.
 - .5 Delivery schedule of specified material and equipment.
 - .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.

Project meetings

- .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.

1.3 PROGRESS MEETINGS

- .1 Consultant must establish a schedule of progress meetings which will take place during course of work and 2 weeks prior to project completion.
- .2 Major Subcontractors involved in Work, Consultant and Owner are to be in attendance.
- .3 Consultant must notify parties a minimum of 5 days prior to meetings.
- .4 Consultant must record minutes of meetings and circulate to attending parties and affected parties not in attendance within 5 days after meeting.
- .5 Meetings 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 effects on construction schedule and on completion date.
 - .12 Other

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 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 Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative within working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

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

1.4 PROJECT MILESTONES

- .1 Project milestones form interim targets for Project Schedule.
 - .1 Excavation completed within 25 working days of Award of Contract date.
 - .2 Substructure completed within 40 working days of Award of Contract date.
 - .3 Superstructure completed within 65 working days of Award of Contract date.
 - .4 Building closed-in and weatherproofed within 105 working days of Award of Contract date.
 - .5 Interior finishing and fitting, mechanical, and electrical work completed within 125 working days of Award of Contract date.
 - .6 Interim Certificate (Substantial Completion) within 130 working days of Award of Contract date.

1.5 MASTER PLAN

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Departmental Representative will review and return revised schedules within 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.

1.6 PROJECT SCHEDULE

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

- .17 Controls.
- .18 Heating, Ventilating, and Air Conditioning.
- .19 Millwork.
- .20 Fire Systems.
- .21 Testing and Commissioning.
- .22 Supplied equipment long delivery items.
- .23 Engineer supplied equipment required dates.

1.7 PROJECT SCHEDULE REPORTING

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

1.8 PROJECT MEETINGS

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

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not used.

PART 3 EXECUTION

3.1 NOT USED

- .1 Not used.

END OF SECTION

PART 1 GENERAL**1.1 ADMINISTRATIVE**

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings stamped and signed by professional engineer registered or licensed in the province of Ontario, Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been 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 Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

SUBMITTAL PROCEDURES

- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Identification of specification section related to submittal
 - .6 Other pertinent data.
- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After Departmental Representative's review, distribute copies.
- .10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.

- .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
- .2 Testing must have been within 3 years of date of contract award for project.
- .13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit electronic copies of manufacturer's instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .18 Delete information not applicable to project.
- .19 Supplement standard information to provide details applicable to project.
- .20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .21 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

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

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

1.4 MOCK-UPS

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

1.5 PHOTOGRAPHIC DOCUMENTATION

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

1.6 CERTIFICATES AND TRANSCRIPTS

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

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

HEALTH AND SAFETY REQUIREMENTS**PART 1 GENERAL****1.1 REFERENCES**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Province of Ontario
 - .1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990, c.0.1, as amended and O. Reg. 213/91 as amended - Updated 2005.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedure.
- .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 Submit one copies of Contractor's authorized representative's work site health and safety inspection reports to authority having jurisdiction, weekly Departmental Representative.
- .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.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 7 days after receipt of comments from Departmental Representative.
- .8 Departmental 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 Departmental Representative.
- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
 - .1 Departmental Representative to provide site-specific requirements.

1.3 FILING OF NOTICE

- .1 File Notice of Project with Provincial authorities prior to beginning of Work.
- .2 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

HEALTH AND SAFETY REQUIREMENTS**1.4 SAFETY ASSESSMENT**

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

1.5 MEETINGS

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

1.6 REGULATORY REQUIREMENTS

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

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

1.8 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.9 COMPLIANCE REQUIREMENTS

- .1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.

1.10 UNFORSEEN HAZARDS

- .1 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 Departmental Representative verbally and in writing.

1.11 POSTING OF DOCUMENTS

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

1.12 CORRECTION OF NON-COMPLIANCE

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

HEALTH AND SAFETY REQUIREMENTS

- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.13 BLASTING

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

1.14 POWDER ACTUATED DEVICES

- .1 Use powder actuated devices only after receipt of written permission from Departmental Representative.

1.15 WORK STOPPAGE

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

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not used.

PART 3 EXECUTION**3.1 NOT USED**

- .1 Not used.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCES**

- .1 Definitions:
 - .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
 - .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water and air; biological & cultural resources and includes management of visual aesthetics; noise; solid; chemical; gaseous; and liquid waste; radiant energy and radioactive material as well as other pollutants.
- .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.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.
- .4 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.
- .5 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .6 Include in Environmental Protection Plan:
 - .1 Name(s) of person(s) responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from site.
 - .3 Name(s) and qualifications of person(s) 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.

1.3 FIRES

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

1.4 DRAINAGE

- .1 If groundwater is encountered during construction, dewatering of excavations must be performed as per OPSS 518. It is assumed that groundwater may be controlled by sump and pumping methods.
- .2 Control disposal or runoff of water containing suspended materials or other harmful substances as follows:

- .1 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials to within the required parameters of the receiving body before discharging to watercourses or drainage areas.
- .3 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 authority having jurisdiction.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

1.5 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 Restrict tree removal to areas designated by Departmental Representative.

1.6 WORK ADJACENT TO WATERWAYS

- .1 Construction equipment to be operated on land only.
- .2 Use waterway beds for borrow material only after written receipt of approval from Departmental Representative.
- .3 Waterways to be kept free of excavated fill, waste material and debris.
- .4 Design and construct temporary crossings to minimize erosion to waterways.
- .5 Do not skid logs or construction materials across waterways.
- .6 Avoid indicated spawning beds when constructing temporary crossings of waterways.
- .7 Blasting is allowed only above water and 100 m minimum from indicated spawning beds.

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

1.8 HISTORICAL/ARCHAEOLOGICAL CONTROL

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

1.9 NOTIFICATION

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

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION**3.1 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Bury rubbish and waste materials on site where directed after receipt of written approval from Departmental 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 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

REGULATORY REQUIREMENTS**PART 1 GENERAL****1.1 REFERENCES AND CODES**

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

1.2 HAZARDOUS MATERIAL DISCOVERY

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

1.3 BUILDING SMOKING ENVIRONMENT

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

1.4 NATIONAL PARKS ACT

- .1 Perform Work in accordance with National Parks Act when projects are located within boundaries of National Park.

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 INSPECTION**

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

1.2 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .2 Allocated costs: to Section 01 21 00 - Allowances.
- .3 Provide equipment required for executing inspection and testing by appointed agencies.
- .4 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .5 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and reinspection.

1.3 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.

1.4 PROCEDURES

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

QUALITY CONTROL**1.5 REJECTED WORK**

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

1.6 REPORTS

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

1.7 TESTS AND MIX DESIGNS

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

1.8 MOCK-UPS

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

1.9 MILL TESTS

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

1.10 EQUIPMENT AND SYSTEMS

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

QUALITY CONTROL

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

TEMPORARY UTILITIES**PART 1 GENERAL****1.1 REFERENCES**

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

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

1.4 DEWATERING

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

1.5 WATER SUPPLY

- .1 There is no potable water supply on construction use.
- .2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
- .3 Departmental Representative will pay for utility charges at prevailing rates.

1.6 TEMPORARY HEATING AND VENTILATION

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.
- .3 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 10 degrees C in areas where construction is in progress.
- .5 Ventilating:

TEMPORARY UTILITIES

- .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, not to be used when available.
- .7 Pay costs for maintaining temporary heat.
- .8 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.
- .9 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.7 TEMPORARY POWER AND LIGHT

- .1 Provide and 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.
- .4 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.
- .5 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Departmental Representative provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.

1.8 TEMPORARY COMMUNICATION FACILITIES

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

1.9 FIRE PROTECTION

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

TEMPORARY UTILITIES

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

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 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 construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

CONSTRUCTION FACILITIES**PART 1 GENERAL****1.1 REFERENCES**

- .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 (PWGSC) 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.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 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.

1.4 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms and temporary stair.

1.5 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.

CONSTRUCTION FACILITIES**1.6 SITE STORAGE/LOADING**

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

1.7 CONSTRUCTION PARKING

- .1 Parking will be permitted on site as directed by Departmental Representative.
- .2 Provide and maintain adequate access to project site.
- .3 Clean all roadways and access areas used by Contractor's equipment.

1.8 SECURITY

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

1.9 OFFICES

- .1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.
- .4 Departmental Representative's Site office not required.

1.10 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.

1.11 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.12 CONSTRUCTION SIGNAGE

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

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.

CONSTRUCTION FACILITIES

- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental 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.
- .7 Construct access and haul roads necessary.
- .8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
- .9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .10 Dust control: adequate to ensure safe operation at all times.
- .11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.
- .12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
- .13 Provide snow removal during period of Work.
- .14 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.14 CLEAN-UP

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

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION**3.1 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.

CONSTRUCTION FACILITIES

- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

TEMPORARY BARRIERS AND ENCLOSURES**PART 1 GENERAL****1.1 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
 - .1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
 - .2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-O121-M1978(R2003), Douglas Fir Plywood.
- .3 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

1.2 INSTALLATION AND REMOVAL

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

1.3 HOARDING

- .1 Erect temporary site enclosures using 38 x 89 mm construction grade lumber framing at 600 mm centres and 1200 x 2400 x 13 mm exterior grade fir plywood to CSA O121.
- .2 Apply plywood panels vertically flush and butt jointed.
- .3 Provide one lockable truck entrance gate and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.
- .4 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.
- .5 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.
- .6 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.4 GUARD RAILS AND BARRICADES

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

1.5 WEATHER ENCLOSURES

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

TEMPORARY BARRIERS AND ENCLOSURES

- .3 Design enclosures to withstand wind pressure and snow loading.

1.6 DUST TIGHT SCREENS

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

1.7 ACCESS TO SITE

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.8 PUBLIC TRAFFIC FLOW

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

1.9 FIRE ROUTES

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

1.10 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

1.11 PROTECTION OF BUILDING FINISHES

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with Departmental Representative 3 locations and installation schedule days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

1.12 WASTE MANAGEMENT AND DISPOSAL

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

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

TEMPORARY BARRIERS AND ENCLOSURES

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

COMMON PRODUCT REQUIREMENTS**PART 1 GENERAL****1.1 RELATED REQUIREMENTS****1.2 REFERENCES**

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

1.3 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 Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.4 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.

COMMON PRODUCT REQUIREMENTS

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

1.5 TRANSPORTATION

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

1.6 MANUFACTURER'S INSTRUCTIONS

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

1.7 QUALITY OF WORK

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.8 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.

COMMON PRODUCT REQUIREMENTS**1.9 CONCEALMENT**

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

1.10 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.

1.11 LOCATION OF FIXTURES

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

1.12 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.

1.13 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.

1.14 PROTECTION OF WORK IN PROGRESS

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

COMMON PRODUCT REQUIREMENTS

1.15 EXISTING UTILITIES

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

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

EXAMINATION AND PREPARATION**PART 1 GENERAL****1.1 REFERENCES**

- .1 Owner's identification of existing survey control points and property limits.

1.2 QUALIFICATIONS OF SURVEYOR

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

1.3 SURVEY REFERENCE POINTS

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

1.4 SURVEY REQUIREMENTS

- .1 Establish two 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 and berms.
- .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.

1.5 EXISTING SERVICES

- .1 Before commencing work, establish location and extent of public and private underground utilities/services in area of Work and notify Departmental Representative of findings. Costs of such services will be borne by Contractor.
- .2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.6 LOCATION OF EQUIPMENT AND FIXTURES

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

EXAMINATION AND PREPARATION

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

1.7 RECORDS

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 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.

1.8 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit name and address of Surveyor to Departmental Representative.
- .2 On request of Departmental 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 and do not conform with Contract Documents.

1.9 SUBSURFACE CONDITIONS

- .1 Promptly notify Departmental Representative 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 Departmental Representative determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

EXECUTION**PART 1 GENERAL****1.1 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.

1.2 MATERIALS

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

1.3 PREPARATION

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

1.4 EXECUTION

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

EXECUTION

- .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.

1.5 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.

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 PROJECT CLEANLINESS**

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .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 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.

1.2 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris other than that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

- .8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors as well as ceiling.
- .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.

1.3 WASTE MANAGEMENT AND DISPOSAL

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

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 WASTE MANAGEMENT GOALS**

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss RCMP's waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be project generated.
- .2 RCMP's waste management goal: to divert a minimum 75 percent of total Project Waste from landfill sites. Prior to project completion provide Departmental Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.
- .3 Target percentage goals are achievable for waste diversion. Contractor to review and confirm Departmental Representative's Waste Audit acceptable values.
- .4 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.
- .5 Protect environment and prevent environmental pollution damage.

1.2 REFERENCES

- .1 Definitions:
 - .1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the Departmental Representative.
 - .2 Class III: non-hazardous waste - construction renovation and demolition waste.
 - .3 Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities
 - .4 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.
- .2 Reference Standards:
 - .1 Ontario Ministry of Environment
 - .1 Ontario 3 R's Regulations (regulation 102/94) for waste management programs applicable to construction and demolition projects greater than 2,000 m².
 - .2 Ontario Environmental Protection Act (EPA)
 - .1 Regulation 102/94, Waste Audits and Waste Reduction Workplans.
 - .2 Regulation 103/94, Source Separation Programs.
 - .3 Canadian Construction Association (CCA)
 - .1 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.
 - .4 Public Works and Government Services Canada (PWGSC)
 - .1 2002 National Construction, Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.
 - .2 CRD Waste Management Market Research Report (available from PWGSC's Environmental Services).
 - .3 Sustainable Development Strategy 2007-2009: Target 2.1 Environmentally Sustainable Use of Natural Resources.
 - .1 Real Property projects over \$1 million and in communities where industrial recycling is supported, implementation of CRD waste management practices will be completed, with waste materials being reused or recycled.

- .2 Contractually ensure resources used in construction or maintenance are consumed and recovered in a sustainable manner.

1.3 DOCUMENTS

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

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

1.5 WASTE AUDIT (WA)

- .1 Departmental Representative will prepare WA prior to project start-up. WA will be provided with bid documentation (see Schedule A).
- .2 WA provides detailed inventory, estimated quantities and types of waste materials that will be generated as well as their potential to be reused and/or recycled and project's waste diversion goals and objectives.
- .3 After award of contract, contractor to review WA and confirm that anticipated quantities of waste generated are accurate and goals achievable.

- .4 If after review, contractor determines that indicated quantities or opportunities in WA are not accurate or achievable, contractor to provide written details of discrepancies and revised quantities for areas of concern. Contractor to meet with Departmental Representative to review and justify revisions.
- .5 Post on-site WA where contractor and sub-contractors are able to review content.

1.6 WASTE REDUCTION WORKPLAN (WRW)

- .1 Prepare and submit WRW (Schedule B) at least 10 days prior to project start-up.
- .2 WRW identifies strategies to optimize diversion through reduction, reuse, and recycling of materials and comply with applicable regulations, based on information acquired from WA.
- .3 WRW should include but not limited to:
 - .1 Applicable regulations.
 - .2 Specific goals for waste reduction, identify existing barriers and develop strategies to overcome them.
 - .3 Destination of materials identified.
 - .4 Deconstruction/disassembly techniques and schedules.
 - .5 Methods to collect, separate, and reduce generated wastes.
 - .6 Location of waste bins on-site.
 - .7 Security of on-site stock piles and waste bins.
 - .8 Protection of personnel, sub-contractors.
 - .9 Clear labelling of storage areas.
 - .10 Training plan for contractor and sub-contractors.
 - .11 Methods to track and report results reliably (Schedule D).
 - .12 Details on materials handling and removal procedures.
 - .13 Recycler and reclaimer requirements.
 - .14 Quantities of materials to be salvaged for reuse or recycled and materials sent to landfill.
 - .15 Requirements for monitoring on-site wastes management activities.
- .4 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
- .5 Post WRW or summary where workers at site are able to review content.
- .6 Monitor and report on waste reduction by documenting total volume (in tonnes) and cost of actual waste removed from project (Schedule D).

1.7 WASTE SOURCE SEPARATION PROGRAM (WSSP)

- .1 As part of Waste Reduction Workplan, prepare WSSP prior to project start-up.
- .2 WSSP will detail methodology and planned on-site activities for separation of reusable and recyclable materials from waste intended for landfill.
- .3 Provide list and drawings of locations that will be made available for sorting, collection, handling and storage of anticipated quantities of reusable and recyclable materials.
- .4 Provide sufficient on-site facilities and containers for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

- .5 Locate containers to facilitate deposit of materials without hindering daily operations.
- .6 Provide training for contractor, sub-contractors and workers in handling and separation of materials for reuse and/or recycling.
- .7 Locate separated materials in areas which minimizes material damage.
- .8 Clearly and securely label containers to identify types/conditions of materials accepted and assist contractor, sub-contractors and workers in separating materials accordingly.
- .9 Monitor on-site waste management activities by conducting periodic site inspections to verify: state of signage, contamination levels, bin locations and condition, personnel participation, use of waste tracking forms and collection of waybills, receipts and invoices.
- .10 On-site sale of salvaged materials is not permitted unless authorized in writing by Departmental Representative and provided that site safety regulations and security requirements are adhered to.

1.8 USE OF SITE AND FACILITIES

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

1.9 WASTE PROCESSING SITES

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

1.10 QUALITY ASSURANCE

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

1.11 STORAGE, HANDLING AND PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .4 Protect surface drainage, mechanical and electrical from damage and blockage.
- .5 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
- .6 Separate and store materials produced during project in designated areas.

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

1.12 DISPOSAL OF WASTES

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

1.13 SCHEDULING

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

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 APPLICATION

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

3.2 CLEANING

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

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

3.3 DIVERSION OF MATERIALS

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

3.4 WASTE DIVERSION 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)

- .1 Schedule A - Waste Audit (WA)

(1) Material Category	(2) Material Quantity Unit	(3) Estimated Waste %	(4) Total Quantity of Waste (unit)	(5) Generation Point	(6) % Recycled	(7) % Reused
Wood and Plastics Material Description						
Off-cuts						
Warped Pallet Forms						
Plastic Packaging						
Cardboard Packaging						

Other						
Doors and Windows Material Description						
Painted Frames						
Glass						
Wood						
Metal						
Other						

3.6 WASTE REDUCTION WORKPLAN (WRW)

.1 Schedule B

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

3.7 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

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

Province	Address	General Inquires	Fax
Ontario	Ministry of Environment and Energy, 135 St. Clair Avenue West Toronto ON M4V 1P5	416-323-4321 800- 565-4923	416-323-4682
	Environment Canada Toronto ON	416-734-4494	

3.8 SCHEDULES

- .1 Following Schedules are attached to this Specification:
 - .1 Waste Audit - Schedule A.
 - .2 Waste Reduction Workplan Form - Schedule B.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCES**

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

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Departmental Representative inspection.
 - .2 Departmental Representative Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, adjusted, balanced and fully operational.
 - .4 Certificates required by Boiler Inspection Branch, Fire Commissioner and/or Utility companies: submitted.
 - .5 Operation of systems: demonstrated to Owner's personnel.
 - .6 Commissioning of mechanical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements and copies of final Commissioning Report submitted to Departmental Representative.
 - .7 Aboveground storage tank inspection documentation, registration, forms, decommissioning and removal in accordance with CEPA SOR/2008-197.
 - .8 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
 - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

1.3 FINAL CLEANING

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

Closeout procedures

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

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCES**

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

1.2 ADMINISTRATIVE REQUIREMENTS

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 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 dwg format on memory stick.

1.5 CONTENTS - PROJECT RECORD DOCUMENTS

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

1.6 AS -BUILT DOCUMENTS AND SAMPLES

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

- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

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

1.8 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.

1.9 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.

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

1.10 MATERIALS AND FINISHES

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

1.11 MAINTENANCE MATERIALS

- .1 Spare Parts:
 - .1 Provide spare parts, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to location as directed by Departmental Representative; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit prior to final payment.
- .2 Extra Stock Materials:
 - .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to location as directed by Departmental Representative; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit prior to final payment.
 - .6 08 71 00 - Door Hardware: Supply 2 sets of wrenches for door closers, locksets and fire exit hardware.
 - .7 09 30 13 - Ceramic Tiling: 2%
 - .8 09 51 13 - Acoustical panel ceilings: 2%
 - .9 09 65 19 - Resilient Tile Flooring: 5%
 - .10 09 68 13 - Tile carpeting: min. 2%
 - .11 09 90 00 - Interior, exterior paints and coatings: 1% of each material and color but not less than 1Gal.
- .3 Special Tools:
 - .1 Provide special tools, in quantities specified in individual specification section.
 - .2 Provide items with tags identifying their associated function and equipment.
 - .3 Deliver to location as directed by Departmental Representative; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
 - .5 09 69 00 - Access Flooring
 - .6 10 28 10 - Toilet and Bath Accessories

1.12 DELIVERY, STORAGE AND HANDLING

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.

- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by Departmental Representative.

1.13 WARRANTIES AND BONDS

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

Closeout submittals

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

1.14 WARRANTY TAGS

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

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 ADMINISTRATIVE REQUIREMENTS**

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of 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.
 - .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 scheduled times, at the equipment location.
 - .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
 - .3 Review contents of manual in detail to explain aspects of operation and maintenance.
 - .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 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 CxA – Commissioning Agent
 - .5 EMCS - Energy Monitoring and Control Systems.
 - .6 O M - Operation and Maintenance.
 - .7 PI - Product Information.
 - .8 PV - Performance Verification.
 - .9 TAB - Testing, Adjusting and Balancing.

1.2 GENERAL

- .1 Commissioning (Cx) shall be performed by independent Commissioning Agent (CxA) Client will employ CxA.
 - .1 CxA Commissioning Agent/company shall present adequate knowledge, skills and experience for similar projects and proof of successful execution of similar task for project of same size.
 - .2 Equipment Manufacturer's representative must be included in commissioning process. Arrange for Manufacturer's representative presence, pay all costs
 - .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.
- .2 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.
- .3 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively

- with each other as intended in accordance with Contract Documents and design criteria.
- .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
 - .3 Co-operate fully with the CA in carrying out the Commissioning Plan.
 - .4 Ensure that all necessary labour and materials are supplied for the implementation of Commissioning.
 - .5 Provide information to the CA for creating a comprehensive commissioning schedule, co-ordinating the activities with the Sub Contractors, Contract Manager and CA.
 - .6 The supply of all labour and materials required to perform all commissioning activities as required by the CA.
 - .7 Fill in the required Commissioning forms, as provided by the CA.
- .4 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational 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.
- .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 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 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms for requirements and instructions for use.
- .2 Departmental Representative to review and approve Cx documentation.
- .3 Provide completed and approved Cx documentation to Departmental Representative.

1.9 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 MEETINGS

- .1 Convene Cx meetings following project meetings: Section 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.
- .6 Meeting will be chaired by Contractor, who will record and distribute minutes.
- .7 Ensure subcontractors and relevant manufacturer representatives are present at 60% and subsequent Cx meetings and as required.

1.11 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 DOCUMENTATION

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

1.16 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:
 - .1 Complete list of instruments proposed to be used.
 - .2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.
- .2 Provide the following equipment as required:
 - .1 2-way radios.
 - .2 Ladders.
 - .3 Equipment as required to complete work.

1.20 COMMISSIONING PERFORMANCE VERIFICATION

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

1.21 WITNESSING COMMISSIONING

- .1 Departmental Representative shall be notify 48hr prior to Cx activity and on own discretion will 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 formulae.

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 75 % 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 41 - Commissioning (Cx) - Training.

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 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 SUMMARY**

- .1 Section Includes:
 - .1 Description of overall structure of Cx Plan and roles and responsibilities of Cx team.

1.2 REFERENCES

- .1 American Water Works Association (AWWA)
- .2 National Fire Protection Association (NFPA)
 - .1 NFPA-13-02, Installation of Sprinkler Systems Handbook.
 - .2 NFPA-14-02, Automatic Sprinkler Systems Handbook.
 - .3 NFPA-20-03, Standard for the Installation of Stationary Fire Pumps for Fire Protection.
- .3 Public Works and Government Services Canada (PWGSC)
 - .1 PWGSC - Commissioning Guidelines CP.4 -3rd edition-03.
- .4 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.

.4 Acronyms:

- .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:

- .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

- .1 Cx Plan to be developed by CxA Commissioning Agent
- .2 Cx Plan to be 100% completed within 8 weeks of award of contract to take into account:
 - .1 Approved shop drawings and product data.
 - .2 Approved changes to contract.
 - .3 Contractor's project schedule.
 - .4 Cx schedule.
 - .5 Contractor's, sub-contractor's, suppliers' requirements.
 - .6 Project construction team's and Cx team's requirements.
- .3 Submit completed Cx Plan to Consultant and obtain written approval.

1.5 REFINEMENT OF CX PLAN

- .1 During construction phase, revise, refine and update Cx Plan to include:
 - .1 Changes resulting from Client program modifications.
 - .2 Approved design and construction changes.
- .2 Revise, refine and update every 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 CX TEAM

- .1 Departmental Representative to maintain overall responsibility for project and is sole point of contact between CxA and members of commissioning team.
- .2 Project Manager will select Cx Team consisting of following members:

- .1 Departmental Representative: 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.
- .2 CxA Commissioning Agent is responsible for:
 - .1 Organizing Cx including development of all commissioning forms.
 - .2 Monitoring operations Cx activities including preparation and tracking of Cx schedule.
 - .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.
 - .9 Demonstrations.
 - .10 Preparation, submission of test reports.
- .3 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 Cx Manager for administrative and coordination purposes.
- .4 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 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.
- .2 CxA to assure presence of the following Cx participants to verify performance of equipment and systems:
 - .1 Installation contractor/subcontractor:
 - .1 Equipment and systems except as noted.

- .3 Equipment manufacturer: equipment specified to be installed and started by manufacturer.
 - .1 To include performance verification.
- .4 Specialist subcontractor: equipment and systems supplied and installed by specialist subcontractor.
- .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 Raised floor systems.
 - .2 Accessibility and operational safety:
 - .3 Doors, windows, related hardware:
 - .1 Door and window hardware.
 - .4 RF Shielded concrete
 - .5 RF Shielded enclosure to ITSG-02
 - .6 Acoustic rating of walls and doors
 - .2 Commission mechanical systems and associated equipment:
 - .1 Plumbing systems:
 - .1 Domestic CWS and HWS.
 - .2 Regular sanitary waste systems.
 - .3 Storm water systems.
 - .2 HVAC and exhaust systems:
 - .1 HVAC systems
 - .2 General exhaust systems
 - .3 Fire and life safety systems:
 - .1 Dry pipe sprinkler systems.

- .2 Fire extinguishers.
- .4 Noise and vibration control systems for mechanical systems.
- .5 Seismic restraint and control measures.
- .6 EMCS.
- .3 Commission electrical systems and equipment:
 - .1 High voltage:
 - .1 High voltage switch gear and transformation equipment.
 - .2 High voltage distribution systems.
 - .2 Low voltage below 750 V:
 - .1 Low voltage equipment.
 - .2 Low voltage distribution systems.
 - .3 Central clock systems.
 - .4 Voice communications systems.
 - .5 Audio/visual systems to following areas:
 - .6 Electronic data and communications information systems.
 - .7 Simultaneous translation systems.
 - .8 MP's call systems.
 - .9 Messenger call systems.
 - .10 Division bells systems.
 - .3 Emergency power generation systems:
 - .1 Generators.
 - .2 Fuel systems.
 - .3 Transfer switchgear and controllers.
 - .4 Uninterruptible power systems.
 - .4 Lighting systems:
 - .1 Lighting equipment.
 - .2 Distribution systems.
 - .3 Emergency lighting systems, including battery packs.
 - .4 Fire exit emergency signage.
 - .5 Fire alarm systems, equipment:
 - .1 Annunciators.
 - .2 Control panels.
 - .3 Fire alarm battery banks.
 - .6 Other systems and equipment:
 - .1 Intrusion and access security and safety systems as follows:
 - .2 Lightning protection systems.
 - .3 Watchman's tour system.

1.9 DELIVERABLES RELATING TO O M PERSPECTIVES

- .1 General requirements:
 - .1 Compile English 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) as developed by CxA.
 - .4 Completed product information (PI) report forms as developed by CxA..
 - .5 Completed performance verification (PV) report forms as developed by CxA..
 - .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 RCMP Design Quality Review Team:
 - .1 Acoustic
 - .2 RF shielding
 - .10 Tests performed by [Owner/User].
 - .11 Training Plans.
 - .12 Cx Reports.
 - .13 Prescribed activities during warranty period.
- .4 Departmental Representative to witness and certify tests and reports of results provided to Departmental Representative.

1.11 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Items listed in this Cx Plan include the following:

- .1 Pre-Start-Up inspections: by Consultant 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 on own discretion inspections and tests.
- .7 Include completed documentation in Cx report.
- .2 Pre-Cx activities - ARCHITECTURAL AND STRUCTURAL:
 - .1 Raised floor systems: verify freedom for air movement through-out.
 - .2 Doors, windows, related hardware:
 - .1 Door and window hardware.
 - .2 Shielded doors
- .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 High voltage distribution systems over 750 V:
 - .2 Low voltage distribution systems under 750 V:
 - .1 Requires independent testing agency to perform pre- energization and post-energization tests.
 - .3 Emergency power generation systems
 - .1 Transfer switches: test by simulating loss of power. Verify availability of power at equipment requiring same.
 - .2 Uninterruptible power systems: test under full and partial load conditions.
 - .4 Lighting systems:
 - .1 Emergency lighting systems:
 - .1 Tests to include verification of lighting levels and coverage, initially by disrupting normal power.
 - .5 Fire alarm systems: test after other safety and security systems are completed. Testing to include a complete verification in accordance with ULC requirements. Departmental Representative has witnessed and certified report, demonstrate devices and zones to Departmental Representative.
 - .6 Low voltage systems: these include:
 - .1 Clock, communications, low voltage lighting control systems and data communications systems.
 - .2 Special systems such as Simultaneous Translation systems, MPs Call systems, Messenger Call systems, Division Bell systems.
 - .7 Security, surveillance and intrusion alarm systems: to include verification by RCMP.
 - .8 Lightning protection systems.
 - .9 Watchman's tour systems.

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 of these start-up activities.
 - .1 Rectify start-up deficiencies to satisfaction of Departmental Representative.
- .4 Performance Verification (PV):
 - .1 Approved CxA Commissioning Agent to perform.
 - .1 Repeat when necessary until results are acceptable to Departmental Representative.
 - .2 Use procedures modified generic procedures to suit project requirements.
 - .3 Departmental Representative to witness and certify reported results using approved PI and PV forms.
 - .4 Departmental Representative to approve completed PV reports and provide to Departmental Representative.

- .5 Departmental Representative reserves right to verify up to 30% of reported results at random.
- .6 Failure of randomly selected item shall result in rejection of PV report or report of system startup and testing.

1.13 CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Perform Cx by specified CxA Commissioning Agency using procedures developed by Departmental Representative and approved by Departmental Representative.
- .2 Departmental Representative to monitor Cx activities.
- .3 Upon satisfactory completion, CxA 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 CX OF INTEGRATED SYSTEMS AND RELATED DOCUMENTATION

- .1 Cx to be performed by specified CxA specialist, using procedures developed by Departmental Representative and approved by Departmental Representative.
- .2 Tests to be witnessed by Departmental Representative and documented on approved report forms.
- .3 Upon satisfactory completion, CxA specialist to prepare Cx Report, to be certified by Departmental Representative and submitted to Departmental Representative for review.
- .4 Departmental Representative reserves right to verify percentage of reported results.
- .5 Integrated systems to include:
 - .1 HVAC and associated systems forming part of integrated HVAC systems
 - .2 Environmental space conditions
 - .3 Fire alarm systems
 - .4 Voice communications systems.
 - .5 Emergency lighting systems.
- .6 Identification:
 - .1 In later stages of Cx, before hand-over and acceptance Departmental Representative, Contractor, and CxA Manager to co-operate to complete inventory data sheets and provide assistance to RCMP in full implementation of MMS identification system of components, equipment, sub-systems, systems.

1.15 INSTALLATION CHECK LISTS (ICL)

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.16 PRODUCT INFORMATION (PI) REPORT FORMS

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.17 PERFORMANCE VERIFICATION (PV) REPORT

- .1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.18 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.

1.19 CX SCHEDULES

- .1 Prepare detailed critical path 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 CxA Commissioning Agents' credentials: 90 days before start of Cx.
 - .4 Cx Forms 60 days before start of Cx.
 - .5 Cx procedures: 3 months after award of contract.
 - .6 Cx Report format: 3 months after contract award.
 - .7 Discussion of heating/cooling loads for Cx: 3 months before start-up.
 - .8 Submission of list of instrumentation with relevant certificates: 30 days before start of Cx.
 - .9 Notification of intention to start TAB: 30 days before start of TAB.
 - .10 TAB: after successful start-up, correction of deficiencies and verification of normal and safe operation.
 - .11 Notification of intention to start Cx: 14 days before start of Cx.
 - .12 Notification of intention to start Cx of integrated systems: after Cx of related systems is completed 14 days before start of integrated system Cx.
 - .13 Identification of deferred Cx.
 - .14 Implementation of training plans.
 - .15 Cx reports: immediately upon successful completion of Cx.
 - .16 Emergency evacuation exercises: after 80% occupancy.
 - .2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Departmental Representative.
 - .3 6 months in Cx schedule for verification of performance in all seasons and wear conditions.
- .2 After approval, incorporate Cx Schedule into Construction Schedule.
- .3 Contractor, and CxA Commissioning Agent, and will monitor progress of Cx against this schedule. Departmental Representative to be informed about progress and adherence to schedule

1.20 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.

1.21 ACTIVITIES DURING WARRANTY PERIOD

- .1 Cx activities must be completed before issuance of Interim Certificate, it is anticipated that certain Cx activities may be necessary during Warranty Period, including:
 - .1 Fine tuning of HVAC and EMCS systems.
 - .2 Adjustment of ventilation rates to promote good indoor air quality and reduce deleterious effects of VOCs generated by off-gassing from construction materials and furnishings.
 - .3 Full-scale emergency evacuation exercises.

1.22 TESTS TO BE PERFORMED BY OWNER/USER

- .1 None is anticipated on this project.

1.23 TRAINING PLANS

- .1 Refer to Section 01 91 41 - Commissioning (Cx) - Training.

1.24 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 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 SUMMARY**

- .1 Section Includes:
 - .1 Commissioning forms to be completed for equipment, system and integrated system.

1.2 COMMISSIONING FORMS

- .1 Commissioning Cx forms, PI forms and PV forms to be developed by CxA according to requirements listed in this Section and best commissioning practice.
- .2 Submit Commissioning Cx forms, PI forms and PV forms to Departmental representative for review and approval

1.3 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.

1.4 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.

1.5 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.

1.6 COMMISSIONING FORMS USE

- .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 in accordance with Section 01 91 51 - Building Management Manual (BMM).

1.7 LANGUAGE

- .1 English

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 SUMMARY**

- .1 Section Includes:
 - .1 This Section specifies roles and responsibilities of Commissioning Training as prepared and executed by the Contractor and CxA.

1.2 TRAINEES

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

1.3 INSTRUCTORS

- .1 CxA Commissioning Agent will provide:
 - .1 Descriptions of systems.
 - .2 Instruction on design philosophy, design criteria, and design intent.
- .2 Include 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.
 - .4 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.

1.4 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.

1.5 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, and Facility Manager will review training manuals.
- .4 Training materials to be in a format that permits future training procedures to same degree of detail.
- .5 Supplement training materials:
 - .1 Transparencies for overhead projectors.
 - .2 Multimedia presentations.
 - .3 Manufacturer's training videos.
 - .4 Equipment models.

1.6 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.

1.7 RESPONSIBILITIES

- .1 CxA to 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.

1.8 TRAINING CONTENT

- .1 Training to include demonstrations by Instructors using the installed equipment and systems.
- .2 Content includes:
 - .1 Review of facility and occupancy profile.
 - .2 Functional requirements.
 - .3 System philosophy, limitations of systems and emergency procedures.
 - .4 Review of system layout, equipment, components and controls.
 - .5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.
 - .6 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.

- .7 Maintenance and servicing.
- .8 Trouble-shooting diagnosis.
- .9 Inter-Action among systems during integrated operation.
- .10 Review of O M documentation.
- .3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

1.9 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:
 - .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 quality.

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

- .1 Not Used.

END OF SECTION

PART 1 GENERAL**1.1 SUMMARY**

- .1 Section Includes:
 - .1 This section is limited to portions of the Building Management Manual (BMM) provided to Departmental Representative by Contractor.
- .2 Acronyms:
 - .1 BMM - Building Management Manual.
 - .2 Cx - Commissioning.
 - .3 HVAC - Heating, Ventilation and Air Conditioning.
 - .4 PI - Product Information.
 - .5 PV - Performance Verification.
 - .6 TAB - Testing, Adjusting and Balancing.
 - .7 WHMIS - Workplace Hazardous Materials Information System.

1.2 GENERAL REQUIREMENTS

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

1.3 APPROVALS

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

1.4 GENERAL INFORMATION

- .1 Provide Departmental Representative the following for insertion into appropriate Part and Section of BMM:
 - .1 Complete list of names, addresses, telephone and fax numbers of contractor, sub-contractors that participated in delivery of project - as indicated in Section 1.2 of BMM.
 - .2 Summary of architectural, structural, fire protection, mechanical and electrical systems installed and commissioned - as indicated in Section 1.4 of BMM.
 - .1 Including sequence of operation as finalized after commissioning is complete as indicated in Section 2.0 of BMM.
 - .3 Description of building operation under conditions of heightened security and emergencies as indicated in Section 2.0 of BMM.
 - .4 System, equipment and components Maintenance Management System (MMS) identification - Section 2.1 of BMM.
 - .5 Information on operation and maintenance of architectural systems and equipment installed and commissioned - Section 2.0 of BMM.

- .6 Information on operation and maintenance of fire protection and life safety systems and equipment installed and commissioned - Section 2.0 of BMM.
- .7 Information on operation and maintenance of mechanical systems and equipment installed and commissioned - Section 2.0 of BMM.
- .8 Operating and maintenance manual - Section 3.2 of BMM.
- .9 Final commissioning plan as actually implemented.
- .10 Completed commissioning checklists.
- .11 Commissioning test procedures employed.
- .12 Completed Product Information (PI) and Performance Verification (PV) report forms, approved and accepted by Departmental Representative.
- .13 Commissioning reports.

1.5 CONTENTS OF OPERATING AND MAINTENANCE MANUAL

- .1 For detailed requirements refer to Section 01 78 00 - Closeout Submittals.
- .2 Departmental Representative to review and approve format and organization within 12 weeks of award of contract.
- .3 Include original manufactures brochures and written information on products and equipment installed on this project.
- .4 Record and organize for easy access and retrieval of information contained in BMM.
- .5 Include completed PI report forms, data and information from other sources as required.
- .6 Inventory directory relating to information on installed systems, equipment and components.
- .7 Approved project shop-drawings, product and maintenance data.
- .8 Manufacturer's data and recommendations relating: manufacturing process, installation, commissioning, start-up, O M, shutdown and training materials.
- .9 Inventory and location of spare parts, special tools and maintenance materials.
- .10 Warranty information.
- .11 Inspection certificates with expiration dates, which require on-going re-certification inspections.
- .12 Maintenance program supporting information including:
 - .1 Recommended maintenance procedures and schedule.
 - .2 Information to removal and replacement of equipment including, required equipment, points of lift and means of entry and egress.

1.6 LIFE SAFETY COMPLIANCE (LSC) MANUAL

- .1 Samples of LSC Manual will be available from Departmental Representative.
- .2 Content of Manual:
 - .1 All possible Emergency situations modes including: presence of fire and smoke, power failure, lose of water or pressure, chemical spills and refrigerant release.
 - .2 Failure of elevators and escalators.
 - .3 HVAC emergencies and fuel supply failures.
 - .4 Intrusion and security breach.

- .5 Emergency provisions for natural disasters, bomb threats and other disruptive situations.
- .6 Dedicated emergency generators for high security projects, medical facilities and computer systems.
- .7 Emergency control procedures for fire, power and major equipment failure.
- .8 Emergency contacts and numbers.
- .9 Manual to be readily available and comprehensible to non- technical readers.

1.7**SUPPORTING DOCUMENTATION FOR INSERTION INTO SUPPORTING APPENDICES**

- .1 Provide Departmental Representative supporting documentation relating to installed equipment and system, including:
 - .1 General:
 - .1 Finalized commissioning plan.
 - .2 WHMIS information manual.
 - .3 Approved "as-built" drawings and specifications.
 - .4 Procedures used during commissioning.
 - .5 Cross-Reference to specification sections.
 - .2 Architectural and structural:
 - .1 Inspection certificates, construction permits.
 - .2 Roof anchor log books.
 - .3 PV reports.
 - .3 Fire prevention, suppression and protection:
 - .1 Test reports.
 - .2 Smoke test reports.
 - .3 PV reports.
 - .4 Mechanical:
 - .1 Installation permits, inspection certificates.
 - .2 Piping pressure test certificates.
 - .3 Ducting leakage test reports.
 - .4 TAB and PV reports.
 - .5 Charts of valves and steam traps.
 - .6 Copies of posted instructions.
 - .5 Electrical:
 - .1 Installation permits, inspection certificates.
 - .2 TAB and PV reports.
 - .3 Electrical work log book.
 - .4 Charts and schedules.
 - .5 Locations of cables and components.
 - .6 Copies of posted instructions.
- .2 Assist Departmental Representative with preparation of BMM.

1.8 LANGUAGE

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

1.9 IDENTIFICATION OF FACILITY

- .1 When submitting information to Departmental Representative for incorporation into BMM, use following system for identification of documentation:
 - .1 Facility
 - .2 Building
 - .3 Integrated systems
 - .4 Systems
 - .5 Sub-systems
 - .6 Components
 - .7 Control points for components.

1.10 USE OF CURRENT TECHNOLOGY

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

PART 2 PRODUCTS**2.1 NOT USED**

- .1 Not used.

PART 3 EXECUTION**3.1 NOT USED**

- .1 Not used.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 03 20 00 Concrete Reinforcing.
- .2 Section 03 30 00 Cast-In Place Concrete.
- .3 Section 03 35 05 Concrete Finishing.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.
 - .2 CAN/CSA-O86.1-00, Engineering Design in Wood (Limit States Design).
 - .3 CSA O121-M1978 (R2003), Douglas Fir Plywood.
 - .4 CSA O151-04, Canadian Softwood Plywood.
 - .5 CAN3-O188.0-M78, Standard Test Methods for Mat-Formed Wood Particleboards and Waferboard.
 - .6 CSA O437 Series-93 (R2006), Standards for OSB and Waferboard.
 - .7 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
 - .8 CAN/CSA-S269.3-M92(R2003), Concrete Formwork.
 - .9 CAN/ULC-S701-97 Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .2 Council of Forest Industries of British Columbia (COFI)
 - .1 COFI Exterior Plywood for Concrete Formwork.
- .3 ACI
 - .1 ACI 302.1R.96 Guide for Concrete Floor and Slab Construction.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings for formwork and falsework in accordance with Division 1.
- .2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, water stops, dovetail anchor slots, and locations of temporary embedded parts. Show size of tie hole, plastic plug, and plug recess. Comply with CSA S269.1, for falsework drawings Comply with CAN/CSA-S269.3 for formwork drawings.
- .3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.
- .4 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

- .5 Each shop drawing submission shall bear stamp and signature of qualified professional Departmental Representative registered or licensed in Province of Ontario, Canada.
- .6 Assume full responsibility for complete design and engineering of formwork including shoring and bracing to resist loads due to wet concrete, forms, wind and other forces arising from use of equipment to place concrete.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Store materials on site in a manner to prevent damage thereto. Protect from weather. Comply with CSA A23.1, Clause 9.
- .2 Protect work of this Section from damage. Protect other work from damage resulting from this work. Replace damaged work which cannot be satisfactorily repaired.

Part 2 Products

2.1 MATERIALS

- .1 Formwork materials:
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121 and CAN/CSA-O86.1.
 - .2 Form ties:
 - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25mm dia. in concrete surface. Form ties not to be coated
 - .3 For Architectural concrete:
 - .1 Form Ties: Threaded internal disconnecting, spreader type, adjustable in length. Ties to have maximum breakback of 40mm from concrete surface. Ensure ties incorporate removable tapered plastic spreader cones, with setback of 40mm. Ensure taper of spreader matches taper of tie hole plugs. Wire ties not permitted. Form ties not to be coated.
 - .2 Tie Hole Plugs: Plastic set back plugs, grey to match concrete, 40mm setback, to fit tightly into tie holes. Include for tie hole plug quantity on basis of 762mm each way plug spacing pattern.
 - .4 Form liner:
 - .1 Plywood: Douglas Fir to CSA O121 T and G.
 - .5 Form release agent: non-staining, chemically active release agent containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing set of film of concrete in contact with form.
 - .6 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 20 to 25mm² at 40°C, flashpoint minimum 150°C, open cup.
 - .7 Falsework materials: to CSA-S269.1.
 - .8 Sealant: to Division 7.

- .9 Waterstops: Extrusions of plasticized PVC low temperature compound to sizes and shapes indicated on drawings.
- .10 Dovetail Anchors and Slots: Minimum 0.6mm overall thickness zinc coating Z275 galvanized steel dovetail anchor slots with fillers to prevent entry of concrete during placing and minimum 1.9mm overall thickness. Zinc coating Z275 galvanized steel dovetail anchors. Anchors shall project to within 19mm of masonry face.
- .11 Mechanical Fasteners: Galvanized steel screw and washer with screw of length to secure insulation to formwork without penetrating concrete finish surface.
- .12 Formwork Insulation: Extruded, expanded polystyrene, CAN/ULC-S701, Type 4, minimum RSI (R) value of 5.0 per 25mm, compressive strength 200kPa, thickness as indicated on Drawings.

Part 3 Execution

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and column centres before proceeding with formwork and ensure dimensions agree with drawings. Verify the locations of all inserts, anchor bolts, cast-ins, etc. with structural, architectural, mechanical, electrical, and shop drawings prior to proceeding with formwork. Report any discrepancies to Departmental Representative immediately.
 - .1 Construct forms to produce plumb and level concrete and true to linear building lines. Maximum variations (not accumulative) as follows:
 - .2 Variation from plumb in concrete surfaces not to exceed 6mm in 3m nor 9mm in 6m or more.
 - .3 Variation from level or grade indicated on Drawings for tops of walls not to exceed 6mm in 3m nor 9mm in 6m in building length.
 - .4 Variation of linear building lines from established position in plan and related positions of walls not to exceed 6mm in 3m, 9mm in 1 bay nor 25mm in building length.
 - .5 Variation of concrete slabs and toppings from dead level or slopes as indicated on Drawings not to exceed 3.2mm in 3m.
- .2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CSA S269.1 and COFI Exterior Plywood for Concrete Formwork.
- .5 Refer to architectural drawings for concrete members requiring architectural exposed finishes.
- .6 Do not place shores and mud sills on frozen ground.
- .7 Provide site drainage to prevent washout of soil supporting mud sills and shores.

- .8 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.
- .9 Align form joints and make watertight. Keep form joints to minimum.
- .10 Locate horizontal form joints for exposed columns 2.4m above finished floor elevation.
- .11 Use 25mm chamfer strips on external corners and/or 25mm fillets at interior corners, joints, unless specified otherwise.
- .12 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .13 Construct forms for architectural concrete to achieve the following:
 - .1 Water-tight forms at corners, panel joints, recesses, arises and at construction joints.
 - .2 Accurate alignment of concrete surfaces.
 - .3 Surfaces without indentations other than those indicated.
 - .4 Sharp and straight corners (unless other wise indicated).
- .14 Build in anchors, sleeves, ties, bolts, nailers, templates, shelf angles and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .15 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.
- .16 If slip forming and flying forms are used, submit details of equipment and procedures for Departmental Representative's approval.
- .17 Use full size contact form sheeting panels wherever possible. Install contact surfaces of formwork to produce neat and symmetrical joint patterns. Ensure joints are vertical or horizontal and, where possible, stagger to maintain structural continuity. Back vertical joints solidly and nail edges of abutting sheets to same stud. Likewise solidly back horizontal joints. Ensure adjacent form panels fit accurately, tight and flush. Use straightest available lumber.
- .18 Align forms to ensure no visible defects appear on finished work.
- .19 Locate wall form ties in accordance with reviewed shop drawings; align on a particular member both vertically and horizontally. Arrange reuse of form so tie holes are also reused. Tighten form ties, particularly at corners.
- .20 Form slab soffits using full size panels where possible. Keep number of smaller size panels to minimum.
- .21 Take particular care in forming corners and openings. Ensure formwork is tight and braced so no movement occurs.
- .22 Use templates to secure and align anchor bolts in formwork prior to placement of the concrete. Report any interference with reinforcing or other inserts to Departmental Representative prior to the placement of the concrete. Concrete should not be placed until interference issues are resolved in writing by the Departmental Representative.

- .23 For walls and shear walls, leave one side of form open for review of reinforcing steel. Close form only after Departmental Representative has reviewed bar placement.

3.2 REMOVAL AND RESHORING

- .1 Leave formwork in place for following minimum periods of time after placing concrete. Proposed removal times to be approved by Departmental Representative in writing prior to work.
- .1 3 days for walls and sides of beams.
 - .2 3 days for columns.
 - .3 28 days for beam soffits, slabs, decks and other structural members, or 3 days when replaced immediately with adequate shoring to standard specified for falsework, and when concrete has reached at least 75% of specified 28 day strength.
 - .4 3 days for footings and abutments.
- .2 Remove formwork when concrete has reached 75 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .3 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .4 Space reshoring in each principal direction at not more than 3m apart.
- .5 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1.
- .6 Strip fibre forms off architectural concrete 2 Days after placing, using power operated saw. To strip form, set power saw blade slightly less than thickness of the form, make 2 vertical cuts and remove form. Then, using broad bladed tool, carefully pry form off with short strokes by pushing handle toward column. Exercise care so not to mar concrete surface. After stripping, replace form halves on column and wire in place to protect column during construction. Leave around columns until after scaffolding and other formwork have been removed at end of construction to ensure column protection.
- .7 Be responsible for safety of structure, both before and after removal of forms until concrete has reached its specified 28 Day compressive strength.
- .8 Take particular care when removing forms to ensure no damage occurs at corners, arises and the like.
- .9 To help avoid colour variations in architectural concrete, ensure length of time between concrete placing and form removal is approximately same for each portion of work.
- .10 In hot weather, wood forms remaining in place should not be considered adequate for curing but should be removed or loosened so concrete surfaces may be kept moist or coated with curing agent.
- .11 In cold weather, defer removal of formwork or insulate formwork, to avoid thermal shock and consequent cracking of concrete surface.

- .12 Install tie hole plugs immediately following removal of spreader cones. Install to a snug fit, maximum setback from concrete surface as specified.
- .13 When concrete is dry, install temporary polyethylene rope in reglets to prevent contamination of same.

3.3 CONSTRUCTION JOINTS

- .1 Form construction joints where required and where indicated. Construction joints shall conform to CSA A23.1, Clause 20.
- .2 Form 50mm x 100mm beveled shear keys full length on construction joints, unless detailed otherwise.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 03 10 00 – Concrete Formwork.
- .2 Section 03 30 00 - Cast-in-Place Concrete.
- .3 Section 03 35 05 – Concrete Finishing.

1.2 REFERENCES

- .1 American Concrete Institute (ACI)
 - .1 ACI 315R-80, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.
- .2 American National Standards Institute/American Concrete Institute (ANSI/ACI)
 - .1 ANSI/ACI 315-80, Details and Detailing of Concrete Reinforcement.
- .3 American Society for Testing and Materials (ASTM)
 - .1 ASTM A 775/A 775M- O/C, Specification for Epoxy-Coated Reinforcing Steel Bars.
- .4 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.
 - .2 CAN3-A23.3-04, Design of Concrete Structures for Buildings.
 - .3 CSA G30.3-M1983 (R1991), Cold Drawn Steel Wire for Concrete Reinforcement.
 - .4 CSA G30.5-M1983 (R1991), Welded Steel Wire Fabric for Concrete Reinforcement.
 - .5 CSA G30.14 M1983 (R1991), Deformed Steel Wire for Concrete Reinforcement.
 - .6 CSA G30.15-M1983 (R1991), Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
 - .7 CAN/CSA-G30.18-M-92 R2002, Billet-Steel Bars for Concrete Reinforcement.
 - .8 CAN/CSA-G40.21-M-92 R2002, Structural Quality Steels.
 - .9 CAN/CSA-G164-M-92 R2002, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .10 CSA W186-M1990, M1998, Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings including placing of reinforcement in accordance with Division 1.

- .2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacings and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada.
- .3 Detail lap lengths and bar development lengths to CAN3-A23.3, unless otherwise indicated. Provide type C tension lap splices unless otherwise indicated.
- .4 Show walls and beams in full elevation and indicate bar size, spacing, laps, bends, etc.
- .5 Show slab reinforcing full length on drawings.
- .6 Detail placement of reinforcing where special conditions occur.

1.4 DELIVERY, STORAGE & HANDLING

- .1 Store materials on site in a manner to prevent damage thereto. Protect from weather. Comply with CSA A23.1, Clause 9.
- .2 Protect work of this Section from damage. Protect other work from damage resulting from this work. Replace damaged work which cannot be satisfactorily repaired.
- .3 Handle, transport and install epoxy coated reinforcing steel bars carefully to avoid damage thereto. Conform to OPSS 1442, Clause 1442.07.03.

Part 2 Products

2.1 MATERIALS

- .1 Substitute different size bars only if permitted in writing by Departmental Representative.
- .2 All metallic components to be bare metal in Type RF concrete.
- .3 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise. No epoxy coated reinforcing steel to be used in Type RF concrete.
- .4 Deformed steel wire for concrete reinforcement: to CSA G30.14.
- .5 Welded steel wire fabric: to CSA G30.5. Provide in flat sheets only.
- .6 Epoxy coating of non-prestressed reinforcement: to ASTM A 775/A 775M
1. No epoxy coating of non-prestressed reinforcement in Type RF concrete.
- .7 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1. To be adequate for strength and support of reinforcing construction required. Use chairs with plastic coated feet where slab and beam soffits will be exposed. Chairs with open cross sections to be used in Type RF concrete.

- .8 Mechanical splices: subject to approval of Departmental Representative.
- .9 Plain round bars: to CAN/CSA-G40.21.

2.1 FABRICATION

- .1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada, unless indicated otherwise.
- .2 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Departmental Representative weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.2 SOURCE QUALITY CONTROL

- .1 Provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to commencing reinforcing work.
- .2 Inform Departmental Representative of proposed source of material to be supplied.

Part 3 Execution

3.1 FIELD BENDING

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

3.2 PLACING REINFORCEMENT

- .1 Place reinforcement in accordance with reviewed shop drawings and in accordance with CAN/CSA-A23.1. Support with chairs, bolsters, bar supports or spacers in as close spacing as possible to prevent displacement of reinforcement from intended bar position, before and during placing of concrete. Pieces of block, wood, and/or similar items, are not acceptable as chairs and spacers. In Type RF concrete, no coating on metallic chairs and chairs to have an open cross section.

Maximum chair spacing:
10M – 600mm
15M – 1200mm

20M – 1600mm
25M – 2000mm

- .2 No slip dowels to be used in Type RF concrete.
- .3 Prior to placing concrete, obtain Departmental Representative's review of reinforcing material and placement. Provide minimum 24 hours' notice prior to concrete placement for review.
- .4 Ensure cover to reinforcement is maintained during concrete pour.
- .5 Protect epoxy coated portions of bars with covering during transportation and handling. Repair in accordance with EM-69.
- .6 Lap wire mesh sections at least 152mm and wire tighter securely; discontinue wire mesh at joints.
- .7 Clean reinforcing before placing concrete.
- .8 Ensure welded wire fabric is lifted to centre of slab (or where indicated) during concrete placing.

3.3 FIELD TOUCH-UP

- .1 Touch up damaged and cut ends of epoxy coated reinforcing steel with compatible finish to provide continuous coating.

3.4 FIELD QUALITY CONTROL

- .1 Independent inspection and testing company may be appointed and paid for by Departmental Representative to conduct mill tests – physical and chemical analysis of reinforcing steel supplied. Refer to Division 1.
- .2 Cooperate with and assist inspection and testing company's personnel during inspection and tests.
- .3 Remove defective materials and complete work which fails tests and replace as directed by Departmental Representative.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 03 10 00 - Concrete Formwork.
- .2 Section 03 20 00 - Concrete Reinforcing.
- .3 Section 03 35 05 - Concrete Finishing.
- .4 Section 05 12 23 - Structural Steel for Buildings.
- .5 Section 32 16 15 - Concrete Walks, Curbs and Gutters

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 109/C109M-03, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50-mm Cube Specimens).
 - .2 ASTM C 260-01, Specification for Air-Entraining Admixtures for Concrete.
 - .3 ASTM C 309-98a, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .4 ASTM C 332-99, Specification for Lightweight Aggregates for Insulating Concrete.
 - .5 ASTM C 494/C494M-99a, Specification for Chemical Admixtures for Concrete.
 - .6 ASTM C 827-1827M-02, Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
 - .7 ASTM C 939-94a, Test Method for Flow of Grout for Preplaced-Aggregate Concrete.
 - .8 ASTM D 412-92, Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
 - .9 ASTM D 624-91, Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
 - .10 ASTM D 1751-04, Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - .11 ASTM D 1752-04a, Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
 - .2 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - .3 CGSB 81-GP-1M-10M-79, Flooring, Conductive and Spark Resistant.
- .3 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A5-93, Portland Cement.

- .2 CAN/CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.
- .3 CAN/CSA-A23.2-04, Methods of Test for Concrete.
- .4 CAN/CSA-A23.5-M86(R1992), Supplementary Cementing Materials.
- .5 CAN/CSA A363-M88(R1996), Cementitious Hydraulic Slag.

1.3 SAMPLES

- .1 Submit samples in accordance with Division 1.
- .2 At least 4 weeks prior to commencing work, inform Departmental Representative of proposed source of aggregates and provide access for sampling.

1.4 CERTIFICATES

- .1 Submit certificates in accordance with Division 1.
- .2 Minimum 4 weeks prior to starting concrete work submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:
 - .1 Portland cement.
 - .2 Blended hydraulic cement.
 - .3 Supplementary cementing materials.
 - .4 Grout.
 - .5 Admixtures.
 - .6 Aggregates.
 - .7 Water.
 - .8 Waterstops.
 - .9 Waterstop joints.
 - .10 Joint filler.
 - .11 Bonding agent
 - .12 Curing compound
 - .13 Column anchor bolts
 - .14 Sealant
 - .15 Specified admixtures
- .3 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.
- .4 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.
- .5 Anchor Bolt Setting Diagrams: Submit detailed drawings for anchor bolt setting.
- .6 Records: Keep a written record of concrete pours, showing location, date, cubic yards or metres of concrete including signed trip ticket for each truck, ambient air

temperature, and unusual occurrences during placement of each pour. Permit inspection of records by Departmental Representative at any time. At completion of work, submit a summary of such data in 6 copies to Departmental Representative.

1.5 QUALITY ASSURANCE

- .1 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures in accordance with Division 1 for Departmental Representative 's approval for following items:
 - .1 Falsework erection.
 - .2 Hot weather concrete.
 - .3 Cold weather concrete.
 - .4 Curing.
 - .5 Finishes.
 - .6 Formwork removal.
 - .7 Joints.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Store materials on site in a manner to prevent damage thereto. Protect from weather. Comply with CSA A23.1, Clause 9.
 1. Aggregate for Type RF Concrete will be delivered dried in shrink-wrapped super sacs. Maintain aggregate in dry condition.
- .2 Protect work of this Section from damage. Protect other work from damage resulting from this work. Replace damaged work which cannot be satisfactorily repaired.

1.7 GENERAL

- .1 Do not place concrete during or before rain. If rain occurs after placing and before initial set of concrete, cover with waterproof material until set. Embedded materials used in parking structural slab for floor drains, pipes and other hardware shall be non-metallic; and a low copper aluminum alloy, as designated in CAN3-B79 or an equally corrosion resistant metal, coated on surfaces in contact with concrete to prevent galvanic corrosion with steel reinforcing or protected against corrosive effects of de-icing chemicals by an effective and durable coating.
- .2 Do not use calcium chloride or other chemical in mix to reduce freezing point of concrete.
- .3 When ready mixed (mixed in transit) concrete is used, complete discharge of concrete within period of 1 hour after mixing water has been added to dry material except when concrete materials are heated, in which case reduce this period to 30 minutes. When concrete is delivered at air temperature below 4°C, ensure temperature at work of not less than 16 °C or more than 32°C.

Part 2 Products**2.1 MATERIALS**

- .1 Portland cement to CAN/CSA-A5-93 Type 10.
- .2 Blended hydraulic cement: to CAN/CSA-A5A363-88(R1998).
- .3 Supplementary cementing materials: to CAN/CSA-A23.5.
- .4 Cementitious hydraulic slag: to CAN/CSA-A363.
- .5 Water: to CAN/CSA-A23.1.
- .6 Aggregates: to CAN/CSA-A23.1. Coarse and fine aggregates for Type RF Concrete to be lightweight aggregate.
- .7 Air entraining admixture: to ASTM C 260.
- .8 Chemical admixtures: to ASTM C 494. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .9 Concrete retarders: to ASTM C 494 water based, low VOC, solvent free. Do not allow moisture of any kind to come in contact with the retarder film.
- .10 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.
 - .1 Compressive strength: 50 MPa at 28 days.
 - .2 Consistency:
 - .1 Fluid: to ASTM C 827. Time of efflux through flow cone (ASTM C 939), under 30s.
 - .2 Flowable: to ASTM C 827. Flow table, 5 drops in 3s, (ASTM C 109, applicable portion) 125 to 145%.
 - .3 Plastic: to ASTM C 827. Flow table, 5 drops in 3 s, (ASTM C 109, applicable portions) 100 to 125 %.
 - .4 Dry pack to manufacturer's requirements.
- .11 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compressive strength of 35 MPa at 28 days.
- .12 Curing compound: to CAN/CSA-A23.1 and at ASTM C309.
- .13 Premoulded joint fillers:
 - .1 Bituminous impregnated fiber board: to ASTM D 1751.
 - .2 Sponge rubber: to ASTM D 1752, Type I, flexible grade.
 - .3 Self-expanding standard cork: to ASTM D 1752, Type III.
- .14 Weep hole tubes: plastic.
- .15 Water: Conforming to CSA A23.1.

2.2 MIXES

- .1 Proportion all concrete in accordance with CAN/CSA-A23.1. Refer to plans for concrete strengths and types.

- .2 Ready-mixed concrete and concrete proportions shall be in accordance with CSA A23.1, Clause 12 and as follows:
 - .1 Minimum allowable compressive strength shall be 20 Mpa (Type RF) at 28 Days of age, unless otherwise noted or shown.
 - .2 If blended normal Portland cement/cementitious hydraulic slag is used except for floor mixes, slag content shall not be more than 25% of total mass of cement. Total volume of cement in concrete floor mixes shall be 100% Normal Portland Cement.
 - .3 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CAN/CSA-A23.1, Clause 17.5.
 - .4 Use of calcium chloride not permitted.
 - .5 Do not change concrete mix without prior approval of Departmental Representative. Should change in material source be proposed, new mix design to be approved by Departmental Representative.
- .3 Ready-mixed Type RF concrete will require an additional 10 minutes of mixing time before the truck can leave the plant.

Part 3 Execution

3.1 PREPARATION

- .1 Obtain Departmental Representative 's approval before placing concrete. Provide 48 hours notice prior to placing of concrete.
 - .1 For walls and columns leave one side of form open for review of reinforcing. Close curing only after Departmental Representative has reviewed bar placement.
- .2 Type RF concrete can only be placed by bucket to a maximum of 3000mm lifts. All placement procedures are to be reviewed with the Departmental Representative prior to commencement of any work on site.
- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.
- .5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .6 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
- .7 Do not place load upon new concrete until authorized by Departmental Representative.
- .8 Confirm surfaces on which concrete is to be placed are free of frost, water and debris before placing concrete.

3.2 CONSTRUCTION

- .1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.
- .2 Sleeves and inserts.
 - .1 No sleeves, ducts, pipes or other openings shall pass through joists, beams, column capitals or columns, except where indicated or approved by Departmental Representative in writing.
 - .2 Where approved by Departmental Representative in writing, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 101mm x 101mm not indicated, must be approved by Departmental Representative.
 - .3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Departmental Representative before placing of concrete.
 - .4 Check locations and sizes of sleeves and openings shown on drawings.
 - .5 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .3 Anchor bolts.
 - .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
 - .2 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
 - .3 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.
- .4 Drainage holes and weep holes:
 - .1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Formwork. If wood forms are used, remove them after concrete has set.
 - .2 Install weep hole tubes and drains as indicated.
- .5 Dovetail anchor slots:
 - .1 Install continuous vertical anchor slot to forms where masonry abuts concrete wall or columns.
 - .2 Install continuous vertical anchor slots at 812mm o.c. where concrete walls are masonry faced.
- .6 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.
- .7 Finishing.
 - .1 Finish concrete in accordance with CAN/CSA-A23.1 and Section 03 35 05.
 - .2 Use procedures acceptable to Departmental Representative or those noted in CAN/CSA-A23.1 to remove excess bleed water. Ensure surface is not damaged.

- .3 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.
- .8 For Type RF concrete, wall compaction to use two pencil vibrators in tandem as placement proceeds along the length of a wall. Wall penetrations to include form vibrators for concrete consolidation.

3.3 SITE TOLERANCE

- .1 Concrete tolerance in accordance with CAN/CSA-A23.1 straight edge method.

3.4 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Departmental Representative in accordance with CAN/CSA-A23.1 and Division 1.
- .2 Departmental Representative will pay for costs of tests as specified in Division 1.
- .3 Contractor will take additional test cylinders during cold and hot weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .4 Concrete cylinder test. Six cylinders from each Day's pour for each 75m³ of concrete, or for each 30m³ of concrete poured in small amounts on successive Days.
- .5 Air entrainment test and slump test made from same batch of concrete from which test cylinders are made.
- .6 Tests will be made in accordance with CSA A23.2.
- .7 Inspection Company's reports of tests will be forwarded to Departmental Representative and Contractor with an opinion or reason for any abnormalities noted thereon.
- .8 Cooperate with and assist Inspection Company's personnel during inspection and tests.
- .9 Remove defective materials and completed work which fails tests and replace as directed by Departmental Representative.
- .10 Where work or materials fail to meet strength requirements as indicated by test results, pay costs of additional inspection and testing required for new replacement work or materials.
- .11 Non-destructive Methods for Testing Concrete shall be in accordance with CAN/CSA-A23.2.
- .12 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

3.5 COLD WEATHER PROTECTION

- .1 Carry out cold weather concreting, unless otherwise specified, in accordance with CSA A23.1.

3.6 HOT WEATHER PROTECTION

- .1 Carry out hot weather concreting, unless otherwise specified, in accordance with CSA A23.1.

END OF SECTION

CONCRETE FLOOR HARDENERS**1 General****1.1 SECTION INCLUDES**

- .1 Materials and installation for concrete floor hardeners, slip resistant coatings, and sheet curing materials.

1.2 RELATED SECTIONS

- .1 Section 03 10 00 – Concrete Formwork

1.3 REFERENCES

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

1.4 SUBMITTALS

- .1 Submit product data in accordance with Division 1.
- .2 Include application instructions for concrete hardener curing compound and slip resistant coating.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Division 2.
 - .1 WHMIS MSDS acceptable to Human Resources Development Canada-Labour and Health Canada for concrete floor hardeners.
 - .2 Indicate VOC content.

2 Products**2.1 FLOOR HARDENER**

- .1 Non-metallic hardener: premixed, dry shake surface hardener, abrasion resistant.

2.2 SLIP RESITANT ABRASIVE AGGREGATE

- .1 Emery aggregate: crushed emery, minimum 50 % aluminum oxide.
- .2 Homogeneous aluminum oxide, minimum 95%.
- .3 Ferric oxide, minimum 25%.
- .4 Silicon carbide.

CONCRETE FLOOR HARDENERS

3 EXECUTION

3.1 EXAMINATION

- .1 Verify that slab surfaces are ready to receive Work.

3.2 HARDENING

- .1 Apply floor hardener aggregate at rate of 1lb per sq. ft. in accordance with manufacturer's written instructions.
- .2 Apply slip resistant coating on floor surfaces as scheduled. Apply in strict accordance with manufacturer's written instructions.

3.3 PROTECTION

- .1 Protect finished installation until floor treatment has completely cured.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-25.20-95, Surface Sealer for Floors.
- .2 Canadian Standards Association (CSA)
 - .1 CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.

1.3 PERFORMANCE REQUIREMENTS

- .1 Product quality and quality of work in accordance with Division 6.
- .2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

1.4 PRODUCT DATA

- .1 Submit product data in accordance with Division 1.
- .2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Division 2. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content.
- .3 Include application instructions for concrete floor treatments.

1.5 ENVIRONMENTAL REQUIREMENTS

- .1 Work area:
 - .1 Make the work area water tight protected against rain and detrimental weather conditions.
- .2 Temperature:
 - .1 Maintain ambient temperature of not less than 10°C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.
- .3 Moisture:
 - .1 Ensure concrete substrate is within moisture limits prescribed by finish manufacturer.
- .4 Safety: Safety
 - .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

Part 2 Products**2.1 CHEMICAL HARDENERS**

- .1 Type 1 - Sodium silicate.
- .2 Water: potable.

2.2 SEALING COMPOUNDS

- .1 Surface sealer: to CAN/CGSB-25.20, Type 2 - water based, clear.
- .2 Surface sealers may not be manufactured or formulated with aromatic solvents formaldehyde halogenated solvents mercury lead cadmium hexavalent chromium and their compounds.

2.3 CURING COMPOUNDS

- .1 Select low VOC, water-based, organic-solvent free curing compounds.

2.4 CONCRETE STAINS

- .1 Select low VOC, water-based concrete stains.

2.5 Mixes

- .1 Mixing, ratios and application in accordance with manufacturer's instructions.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verify that all surfaces are ready to receive work and elevations are as indicated on drawings.

3.2 WORKMANSHIP

- .1 Steel trowel concrete slabs to receive new epoxy floor finish.
- .2 Other concrete slabs to be screeded off to true lines and levels shown and left ready to receive finish. Depress slabs where required.
- .3 Where floor drains occur, floors to be level around walls and have a minimum 5mm per metre uniform pitch to drains, unless indicated otherwise.
- .4 Co-ordinate with equipment suppliers regarding additional requirements for tolerances on floor level finishes etc.

3.3 PLAIN FLOOR, FINISH (UNEXPOSED)

- .1 Roll or tamp concrete to force coarse aggregate into concrete mix, then screed.
- .2 Float surface with wood or metal float or with power finishing machine and bring surface to true elevation.
- .3 Steel trowel to smooth and even surface.

CONCRETE FINISHING

- .4 Follow with second steel trowelling to produce smooth burnished surface to within 6mm tolerance when measured in any direction using 3m straight edge. Do not overtrowel.
- .5 Sprinkling of dry cement or dry cement and sand mixture over concrete surfaces is not acceptable.
- .6 Apply curing compound in accordance with manufacturer's instructions. Do not use curing compound when slab is to receive bonded finish. Damp curing or other approved method shall then be employed.
- .7 No sawcut crack-control joints in slabs on grade composed of Type RF concrete.
- .8 After curing and when concrete is dry, seal control joints and joints at junction with vertical surfaces with sealing compound.

3.4 FLOOR FINISH (EXPOSED)

- .1 Finish concrete floors as per Paragraph 3.2, Clauses .1 to .5, and apply floor hardener, non-metallic aggregate at a rate of 5.0 kg/m² to manufacturer's instructions.
- .2 Apply curing/sealing compound to manufacturer's instructions.
- .3 No sawcut crack-control joints in slabs on grade composed of Type RF concrete.
- .4 After curing/sealing and when concrete is dry, seal control joints and joints at junction with vertical surfaces with sealing compound.
- .5 Clean surfaces and apply second coat curing/sealing compound before handing building over to Departmental Representative.

3.5 APPLICATION

- .1 Curing/Sealing:
 - .1 Liquid Compound Curing/Sealing: Apply compound after saw cutting operations have been completed, at a rate recommended by compound manufacturer. Clean concrete floor of laitance, tiremarks, oil, grease, etc. to the satisfaction of the Departmental Representative prior to applying sealing compound.
 - .2 Water Curing: Water cure slabs where required for compatibility of floor finish adhesive. Do not use curing/sealing compound. Water down entire area and cover with polyethylene sheets for a minimum of 7 Days. Sheet coverage to include exposed edges. Provide suitable weights to prevent blow-off or displacement of sheets. Remove cover after minimum 7 consecutive Days. Allow to air dry until concrete has developed design strength.

END OF SECTION

Part 1 General**1.1 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A 36/A36M-08, Specification for Structural Steel.
 - .2 ASTM A 193/A193M-12a, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
 - .3 ASTM A 307-10, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - .4 ASTM A 325-10, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - .5 ASTM A 325M-04b, Specification for High-Strength Bolts for Structural Steel Joints.
 - .6 ASTM A 490M-12, Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric).
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-85.10, Protective Coatings for Metals.
- .3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).
 - .1 CISC/CPMA 1-73b, Quick-Drying, One-Coat Paint for Use on Structural Steel.
 - .2 CISC/CPMA 2-75, Quick-Drying, Primer for use on Structural Steel.
- .4 Canadian Standards Association (CSA International)
 - .1 CAN/CSA G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel. All HSS sections to be Class C.
 - .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA-S16-01, Limit States Design of Steel Structures.
 - .4 CAN/CSA-S136-01, Cold Formed Steel Structural Members.
 - .5 CSA-S136.1-01, Commentary on CSA Standard S136.
 - .6 CSA W47.1-92(R2001), Certification of Companies for Fusion Welding of Steel Structures.
 - .7 CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding.
 - .8 CSA W55.3-1965(R1998), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .9 CSA W59-M1989(R2001), Welded Steel Construction (Metal Arc Welding).

- .5 Master Painters Institute
 - .1 MPI-INT 5.1-98, Structural Steel and Metal Fabrications.
 - .2 MPI-EXT 5.1-98, Structural Steel and Metal Fabrications.
- .6 The Society for Protective Coatings (SSPC)
 - .1 SSPC SP-6/NACE No. 3-00, Commercial Blast Cleaning.

1.2 DESIGN REQUIREMENTS

- .1 Design details and connections in accordance with requirements of CAN/CSA-S16 and CAN/CSA-S136 (with CSA-S136.1) to resist forces, moments, shears and allow for movements indicated.
- .2 Shear connections:
 - .1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.
 - .2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.
- .3 Submit sketches and design calculations stamped and signed by qualified professional Departmental Representative licensed in Province of Ontario, Canada for non standard connections.
- .4 Do Welding to CSA W59-M1989 (R2001).

1.3 SHOP DRAWINGS

- .1 Submit shop drawings including fabrication and erection documents and materials list in accordance with Division 1.
 - .1 Verify site conditions and dimensions on site before shop drawing preparation. Show all on shop drawings.
 - .2 Shop drawings must be original. Reproduction of Departmental Representative's design drawings is not acceptable.
- .2 Erection drawings: indicate details and information necessary for assembly and erection purposes including:
 - .1 Description of methods.
 - .2 Sequence of erection.
 - .3 Type of equipment used in erection.
 - .4 Temporary bracings.
 - .5 Connections
- .3 Ensure Fabricator drawings showing designed assemblies, components and connections are stamped and signed by qualified professional Departmental Representative licensed in the province of Ontario, Canada.

1.4 SAMPLES

- .1 Submit samples in accordance with Division 1.

1.5 QUALITY ASSURANCE

- .1 Submit 5 copies of mill test reports 4 weeks prior to fabrication of structural steel.
 - .1 Mill test reports to show chemical and physical properties and other details of steel to be incorporated in project.
 - .2 Provide mill test reports certified by metallurgists qualified to practice in province of Ontario, Canada.
- .2 Provide structural steel Fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

Part 2 Products**2.1 MATERIALS**

- .1 Structural steel: to CAN/CSA-G40.20/G40.21 Grade 350W and CAN/CSA-S136.
- .2 Anchor bolts: to CAN/CSA-G40.20/G40.21, Grade 300W (A307).
- .3 High strength anchor bolts: to ASTM A 325M.
- .4 Bolts, nuts and washers: to ASTM A 325M.
- .5 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.
- .6 Shop paint primer: to CISC/CPMA 2.
- .7 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 105kg/m².
- .8 HSS Sections: to CAN/CSA-G40.21-M01, Type 350W (Class C).

2.2 FABRICATION

- .1 Fabricate structural steel in accordance with CAN/CSA-S16 and CAN/CSA-S136 and in accordance with reviewed shop drawings.
- .2 Continuously seal members by intermittent welds and plastic filler, unless otherwise indicated. Grind smooth.
- .3 Provide holes in top and bottom flanges for attachment of wood nailers, as required.
- .4 Hot dip galvanize after fabrication.

2.3 SHOP PAINTING

- .1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16 and CAN/CSA-S136.

- .2 Clean members, remove loose mill scale, rust, oil, dirt and other foreign matter. Prepare surface according to SSPC-SP-6.
- .3 Apply one coat of primer in shop to steel surfaces to achieve minimum dry film thickness of 0.065 to 0.080 mils, except:
 - .1 Interior Steel: Concealed
 - .1 Surface preparation: to SSPC SP 3-89.
 - .2 Primer: One coat iron oxide type: to CAN/CGSB-1.40-M89 (or equivalent).
 - .2 Interior and Exterior Steel: Exposed
 - .1 Surface preparation: to SSPC SP 6-89 commercial blast cleaning using mechanical shot blast techniques. Hand cleaning not permitted.
 - .2 Primer: One coat applied in accordance with Division 9.
 - .3 Loose Lintels: Hot dipped galvanized.
 - .4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.
 - .5 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.
 - .6 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

Part 3 Execution

3.1 GENERAL

- .1 Structural steel work: in accordance with CAN/CSA-S16 and CAN/CSA-S136.
- .2 Welding: in accordance with CSA W59.
 - .1 If a metal plate or angle iron is embedded into the RF concrete to which RF penetrations i.e. doors, electrical panels, air vents etc. are to be attached, the plate or angle iron must be fabricated to create a continuous piece of metal so that there are no gaps, holes, or joints in the metal either in the embedded portion or the exposed portion of the steel.

If welding is needed to create the continuous metal RF frame it should be performed as follows.

- 1. Only metal inert gas (MIG) or shielded metal arc welding processes are to be used.
- 2. Prepare surfaces by removing rust, scale, oil, and other foreign materials.
- 3. Produce a continuous full penetration weld free of slag, inclusions, gas pockets, worm holes, cracks, or incomplete fusion.
- 4. Stresses in the welds should be relieved by skip welding to minimize buckling

- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.2 CONNECTION TO EXISTING WORK

- .1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Departmental Representative for direction before commencing fabrication.

3.3 MARKING

- .1 Mark materials in accordance with CAN/CSA G40.20/G40.21. Do not use die stamping. If steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.
- .2 Match marking: shop mark bearing assemblies and splices for fit and match.

3.4 ERECTION

- .1 Check anchor bolt layout before erection. Arrange for discrepancies.
- .2 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 and CAN/CSA-S136 in accordance with reviewed erection drawings.
- .3 Field cutting or altering structural members: to approval of Departmental Representative in writing.
- .4 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.

3.5 FIELD QUALITY CONTROL

- .1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Departmental Representative.
- .2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Departmental Representative.
- .3 Submit test reports to Departmental Representative within 1 week of completion of inspection.
- .4 Departmental Representative will pay costs of tests as specified in Division 1.

3.6 FIELD PAINTING

- .1 Paint in accordance with Division 9.
 - .1 Touch up damaged surfaces and surfaces without shop coat with primer to SSPC-SP-6 except as specified otherwise. Apply in accordance with CAN/CGSB 85.10.

3.7 GALVANIZING TOUCH-UP

- .1 Touch up galvanized surfaces damaged during transportation, handling, storage, and erection and as a result of work of other sections.
- .2 Touch up in accordance with ASTM A780.
- .3 Clean damaged surfaces with stiff wire brush to remove rust, loose and cracked coatings.
- .4 Clean welds, bolted connections and abraded areas.
- .5 Apply galvanizing repair materials to match hot dip coating weight and appearance.

END OF SECTION

METAL FABRICATIONS**PART 1 GENERAL****1.1 REFERENCES**

- .1 ASTM International
 - .1 ASTM A53/A53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A269-08, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A307-07b, 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.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, pipe, tubing and/or 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 and 01 35 43 - Environmental Procedures.
 - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.
- .3 Shop Drawings:

METAL FABRICATIONS

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province Ontario, Canada.
- .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.3 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.

1.4 DELIVERY, STORAGE AND HANDLING

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

PART 2 PRODUCTS**2.1 MATERIALS**

- .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 300W.
- .2 Steel pipe: to ASTM A53/A53M standard weight, black and galvanized finish.
- .3 Welding materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.
- .5 Bolts and anchor bolts: to ASTM A307.
- .6 Aluminum sheet: plain or embossed pattern, thickness and finish as indicated.
- .7 Stainless steel tubing, angles, plates, threaded rods, fasteners and / or bars : to ASTM A269, Type 302 commercial grade, seamless welded with AISI No. 4 finish.
- .8 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

METAL FABRICATIONS

- .2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.
- .3 Where possible, fit and shop assemble work, ready for erection.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.
- .2 Chromium plating: chrome on steel with plating sequence of 0.009 mm thickness of copper 0.010 mm thickness of nickel and 0.0025 mm thickness of chromium.
- .3 Shop coat primer: in accordance with CAN/CGSB-1.40.
- .4 Zinc primer: zinc rich, ready mix, in accordance with CAN/CGSB-1.181.

2.4 ISOLATION COATING

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

2.5 SHOP PAINTING

- .1 Primer: VOC limit 250 g/L maximum to CCD-047a or CCD-048.
- .2 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .4 Clean surfaces to be field welded; do not paint.

2.6 ANGLE LINTELS

- .1 Steel angles: galvanized, sizes indicated for openings. Provide 150 mm minimum bearing at ends.
- .2 Weld or bolt back-to-back angles to profiles as indicated.
- .3 Finish: galvanized for outdoors and shop primed for indoors.
 - .1 Primer: VOC limit 250 g/L maximum to GS-11 when applied onsite.

2.7 ACCESS LADDERS

- .1 Aluminum service ladders with a closed fall protection cage for all ladders when there is a danger that the worker will fall more than 5 meters from the ladder to the ground, roof or floor. The applications of the system include:
 - .2 Overall width of the ladder - 605 mm
 - .3 Distance between vertical side rails - 525 mm
 - .4 Rung diameter - 50 x 35 mm (profile)

METAL FABRICATIONS

- .5 Space between rung - 300 mm
- .6 Vertical extension of the side rails over the finish surface - 900 to 1100 mm
- .7 Weight
 - .1 Sections of steps - 2.9 kg / m (i.e. holding bracket and fixings)
 - .2 Cage sections - 8.3 kg / m
- .8 Approved product: Skyline Group 7000 KATT Series Modular Ladder System or equivalent approved by the Architect.

2.8 ACCESS LADDER ENCLOSURE REQUIREMENTS:

- .1 Ladders to be fully enclosed with a locking, solid cover min. 3 m tall as follows:
 - .1 Enclosure to be minimum 18 gauge thick steel sheet (or equivalent) with no sharp corners or edges.
 - .2 Enclosure to be anchored to wall with appropriate mechanical fasteners spaced every 200 mm (8") o.c. and fasteners to be concealed within enclosure. Developed fastener and anchor strength to be equivalent to 1/4"-20 UNC steel screws in both tension and shear.
 - .3 Gap width between the wall and enclosure must be less than 2 mm.
 - .4 Gap between wall and enclosure to be caulked full height.
 - .5 Enclosure to latch closed at minimum of 3 points (equally spaced along height of enclosure) with latching mechanism locked by a high security cylinder – cylinder to be installed by Protective Technical Security Branch (PTSB).

2.9 CHANNEL FRAMES

- .1 Fabricate frames from steel, sizes of channel and opening as indicated.
- .2 Weld channels together to form continuous frame for jambs and head of openings, sizes as indicated.
- .3 Weld 25mm x 500mm x 4.8mm mm thick steel strap anchors to channel jamb frame at 400mm on centre.
- .4 Finish: prime coat painted.

PART 3 EXECUTION**3.1 EXAMINATION**

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

METAL FABRICATIONS**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 Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 Make field connections 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 ACCESS LADDERS

- .1 Install access ladders in locations as indicated.
- .2 Erect ladders 150 mm clear of wall on bracket supports.

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 Waste Management: separate waste materials for reuse and / or 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

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 07 42 43 – Composite Wall Panels
- .2 Section 07 52 16 – Modified Bituminous Membrane Roofing
- .3 Section 07 62 00 – Sheet Metal Flashing and Trim
- .4 Section 09 90 00 – Interior, Exterior Paints and Coatings

1.2 REFERENCES

- .1 American National Standards Institute/National Particleboard Association (ANSI/NPA)
 - .1 ANSI/NPA A208.1-2009, Particleboard.
- .2 CSA International
 - .1 CSA O121-08, Douglas Fir Plywood.
 - .2 CSA O141-05(R2009), Softwood Lumber.
 - .3 CSA O151-09, Canadian Softwood Plywood.
- .3 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .4 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2010.
- .5 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.
- .6 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 wood products 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 Province of Ontario, Canada.
 - .2 Wood Certification: submit vendor's or manufacturer's Chain-of-Custody Certificate number for CAN/CSA-Z809 or FSC or SFI certified wood.
 - .3 Low-Emitting Materials:

- .1 Submit listing of adhesives, sealants, paints and coatings used in building, showing compliance with VOC and chemical component limits or restriction requirements.
- .2 Submit listing of composite wood products used in building, stating that they contain no added urea-formaldehyde resins, and laminate adhesives used in building, stating that they contain no urea-formaldehyde.

1.4 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.1 FRAMING STRUCTURAL AND PANEL MATERIALS

- .1 Lumber: softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:
 - .1 CSA O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
- .2 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
 - .1 Board sizes: "Standard" or better grade.
 - .2 Dimension sizes: "Standard" light framing or better grade.
- .3 Douglas fir plywood (DFP): complies with CSA O121, "construction" classification, "standard" category.
 - .1 Without urea-formaldehyde.

- .4 Douglas fir plywood (DFP): complies with CSA O121, "construction" classification, "exterior" category.
 - .1 Without urea-formaldehyde.

2.2 ACCESSORIES

- .1 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
- .2 Nails, plugs and jumpers: the use of nails, plugs and jumpers is prohibited.
- .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 fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.
- .5 Adhesive: one-component, polymer-based and water-repellent.
 - .1 Acceptable products: "Titebond III" or equivalent approved by architect.
- .6 Fastener Finishes:
 - .1 Galvanizing: to ASTM A123/A123M, use galvanized fasteners for interior highly humid areas.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 MATERIAL USAGE

- .1 Electrical equipment mounting boards:
 - .1 Plywood, DFP or CSP C grade, square edge 19 mm thick.

3.3 INSTALLATION

- .1 Proceed as required by NBC and in accordance with the following requirements.
- .2 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding electrical equipment mounting boards, and other work as required.
- .3 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.
 - .1 Align and plumb faces of furring and blocking to tolerance of 1:600.

- .4 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .5 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized fasteners.
- .6 Install sleepers as indicated.
- .7 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.
- .8 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .9 Countersink bolts where necessary to provide clearance for other 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.
- .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 rough carpentry installation.

3.6 PAINT

- .1 Paint plywood panels and wood elements with fire retardant paint system no. P10.

END OF SECTION

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 06 10 00 – Rough Carpentry
- .2 Section 07 92 00 – Joint Sealing
- .3 Section 09 21 16 – Gypsum Board Assemblies
- .4 Section 09 90 00 – Interior, Exterior Paints and Coatings

1.2 REFERENCES

- .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 E1333-10, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.
 - .2 ASTM D2832-92(R2011), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
 - .3 ASTM D5116-10, 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)

- .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. Submit two 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 Province of Ontario, Canada.
 - .2 Indicate details of construction, profiles, jointing, fastening and other related details.
 - .1 Scales: profiles full size, details half full size.
 - .3 Indicate materials, thicknesses, finishes and hardware.
 - .4 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 specified wood materials: sample size 300 x 300 mm or 300mm 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.
- .6 Sustainable Design Submittals:
 - .1 Wood Certification: submit vendor's or manufacturer's Chain-of-Custody Certificate number for CAN/CSA-Z809 or FSC or SFI certified wood.
 - .1 Submit vendor's or manufacturer's FSC Chain-of-Custody Certificate number.
 - .2 Low-Emitting Materials:
 - .1 Submit listing of adhesives and sealants used in building, comply with VOC and chemical component limits or restrictions requirements.
 - .2 Submit listing of composite wood products used in building, stating that they contain no added urea-formaldehyde resins.
 - .3 Submit listing of laminate adhesives used in building, stating that they contain no urea-formaldehyde.

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, counter top, shelving unit, convector cabinet, complete with hardware shop applied finishes, and install where directed by Departmental Representative.
 - .2 Allow 48 hours for inspection of mock-up by Departmental 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 Departmental Representative.
 - .5 Mock-up may 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 off ground, 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.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Softwood lumber: unless specified otherwise, S4S, moisture content 15 % or less in accordance with following standards:
 - .1 CSA O141.
 - .2 CAN/CSA-Z809 or FSC or SFI certified.
 - .3 NLGA Standard Grading Rules for Canadian Lumber.
 - .4 AWMAC 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, CSA Z760-94 Life Cycle Assessment.
- .4 Hardwood lumber: moisture content 9 % 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 MDF (medium density fibreboard) core: to ANSI A208.2, Grade A, 16 mm thick, density 769 kg/m², 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.
- .7 Laminated plastic for flatwork: to NEMA LD3, Grade VGL, Type HD, 1.5 mm thick; based on solid, woodgrain, printed pattern, metallic, integral colour throughout or multilayered colour range with gloss, satin, furniture, matt, textured or embossed finish.
- .8 Laminated plastic backing sheet: Grade BK, Type HD minimum of 0.5 mm thick or same thickness and colour as face laminate.
- .9 Laminated plastic liner sheet: Grade GP, Type HD, 0.5 mm thick, white colour.

- .10 Nails and staples: to CSA B111.
- .11 Wood screws: copper, brass, stainless steel, steel or plain, type and size to suit application.
- .12 Splines: according to the best choice for use.
- .13 Sealant: in accordance with Section 07 92 00 - Joint Sealants.
 - .1 Sealants: VOC limit 250 g/L maximum to SCAQMD Rule 1168.
- .14 Laminated plastic adhesive:
 - .1 Adhesive: contact adhesive to CAN/CGSB-71.20.
 - .2 Adhesives: VOC limit 30 g/L maximum to SCAQMD Rule 1168.
 - .3 Clear Wood Finishes: VOC limit 350 g/L maximum to SCAQMD Rule 1113.
 - .4 Paints: VOC limit 50 g/L maximum to SCAQMD Rule 1113.

2.2 MANUFACTURED UNITS

- .1 Casework:
 - .1 Fabricate caseworks to AWMAC premium quality grade.
 - .2 Furring, blocking, nailing strips, grounds and rough bucks and sleepers.
 - .1 S2S is acceptable.
 - .2 Board sizes: "standard" or better grade.
 - .3 Dimension sizes: "standard" light framing or better grade.
 - .4 Urea-formaldehyde free.
 - .3 Framing pine species, NLGA grade.
 - .4 Case bodies (ends, divisions and bottoms).
 - .1 Douglas Fir plywood with squared edges, 16 mm thick with plastic laminate facing.
 - .5 Backs:
 - .1 Douglas Fir plywood with squared edges, 16 mm thick with plastic laminate facing.
 - .6 Shelving:
 - .1 Medium density fibreboard (MDF) with squared edges, 19 mm thick with plastic laminate surfacing.
- .2 Drawers:
 - .1 Fabricate drawers to AWMAC premium grade supplemented as follows:
 - .2 Sides and Backs.
 - .1 Douglas Fir plywood with squared edges, 16 mm thick with plastic laminate facing.
 - .3 Bottoms:
 - .1 Douglas Fir plywood with squared edges, 16 mm thick with plastic laminate facing.
 - .4 Fronts:
 - .1 MDF panels, squared edges, 16 mm thick, with plastic laminate facing.
- .3 Casework Doors:
 - .1 Fabricate doors to AWMAC premium grade supplemented as follows:

- .2 Douglas Fir plywood with squared edges, 16 mm thick with plastic laminate facing.
- .4 Countertops
 - .1 Unless otherwise specified, fabricate preformed counter tops with laminated Douglas fir plywood 19mm and 16mm thick, with a moisture content of no more than 8%, sanded faces, squared edges, with plastic laminate facing.
 - .2 Include splashback plastic laminate splashbacks at the back and ends of countertops and fascias on front edge, as indicated.
 - .3 Finish soffit of support grade plastic laminate countertops.
 - .4 Install 3mm thick PVC finishing strips on front edge of counters as indicated. These borders, the width of which should correspond to the thickness of the counter, will remain apparent after their installation. Color to be identical to plastic laminate.

2.3 FINISHING HARDWARE

- .1 Handles: at the architect's choice or according to the drawings
- .2 Clip hinges, 100 degree: 71 M 255-180 from Richelieu;
- .3 Drawer Slides: Full Extension Type, side mount, steel ball bearing, safety lock, such as Richelieu Series 2632.
- .4 Bearings: MP 301-11, transparent, from Richelieu.
- .5 Shelf supports: 340.010-30 from Richelieu;
- .6 Plastic screw cap, white, to be inserted into countersunk holes 10 mm in diameter, to conceal wall furniture anchor screws.
- .7 Rack for adjustable shelves:
 - .1 Cabinets: metal racks, recessed, "U" profile, zinc finished steel such as Richelieu's 120 series, Richelieu CP-21-2G zinc finish steel brackets
 - .2 Deposits and similar premises: 32 mm wide double metal stud, white finish of appropriate length, type Richelieu Series 185, double-ribbed metal brackets, white finish, of appropriate length, type # 190 Richelieu series.
- .8 Locks: for furniture with master key system and sub-master such as Best or approved equivalent.
- .9 Bar with hangers: chromed steel tube 30 mm in diameter and 2 mm thick.

2.4 OTHER MATERIALS

- .1 Aluminum: natural anodized aluminum, dimensions as indicated on the plans. All fasteners must be concealed type.

2.5 FABRICATION

- .1 Verify all dimensions on site before beginning production.
- .2 Set nails and countersink screws apply stained wood filler to indentations, sand smooth and leave ready to receive finish.
- .3 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.
- .4 Shelving to cabinetwork to be adjustable unless otherwise noted.

- .5 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.
- .6 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.
- .7 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.
- .8 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .9 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.
- .10 Form shaped profiles and bends as indicated, using postforming grade laminate to laminate manufacturer's instructions.
- .11 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 mitre laminate edges.
- .12 Apply laminate backing sheet to reverse side of core of plastic laminate work.
- .13 Apply laminated plastic liner sheet to interior of cabinetry.

2.6 FINISHING

- .1 Finish in accordance with Section 09 90 00 - Interior, Exterior Paints and Coatings.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Do architectural woodwork to Quality Standards of AWMAC.
- .2 Install prefinished millwork at locations shown on drawings.
 - .1 Position accurately, level, plumb straight.
- .3 Fasten and anchor millwork 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 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00 - Joint Sealants.
- .7 Apply 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.

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 millwork, cabinet work, outside surfaces, inside cupboards and drawers.
 - .2 Remove excess glue from surfaces.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

- .1 Protect 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

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Division 03 - Concrete
- .2 Section 07 21 13 - Board Insulation
- .3 Section 07 26 16 - Under Slab Vapor Barrier

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
 - .2 CAN/CGSB-37.3-M89, Application of Emulsified Asphalts for Dampproofing or Waterproofing.
 - .3 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
 - .4 CGSB 37-GP-6Ma-83, Asphalt, Cutback, Unfilled, for Dampproofing.
 - .5 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
 - .6 CGSB 37-GP-11M-76(R1984), Application of Cutback Asphalt Plastic Cement.
 - .7 CGSB 37-GP-12Ma-84, Application of Unfilled Cutback Asphalt for Dampproofing.
 - .8 CGSB 37-GP-15M-76(R1984), Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.
 - .9 CAN/CGSB-37.16-M89, Filled, Cutback, Asphalt for Dampproofing and Waterproofing.
 - .10 CAN/CGSB-37.28-M89, Reinforced Mineral Colloid Type, Emulsified Asphalt for Roof Coatings and for Waterproofing.
 - .11 CGSB 37-GP-36M-76, Application of Filled Cutback Asphalts for Dampproofing and Waterproofing.
 - .12 CGSB 37-GP-37M-77, Application of Hot Asphalt for Dampproofing or Waterproofing.
- .2 CSA International
 - .1 CAN/CSA-A123.4-04(R2008), Asphalt for Construction of Built-Up Roof Coverings and Waterproofing Systems.
- .3 Health Canada
 - .1 Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

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 bituminous dampproofing application 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 Manufacturer's Instructions: provide to indicate special handling criteria, installation sequence and cleaning procedures.

1.4 DELIVERY, STORAGE AND HANDLING

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

1.5 SITE CONDITIONS

- .1 Ambient Conditions: temperature, relative humidity, moisture content.
 - .1 Apply dampproofing materials only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
 - .2 Do not proceed with Work when wind chill effect would tend to set bitumen before proper curing takes place.
 - .3 Maintain air temperature and substrate temperature at dampproofing installation area above 5 degrees C for 24 hours before, during and 24 hours after installation.
 - .4 Do not apply dampproofing in wet weather.
- .2 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
- .3 Ventilation:
 - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
 - .2 Provide continuous ventilation during and after dampproofing application. Run ventilation system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of dampproofing installation.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Acceptable products: use only products from the same manufacturer for the work of each system in this section.

- .2 Geotextile: Bentonite geotextile waterproofing with integrated polyethylene liner, acceptable products: "Voltex DS" by cetco or equivalent approved by the architect.
- .3 Drainage Board (vertical): Three-dimensional polymeric core drain board with non-woven geotextile fabric fully bonded to the top dimples of the core.
 - .1 Water flow Rate (ASTM D-4716) : 224L/min/m.
 - .2 Acceptable products: Bakor DB 2000 or equivalent approved by the architect.
- .4 Fluid Applied Bituminous Dampproofing Membrane
 - .1 Liquid applied, dampproofing emulsion composed of vacuum-reduced asphalt dispersed in a mineral colloid emulsifier, designed for use and cure at temperatures above 5 degrees Celsius, in compliance with CAN/CGSB 37.2.
 - .1 Colour: Black
 - .2 Solids by Volume: 57%
 - .3 Application Temperature: 5 deg C (40 deg F) minimum.
 - .4 Maximum VOC: 0 g/L
 - .5 Water Vapour Permeance (ASTM E96): 8 ng/Pa.m².s., (0.14 perms)
 - .6 Acceptable products: 700-01 Dampproofing and Waterproofing Asphalt Emulsion by Henry Company or equivalent approved by the architect.
 - .2 Liquid applied medium consistency, solvent type waterproofing and dampproofing compound of selected asphalts and fibres permitting application in thick films; designed for use and cure at temperatures between 0 degree Celsius and 5 degrees Celsius, in compliance with CAN/CGSB 37.16-M89.
 - .1 Colour: Black
 - .2 Solids by Volume: 54%
 - .3 Application Temperature: Ambient (Thickens at low temperature).
 - .4 Water Vapour Permeance (ASTM E96): 2.9 ng/Pa.m².s., (0.05 perms)
 - .5 Acceptable products: 710-11 Dampproofing and Waterproofing Asphalt Coating by Henry Company or equivalent approved by the architect.
- .5 Sealing Compound: Polybitume sealing compound complying with CAN / CGSB-37.29
 - .1 Color: black
 - .2 Solids by volume: ± 70%
 - .3 Weight: ± 1.0 kg / l
 - .4 Coverage: at 3mm thickness 0.3 m² / l
 - .5 Drying time: at 50% RH, 20 ° C, ± 4 hours
 - .6 Permeability to water vapor: 2.9 ng / Pa.m².s
 - .7 Acceptable products: Bakor 570-05 or equivalent approved by the architect.
- .6 Asphalt primer: to CAN/CGSB-37.2.
- .7 Accessories: According to the manufacturer's recommendations

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 WORKMANSHIP

- .1 Keep hot asphalt:
 - .1 Below its flash point.
 - .2 At or below its final blowing temperature.
 - .3 Within its equiviscous temperature range at place of application.

3.3 PREPARATION

- .1 Before applying dampproofing:
 - .1 Seal exterior joints between foundation walls and footings, joints between concrete floor slab and foundation and around penetrations through dampproofing with sealing compound.

3.4 APPLICATION

- .1 Do dampproofing in accordance with CAN/CGSB-37.3.
- .2 Do sealing work in accordance with CGSB 37-GP-11M.
- .3 Do priming of surface in accordance with CGSB 37-GP-15M.
- .4 Apply primer to CGSB primer standard.
- .5 Apply dampproofing in accordance with applicable CGSB application standard.

Material	Application	
CAN/CGSB-37.2	use	CAN/CGSB-37.3
CGSB 37-GP-6Ma	use	CGSB 37-GP-12M
CAN/CGSB-37.16	use	CGSB 37-GP-36M
CAN/CGSB-37.28	use	CAN/CGSB-37.3
CSA A123.4	use	CGSB 37-GP-37M

3.5 SCHEDULE

- .1 Apply continuous, uniform coating to entire exterior faces of foundation walls from 50 mm below finished grade level to and including tops of foundation wall footings.
- .2 Apply continuous, uniform coating to exterior side of foundation walls enclosing rooms below finished grade. Include exterior portion of interior walls where floors in adjacent rooms are at different elevations.

- .3 Apply two additional coats of dampproofing to vertical corners and construction joints for a minimum width of 230 mm on each side, and all around and for 230 mm along pipes passing through walls.

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/or 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 dampproofing application.

END OF SECTION

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Division 03 - Concrete
- .2 Section 07 11 13 – Bituminous Dampproofing.
- .3 Section 07 27 00 – Air Barriers
- .4 Section 09 21 16 – Gypsum Board Assemblies.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM C208-12, Standard Specification for Cellulosic Fiber Insulating Board.
 - .2 ASTM C591-13, Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
 - .3 ASTM C612-14, Standard Specification for Mineral Fibre Block and Board Thermal Insulation.
 - .4 ASTM C726-12, Standard Specification for Mineral Fiber Roof Insulation Board.
 - .5 ASTM C728-13, Standard Specification for Perlite Thermal Insulation Board.
 - .6 ASTM C1126-14, Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation.
 - .7 ASTM C1289-14, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - .8 ASTM E96/E96M-13, Standard Test Methods for Water Vapour Transmission of Materials.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 71-GP-24M-AMEND-77(R1983), Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.
- .3 CSA Group
 - .1 CSA B149 PACKAGE-10, Consists of B149.1, Natural Gas and Propane Installation Code and B149.2, Propane Storage and Handling Code.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .5 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S604-2012, Standard for Factory-Built Type A Chimneys.
 - .2 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
 - .3 CAN/ULC-S702-2012, Standard for Mineral Fibre Insulation for Buildings.
 - .4 CAN/ULC-S704-11, Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.

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 board 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 43 - Environmental Procedures and 01 35 29.06 - Health and Safety Requirements. Indicate VOC's during application and curing.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario.
- .4 Samples:
 - .1 Submit 300 x 300 mm x 50 mm sample of board insulation.
- .5 Certificates:
 - .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .6 Test Reports:
 - .1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .7 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.

1.4 DELIVERY, STORAGE AND HANDLING

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

PART 2 PRODUCTS**2.1 INSULATION**

- .1 Foundation Wall Insulation: Extruded polystyrene, in accordance with CAN / ULC-S701 Type 4 with factory applied latex-modified concrete facing 8 mm thick, up to 300 mm below finish soil level:
 - .1 Thermal resistance (ASTM C518): RSI 0.88 / 25 mm (5.0 R-Value).

- .2 Compressive Strength (ASTM D1621): 241 kPa (35 psi).
 - .3 Water Absorption (ASTM D2842): <0.7% by volume.
 - .4 Water vapor permeance (ASTM E96): 60 permSI max (1.0 perm max).
 - .5 Insulation thickness: 51mm (2 inches).
 - .6 Acceptable Products: STYROFOAM™ Tech-Crete Blanks from DOW Chemical, "CFI Wall Panels" from T. Clear Corp. or equivalent approved by the architect.
- .2 Under slab insulation: Extruded polystyrene panels in accordance with CAN / ULC S701, rigid, closed-cell with high density integrated skin.
- .1 Type: 4.
 - .2 Thermal Resistance per 25mm (per inch): 0.88 (5.0)
 - .3 Resistance to compression: Min. 207 kPa.
 - .4 Thickness: 50 mm.
 - .5 Dimensions: 610 x 2440 mm.
 - .6 Shape: Tapered
 - .7 Acceptable Products: "Styrofoam SM" from DOW Chemical, or equivalent approved by the architect

2.2 ADHESIVE

- .1 Adhesive (for polystyrene): to CGSB 71-GP-24M and as per board insulation manufacturer's recommendation.

2.3 ACCESSORIES

- .1 Staples, fasteners, flashing and trim: as recommended by board insulation manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: Comply with manufacturer's written requirements, recommendations and specifications, including technical bulletins and installation instructions specified in product catalogs and packaging cartons, as well as data sheet specifications.

3.3 INSTALLATION

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.

- .3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts and other protrusions.
- .4 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .5 Offset both vertical and horizontal joints in multiple layer applications.
- .6 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.4 RIGID INSULATION INSTALLATION

- .1 Apply adhesive to insulation board in accordance with manufacturer's recommendations.
- .2 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm wide 0.15 mm modified bituminous membrane over expansion and control joints using compatible adhesive and primer before application of insulation.
- .3 Exterior application: extend boards to top of footing. Install on exterior face of perimeter foundation wall with adhesive.
- .4 Under slab application: extend boards 1200 mm in from perimeter foundation wall. Lay boards on level compacted fill.

3.5 REPAIR OF CONCRETE COATING

- .1 Concrete lining on insulation board shall be retouched with patching mortar where concrete liner has been damaged during fabrication or installation.
- .2 Remove from the place to be repaired any concrete that is deteriorated, as well as dust, oil, grease and other materials that could prevent good adhesion.
- .3 Apply repair mortar in accordance with manufacturer's written instructions.
- .4 Fill all pores and voids. Form and finish the surfaces for a good adhesion of the membrane.
- .5 Do not exceed the time of use. Maintain the recommended conditions for hardening and the recommended total time.
- .6 Surface finishing: application of plaster on concrete liner.

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.

END OF SECTION

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 06 10 00 – Rough Carpentry
- .2 Section 07 27 00 – Air Barriers.
- .3 Section 07 42 43 – Composite Wall Panels
- .4 Section 08 50 00 – Windows
- .5 Section 09 21 16 – Gypsum Board Assemblies

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM C553-13, Standard Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
 - .2 ASTM C665-12, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - .3 ASTM C1320-10, 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-S604-2012, Standard for Factory-Built Type A Chimneys.
 - .2 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, 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.

PART 2 PRODUCTS**2.1 INSULATION**

- .1 Batt and blanket mineral fibre: to CAN/ULC-S702.
 - .1 Type: 1.
 - .2 Thickness: as indicated.
 - .3 Acceptable products:
 - .1 Acoustic Insulation: "Roxul AFB" or equivalent approved by architect.
 - .2 Thermal Insulation: "Roxul Plus MB" or equivalent approved by architect.
 - .3 Cavity wall: "Roxul CavityRock DD" or equivalent approved by the architect.

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.

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 INSULATION INSTALLATION

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces and to ASTM C1320.
- .2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .3 Do not compress insulation to fit into spaces.
- .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 Type A chimneys and CSA B149.1 and CSA B149.2 Type B or L vents.
- .5 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for recycling and 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.

END OF SECTION

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 07 27 00 – Air Barriers.
- .2 Section 07 42 43 – Composite Wall Panels.
- .3 Section 07 84 00 – Firestopping.
- .4 Section 08 11 00 – Metal Doors and Frames.
- .5 Section 08 50 00 – Windows.

1.2 REFERENCES

- .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 Sections 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 and cleaning procedures.

1.4 **QUALITY ASSURANCE**

- .1 Applicators to conform to CUFGA 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, window and openings.
 - .3 Mock-up may be part of finished work.
 - .4 Allow 24 hours for inspection of mock-up by Departmental 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 eye protection, gloves, dust masks, long sleeved clothing, protective clothing and respirators 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 with manufacturer's written instructions and 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location, off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect specified materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.6 **SITE CONDITIONS**

- .1 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.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Insulation: spray polyurethane to CAN / ULC S705.1 and complying with the following performance objective. Medium density material made from renewable vegetable oil and recycled plastic, does not include any substances that contribute to the depletion of ozone layer.
 - .1 Acceptable Products: "HEATLOK SOYA" by Demilec, "JM Corbond III" Johns Manville or equivalent approved by Architect.
- .2 Sealing foam / mono-component adhesive polyurethane "DuraFoam 24S".
- .3 Primers: to manufacturer's recommendations, taking into account condition of surfaces to be insulated.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 APPLICATION

- .1 Apply insulation to clean surfaces in accordance with manufacturer's printed instructions and CAN/ULC-S705.2.
- .2 Use primer where recommended by manufacturer.
- .3 Apply sprayed foam insulation in thickness as indicated.

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 insulation material spilled during installation and leave work area ready for application of wall board.
- .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.

END OF SECTION

UNDER SLAB VAPOUR BARRIERS**PART 1 GENERAL****1.1 SECTION CONTENT**

This section describes the requirements for, but not limited to, the supply and installation of vapor barrier polyethylene part of the concrete slabs on grade.

1.2 RELATED REQUIREMENTS

- .1 Division 03 - Concrete.
- .2 Section 06 10 10 - Rough Carpentry.
- .3 Section 07 11 13 - Bituminous Dampproofing.
- .4 Section 07 21 13 - Board Insulation.
- .5 Division 22 - Plumbing.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D 1709 - 09 Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
 - .2 ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
 - .3 ASTM E 154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
 - .4 ASTM E 1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - .5 ASTM E 1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
 - .6 ASTM F 1249-01 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
- .2 American Concrete Institute (ACI)
 - .1 ACI 302.1R-96 Vapor Barrier Component (plastic membrane) is not less than 10 mils thick.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include:
 - .1 Product characteristics.
 - .2 Performance criteria.
 - .3 Limitations.
- .3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).

UNDER SLAB VAPOUR BARRIERS

- .4 Quality assurance submittals:
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Instructions: submit manufacturer's installation instructions and comply with written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

1.5 ENVIRONMENTAL REQUIREMENTS

- .1 Product not intended for improper use, or permanent exposure to weather.
- .2 Do not apply on frozen ground.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .1 Protect prefabricated constructions against moisture and damages during their delivery or after.
 - .2 Store prefabricated constructions in well ventilated premises protected against moisture or extreme temperature variations.
- .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 cabinetry from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

PART 2 PRODUCTS**2.1 SHEET VAPOUR BARRIER**

- .1 Plastic vapour retarder
 - .1 Specification: polyolefin-based resin/chemical membrane, to ASTM E 1745 as follows:
 - .1 Maximum water vapour permeance (ASTM E-96): 0.0063 Perms
 - .2 Puncture Resistance (ASTM D1709 Method B): >3200 grams
 - .3 Tensile Strength (ASTM E154 Section 9): 12.61 kN/m
 - .4 Water Vapor Permeance After wetting and drying (ASTM E154 section 8 and ASTM E96 Procედure B): 0.0052 perms
 - .5 Water Vapor Permeance Resistance to Plastic Flow and Elevated Temperature (ASTM E-154 Section 11 and ASTM E-96 Procedure B) : 0.0057 Perms
 - .6 Water Vapor Permeance Effect Low Temperature and Flexibility (ASTM E-154, Section 12 and ASTM E-96, Procedure B): 0.0052 perms

UNDER SLAB VAPOUR BARRIERS

- .7 Water Vapor Permeance Resistance to Deterioratio From Organisms and Substances in Contacting Soil (ASTM E-154, Section 13 and ASTM E-96 Procedure B): 0.0052 perms
- .2 Acceptable Products : "PERMINATOR" 15 mils by W. R. MEADOWS. or equivalent approved by Architect.

2.2 ACCESSOIRES

- .1 Joint sealing tape: air tight adhesive tape, apply with light pressure, type recommended by manufacturer of vapor barrier, 100 mm wide.
- .2 Sealant: compatible with vapor barrier used and recommended by manufacturer. Compliant with Section 07 92 00 - Joint Sealants.
- .3 Molded vapor barrier elements to manufacturer's recommendations.
- .4 Hose clamps
 - .1 Fabricate hose clamps with vapor barrier material and pressure sensitive tape according to manufacturer's instructions.

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 MANUFACTURERS INSTRUCTIONS

- .1 Conformance: comply with manufacturer's written requirements, recommendations and specifications including all available data sheets, instructions relative to maintenance and handling, storage and product installation, and technical instructions in data sheets.

3.3 PREPARATION

- .1 Prepare surfaces in accordance with manufacturer's written instructions.
- .2 Level, compress or roll ground or granulate below slab base

3.4 INSTALLATION

- .1 Install vapour barrier in accordance with manufacturer's written instructions and to ASTM E 1643-98.

UNDER SLAB VAPOUR BARRIERS

- .2 Ensure services are installed and inspected prior to installation of retarder.
- .3 Install sheet vapour retarder on warm side of exterior ceiling wall, assemblies prior to installation of gypsum board to form continuous barrier.
- .4 Use sheets of largest practical size to minimize joints.
- .5 Unroll vapour barrier where slab will be poured. Cut to dimensions if required.
- .6 All joints and connections, lateral or butt jointed, will overlap width 150 mm, cover up with joint sealing tape, 100 mm wide. The area where tape is applied should be free of dust, dirt and moisture so as to allow maximum self-adhesion.
- .7 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

3.5 PERIMETER SEALS

- .1 Seal perimeter of sheet vapour barrier as follows:
 - .1 Apply continuous bead of sealant to substrate at perimeter of sheets.
 - .2 Lap sheet over sealant and press into sealant bead.
 - .3 Install staples through lapped sheets at sealant bead into wood substrate.
 - .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.6 VAPOUR BARRIER TRAVERSAL

- .1 Seal protrusions as per manufacturer's written indications.

3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 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 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

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 07 21 16 – Blanket Insulation
- .2 Section 07 42 43 – Composite Wall Panels
- .3 Section 07 92 00 – Joint sealants
- .4 Section 08 11 00 – Metal Doors and Frames
- .5 Section 08 50 00 – Windows
- .6 Section 09 21 16 – Gypsum Board Assemblies
- .7 Structure drawings, concrete and steel

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM D4541-02, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
 - .2 ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls, by Uniform Static Air Pressure Difference.
 - .3 ASTM E783-02, Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
 - .4 ASTM E1186-03, Standard Practices for Air Leakage Site Detection in Building Envelope and Air Retarder Systems.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit WHMIS MSDS - Material Safety Data Sheets.
- .3 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Applicator: company specializing in performing work of this section with minimum 5 years documented experience with installation of air/vapour barrier systems.

- .1 Completed installation must be approved by the material manufacturer.
- .2 Applicator: company:
 - .1 Currently licensed by National Air Barrier Association, Canadian Urethane Foam Contractor's Association or certifying organization.
 - .2 Must maintain their license throughout the duration of the project.
- .2 Mock-Up:
 - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct typical exterior wall panel, 3 m long by 3 m wide, incorporating window frame and sill, insulation, building corner condition, junction with roof system; illustrating materials interface and seals.
 - .3 Locate where directed.
 - .4 Mock-up may remain as part of finished work.
 - .5 Allow 48 hours for inspection of mock-up by Departmental Representative before proceeding with air/vapour barrier Work.

1.5 DELIVERY, STORAGE AND HANDLING

- .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 Avoid spillage: immediately notify Departmental Representative if spillage occurs and start clean up procedures.
- .4 Clean spills and leave area as it was prior to spill.

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.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.7 AMBIENT CONDITIONS

- .1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.
- .2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
- .3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

1.8 SEQUENCING

- .1 Sequence work in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Charts.
- .2 Sequence work to permit installation of materials in conjunction with related materials and seals.

PART 2 PRODUCTS**2.1 MEMBRANES**

- .1 Primary sheet air/vapor barrier membrane: SBS modified bitumen, self-adhering sheet membrane complete with a engineered thermoplastic film. Membrane shall have the following physical properties:
 - .1 ASTM E2357: Standard Test Method for Determining Air Leakage of Air Barrier Assemblies,
 - .2 Air leakage: <0.0001 CFM/ft² @1.6 lbs/ft² to ASTM E2178 and ASTM E283 and have no increased air leakage when subjected to a sustained wind load of 10.5 lbs/ft² for 1 hour and gust wind load pressure of 62.8 lbs/ft² for 10 seconds when tested at 1.6 lbs/ft² to ASTM E331,
 - .3 Vapour permeance: 0.03 perms to ASTM E96 (Desiccant Method),
 - .4 Vapour permeance: 0.08 perms to ASTM E96 (Wet Cup Method),
 - .5 Membrane Thickness: 0.0394 inches (40 mils),
 - .6 Low temperature flexibility: -30°C to CGSB 37-GP-56M,
 - .7 Elongation: 200% to ASTM D412-modified,
 - .8 Meets CAN/CGSB-51-33 Type I Water Vapour Permeance requirements
 - .9 Acceptable Products: Blueskin[®] SA manufactured by Henry or equivalent approved by the architect.

2.2 ACCESSORIES

- .1 Primer for self-adhering membranes at temperatures above -4° Celsius: polymer emulsion based adhesive, quick setting. Primer shall have the following physical properties:
 - .1 Weight: 8.7 lbs/gal,
 - .2 Solids by weight: 53%,
 - .3 Water based, no solvent odors,
 - .4 Drying time (initial set): 30 minutes at 50% RH and 70 degrees F
 - .5 Acceptable Products: Aquatac[™] Primer manufactured by Henry or equivalent approved by the architect.
- .2 Adhesive for self-adhering membranes at all temperatures: synthetic rubber based adhesive, quick setting, having the following physical properties:
 - .1 Weight: 6 lbs/gal,
 - .2 Solids by weight: 35%,
 - .3 Drying time (initial set): 30 minutes
 - .4 Acceptable Products: Blueskin[®] Adhesive manufactured by Henry or equivalent approved by the architect.
- .3 Substrate cleaner: non corrosive, compatible with adjoining materials
- .4 Insulation adhesive: synthetic, trowel applied, rubber based adhesive, having the following physical properties:
 - .1 Compatibility: With air barrier membrane, substrate and insulation,
 - .2 Air leakage: 0.0026 CFM/ft² @ 2.1 lbs/ft² to ASTM E283,
 - .3 Water vapor permeance: 0.03 perms to ASTM E96,

- .4 Long term flexibility: CGSB 71-GP-24M
- .5 Acceptable Products: Air-Bloc 21 Insulation Adhesive manufactured by Henry or equivalent approved by the architect.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

- .1 Perform Work in accordance with Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification requirements for materials and installation.
- .2 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.
- .3 Perform Work in accordance with Canadian Urethane Foam Contractor's Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.

3.3 EXAMINATION

- .1 Verify that surfaces and conditions are ready to accept work of this section.
- .2 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.
- .3 Report unsatisfactory conditions to Departmental Representative in writing.
- .4 Do not start work until deficiencies have been corrected.
 - .1 Beginning of Work implies acceptance of conditions.

3.4 PREPARATION

- .1 Remove loose or foreign matter, which might impair adhesion of materials.
- .2 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions.
- .3 Ensure substrates are free of surface moisture prior to application of self-adhesive membrane and primer.
- .4 Ensure metal closures are free of sharp edges and burrs.
- .5 Prime substrate surfaces to receive adhesive or sealants in accordance with manufacturer's instructions.

3.5 INSTALLATION

- .1 Inside and outside corners
 - .1 Seal inside and outside corners of sheathing boards with a strip of self-adhering air/vapor barrier membrane extending a minimum of 3 inches on either side of the corner detail.

- .1 Prime surfaces as per manufacturers' instructions and allow to dry.
- .2 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all end and side laps of membrane.
- .3 Roll all laps and membrane with a counter top roller to ensure seal.
- .2 Transition areas
 - .1 Tie-in to structural beams, columns, floor slabs and intermittent floors, parapet curbs, foundation walls, roofing systems and at the interface of dissimilar materials as indicated in drawings with self-adhering air/vapor barrier membrane.
 - .1 Prime surfaces as per manufacturers' instructions and allow to dry.
 - .2 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Provide minimum 3 inch lap to all substrates.
 - .3 Ensure minimum 2 inch overlap at all end and side laps of membrane.
 - .4 Roll all laps and membrane with a counter top roller to ensure seal.
- .3 Windows and rough openings
 - .1 Wrap rough openings with self-adhered air/vapor barrier membrane as detailed.
 - .1 Prime surfaces as per manufacturers' instructions and allow to dry.
 - .2 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inch overlap at all end and side laps of membrane.
 - .3 Roll all laps and membrane with a counter top roller to ensure seal.
- .4 Primary air barrier
 - .1 Apply self-adhering air/vapour barrier membrane complete and continuous to prepared and primed substrate in an overlapping shingle fashion and in accordance with manufacturer's recommendations and written instructions. Stagger all vertical joints.
 - .1 Prime surfaces as per manufacturers' instructions and allow to dry.
 - .2 Align and position self-adhering air/vapour barrier membrane, remove protective film and press firmly into place. Ensure minimum 2 inch overlap at all end and side laps of membrane.
 - .3 Roll all laps and membrane with a counter top roller to ensure seal.
 - .4 At the end of each days work seal the top edge of the membrane where it meets the substrate with termination sealant. Trowel apply a feathered edge to seal termination and shed water.

3.6 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.

3.7 PROTECTION OF WORK

- .1 Protect finished work in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Do not permit adjacent work to damage work of this section.

- .3 Ensure finished work is protected from climatic conditions.

END OF SECTION

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 07 21 16 Blanket Insulation
- .2 Section 07 21 29.03 Sprayed insulation polyurethane foam
- .3 Section 07 27 00 Air Barriers
- .4 Section 07 46 13 Preformed Metal Siding
- .5 Section 07 62 00 Sheet Metal Flashing and Trim
- .6 Section 07 92 00 Joint sealants

1.2 REFERENCES

- .1 The Aluminum Association, Inc. (AA)
 - .1 AA DAF45-03, Designation System for Aluminum Finishes.
- .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A167-99(2004), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM A240/A240M-05a, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - .3 ASTM A480/A480M-05, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
 - .4 ASTM D523-89(R1999), Standard Test Method for Specular Gloss.
 - .5 ASTM D822-01, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 19-GP-14M-76(R1984), Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.
- .4 Green Seal Environmental Standards
 - .1 Standard GC-03-93, Anti-Corrosive Paints.
 - .2 Standard GS-11-97, Architectural Paints.
- .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
 - .1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.3 DESIGN REQUIREMENTS

- .1 Design metal cladding to allow for thermal movement of component materials caused by variation in ambient temperature range of 80 degrees C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

- .2 Maximum deviation from vertical and horizontal alignment of erected panels: 1 to 1000.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for cladding system 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.
- .3 Shop Drawings:
 - .1 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Indicate dimensions and thickness of panels, fastening and anchoring methods, detail and location of joints and gaskets, thermal movement provision, wall openings, head, jamb and sill details, materials and finish, compliance with design criteria and requirements of related work.
- .4 Samples:
 - .1 Submit duplicate 100 x 100 mm samples of wall and soffit system, representative of materials, finishes and colours.
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Certificates: submit certificates signed by manufacturer certifying that composite wall panels comply with specified performance characteristics and physical properties.
 - .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.5 QUALIFICATIONS

- .1 Manufacturer: company specializing in producing composite wall panels with 5 documented experience with sufficient capacity to produce and deliver required units without causing delay in work.
- .2 Installer: person specializing in composite wall panel installations approved by manufacturer with 5 documented experience.
- .3 Mock-ups: construct mock-ups in accordance with Section 01 45 00 - Quality Control and to requirements supplemented as follows:
 - .1 Provide mock-up for evaluation of surface finishes and workmanship.
 - .2 Provide initial production units for job-site assembly with other materials for review.
 - .3 Co-ordinate type and location of mock-ups with project requirements.
 - .4 Accepted units will be used as standard for acceptance of production units.
 - .5 Remove and replace units which are not accepted.
 - .6 Do not proceed with remaining work until workmanship, colour, and finish are reviewed by Departmental Representative.
 - .7 Refinish mock-up area as required to produce acceptable work.

- .8 When accepted, mock-up will demonstrate minimum standard of quality required for this work.
 - .1 Approved mock-up may remain as part of finished work.
- .4 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Departmental Representative in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver, store and protect material in accordance with panel manufacturer's recommendations.
- .3 Do not expose panels with strippable film to direct sunlight or extreme heat.
- .4 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Architectural panels: 4 mm thick, 3105-H14 high-performance 3105-H14 aluminum alloy cladding panels of 0.51 mm thickness and an extruded flame retardant core of "Alpolic / FR Core". Acceptable Product: Composite Panel System 3 - Dry joint as manufactured by Vicwest or equivalent approved by the architect. Color: CNC Charcoal.
- .2 The cladding system will include all panel stiffeners, fasteners, trim, required accessories and sealants to meet applicable codes for wind loads, air infiltration and water penetration. All systems will be designed according to the principles of the open rain-screen principles.
- .3 Girt:
 - .1 All girts shall be Grade A steel to ASTM A653 / A653M zinc plated Z275 and manufactured to the dimensions and profiles shown on the drawings with a thickness determined by structural calculations (see section 1.4.3) but not less than 1.5 mm.
 - .2 All girts will be notched to follow the shapes of the inner facing and allow to fix these girts through the inner facing directly on the structure.
- .4 Reveals:
 - .1 All reveals to be 50mm wide unless noted otherwise; Color: BGN Green and TBX Silver Metallic. See architectural elevations for location of reveals colour.

2.2 ACCESSOIRES

- .1 Flashings: In accordance with Section 07 62 00 - Flashing and sheet metal accessories. The material must match the siding in the exposed areas. Galvanized material in concealed areas. If necessary, custom-build them to take architectural details into account. Use preformed corner pieces only. Edges exposed to double back.
- .2 Closures: Metal closures adapted to the type of profile chosen, according to the manufacturer's recommendations.
- .3 Sealant: Refer to Section 07 92 00 - Joint Sealing.
- .4 Exposed moldings: 0.61mm (24 gauge) bare metal thickness, to ASTM A653 / A653M, grade 230 with Z275 prefinished zinc plating with silicone modified polyester (PMS) coating in the same color as the siding.
- .5 Screws: to ANSI B18.6.4 stainless steel with pre-painted hex head in the same color as the backing and built-in EPDM washer and according to the manufacturer's recommendations.
- .6 Touch-up paint: as recommended by the manufacturer of metal panels and used only with the permission of the Departmental Representative.
- .7 Insulation plaster: bituminous paint solution of epoxy resins alkali resistant.
- .8 Thermal cuts: Edge of 3mm thick foam rubber over a minimum width of 25mm to cover the face of the sub-intermediate, supplied in roll, covered with a protective paper.
- .9 Closing edges: Unicellular foam of flexible PVC, having the same shape as the metal cladding, of type for Arctic climate.
- .10 Metal Closures: Same thickness and finish as adjacent panels.

PART 3 EXECUTION**3.1 MANUFACTURER'S INSTRUCTIONS**

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

3.2 EXAMINATION

- .1 Before installation examine alignment of substrate and notify Departmental Representative in writing if substrate does not comply with requirements of panel installer.

3.3 INSTALLATION

- .1 Install composite panels in accordance with manufacturer's written instructions and shop drawings.
 - .1 Allow for thermal movement.
- .2 Maintain following installation tolerances:
 - .1 Maximum variation from plane or location shown on shop drawings: 10 mm/10 m of length and up to 20 mm/100 m.
 - .2 Maximum deviation for vertical member: 3 mm in an 8.5 m run.
 - .3 Maximum deviation for a horizontal member: 3 mm in an 8.5 m run

- .4 Maximum offset from true alignment between two adjacent members abutting end to end, in line: 0.75 mm.
- .3 Remove strippable coating from panels as they are erected.

3.4 CLEANING

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

END OF SECTION

PREFORMED METAL SIDING**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 07 21 16 - Blanket Insulation.
- .2 Section 07 21 29.03 - Sprayed insulation polyurethane foam.
- .3 Section 07 27 00 - Air Barriers.
- .4 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .5 Section 07 92 00 - Joint sealants.

1.2 REFERENCES

- .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 D2369-10e1, Test Method for Volatile Content of Coatings.
 - .2 ASTM D2832-92(2011), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
 - .3 ASTM D5116-10, 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-93.2-M91, Prefinished Aluminum Siding, Soffits and Fascia, for Residential Use.
 - .3 CAN/CGSB-93.3-M91, 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)

PREFORMED METAL SIDING

- .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.
 - .1 Indicate VOC's for caulking materials during application and curing.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, 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 300 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 PERFORMANCE REQUIREMENTS

- .1 Components: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall as calculated in accordance with applicable code.
- .2 Movement: Accommodate movement within system without damage to components or movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; deflection of structural support framing.
- .3 Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
- .4 Non-Combustible: (ASTM E136-16, CAN/ULC S114) Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.
- .5 Surface Burning: (ASTM E2768-11) Standard Test Method for Extended Duration Surface Burning Characteristics for Building Materials (30 min Tunnel Test)
- .6 Wind Load (TAS 202 & 203): Uniform Static air and cyclic wind pressure. 100 psf design pressure. Contact manufacturer for ultimate test pressure data corresponding to framing type, dimensions, fastener type, and attachment clips. Project engineer(s) must determine Zone 4 and 5 design pressures based on project specifics.

PREFORMED METAL SIDING**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 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, packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS**2.1 MATERIALS**

- .1 Strip siding and soffit: to CAN/CGSB-93.2
 - .1 Extruded Aluminum Siding and Soffits with Alluminate bonded film finish is extruded aluminum with integrated venting system.
 - .1 Stock# 102311 – 6" V Groove Siding & Soffits.
 - .2 Colour: Light Fir
 - .3 Acceptable Products: Longboard Wood Grain Aluminum Siding manufactured by Mayne Coatings Corp or equivalent approved by the architect.
 - .2 Thermally Broken façade sub-structure for external continuous insulation 125mm L-Clip.

2.2 FASTENERS

- .1 Nails: CSA B111. Screws: ASME B18.6.3. Purpose made aluminum alloy.

2.3 CAULKING

- .1 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
 - .1 Test for acceptable VOC emissions in accordance with ASTM D2369 and ASTM D2832.

2.4 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.

PREFORMED METAL SIDING**PART 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 Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 MANUFACTURER'S INSTRUCTIONS

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

3.3 INSTALLATION

- .1 Install cladding in accordance with CGSB 93.5, and manufacturer's written instructions.
- .2 Install continuous starter strips, inside and outside corners, edgings, soffit, drip, cap, sill and window/door opening flashings as indicated.
- .3 Install outside corners, fillers and closure strips with carefully formed and profiled work.
- .4 Install soffit and fascia cladding as indicated.
- .5 Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.
- .6 Attach components in manner not restricting thermal movement.
- .7 Caulk junctions with adjoining work with sealant. Do work in accordance with Section 07 92 00 - Joint Sealants.
- .8 Fasten siding to structural supports; aligned, level, and plumb.
- .9 Locate joints over supports.
- .10 Install expansion control joints where indicated.
- .11 Use concealed fasteners unless otherwise approved by Architect.
- .12 Install siding, and accessories in accordance with best practice, with all joint members plumb and true.

3.4 FIELD QUALITY CONTROL

- .1 After installation of cladding, check entire surface for obvious flaws or defects.
- .2 Replace and repair any problem areas, paying close attention to the substrate for causes of the problem.

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.

PREFORMED METAL SIDING

- .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.

3.6 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

PART 1 GENERAL**1.1 REFERENCE STANDARDS**

- .1 Submit a report, issued by a certified materials testing laboratory, attesting that the specified roofing system was tested in accordance with CSA A123.21-14, Standard test method for the dynamic wind uplift resistance of membrane-roofing systems. Test results shall demonstrate that the roofing system provides a Dynamic Uplift Resistance (DUR) of -1.1 kPa for the field surface of the roof, -1.5 kPa for the edges of the roof, and -3.3 kPa for the corners of the roof.
- .2 Membranes must meet or exceed requirements of CGSB 37.56-M (9th Draft), *Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing*.
- .3 Membranes must meet or exceed requirements of ASTM D 6162, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
- .4 Membranes must meet or exceed requirements of ASTM D 6164, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
- .5 Polyisocyanurate thermal insulation boards must meet or exceed requirements of CAN/ULC S704-11, *Thermal Insulation, Polyurethane and Polyisocyanurate, Boards Faced*.
- .6 Roofing system must meet or exceed requirements of CAN/ULC-S107-10, Methods of Fire Tests of Roof Coverings, Class C.

1.2 COMPATIBILITY

- .1 All waterproofing materials will be provided by the same manufacturer.

1.3 TECHNICAL DOCUMENTS

- .1 Submit two (2) copies of the most current technical data sheets. These documents must describe the physical properties of materials and explanations about product installation, including restrictions, limitations and other manufacturer recommendations.

1.4 CONTRACTOR QUALIFICATIONS

- .1 Roofing contractors and sub-contractors must, when tendering and during works, possess a roofing contractor operating license.

1.5 MATERIALS STORAGE AND DELIVERY

- .1 All materials will be delivered and stored in their original packaging, in conformance with the requirements described in the manufacturer's technical documentation.
- .2 At all times, materials will be adequately protected and stored in a dry and properly ventilated area, away from any welding flame or spark, and sheltered from the elements and any harmful substances.
- .3 Store adhesives and solvent-based mastics at a minimum of 5 °C (41 °F).
- .4 Materials delivered in rolls will be carefully stored upright; flashings will be stored to avoid wrinkling, buckling, scratches or any other possible damage.

- .5 Avoid gathering construction materials on the roof, which may affect the structural integrity by imposing loads exceeding what is admissible.

1.6 FIRE PROTECTION

- .1 Prior to the start of work, conduct a site inspection to ensure its safety in order to minimize fire risks and hazards.
- .2 Respect safety measures recommended by the related local authorities.
- .3 At the end of each workday, use a heat detector gun to spot any smouldering or concealed fire. Job planning must be organized to ensure workers are still on location at least 2 hours after welding works. An inspection must be performed by an employee of the roofing contractor who specializes in this kind of job at the end of works and, if necessary, with the help of a member of the fire protection service of the city.
- .4 Never apply the torch directly to flammable materials.
- .5 Throughout roofing installation, maintain a clean site and have a fire hose (when possible) and at least one ULC-approved Class A, B or C fire extinguisher, charged and in perfect operating condition, within 6 m (20 ft) of each torch. Respect all safety measures described in technical data sheets of sealants. Welding torches must never be placed near combustible or flammable products, nor be used where the flame is not visible or cannot be easily controlled.

1.7 WARRANTIES

- .1 For work covered by this section, Section 07 52 16 - SBS Elastomeric Bitumen Membrane Roofing, the 12-month warranty period is extended to 60 months.

PART 2 PRODUCTS

2.1 VAPOUR BARRIER

- .1 Modified Bitumen Vapour Barrier
 - .1 Description: Roofing membrane composed of SBS modified bitumen and a glass mat reinforcement. The upper surface is sanded, the underface is covered with a thermofusible plastic film.
 - .2 In conformance with: CAN/CGSB 37.56-M (9th Draft).
 - .3 Specified product(s): ELASTOPHENE SP by SOPREMA.
- .2 Vapour Barrier Continuity Strip
 - .1 Description: Waterproofing membrane with composite reinforcement and SBS modified bitumen. The surface is sanded and the underface is self-adhesive and covered with a silicon release film.
 - .2 Specified product: SOPRALENE STICK ADHESIVE by SOPREMA.

2.2 INSULATION

- .1 Polyisocyanurate Insulation
 - .1 Description: Closed-cell polyisocyanurate foam flat insulation board laminated on both sides with a fiberglass yarn-reinforced organic paper with shiplap edges on four sides.

- .2 Specified product: SOPRA-ISO by SOPREMA
- .2 Tapered Polyisocyanurate Insulation
 - .1 Description : Closed-cell polyisocyanurate foam insulation panel designed to create a minimum two percent (%) slope to the roof system.
 - .2 Specified product : SOPRA-ISO by SOPREMA
- .3 Polyisocyanurate Cricket
 - .1 Description : Pre-cut closed-cell polyisocyanurate foam insulation panel made to prevent water from stagnating on the roof.
 - .2 Specified product : PRE-CUT HINGED CRICKET or PRE-CUT CRICKET FOR MECHANICAL UNITS by Soprema

2.3 MEMBRANES

- .1 High-Density Polyisocyanurate Board and Base Sheet Membrane
 - .1 Description: Board composed of SBS modified bitumen membrane with a polyester reinforcement, factory-laminated on a HD polyisocyanurate insulation board. The board measures 0.91 m x 2.44 m (3 ft x 8 ft). The surface is covered with thermofusible plastic film. The membrane side lap is part self-adhesive and part thermofusible.
 - .2 Thickness: 12.7 mm (1/2 in)
 - .3 In conformance with: CGSB 37.56-M (9th Draft).
 - .4 Properties:

	MD	XD
.1 Strain energy (kN/m)	9	7
.2 Breaking strength (kN/m)	17	12.5
.3 Ultimate elongation (%)	60	65
.4 Tear resistance (N)	60	
.5 Static puncture resistance (N)	400	
.6 Dimensional stability (%)	-0.4	0.3
.7 Plastic flow (°C)	≥ 115	
.8 Cold bending at -30 °C	No cracking	
.9 Lap joint strength (kN/m)	Pass > 4 kN/m	
 - .5 Specified product: SOPRASMART ISO HD 180 by SOPREMA
- .2 Base Sheet Membrane for Flashings and Parapets
 - .1 Description: Membrane composed of SBS modified bitumen and composite heavy duty reinforcement. The surface is covered with a thermofusible plastic film and the underface is covered with a release protection film. The surface shall be marked with three (3) chalk lines to ensure proper roll alignment.
 - .2 In conformance with: CGSB 37.56-M (9th Draft).
 - .3 Properties:

	MD	XD
.1 Strain energy (kN/m)	7,8	7,2
.2 Breaking strength (kN/m)	15	13,5
.3 Ultimate elongation (%)	60	65
.4 Tear resistance (N)	125	

- | | | | |
|----|----------------------------|-----|-----|
| .5 | Static puncture resistance | (N) | 560 |
| .6 | Cold bending at -30 °C | -30 | |
- .4 Specified product: SOPRALENE FLAM STICK by SOPREMA
- .3 Colour Choices for Roofing Cap Sheet Membrane Granules
- .1 For field surfaces: grey.
- .2 For walkway surfaces: grey.
- .4 Roofing Cap Sheet Membrane for Field Surfaces
- .1 Description: Roofing membrane composed of SBS modified bitumen with a composite reinforcement and elastomeric bitumen with flame-retarding agent. The surface is protected by coloured granules. The underface is covered with a thermofusible plastic film.
- .2 In conformance with: ASTM D6162.
- .3 Properties: MD XD
- | | | | |
|----|----------------------------|---------------|------|
| .1 | Strain energy (kN/m) | 7.8 | 7.2 |
| .2 | Breaking strength (kN/m) | 15 | 13.5 |
| .3 | Ultimate elongation (%) | 60 | 65 |
| .4 | Tear resistance (N) | 125 | |
| .5 | Static puncture resistance | (N) | 560 |
| .6 | Dimensional stability (%) | 0.2 | 0 |
| .7 | Plastic flow (°C) | ≥ 110 | |
| .8 | Cold bending at -30 °C | No cracking | |
| .9 | Lap joint strength (kN/m) | Pass > 4 kN/m | |
- .4 Specified Product: SOPRAPLY TRAFFIC CAP 560 by SOPREMA
- .5 Roofing Cap Sheet Membrane for Flashings and Parapets
- .1 Description: Roofing membrane composed of SBS modified bitumen with a composite reinforcement and elastomeric bitumen with flame-retarding agent. The surface is protected by coloured granules. The underface is covered with a thermofusible plastic film.
- .2 In conformance with: ASTM D6162.
- .3 Properties: MD XD
- | | | | |
|----|----------------------------|---------------|------|
| .1 | Strain energy (kN/m) | 7.8 | 7.2 |
| .2 | Breaking strength (kN/m) | 15 | 13.5 |
| .3 | Ultimate elongation (%) | 60 | 65 |
| .4 | Tear resistance (N) | 125 | |
| .5 | Static puncture resistance | (N) | 560 |
| .6 | Dimensional stability (%) | 0.2 | 0 |
| .7 | Plastic flow (°C) | ≥ 110 | |
| .8 | Cold bending at -30 °C | No cracking | |
| .9 | Lap joint strength (kN/m) | Pass > 4 kN/m | |
- .4 Specified Product: SOPRAPLY TRAFFIC CAP 560 by SOPREMA

2.4 ACCESSORY MEMBRANES**.1 Cover Strip**

- .1 Description: Membrane strip of 330 mm (13 in) made of SBS modified bitumen with a composite reinforcement. Both faces are covered with a plastic thermofusible film. The strip ensures water-tightness in the end laps.
- .2 In conformance with: ASTM D6162.
- .3 Specified product: SOPRALAP (for thermofusible surfaces) by SOPREMA.

2.5 PRIMERS**.1 Primer for Self-Adhesive Membranes**

- .1 Description: Primer composed of SBS synthetic rubber, adhesive resins and volatile solvents. Used as primer to improve the adhesion of self-adhesive membranes.
- .2 Specified product: ELASTOCOL STICK by SOPREMA.

2.6 ADHESIVES**.1 Insulation Adhesive**

- .1 Description: Two-component, quick-setting, low-expansion foam urethane adhesive that can be applied at any temperature.
- .2 Specified product: DUOTACK by SOPREMA

2.7 FLAME-STOP MEMBRANE

- .1 Description: Self-adhesive membrane composed of SBS modified bitumen and a glass mat reinforcement, designed to prevent flames from penetrating into voids, cavities and openings before installing heat-welded membranes.
- .2 Specified products: SOPRAGUARD tape by SOPREMA

2.8 COMPLEMENTARY WATERPROOFING PRODUCTS**.1 Waterproofing Mastic**

- .1 Description: Multi-purpose mastic composed of SBS modified bitumen, fibres, mineral fillers and solvents.
- .2 Specified product: SOPRAMASTIC by SOPREMA

.2 Sealing Product

- .1 Description: Bitumen/polyurethane waterproofing mono-component resin and polyester reinforcement.
- .2 Specified products: ALSAN FLASHING and ALSAN REINFORCEMENT by SOPREMA

2.9 ROOF WALKWAYS**.1 Membrane Walkways**

- .1 Description: Waterproofing membrane composed of SBS modified bitumen and non-woven polyester reinforcement, used to protect membranes subjected to foot traffic. The surface is covered with black granules; the underface is protected by a thermofusible plastic film.
- .2 In conformance with: CGSB 37.56-M (9th Draft).

- .3 Specified product: SOPRAWALK by SOPREMA

PART 3 EXECUTION OF WORK

3.1 SURFACE EXAMINATION AND PREPARATION

- .1 Surface examination and preparation must be completed in conformance with instructions in the membrane manufacturer's technical documentation.
- .2 Before roofing work begins, the Departmental Representative's representative and roofing foreman will inspect and approve deck conditions (including slopes and wood grounds) as well as flashings at parapets, roof drains, plumbing vents, ventilation outlets and other construction joints. If necessary, a non-conformity notice will be issued to the contractor so that required corrections can be carried out. The start of roofing work will be considered as acceptance of conditions for work completion.
- .3 Do not begin any portion of work before surfaces are clean, smooth, dry, and free of ice and debris. Use of calcium or salt is forbidden for ice or snow removal.
- .4 Be sure plumbing, carpentry and all other works have been duly completed.
- .5 No materials will be installed during rain or snowfall.

3.2 METHOD OF EXECUTION

- .1 Roofing work must be completed in a continuous fashion as surfaces are readied and as weather conditions allows it.
- .2 It's preferable to seal all joints that are not covered by a cap sheet membrane the same day. A second cap sheet cannot be installed if any moisture is present in joints.
- .3 Ensure waterproofing of roofs at all times, including protection during installation work by other trades and protection as work is completed (e.g. vents, drains, etc.).

3.3 SITE PROTECTION

- .1 Protect the exposed surfaces of finished work to avoid damage during roof installation and material transportation. Install walkways made of rigid boards over installed roofing materials to enable passage of people and transport of products. Assume full responsibility for any damage.

3.4 PREPARATION WORK – CONCRETE DECK

- .1 Prepare surfaces according to manufacturer's recommendations. Surfaces to be waterproofed with elastomeric bitumen membrane must have a Concrete Surface Profile (CSP) of 1 to 5 (CSP as per the *International Concrete Repair Institute*).

3.5 APPLICATION OF PRIMER

- .1 Wooden, metallic, concrete, and masonry surfaces or gypsum insulation substrate will receive a coat of primer at a rate of 0.3 to 0.5 L/m² (no primer is required for factory-painted metals). All surfaces to be primed must be free of rust, dust or any residue that may hinder adherence. Primed surfaces must be covered with the roofing membrane as soon as possible (on the same day for self-adhesive membranes).

3.6 INSTALLATION OF SELF-ADHESIVE VAPOUR BARRIER

- .1 Primer must be dry prior to the installation of the vapour barrier membrane.
- .2 Starting at the bottom of the slope, without adhering the membrane, unroll it onto the substrate for alignment. Do not immediately remove the silicone release film.
- .3 Align the roll parallel to the ribs of the steel deck. Make sure membrane overlaps are supported along their entire length.
- .4 Remove one end of the silicone release film and adhere this part of the membrane to the substrate. Remove the remaining release film at a 45° angle to avoid wrinkles in the membrane.
- .5 Overlap adjacent rolls of 75 mm (3 in) and 100 mm (4 in). End laps must be 150 mm (6 in). Space end laps by at least 300 mm (12 in).
- .6 When the vapour barrier is installed directly on a steel deck, place a thin sheet of metal under the end laps of the vapour barrier.

3.7 INSTALLATION OF INSULATION

- .1 Adhere insulation by using specified adhesive in continuous strips spaced 305mm on the field surface, 305mm on the perimeter, and 305mm on corners.
- .2 Install only as much insulation as can be covered in the same day.

3.8 INSTALLATION OF TAPERED INSULATION PANELS

- .1 Install tapered insulation panels in conformance with manufacturer's instructions and recommendations.

3.9 INSTALLATION OF BOARDS AND FACTORY-LAMINATED BASE SHEET

- .1 Adhere base sheet board using adhesive applied in continuous strips spaced 305mm on the field surface, 305mm on the perimeter, and 305mm on corners..
- .2 All boards must be in perfect connection, without any significant variances in level, and must be completely adhered to the surface.
- .3 Seal end laps by welding a 330-mm (13-in) wide protection strip centered on the joint.
- .4 Avoid the formation of wrinkles, swellings or fishmouths.

3.10 INSTALLATION OF TORCH-APPLIED BASE SHEET ON THE FIELD SURFACE

- .1 Unroll base sheet on the substrate, taking care to align the edge of the first selvedge with drain centre (parallel to roof edge).
- .2 Cut off corners at end laps to be covered by the next roll.
- .3 Weld the base sheet onto prepared substrate.
- .4 Each selvedge will overlap the previous one along lines provided for this purpose, and will overlap the ends by 150 mm (6 in). Space end laps by a minimum of 300 mm (12 in).
- .5 Avoid the formation of wrinkles, swellings or fishmouths.

3.11 INSTALLATION OF SELF-ADHESIVE BASE SHEET ON FLASHINGS AND PARAPETS

- .1 Apply base sheet flashing only after primer coat is dry.
- .2 Before applying membranes, always burn the plastic film from the section to be covered if there is an overlap (inside and outside corners and field surface). For

sanded base sheet membranes, apply primer for self-adhesive membrane on the area to be covered at the foot of the parapets.

- .3 Cut off corners at end laps of areas to be covered by the next roll.
- .4 Each selvedge will overlap the previous one along lines provided for this purpose, and by 150 mm (6 in) at the ends.
- .5 Position the pre-cut membrane. Remove 150 mm (6 in) of the silicone release film to hold the membrane in place at the top of the parapet.
- .6 Then, gradually peel off the remaining silicone release film, pressing down on the membrane with an aluminum applicator to ensure good adhesion. Use the aluminum applicator to ensure a perfect transition between the flashing and the field surface. Smooth the entire membrane surface with a membrane roller for full adhesion.
- .7 Install a reinforcing gusset at all inside and outside corners.
- .8 Always seal overlaps at the end of the workday.
- .9 Avoid the formation of wrinkles, swellings or fishmouths.

3.12 INSTALLATION OF REINFORCED GUSSETS

- .1 Install reinforcing gussets at all inside and outside corners.
- .2 Heat-weld the gussets in place after installing base sheet membrane.

3.13 INSTALLATION OF REINFORCING MEMBRANES

- .1 Install reinforcing membranes specified according to the typical detailed instructions in the documentation of membrane manufacturer.

3.14 INSTALLATION OF ROOF DRAINS

- .1 Burn the plastic film of the section to be covered by the roof drain.
- .2 Insert the drain sleeve into the rainwater drainage opening on the roof.
- .3 Peel off the release protection film and adhere the flexible deck flange to the base sheet membrane of the field surface.
- .4 Apply pressure over the whole surface using a membrane roller.
- .5 Seal the perimeter of the of the flexible deck flange with a torch and a round nosed-trowel.
- .6 Heat-weld the cap sheet membrane on the roof drain flexible deck flange. Allow to cool and cut the roof drain hole.
- .7 Position and centre the strainer at the upper rainwater drainage opening of the roof drain.
- .8 Insert and slide the legs of the strainer into the sleeve of the roof drain. Adjust the legs according to diameter. Tighten the upper screws to fix the legs and tighten the side screws to hold the strainer in place.

3.15 INSTALLATION OF VENT STACKS

- .1 Burn the plastic film of the section to be covered by the roof drain.
- .2 Insert the aluminum vent sleeve over the main plumbing system.
- .3 Peel off the release protection film and adhere the flexible deck flange to the base sheet membrane of the field surface.
- .4 Apply pressure over the whole surface using a membrane roller.

- .5 Seal the perimeter of the of the flexible deck flange with a torch and a round nosed-trowel.
- .6 Insulate the space between the main plumbing vent system and the aluminum vent sleeve.
- .7 Insert and position the adjustable flashing into the aluminum vent sleeve. The adjustable flashing must sit on the main plumbing vent system.
- .8 Heat-weld the cap sheet membrane on the roof drain flexible deck flange. Allow to cool and cut the roof drain hole.
- .9 Install and affix the aluminum rain cap on the aluminum vent sleeve.

3.16**INSTALLATION OF THERMOFUSIBLE CAP SHEET ON FIELD SURFACE**

- .1 Begin with double-selvage starter roll. If starter roll is not used, side laps covered with granules must be de-granulated by embedding granules in torch-heated bitumen over a 75-mm (3 in) width.
- .2 Starting at drain, Unroll the membrane on the base sheet, taking care to align the edge of the first selvage with the edge of the roof.
- .3 Cut off corners at end laps at areas to be covered by the next roll.
- .4 Each selvage will overlap the previous one along lines provided for this purpose, and will overlap by 150 mm (6 in) at the ends. Space end laps a minimum of 300 mm (12 in).
- .5 Heat-weld cap sheet membrane with a torch on the base sheet to create a bleed out of 3 to 6 mm (1/8 to 1/4 in).
- .6 During installation, be careful not to overheat the membrane or its reinforcements.
- .7 Avoid the formation of wrinkles, swellings or fishmouths.
- .8 Avoid walking over finished surfaces; use rigid protective walkways as needed.

3.17**INSTALLATION OF THERMOFUSIBLE CAP SHEET ON FLASHINGS AND PARAPETS**

- .1 This cap sheet must be installed in one-metre-wide strips (3.25 ft).
- .2 Each selvage will overlap the previous one laterally along lines provided for this purpose, and will overlap by 150 mm (6 in) the field surface. Membranes for flashings must be spaced at least 100 mm (4 in) with respect to the cap sheet membranes on the field surface, to avoid areas of excessive membrane thickness.
- .3 Cut off corners at end laps on areas to be covered by the next roll.
- .4 Use a chalk line to draw a straight line on the field surface, 150 mm (6 in) from flashings and parapets.
- .5 Use a torch and round-nose trowel to embed the surface granules in the layer of hot bitumen, starting from the chalk line on the field surface to the bottom edge of the flashing or parapet, as well as on the granulated vertical surfaces to be overlapped.
- .6 This cap sheet will be heat-welded directly to the base sheet membrane, proceeding from bottom to top.
- .7 Avoid the formation of wrinkles, swellings or fishmouths.
- .8 During installation, be careful not to overheat the membrane and its reinforcements.

3.18**INSTALLATION OF WALKWAYS**

- .1 Install walkways in compliance with requirements previously stipulated for cap sheet installation. Apply primer to cap sheet before installing walkways.

3.19 WATERPROOFING FOR VARIOUS DETAILS

- .1 Install waterproofing membranes at various roofing details in conformance with typical details indicated in technical documentation of the manufacturer.

3.20 CLEANING

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by work of this section.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Place materials defined as hazardous or toxic in designated containers.
 - .2 Clearly label location of salvaged material's storage areas and provide barriers and security devices.
 - .3 Ensure emptied containers are sealed and stored safely.
 - .4 Divert unused aggregate materials from landfill to local facility for reuse as reviewed by Departmental Representative.
 - .5 Unused paint and coating material must be disposed of at official hazardous material collections site as reviewed by Departmental Representative.
 - .6 Unused adhesive, sealant and asphalt materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
 - .7 Dispose of unused adhesive material at official hazardous material collections site approved by Departmental Representative.
 - .8 Dispose of unused sealant material at official hazardous material collections site approved by Departmental Representative.
 - .9 Dispose of unused asphalt material at official hazardous material collections site approved by Departmental Representative.
 - .10 Divert unused gypsum materials from landfill to recycling facility as reviewed by Departmental Representative.

- END OF SECTION -

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 07 92 00 – Joint sealants

1.2 REFERENCES

- .1 The Aluminum Association Inc. (AAI)
 - .1 AAI-Aluminum Sheet Metal Work in Building Construction-2002.
 - .2 AAI DAF45-03, Designation System for Aluminum Finishes.
- .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A167-99(2004), Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM A240/A240M-07e1, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - .3 ASTM A606-04, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
 - .4 ASTM A653/A653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .5 ASTM A792/A792M-06a, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .3 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual 1997.
- .4 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.
- .5 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.
- .6 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.
- .7 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

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 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 Province of Ontario, 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 and cleaning procedures.

1.4 QUALITY ASSURANCE

- .1 Pre-Installation Meetings: convene pre-installation meeting two weeks prior to beginning work of this Section, with contractor's representative and Departmental Representative in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS**2.1 SHEET METAL MATERIALS**

- .1 Zinc coated steel sheet: commercial quality to ASTM A653/A653M, with Z275 designation zinc coating.

- .2 Stainless steel sheet: to ASTM A240/A240M, Type 304 with no. 4 finish.

2.2 PREFINISHED STEEL SHEET

- .1 The VOC content of the surface coatings and retouching products of prefinished sheet metal shall not exceed 250 g / L.
- .2 Prefinished steel with factory applied silicone modified polyester.
 - .1 Class F1S.
 - .2 Colour selected by Departmental Representative from manufacturer's standard range.
 - .3 Specular gloss: 30 units +/- 5 in accordance with ASTM D523.
 - .4 Coating thickness: not less than 25 micrometres.
 - .5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D822 as follows:
 - .1 Outdoor exposure period 1000 hours.
 - .2 Humidity resistance exposure period 1000 hours.

2.3 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Plastic cement: to CAN/CGSB 37.5.
- .3 Underlay for metal flashing: dry sheathing to CAN/CGSB-51.32.
- .4 Sealants: in accordance with Section 07 92 00 - Joint Sealants
- .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 flashing application.
- .7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .8 Touch-up paint: as recommended by prefinished material manufacturer.
- .9 For membrane piercing work, fasteners shall be of the screw type only.

2.4 FABRICATION

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

2.5 METAL FLASHINGS

- .1 Form flashings, copings and fascias must be shaped to the profiles indicated.

2.6 SCUPPERS

- .1 Form scuppers from stainless steel.
- .2 Sizes and profiles as indicated.
- .3 Provide necessary fastenings.

PART 3 EXECUTION**3.1 MANUFACTURER'S INSTRUCTIONS**

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

3.2 INSTALLATION

- .1 Install sheet metal work as detailed.
- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal.
 - .1 Secure in place and lap joints 100 mm.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
 - .1 Flash joints using as detailed.
- .5 Lock end joints and caulk with sealant.
- .6 Caulk flashing at cap flashing with sealant.
- .7 Install pans, where shown around items projecting through roof membrane.

3.3 SCUPPERS

- .1 Install scuppers as indicated.

3.4 CLEANING

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

END OF SECTION

ROOF ACCESSORIES**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 07 52 16 - Modified SBS Elastomeric Bituminous Membrane Roofing
- .2 Section 07 62 00 - Sheet Metal Flashing and Trim
- .3 Section 07 92 00 - Joint sealants
- .4 Division 22 - Plumbing
- .5 Division 23 - Heating, Ventilating and Air-Conditioning (HVAC)
- .6 Division 26 - Electrical

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM A506-12, Standard Specification for Alloy and Structural Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled.
 - .2 ASTM B370-11e1, Standard Specification for Copper Sheet and Strip for Building Construction.
 - .3 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .4 ASTM D2369-10e1, Standard Test Method for Volatile Content of Coatings.
 - .5 ASTM D2832-2011, Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
 - .6 ASTM D5116-10, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
- .2 CSA International
 - .1 CSA B111-1974(R2005), Wire Nails, Spikes and Staples.
- .3 Green Seal Environmental Standards (GS)
 - .1 GS-11-11, Standard for Paints and Coatings.
 - .2 GS-36-11, Standard for Adhesives for Commercial Use.
- .4 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
 - .1 MPI #76, Primer, Alkyd, Quick Dry, for Metal.

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 roof hatches 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.

ROOF ACCESSORIES

- .1 Indicate VOC's for caulking materials during application and curing.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .1 Indicate size and description of components, materials, attachment devices, description of frame and finish, and construction details.
 - .4 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.
 - .5 Maintenance instructions
 - .6 Provide maintenance instructions for each roof accessory to incorporate in the maintenance manual in accordance with Section 01 78 00 - Closeout Submittals.

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 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Submit operation and maintenance data for hardware complete with pertinent details, spare parts lists and warnings against harmful maintenance materials and practices for incorporation into manual.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect roof 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, packaging materials as specified in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

ROOF ACCESSORIES**PART 2 PRODUCTS****2.1 MATERIALS**

- .1 Steel sheet: regular quality alloy steel to ASTM A506.
- .2 Galvanized steel sheet: commercial quality to ASTM A653/A653M, Z275 designation zinc coating.
- .3 Examine architectural, mechanical, and electrical drawings, and provide roofing accessories as required for the entire project. The items shown on the drawings are typical and do not include all the specific conditions. They are there to establish a general level of acceptability for the quality and performance of roofing accessories.
- .4 Provide products that meet the following requirements:
 - .1 Complies with CSA B272-93 (Prefabricated Waterproof Roof Vent Flashing);
 - .2 Maintenance free design.
- .5 Removable Vent Cap Flashing: Vent Flashing: 457mm high removable flashing cap; 1100-0T aluminum alloy matte surface, 1.6mm; in accordance with CSA B272-93; with removable cap and EPDM base gasket; apron at the level of the support covered with a bituminous primer; stainless steel cap against vandalism.
 - .1 .1 Approved Product: Model SJ-27 by Thaler Metal Industries or equivalent approved by the Architect.
- .6 Roof flange: 610mm high high gauge galvanized steel, miter and welded joints, integral backing plate, pressure treated wood nailing base and insulated with 38mm thick fiberglass panel. thickness, complete with prefinished internal walls for the edges.
 - .1 Approved Product: Model RT-3 by Journault Jourplex or equivalent approved by architect.
- .7 Insulated rim cover: conforms to the requirements of the roof edge and according to the manufacturer's recommendations.
- .8 Provide other items as required, including pipe supports, pipe flashing, cable tie flashing, etc. of the same quality as the specified items.
- .9 Coordinate with appropriate architectural, mechanical and electrical sections to establish correct sizes and positions of items.
- .10 Sealants: refer to section 07 92 00 - Joint sealants.

PART 3 EXECUTION**3.1 EXAMINATION**

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

ROOF ACCESSORIES**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 Erect components plumb, level and in proper alignment.
- .2 Ensure continuity of building envelope air barrier and vapour retarder systems.
- .3 Adjust and seal assembly with provision for expansion and contraction of components.
- .4 Secure prefabricated curb assembly to structure.
- .5 Coat aluminum and copper in contact with dissimilar materials, with isolation coating.
- .6 Secure and seal frame to curb.

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 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 roof hatch installation.

END OF SECTION

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 07 52 16 - Modified SBS Elastomeric Bituminous Membrane Roofing
- .2 Section 07 62 00 - Sheet Metal Flashing and Trim
- .3 Section 07 92 00 - Joint sealants
- .4 Division 22 - Plumbing
- .5 Division 23 - Heating, Ventilating and Air-Conditioning (HVAC)
- .6 Division 26 - Electrical

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .3 ASTM A500/A500M-10a, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- .2 CSA International
 - .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.
 - .3 CSA W55.3-08, Certification of Companies for Resistance Welding of Steel and Aluminum.
- .3 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
 - .1 MPI #101, Primer, Epoxy, Anti-Corrosive, for Metal.
- .4 The Society for Protective Coatings (SSPC)
 - .1 SP -2-04, Hand-Tool Cleaning.

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 roof anchors and safety restraints and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

- .1 Indicate component profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- .2 Indicate welded connections using standard welding symbols include net weld lengths.
- .2 Submit design data and calculations.

1.4 QUALITY ASSURANCE

- .1 Design structural support framing components and site inspect installation under direct supervision of Professional Structural Engineer experienced in design of this Work and licensed in the Province of Ontario Canada.
- .2 Qualifications:
 - .1 Welder's qualifications: welders certification to CSA W55.3
 - .1 Employ qualified and licensed welders possessing certificates for each procedure to be performed.
 - .2 Each welder to possess identification symbol issued by authority having jurisdiction.
 - .2 Welding company certification: certified for fusion welding of steel structures to CSA W47.1
 - .3 Manufacturer Qualifications: company specializing in manufacturing products specified in this section with minimum 3 years documented experience.

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 roof anchors and safety restraints from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

- .1 Personal Restraint Assembly: Posts, steel rope loops, and attachments to resist lateral forces of 3 kN at any point and in all directions, without damage or permanent set.

2.2 MATERIALS

- .1 Steel Sections and Plates: CSA G40.20M/G40.21.
- .2 Steel Tubing: ASTM A500/A500M, Grade B.
- .3 Steel Rings: forged steel, ring thickness determined by imposed loads.

- .4 Steel Cable (between post travel restraints): minimum 9 mm diameter, spiral wound multi-strand stainless steel aircraft cable.
- .5 Bolts, Nuts, and Washers for Stainless Steel: stainless steel, matte finish.
- .6 Gaskets Under Anchors: neoprene pads, compatible with roof membrane, cut to size.
- .7 Welding Materials: CSA W47.1 for materials being welded.
- .8 Shop Primer: MPI #101, 2 coats.

2.3 FABRICATION

- .1 Fit and shop assemble items in largest practical sections, for delivery to site.
- .2 Fabricate items with joints tightly fitted and secured.
- .3 Continuously seal joined members by intermittent welds and plastic filler.
- .4 Grind exposed joints flush and smooth with adjacent finish surface.
 - .1 Make exposed joints butt tight, flush, and hairline.
 - .2 Ease exposed edges to small uniform radius.
- .5 Exposed Mechanical Fastenings: screws or bolts; consistent with design of component.
- .6 Furnish and install components required for anchorage of fabrications.
- .7 Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.4 FABRICATION TOLERANCES

- .1 Squareness: 3 mm maximum difference in diagonal measurements.
- .2 Maximum Deviation from Plane: 1.5 mm from 1 m.

2.5 FINISHES

- .1 Prepare uncoated steel (restraint post) surfaces: SSPC-SP 2, no more than 4 hours before applying epoxy primer.
- .2 Concealed steel anchors, clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- .3 Do not prime surfaces in direct contact with concrete or where field welding is required.
- .4 Concealed Structural Components and Anchors: galvanize after fabrication to ASTM A123/A123M to minimum 600 g/sq m galvanized coating.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for roof anchors and safety restraint installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

.2 Verify dimensions, tolerances, and method of attachment with other work.

3.2 PREPARATION

.1 Supply and install steel items required to be cast into concrete as clean uncoated metal, with setting templates to appropriate sections.

3.3 ERECTION TOLERANCES

.1 Maximum Variation from Plumb and Level: 3 mm.

3.4 INSTALLATION

.1 Install items plumb and level, accurately fitted, free from distortion or defects.

.2 Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

.3 Field weld components as indicated on shop drawings.

.4 Obtain approval from Departmental Representative prior to site cutting or making adjustments not scheduled.

.5 After erection, apply primer in accordance with MPI Painting Manual to: welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

.6 Thread aircraft cable through eye-lets at top of post, to linear roof coverage of post restraints; pressure crimp cable ends.

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 reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

3.6 PROTECTION

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

.2 Repair damage to adjacent materials caused by roof anchors and safety restraint installation.

END OF SECTION

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 07 21 29.03 - Sprayed insulation polyurethane foam
- .2 Section 09 91 23 - Interior Painting
- .3 Division 22 - Plumbing
- .4 Division 23 - Heating, Ventilating and Air-Conditioning (HVAC)
- .5 Division 26 - Electrical

1.2 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .2 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN-ULC-S101-04, Standard Methods of fire Endurance Tests of Building Construction and Materials.
 - .2 CAN-ULC-S102-03, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.
- .3 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Test Reports:
 - .1 Submit product data including certified copies of test reports verifying fireproofing applied to substrate as constructed on project will meet or exceed requirements of Specification.
 - .2 Submit test results in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
 - .3 For assemblies not tested and rated, submit proposals based on related designs using accepted fireproofing design criteria.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence 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.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: person specializing in sprayed-on fireproofing approved by manufacturer with 5 years of documented experience.
- .2 Mock-ups:
 - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
 - .2 Apply fireproofing to approximately 10 m² area of surfaces of mock-up-matching surface to be treated.
 - .3 Mock-up will be used:
 - .1 To judge workmanship, substrate preparation, operation of equipment and material application.
 - .4 Locate where directed.
 - .5 Allow 48 hours for inspection of mock-up by Departmental Representative before proceeding with fireproofing 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.
- .3 Site Meetings:
 - .1 Convene pre-installation meeting two weeks prior to beginning work of this Section, with contractor's representative and Departmental Representative in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Charts to:
 - .1 Verify Project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
 - .2 Prior to start of Work arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work.
 - .3 Hold project meetings every 2 weeks.
 - .4 Ensure key personnel, site supervisor, project manager and subcontractor representatives attend.
 - .5 Departmental Representative will provide written notification of change to meeting schedule established upon contract award 48 hours prior to scheduled meeting.
- .4 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
 - .1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver packaged materials in original unopened containers, marked to indicate brand name, manufacturer and ULC markings.
- .2 Storage and Protection:
 - .1 Store materials indoors and in dry location.
 - .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
 - .3 Damaged or opened containers will be rejected.
 - .4 Packaging to indicate shelf-life and materials to be applied prior to expiration of shelf-life.
 - .5 Provide temporary enclosures to prevent spray from contaminating air beyond application area.
 - .6 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of fireproofing materials.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 AMBIENT CONDITIONS

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

PART 2 PRODUCTS**2.1 MATERIALS**

- .1 Projective fire retardant: cementitious (based on 60% to 80% Portland cement), ULC listed and approved for use in specified ULC models.
 - .1 Acceptable Products: "Monokote Z-106" manufactured by Grace Construction Products Ltd. or equivalent approved by the architect.

- .2 Fire retardant to be applied by rigid insulation (thermal barrier): cementitious, ULC approved and approved for use in specified ULC models.
 - .1 Acceptable Products: "Monokote Z-3306" manufactured by Grace Construction Products Ltd. or equivalent approved by the architect.
- .3 Curing compound: of the type recommended by the manufacturer of the flame retardant and approved for use in the case of specified ULC models.
- .4 Sealing compound: the type recommended by the flame retardant manufacturer and approved for use in specified ULC models.
- .5 Water: free from acids, alkalis or other organic matter that could harm the result, and potable.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

- .1 Substrate: free of material, which would impair bond.
- .2 Verify that painted substrates are compatible and have suitable bonding characteristics to receive fireproofing.
- .3 Remove incompatible materials.
- .4 Ensure that items required to penetrate fireproofing are placed before installation of fireproofing.
- .5 Ensure that ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is completed.

3.3 APPLICATION

- .1 Apply bonding adhesive or primer to substrate if recommended by manufacturer.
- .2 Apply fireproofing to achieve a coating to meet fire resistance requirements as shown in drawings and CAN-ULC S124 requirements for thermal barrier.
- .3 Apply fireproofing over substrate, building up to required thickness to cover substrate with monolithic blanket of uniform density and texture.
- .4 Apply fireproofing directly to open web joists without use of expanded lath.
- .5 Tamp smooth, surfaces visible in finished work.
- .6 Apply curing compound to surface of cementitious fireproofing as required by manufacturer.
- .7 Apply sealer to surface of mineral fibre fireproofing as required by manufacturer in ventilation plenums and where fireproofing is to be painted and as indicated.

3.4 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:

- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.
- .2 Inspection and Site Tests:
- .1 Inspection and testing of fireproofing will be carried out by Testing Laboratory designated by Departmental Representative.
 - .2 Departmental Representative will pay costs for testing, as specified in Section 01 29 83 - Payment Procedures: Testing Laboratory Services.

3.5 PATCHING

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

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Clean surfaces not indicated to receive fireproofing of sprayed material within 24 hours period after application.
- .3 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL**1.1 CONTENT**

- .1 The present section looks at systems of fire and smoke barriers not prescribed in any other section or to which the other sections refer to.
- .2 Refer to relevant sections for requirements relating to any other systems of fire and smoke barriers.
- .3 Systems of fire and smoke barriers used in various installations must be coordinated with those prescribed in other sections. Preferably, only one product, by same manufacturer, shall be used for all joints of same kind throughout work.

1.2 RELATED REQUIREMENTS

- .1 Section 07 81 00 - Applied Fireproofing
- .2 Section 07 92 00 - Joint sealants
- .3 Section 09 21 16 - Gypsum Board Assemblies
- .4 Section 09 22 16 - Non-structural Metal Framing
- .5 Division 22 - Plumbing
- .6 Division 23 - Heating, Ventilating and Air-Conditioning (HVAC)
- .7 Division 26 - Electrical

1.3 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .2 Underwriter's Laboratories of Canada (ULC)
 - .1 ULC-S115-1995, Fire Tests of Fire stop Systems.

1.4 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.

1.5 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.
- .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-U LC-S101 for fire endurance and CAN-U LC-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.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: person specializing in fire stopping installations approved by manufacturer with 5 documented experience.
- .2 Pre-Installation Meetings: convene pre-installation meeting two week prior to beginning work of this Section, with contractor's representative and Departmental Representative in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GAN TT) Chart to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

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

PART 2 PRODUCTS**2.1 MATERIALS**

- .1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
 - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended.
 - .2 Fire stop system rating: as indicated on drawings or in accordance with systems already in place.
 - .1 Reference product: A/D Firebarrier Silicone compound for 1 h and 2 h ULC and FM systems.
 - .2 Reference product: A/D Firebarrier for 1 h and 2 h ULC and FM systems.
- .2 Service penetration assemblies: systems tested to CAN-ULC-S115, appearing in manual # 40 U19 published by ULC.
- .3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115, appearing in manual # 40 U19.13 and # 40 U19.15 published by ULC.
- .4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

- .9 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.
- .10 Sealants for vertical joints: non-sagging.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

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

3.3 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

3.4 SEQUENCES OF OPERATION

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

3.5 FIELD QUALITY CONTROL

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

3.6 LOCATION OF FIRESTOPPING SYSTEMS

- .1 Fire stop and smoke seal at:
 - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
 - .2 Edge of floor slabs at curtain wall and precast concrete panels.
 - .3 Top of fire-resistance rated masonry and gypsum board partitions.
 - .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
 - .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
 - .6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
 - .7 Openings and sleeves installed for future use through fire separations.
 - .8 Around mechanical and electrical assemblies penetrating fire separations.
 - .9 Rigid ducts: greater than 129 cm² : fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

3.7 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

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 05 50 00 – Metal Fabrications.
- .2 Section 06 40 00 – Architectural Woodwork.
- .3 Section 07 42 43 – Composite Wall Panels
- .4 Section 07 62 00 – Sheet Metal Flashing and Trim
- .5 Section 08 11 00 – Metal Doors and Frames
- .6 Section 08 50 00 – Windows
- .7 Section 09 21 16 – Gypsum Board Assemblies

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM C919-08, Standard Practice for Use of Sealants in Acoustical Applications.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
 - .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
 - .3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
 - .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
 - .5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.
- .3 General Services Administration (GSA) - Federal Specifications (FS)
 - .1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.

- .2 Manufacturer's product to describe:
 - .1 Caulking compound.
 - .2 Primers.
 - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- .3 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 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.

1.4 CLOSEOUT SUBMITTALS

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

1.5 DELIVERY, STORAGE AND HANDLING

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

1.6 SITE CONDITIONS

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

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

1.7 ENVIRONMENTAL REQUIREMENTS

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

1.8 WARRANTY

- .1 For work subject to this section, section 07 92 00 – Joint Sealants, the 12 month warranty period is extended to 60 months.
- .2 For each section with caulking to perform, provide a guarantee stating that sealing work is guaranteed against deterioration, cracking, erosion, loss of consistency, contraction, leakage, loss of adhesion and cohesion and tarnishing and staining of adjacent surfaces.

PART 2 PRODUCTS

2.1 SEALANT MATERIALS

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

2.2 SEALANT MATERIAL DESIGNATIONS

- .1 Sealant for acoustic insulation: to CAN/ULC-S115, ITS (STC) 52 minimum.
 - .1 Type: Single component Acrylic Latex sealant
 - .2 Color: White.
 - .3 Solids: 65%
 - .4 VOC Content: 35 g/L
 - .5 Approved products: "Tremstop Acrylic" or equivalent approved by the architect.
- .2 Mold Resistant Interior Sealant: to CAN / CGSB 19-GP-22M.
 - .1 One-part, acetoxycure silicone rubber sealant.
 - .2 Flow, sag or slump (ASTM C629): None
 - .3 Application temperature range: -37 ° C to 60 ° C
 - .4 After ripening for 7 days at 25 ° C and 50% RH
 - .1 Ultimate Tensile Strength (ASTM D412): 2.1 mPa
 - .2 Tear Strength (ASTM D624): 4.4 N / m
 - .3 Peel strength (ASTM C794): 3.5 N / m
 - .5 Color: transparent white

JOINT SEALANTS

- .6 Approved Products: "Dow Corning 786" or equivalent approved by the Architect.
- .3 Exterior Sealant: One-component Silicone Sealant Neutral.
 - .1 Ultra-low-modulus, one-part, neutral-cure silicone sealant
 - .2 Flow, sag or Slump (ASTM D2202): None
 - .3 Curing time, 50% RH, 25 ° C 10mm thickness (ASTM C679): 7 to 14 days
 - .4 Full adhesion, hardened joint: 14 to 21 days
 - .5 Maximum VOC Content: 23 g / L
 - .6 As Cured after 7 days at 25 ° C and 50% RH
 - .1 Tensile Strength, maximum (ASTM D412): 0.70 kg/mm²
 - .2 Peel Strength (ASTM C794): 4.46 kg/mm²
 - .7 Color: To be chosen by the Consultant.
 - .8 Approved Products: "Dow Corning 790" or equivalent approved by the Architect.
- .4 Floor Sealant: two-component, premium-grade, polyurethane-based, elastomeric sealant material to CAN / CGSB 19.24-M90, approved by the USDA and approved by the Canadian Environmental Agency. food inspection.
 - .1 Joint movement: ± 50%
 - .2 Tear strength (ASTM D624): 7.88 N/mm
 - .3 Tensile strength at break (ASTM D412): 0.62 mPa
 - .4 Curing Rate (ASTM C679):
 - .1 Touch dry: 8 to 10 hours
 - .2 Final cure: 3 days
 - .5 Color To be chosen by the Consultant.
 - .6 Approved Products: "Sikaflex 2c NS EZ Sika" or equivalent approved by the architect.
- .5 Preformed compressible and non-compressible back-up materials:
 - .1 Polyethylene, urethane, neoprene or vinyl foam:
 - .1 Extruded closed cell foam backer rod.
 - .2 Size: oversize 30 to 50 %.
 - .2 Neoprene or butyl rubber:
 - .1 Round solid rod, Shore A hardness 70.
 - .3 High density foam:
 - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m³ density, or neoprene foam backer, size as recommended by manufacturer.
 - .4 Bond breaker tape:
 - .1 Polyethylene bond breaker tape which will not bond to sealant.
- .6 Preformed sealants:
 - .1 The sealant system will be pre-formed, pre-compressed and self-expanding. The expansion foam will be cellular foam impregnated with a water-based, non-drying acrylic polymer.
 - .2 Approved Products: "Emseal Backerseal" or equivalent approved by Architect.

2.3 JOINT CLEANER

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

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 SURFACE PREPARATION

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

3.3 PRIMING

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

3.4 BACKUP MATERIAL

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

3.5 MIXING

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

3.6 APPLICATION

- .1 Sealant:

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

3.7 **CLEANING**

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

3.8 **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

METAL DOORS AND FRAMES**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 05 50 00 – Metal Fabrications
- .2 Section 06 10 00 – Rough Carpentry
- .3 Section 07 21 16 – Blanket Insulation
- .4 Section 07 27 00 – Air Barriers
- .5 Section 07 92 00 – Joint Sealants
- .6 Section 08 71 00 – Door Hardware
- .7 Section 08 80 50 – Glazing
- .8 Section 09 21 16 – Gypsum Board Assemblies
- .9 Section 09 90 00 – Interior, Exterior Paints and Coatings
- .10 Division 26 – Electricity

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A653/A653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-G40.20-F04/G40.21-F04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W59-F03, 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.
- .6 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.

METAL DOORS AND FRAMES

- .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 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 for ratings specified or indicated.
 - .3 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104 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 Province of Ontario, Canada.
 - .2 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, louvred, arrangement of hardware fire rating and finishes.
 - .3 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings reinforcing or 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 samples in accordance with Section 01 33 00 - Submittal Procedures.
- .5 Submit one 300 x 300 mm corner sample of each type of frame.
 - .1 Show butt cutout, glazing stops, snap-on trim with clips and 300 mm long removable mullion connection.

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 incorporation into manual.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:

METAL DOORS AND FRAMES

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

PART 2 PRODUCTS**2.1 MATERIALS**

- .1 Steel doors:
 - .1 Hot dipped galvanized steel sheet: to ASTM A653M, ZF75 zinc coating, and minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.
 - .2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653M, ZF75 zinc coating.

2.2 DOOR CORE MATERIALS

- .1 Honeycomb construction:
 - .1 Structural small cell, 24.5 mm maximum kraft paper 'honeycomb', weight: 36.3 kg per ream minimum, density: 16.5 kg/m³ minimum sanded to required thickness. Product with no added urea-formaldehyde.
 - .2 Hollow Steel Insulated core:
 - .1 Polyurethane: to CGSB 51-GP-21M.rigid, modified polyisocyanurate, closed cell board. Density 32 kg/m³.

2.3 ADHESIVES

- .1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
- .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.

2.4 PRIMER

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

2.5 PAINT

- .1 Field paint steel doors and frames in accordance with Section 09 90 00 - Interior, Exterior Paints and Coatings. Protect weather-strips from paint. Provide final finish free of scratches or other blemishes.

2.6 ACCESSORIES

- .1 Door silencers: single stud rubber/neoprene type.
- .2 Horizontal closing profiles:
 - .1 Exterior top caps: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.

METAL DOORS AND FRAMES

- .3 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
- .4 Metallic paste filler: to manufacturer's standard.
- .5 Fire labels: metal riveted.
- .6 Sealant Products: silicone based, mold resistant, in accordance with section 07 92 00 - Joint Sealants.
- .7 Glazing: tempered glass, in accordance with 08 80 50 – Glazing.
- .8 Make provisions for glazing as indicated and provide necessary glazing stops.
 - .1 Provide removable stainless steel glazing beads for use with glazing tapes and compounds and secured with countersunk stainless steel screws.
 - .2 Design exterior glazing stops to be tamperproof.

2.7 FRAMES FABRICATION GENERAL

- .1 Fabricate frames in accordance with CSDMA specifications.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Exterior frames: 1.6 mm welded, thermally broken type construction.
- .4 Interior frames: 1.6 mm welded.
- .5 Exterior and interior frames larger than 915 mm: 1.9 mm thickness, welded.
- .6 Blank, reinforce, drill and tap frames for mortised, templated hardware, electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
- .7 Protect mortised cut-outs with steel guard boxes.
- .8 Prepare frame for door silencers, 3 for single door, 2 at head for double door.
- .9 Manufacturer's nameplates on frames and screens are not permitted.
- .10 Conceal fastenings except where exposed fastenings are indicated.
- .11 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
- .12 Insulate exterior frame components with polyurethane insulation.

2.8 FRAME ANCHORAGE

- .1 Provide appropriate anchorage to floor and wall construction.
- .2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
- .3 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.
- .4 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

METAL DOORS AND FRAMES**2.9 FRAMES: WELDED TYPE**

- .1 Welding in accordance with CSA W59.
- .2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.
- .3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.
- .4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
- .5 Securely attach floor anchors to inside of each jamb profile.
- .6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.10 DOOR FABRICATION GENERAL

- .1 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.
- .2 Exterior doors: hollow steel construction. Interior doors: honeycomb construction.
- .3 Blank, reinforce, drill doors and tap for mortised, templated hardware as well as electronic hardware.
- .4 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.
- .5 Reinforce doors where required, for surface mounted hardware. Provide flush PVC top caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.
- .6 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
- .7 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in conformance with CAN4-S104 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.
- .8 Manufacturer's nameplates on doors are not permitted.

2.11 DOORS: HONEYCOMB CORE CONSTRUCTION

- .1 Form face sheets for exterior doors from 1.6 mm sheet steel with honeycomb polyurethane core laminated under pressure to face sheets.
- .2 Form face sheets for interior doors from 1.6 mm sheet steel with honeycomb core laminated under pressure to face sheets.

2.12 THERMALLY BROKEN DOORS AND FRAMES

- .1 Fabricate thermally broken doors by using insulated core and separating exterior parts from interior parts with continuous interlocking thermal break, installed mechanically.
- .2 Thermal break: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.

METAL DOORS AND FRAMES**PART 3 EXECUTION****3.1 MANUFACTURER'S INSTRUCTIONS**

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

3.2 INSTALLATION GENERAL

- .1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.
- .2 Install doors and frames to CSDMA Installation Guide.

3.3 FRAME INSTALLATION

- .1 Set frames plumb, square, level and at correct elevation.
- .2 Secure anchorages and connections to adjacent construction.
- .3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.
- .4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.
- .5 Caulk perimeter of frames between frame and adjacent material.
- .6 Maintain continuity of air barrier and vapour retarder.

3.4 DOOR INSTALLATION

- .1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.
- .2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
 - .1 Hinge side: 1.0 mm.
 - .2 Latch side and head: 1.5 mm.
 - .3 Finished floor, top of carpet, non-combustible sill and thresholds: 13 mm.
- .3 Adjust operable parts for correct function.
- .4 Install louvres.

3.5 FINISH REPAIRS

- .1 Touch up with primer finishes damaged during installation.
- .2 Fill exposed frame anchors surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.6 GLAZING

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

END OF SECTION

FLUSH WOOD DOORS**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 08 11 00 - Metal Doors and Frames.
- .2 Section 08 71 00 - Door Hardware.
- .3 Section 09 90 00 - Interior, Exterior Paints and Coatings

1.2 REFERENCES

- .1 Architectural Woodwork Manufacturers Association of Canada (AWMAC).
 - .1 Quality Standards for Architectural Woodwork 1998.
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-71.19-M88, Adhesive, Contact, Sprayable.
 - .2 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
- .3 Canadian Standards Association (CSA International).
 - .1 CSA A440.2-98, Energy Performance of Windows and Other Fenestration Systems.
 - .2 CSA O115-M1982(R2001), Hardwood and Decorative Plywood.
 - .3 CAN/CSA O132.2 Series-90(R1998), Wood Flush Doors.
 - .4 CAN/CSA-O132.5-M1992(R1998), Stile and Rail Wood Doors.
 - .5 CAN/CSA-Z808-96, A Sustainable Forest Management System: Guidance Document.
 - .6 CSA Certification Program for Windows and Doors 00.
- .4 Environmental Choice Program (ECP).
 - .1 CCD-045-92, Sealants and Caulking Compounds.
 - .2 CCD-046-92, Adhesives.
- .5 National Fire Protection Association (NFPA).
 - .1 NFPA 80-1999, Standard for Fire Doors and Fire Windows.
 - .2 NFPA 252-1999, Standard Method of Fire Tests of Door Assemblies.
- .6 Underwriters' Laboratories of Canada (ULC).
 - .1 CAN-4S104M-80(R1985), Fire Tests of Door Assemblies.
 - .2 CAN4-S105M-85 (R1992), Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:

FLUSH WOOD DOORS

- .1 For caulking materials during application and curing.
- .2 For door materials and adhesives.

.2 Shop Drawings:

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate door types and cutouts for lights, louvres, sizes, core construction, transom panel construction and cutouts.

1.4 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit one 300 x 300 mm corner sample of each type wood door.
- .3 Show door construction, core, glazing detail and faces.
- .4 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.

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 incorporation into manual.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Wood fire rated doors: labelled and listed by an organization accredited by Standards Council of Canada.
- .2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Pre-installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section 01 31 19 Project Meetings.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Storage and Protection:
 - .1 Protect doors from dampness. Arrange for delivery after work causing abnormal humidity has been completed.
 - .2 Store doors in well ventilated room, off floor, in accordance with manufacturer's recommendations.
 - .3 Protect doors from scratches, handling marks and other damage. Crate doors.
 - .4 Store doors away from direct sunlight.

1.8 WASTE MANAGEMENT AND DISPOSAL

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

FLUSH WOOD DOORS

- .2 Dispose of corrugated cardboard, polystyrene and plastic packaging material in appropriate on-site bin for recycling in accordance with site waste management program.
- .3 Unused or damaged glazing materials are not recyclable and must not be diverted to municipal recycling programs.
- .4 Divert unused adhesive material from landfill to official hazardous material collections site approved by Departmental Representative.
- .5 Do not dispose of unused paint materials into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 PRODUCTS**2.1 FLUSH WOOD DOORS**

- .1 Solid core: to CAN/CSA-O132.2.1.
 - .1 Construction:
 - .1 Manufacture doors to ANSI/WDMA I.S. 1A-13 Heavy Duty performance level.
 - .2 Faces of wood veneered doors intended for transparent finish: with stain, A Grade, Quarter Cut, Book Match, Run Match, Birch.
 - .3 Identify doors in pairs and sets on door schedule by door numbers, including doors separated by a mullion.
 - .4 Provide UF Free composite crossband. Wood crossband is not permitted.
 - .5 Adhesives: AWS Type I.
 - .6 Laminating adhesives, on-site and shop-applied must not contain added urea-formaldehyde resins.
 - .2 Non-Rated Wood Doors
 - .1 Core for non-rated doors: Particleboard
 - .2 Stiles for non-rated doors: structural composite lumber laminated to hardwood.
 - .3 Top and bottom rails for non-rated doors: structural composite lumber.
 - .4 Acceptable product:
 - .1 "5-FSPC-EME", as manufactured by Lambton Doors or equivalent approved by the Departmental Representative.
 - .3 Specialty doors
 - .1 Acoustical doors: STC 50, manufacturer's standard. The Sound Transmission Class (STC) specified shall be certified by the manufacturer to be based on tests conducted at an independent testing agency in accordance with ASTM E90 and ASTM E413.
 - .2 Acceptable product:
 - .1 "5-STC50-EME", as manufactured by Lambton Doors or equivalent approved by the Departmental Representative.

2.2 FABRICATION

- .1 Vertical edge strips to match face veneer.
- .2 Provide to match face veneer with mitred corners.

FLUSH WOOD DOORS

- .3 Bevel vertical edges of single acting doors 3 mm in 50 mm on lock side and 1.5 mm in 50 mm on hinge side.
- .4 Radius vertical edges of double acting doors to 60 mm radius.

PART 3 EXECUTION**3.1 EXAMINATION**

- .1 Verify that opening sizes and tolerances are acceptable and ready to receive this work.
- .2 Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

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 Unwrap and protect doors in accordance with CAN/CSA-O132.2 Series, Appendix A.
- .2 Install labelled fire rated doors to NFPA 80.
- .3 Install doors and hardware in accordance with manufacturer's printed instructions and CAN/CSA-O132.2 Series, Appendix A.
- .4 Adjust hardware for correct function.
- .5 Install glazing in accordance with Section 08 80 50 - Glazing.

3.4 ADJUSTMENT

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

3.5 CLEANING

- .1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .2 Remove traces of primer, caulking; clean doors and frames.
- .3 Clean glass and glazing materials with approved non-abrasive cleaner.
- .4 On completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 07 21 13 - Board Insulation
- .2 Section 07 26 16 - Blanket Insulation
- .3 Section 07 21 29.03 - Sprayed Insulation – Polyurethane Foam
- .4 Section 07 27 00 - Air Barriers
- .5 Section 07 42 43 - Composite Metal and Glass Wall Panels
- .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 DEFINITIONS

- .1 Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association– AAMA Glossary.

1.3 PERFORMANCE REQUIREMENTS: FIXED WINDOWS

- .1 Overall performance: A system of windows with aluminum frames must withstand the effects of the following performance requirements without exceeding the performance criteria or failure due to faulty construction, manufacture or installation, or other construction defects.
- .2 Casement windows Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).
 - .1 Performance Class and Grade: AW-PG70-FW
 - .2 Air Infiltration: The test specimen shall be tested in accordance with ASTM E283 at a minimum size of 60" x 99" (1524 x 2515 mm). The level of air infiltration must not be greater than 0.10 pi3m/pi2 to a differential static pressure of 6.24 lb/pi2 (300 Pa). The test specimen shall meet the A3 rating of less than 0.25 (m3/h)/m at 1,57 lb/pi2 (300 Pa) when tested in accordance with CAN/CSA-A440-00 Windows.
 - .3 Water Resistance: The test specimen shall be tested in accordance with ASTM E547 and ASTM E331 at a minimum size of 36" x 60" (914 mm x 1524 mm). There must not be any leakage as defined in the test method to a differential static pressure of 15 lb/pi2 (720 Pa).The test specimen shall meet the B7 rating with no water leakage at 15 lb/pi2 (720 Pa) when tested in accordance with CAN/CSA-A440-00 Windows.
 - .4 Uniform Load Deflection: A minimum difference of static pressure of 70 lb/pi2 (3352 Pa) should be applied in a positive sense, and then in a negative sense, in accordance with ASTM E 330. There must not be any deflection over L/175 of the scope of any framework element. The test specimen shall meet the C5 rating when tested in accordance with CAN/CSA-A440-00 Windows.
 - .5 Uniform Load Structural: A minimum static air pressure difference of 105 lb/pi2 (5028 Pa) shall be applied in the positive and negative direction in accordance with

WINDOWS

- ASTM E330. The unit shall be evaluated after each load and will be subject to a 0.2% maximum permanent deformation.
- .6 Component Testing: Window components shall be tested in accordance with procedures described in AAMA/WDMA/CSA 101/I.S.2/A440 and AAMA 910.
 - .7 Thermal Transmittance (U-Factor): When tested to AAMA Specification 1503, the thermal transmittance (U-Factor) shall not be more than;
 - .1 Insulating glass 1 in. (25.4 mm):
 - .1 Swing casement opening outwards: U-Factor shall not be greater than 0.43 BTU/ h/ft²/°F according to AAMA 1503 with low emissivity coated glass of 1/4 in. (6.35 mm) outside, spacer Technoform TGI, 1/2 inch (12.7 mm), and clear glass of 1/4 inch (6.35 mm) inside.
 - .8 Condensation Resistance Test (CRF): When tested in accordance with AAMA Specification 1503 and CAN/CSA-A440, the condensation resistance factor (CFR) shall not be less than 77 (frame) and 72 (glass)
 - .9 Temperature index (I): provide aluminium windows with established thermal performance in accordance with the CSA-A440 standard at temperature (I) index greater than 73 (frame) and 66 (glass) for AAMC6400 window and 70 (frame) and 67 (glass) for AAMC6500 window.
 - .10 Sound transmission index (STC) and indoor-outdoor transmission index (OITC): when subjected to tests according to AAMA 1801, sound transmission and indoor-outdoor transmission (OITC) indices should not be less in:
 - .1 Insulating glass of 1 in. (25.4 mm) with clear glass 3/16 in. (4.76 mm) outside, spacer 3/8 inch (9.5 mm) aluminum and laminated clear glass of 7/16-inch (11.1 mm) inside:
 - .1 STC must not be less than 38; OITC must not be less than 32.
 - .11 Forced Entry Resistance: All windows shall conform to ASTM F588, Grade 10.
 - .12 Thermal Barrier Test: Thermal break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for curtain wall components, anchorage and fasteners, glass and infill, and internal drainage details and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by the professional engineer who designed the structural support framing, it must be a recognized professional in the Province of Ontario, Canada.
 - .2 Shop drawings must indicate clearly nature of materials, include full size details of the headrail, jambs and window sill, as well as profiles of the constituent elements, showing Interior and exterior trim, the junctions between the combined windows, it must indicate work ratings and details of the anchorages, it must show where to apply protective coating, and include a description of related elements, caulking

WINDOWS

product, as well as exposed finishes, and fasteners. Shop drawings must also indicate location of manufacturer's data plate.

- .4 Samples:
 - .1 Submit each unit for review and acceptance.
 - .2 Samples will be delivered to Contractor and will constitute part of the work.
 - .3 Submit complete window sample full size, for each window type.
 - .4 Samples should clearly show details of blind frame, frame and windowsill, type of glazing and sealing, type of mosquito net, finish and hardware. They should also show location of manufacturer's data plate.
 - .5 Submit 150 mm long samples, for headrail, jambs, support, stiles, mullions, showing elements profiles.
- .5 Product Test Reports:
 - .1 Submit substantiating engineering data, based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency, for glazed aluminum windows, indicating compliance with performance requirements.
 - .2 All test reports that refer to the NAFS standard must include on first page a summary of the results including the following:
 - .1 Manufacturer of the product.
 - .2 Type of product.
 - .3 Model/serial number of product.
 - .4 Main designation of product.
 - .5 Secondary designation of product.
 - .1 Positive pressure.
 - .2 Negative pressure.
 - .3 Pressure test for resistance to water infiltration.
 - .4 Level of infiltration and exfiltration of air acceptable in Canada.
 - .6 Date of completion of tests.
 - .3 Content of report will also include the following information:
 - .1 Testing dates.
 - .2 Dates of report writing.
 - .3 Retention period of test-related information.
 - .4 Location of test facilities.
 - .5 Exhaustive description of test specimens, including notably the following.
 - .1 Anodized finish, weather resistance characteristics.
 - .2 Resistance to condensation.
 - .3 Resistance to breakage in case of fall, with sash windows (vertical translation) only.
 - .4 Blocking-resistance, in case of sliding windows (horizontal translation) only.
 - .5 Pullout resistance (frame) in case of vinyl windows.
 - .6 Resistance to tampering.
 - .7 Resistance to deformation (mullions), in case of combined/composite windows.

WINDOWS

- .6 Complete description of modifications, if necessary.
- .7 Conclusion
- .8 Drawings certified by testing laboratory, if provided.

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 windows for incorporation into manual.

1.6 QUALITY ASSURANCE

- .1 Installer qualifications: company specializing in performing the work of this section with documented experience in installing successfully identical or similar units to those required for this project and other similar projects in size and magnitude.
- .2 Manufacturer qualifications: company specializing in manufacturing the products specified in this section with documented experience, including test reports and calculations.
- .3 Source Limitations: Obtain aluminum curtain wall system through one source from a single manufacturer.
- .4 Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. See Division 01, "Products Requirements". Do not modify size and dimensions.
- .5 Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- .6 Models: build models to verify selections made following submission of samples, demonstrate visual effects and establish quality standards for materials and execution.
- .7 Build a model for indicated window types at locations shown on drawings.
- .8 Pre-installation conferences: hold a conference on project site to meet requirements Division 01 - "Project Management and Coordination".

1.7 AMBIENT CONDITIONS

- .1 Field measurements: check aluminum windows openings by taking measurements on site before fabrication and indicate on shop drawings.

1.8 WARRANTY

- .1 Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.
- .2 Warranty Period: Two (2) years from Date of Substantial Completion of the project.

1.9 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.

WINDOWS

- .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 window 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, 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.

PART 2 PRODUCTS**2.1 WINDOWS**

- .1 Fixed windows: 152 mm frame depth.
 - .1 Acceptable product: AAMC6600 (AW-PG70-FW) series by Kawneer - or equivalent approved by Architect.

2.2 MATERIALS

- .1 Aluminum Extrusions: Alloy and temper recommended by glazed aluminum curtain wall manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.8 mm) wall thickness at any location for the main frame and components.
- .2 Thermal Barrier: The thermal barrier shall be by Kawneer consisting of two parallel glass fiber-reinforced nylon strips installed continuously and mechanically bonded to the aluminum.
- .3 Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.
- .4 Anchors, Clips, and Accessories: Aluminum or nonmagnetic stainless steel complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- .5 Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated
- .6 Sealant: For sealants required within fabricated curtain wall system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.3 GLAZING

- .1 Glazing: Comply with section 08 80 50 "Glazing", for glass and glazing requirements applicable to glazed aluminum window units.

WINDOWS**2.4 ACCESSORY MATERIALS**

- .1 Dividers, support inserts, sealants and adhesion barrier: fixed permanent types, manufacturer's standard, hardness recommended by manufacturer, compatible with sealing products and meeting system performance requirements.
- .2 Gaskets, sealants and grouts for frame system recommended by manufacturer for type of joints.
- .3 Sealants and grouts for perimeter joints of window system as indicated in "Sealants", Division 7.
- .4 Perimeter anchors: when steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
- .5 Optional interior trim: Extruded aluminum, hardness and alloy 6063-T6 extruded in accordance with profiles and details shown.
 - .1 Interior trim: minimum wall thickness of interior moldings will be 0.062 inches (1.57 mm). Face trim is fixed rigidly to a concealed mounting flange. Visible fixings will not be accepted. The mounting flange is extruded aluminum, hardness and alloy 6063-T6. The minimum wall thickness will be 0.062 inch (1.57 mm). Molding flanges will be provided with a length of 4 inches (101.6 mm) and will be installed with a maximum spacing center to center of 18 inches (457.2 mm).
- .6 Coupling mullions: Extruded aluminum, alloy and hardness 6063-T6, according to profiles and dimensions shown on drawings. Mullions must provide structural properties to withstand wind pressure as specified in standards and performance criteria.
- .7 Optional Screens: Extruded aluminum frames, alloy and hardness 6063-T6, corner joints; fibreglass mesh 18 x 16; frame finish to match aluminum windows; Extruded vinyl grooves, removable to allow replacement of screen.
- .8 Security window film for all windows: conforming to UL 972 and ULC-S332 standard:
 - .1 Acceptable product: SF9 Ace Security Laminate or equivalent approved by Departmental Representative.

2.5 FABRICATION (FIXED WINDOWS)

- .1 Fabricate components that, when assembled, have the following characteristics:
 - .1 Profiles that are sharp, straight, and free of defects or deformations.
 - .2 Accurately fit and secure joints and corners. Make joints flush, and weatherproof.
 - .3 Means to drain water through joints, condensation occurring in context of frame elements and moisture moving within system to the outside.
 - .4 Physical and thermal isolation of glazing from framing members.
 - .5 Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - .6 Provisions for glazing replacement onsite.
 - .7 Fasteners, anchors, and connection devices concealed from view to greatest extent possible.
- .2 Window frames: Fabricate assembly components using standard installation instructions from manufacturer.

WINDOWS

- .3 After fabrication clearly indicate on components their respective locations in project as specified in workshop drawings.
- .4 Improved thermal construction: Fabricate aluminum windows with a thermal barrier having low integrated conductance, concealed between exterior materials and window jambs exposed on the inside, so as to eliminate metal to metal direct contact. Thermal barriers shall be designed in accordance with AAMA TIR A8.
- .5 Thermal Barrier: The thermal barrier must be by Kawneer composed of two strips of fiber-reinforced nylon parallel glass installed continuously and mechanically bonded to aluminum.

2.6 ALUMINUM FINISHES FOR WINDOW FRAMES

- .1 Finish coatings: conform to AA (Aluminum Association) designations.
 - .1 Interior: Kawneer PermanodicMC AA-M10C21A31, AAMA 611, Architectural category II transparent anodizing (Natural colour no 17) (standard).
 - .2 Exterior : Kawneer PermafluorMC (70 % PVDF), AAMA 2605, fluoropolymer coating (Couleu QC 56072 Charcoal).

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 INSTALLATION

- .1 Window installation:
 - .1 Install in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
 - .2 Arrange components to prevent abrupt variation in colour.
- .2 Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- .3 Install aluminum framed window system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- .4 Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
- .5 Install aluminum framed window system and components to drain condensation, water penetrating joints, and moisture migrating within system to the exterior.

WINDOWS

- .6 Separate aluminum from dissimilar materials to prevent corrosion or electrolytic action at points of contact
- .7 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 Departmental Representative.

3.3 CLEANING

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

3.4 PROTECTION

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

END OF SECTION

DOOR HARDWARE**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 08 11 00 - Metal Doors and Frames
- .2 Section 08 14 16 - Flush Wood Doors
- .3 Division 26 – Electricity.

1.2 REFERENCES

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

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 Submit for review and acceptance of each unit.

DOOR HARDWARE

- .2 Samples will be returned for inclusion into work.
- .3 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
- .4 After approval samples will be returned for incorporation in Work.

.4 Hardware List:

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

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

.6 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 Extra Stock Materials:**

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

1.6 MAINTENANCE DATA SHEET:

- .1 Provide maintenance data sheet, list of parts and manufacturer's instructions for each type of door, lock, stop door and accessories for emergency exits and attach to maintenance manual referred to in section on General Conditions.
- .2 Instruct maintenance personnel how to clean and take care of hardware parts. Organize a meeting on information and training lasting a minimum of two hours.

1.7 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.

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.

DOOR HARDWARE

- .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 off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect door hardware from nicks, scratches, and blemishes.
 - .3 Protect prefinished surfaces with wrapping or strippable coating.
 - .4 Replace defective or damaged materials with new.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS**2.1 HARDWARE ITEMS**

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

2.2 HARDWARE FOR DOORS

- .1 The function of the hardware will be as listed in architectural hardware groups at the end of this section.
- .2 All lock strikes will be supplied with dust boxes.
- .3 The Subcontractor shall prepare its bid with the materials, accessories and apparatus specified in the specifications and drawings.

2.3 FASTENINGS

- .1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.
- .2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .3 Exposed fastening devices to match finish of hardware.
- .4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.
- .5 Use fasteners compatible with material through which they pass.

2.4 KEYING

- .1 Doors, padlocks and cabinet locks to be as directed. Prepare detailed keying schedule in conjunction with Departmental Representative.
- .2 Supply keys in duplicate for every lock in this Contract.
- .3 Supply 3 master keys for each master key or grand master key group.
- .4 Stamp keying code numbers on keys and cylinders.
- .5 Supply construction cores.

DOOR HARDWARE

- .6 Hand over permanent cores and keys to Departmental Representative.

PART 3 EXECUTION**3.1 INSTALLATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Supply 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 Where door stop contacts door pulls, mount stop to strike bottom of pull.
- .6 Install key control cabinet.
- .7 Use only manufacturer's supplied fasteners.
 - .1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
- .8 Remove construction cores when directed by Departmental Representative.
 - .1 Install permanent cores and ensure locks operate correctly.

3.2 ADJUSTING

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

3.3 CLEANING

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

3.4 DEMONSTRATION

- .1 Keying System Setup and Cabinet:

DOOR HARDWARE

Proposal Ref : 7207528

June 12, 2018

- .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 Departmental 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.

3.5 PROTECTION

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

3.6 SCHEDULE**GROUPE NO. 01**

DOOR(S) #:

100.1 100.2

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	HINGE	5BB1HW 114X102MM NRP	630	IVE
1	POWER TRANSFER	ABLOY EA280 OR SECURITRON EPT	626	ABL
1	EU MORTISE LOCK	L9492LEU 17B RX DM	626	SCH
1	MORTISE CYLINDER	SCHLAGE C, CONSTRUCTION CYLINDER	626	SCH
1	ASTRAGAL	43STST X HEIGHT	630	ZER
1	SURFACE CLOSER	4040XP CUSH	689	LCN
1	KICK PLATE	8400 240MM 2LDW B4E-CS	630	IVE
2	JAMB SEAL	326AA-S X HEIGHT	AA	ZER
1	HEAD SEAL	429AA-S X WIDTH	AA	ZER
1	DOOR SWEEP	8197AA X WIDTH	AA	ZER
1	THRESHOLD	526A X WIDTH	689	ZER

DOOR HARDWARE

Proposal Ref : 7207528

June 12, 2018

GROUPE NO. 02

DOOR(S) #:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	HINGE	5BB1 114X102MM NRP	652	IVE
1	STOREROOM W/DEADBOLT	L9480L 17B	626	SCH
1	MORTISE CYLINDER	SCHLAGE C, CONSTRUCTION CYLINDER	626	SCH
1	LOCK GUARD	ILP-212	630	DNJ
1	SURFACE CLOSER	4040XP	689	LCN
1	KICK PLATE	8400 240MM 2LDW B4E-CS	630	IVE
1	FLOOR STOP	FS439	630	IVE
1	SEAL SET	326AA-S X 1/WIDTH X 2/HEIGHT	AA	ZER
1	DOOR BOTTOM	362AA	AA	ZER
1	THRESHOLD	564A-223	AA	ZER
1	GASKETING	188SBK PSA	BK	ZER

GROUPE NO. 03

DOOR(S) #:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	HINGE	5BB1HW 114X102MM NRP	630	IVE
1	POWER TRANSFER	ABLOY EA280 OR SECURITRON EPT	626	ABL
1	EU MORTISE LOCK	L9492LEU 17B RX DM	626	SCH
1	MORTISE CYLINDER	SCHLAGE C, CONSTRUCTION CYLINDER	626	SCH
1	LOCK GUARD	ILP-212	630	DNJ
1	SURFACE CLOSER	4040XP	689	LCN
1	KICK PLATE	8400 240MM 2LDW B4E-CS	630	IVE
1	FLOOR STOP	FS439	630	IVE
1	SEAL SET	326AA-S X 1/WIDTH X 2/HEIGHT	AA	ZER
1	DOOR BOTTOM	362AA	AA	ZER
1	THRESHOLD	564A-223	AA	ZER

GROUPE NO. 04

DOOR(S) #:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	HINGE	5BB1HW 114X102MM NRP	630	IVE
1	EU MORTISE LOCK	L9080L 17B	626	SCH
1	MORTISE CYLINDER	SCHLAGE C, CONSTRUCTION CYLINDER	626	SCH
1	SURFACE CLOSER	4040XP	689	LCN
1	KICK PLATE	8400 240MM 2LDW B4E-CS	630	IVE
1	FLOOR STOP	FS439	630	IVE
1	GASKETING	188SBK PSA	BK	ZER

GROUPE NO. 05

DOOR(S) #:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	HINGE	5BB1 114X102MM NRP	652	IVE
1	BATH/BEDROOM PRIVACY	L9040 17B	626	SCH
1	FLOOR STOP	FS439	630	IVE

DOOR HARDWARE

Proposal Ref : 7207528

June 12, 2018

GROUPE NO. 06

106.1 121B.1

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	HINGE	5BB1HW 114X102MM NRP	630	IVE
1	POWER TRANSFER	ABLOY EA280 OR SECURITRON EPT	626	ABL
1	EU MORTISE LOCK	L9492LEU 17B RX DM	626	SCH
1	MORTISE CYLINDER	SCHLAGE C, CONSTRUCTION CYLINDER	626	SCH
1	ASTRAGAL	43STST X HEIGHT	STST	ZER
1	SURFACE CLOSER	4040XP CUSH	689	LCN
1	KICK PLATE	8400 240MM 2LDW B4E-CS	630	IVE
1	SEAL SET	326AA-S X 1/WIDTH X 2/HEIGHT	AA	ZER
1	DOOR BOTTOM	362AA	AA	ZER
1	THRESHOLD	564A-223	AA	ZER
1	GASKETING	188SBK PSA	BK	ZER

GROUPE NO. 07

DOOR(S) #:

109.1

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	HINGE	5BB1HW 114X102MM NRP	630	IVE
1	OFFICE/ENTRY LOCK	L9050L 17B	626	SCH
1	MORTISE CYLINDER	SCHLAGE C, CONSTRUCTION CYLINDER	626	SCH
1	SURFACE CLOSER	4040XP	689	LCN
1	KICK PLATE	8400 240MM 2LDW B4E-CS	630	IVE
1	FLOOR STOP	FS439	630	IVE
1	SEAL SET	326AA-S X 1/WIDTH X 2/HEIGHT	AA	ZER
1	DOOR BOTTOM	362AA	AA	ZER
1	THRESHOLD	564A-223	AA	ZER
1	GASKETING	188SBK PSA	BK	ZER

GROUPE NO. 8

DOOR(S) #:

110.1 110.2

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	HINGE	5BB1 114X102MM NRP	652	IVE
1	STOREROOM LOCK	L9080L 17B	626	SCH
1	MORTISE CYLINDER	SCHLAGE C, CONSTRUCTION CYLINDER	626	SCH
1	SURFACE CLOSER	4040XP	689	LCN
1	KICK PLATE	8400 240MM 2LDW B4E-CS	630	IVE
1	FLOOR STOP	FS439	630	IVE
1	SEAL SET	326AA-S X 1/WIDTH X 2/HEIGHT	AA	ZER
1	DOOR BOTTOM	362AA	AA	ZER
1	THRESHOLD	564A-223	AA	ZER
1	GASKETING	188SBK PSA	BK	ZER

DOOR HARDWARE

Proposal Ref : 7207528

June 12, 2018

GROUPE NO. 9

DOOR(S) #:

121.1

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	HINGE	5BB1HW 114X102MM NRP	630	IVE
1	PASSAGE SET	L9010 17B	626	SCH
1	SURFACE CLOSER	4040XP CUSH	689	LCN
1	KICK PLATE	8400 240MM 2LDW B4E-CS	630	IVE
1	FLOOR STOP	FS439	630	IVE
1	SEAL SET	326AA-S X 1/WIDTH X 2/HEIGHT	AA	ZER
1	DOOR BOTTOM	362AA	AA	ZER
1	THRESHOLD	564A-223	AA	ZER
1	GASKETING	188SBK PSA	BK	ZER

GROUPE NO. 10

DOOR(S) #:

129.1

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	HINGE	5BB1HW 114X102MM NRP	630	IVE
1	STOREROOM LOCK	L9080L 17B	626	SCH
1	MORTISE CYLINDER	SCHLAGE C, CONSTRUCTION CYLINDER	626	SCH
1	SURFACE CLOSER	4040XP	689	LCN
1	KICK PLATE	8400 240MM 2LDW B4E-CS	630	IVE
1	FLOOR STOP	FS439	630	IVE
1	SEAL SET	326AA-S X 1/WIDTH X 2/HEIGHT	AA	ZER
1	DOOR BOTTOM	362AA	AA	ZER
1	THRESHOLD	564A-223	AA	ZER
1	GASKETING	188SBK PSA	BK	ZER

GROUPE NO. 11 NO OUTSIDE TRIM

DOOR(S) #:

140.1

140.1

141.1

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	HINGE	5BB1HW 114X102MM NRP	630	IVE
1	STOREROOM W/DEADBOLT	L9480L 17B L283-150	626	SCH
1	ASTRAGAL	43STST X HEIGHT	630	ZER
1	SURFACE CLOSER	4040XP CUSH	689	LCN
1	KICK PLATE	8400 240MM 2LDW B4E-CS	630	IVE
1	THRESHOLD	526A X WIDTH	AA	ZER
2	JAMB SEAL	326AA-S X HEIGHT	AA	ZER
1	HEAD SEAL	429AA-S X WIDTH	AA	ZER
1	DOOR SWEEP	8197AA X WIDTH	AA	ZER

DOOR HARDWARE

GROUPE NO. 12

DOOR(S) #:

EXT. GATE 1 EXT. GATE 2 EXT. GATE 4

DESCRIPTION

RCI 8380 gate maglock with appropriate bracket

Heavy duty spring closer rated for extreme cold temperatures

Heavy duty pivot hinges rated for high traffic and extreme weather conditions

GROUPE NO. 13

DOOR(S) #:

EXT. GATE 3 EXT. GATE 5

DESCRIPTION

Padlock – Abloy PL330SWP

Provisions to install the padlock, permanently secured to the fence (ie. Welded)

Heavy duty pivot hinges rated for high traffic and extreme weather conditions.

END OF SECTION

GLAZING**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 08 11 00 – Metal Doors and Frames
- .2 Section 08 11 16 – Aluminium Doors and Frames
- .3 Section 08 50 00 – Windows.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM C542-05, Standard Specification for Lock-Strip Gaskets.
 - .2 ASTM D790-07e1, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - .3 ASTM D1003-07e1, Standard Test Method for Haze and Luminous Transmittance of Plastics.
 - .4 ASTM D1929-96(R2001)e1, Standard Test Method for Determining Ignition Temperature of Plastics.
 - .5 ASTM D2240-05, Standard Test Method for Rubber Property - Durometer Hardness.
 - .6 ASTM E84-10, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - .7 ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - .8 ASTM F1233-08, 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)

GLAZING

- .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.
- .6 Underwriters' Laboratories of Canada (ULC)
 - .1 ULC-S332 Standard for burglary resisting glazing material

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Québec, Canada.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned to Contractor 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.

1.4 CLOSEOUT SUBMITTALS

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

1.5 QUALITY ASSURANCE

- .1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .2 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct mock-up to include glass glazing, and perimeter air barrier and vapour retarder seal.
 - .3 Mock-up will be used:
 - .1 To judge quality of work, substrate preparation, operation of equipment and material application.
 - .4 Locate where indicated.

GLAZING

- .5 Allow 24 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.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect glazing and frames from nicks, scratches, and blemishes.
 - .3 Protect prefinished aluminum surfaces with protective wrapping.
 - .4 Replace defective or damaged materials with new.

1.7 AMBIENT CONDITIONS

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

PART 2 PRODUCTS**2.1 FLAT GLASS**

- .1 Safety Glass: to CAN/CGSB-12.1, transparent, 6 mm thick.
 - .1 Type: 2-tempered.
 - .2 Class: B-float.
 - .3 Category: 1.

2.2 INSULATING GLASS UNITS

- .1 Performance Requirements:
 - .1 Light transmission percentage:
 - .1 Visible: 65
 - .2 Solar: 31
 - .3 UV Rays: 32
 - .2 Light reflection percentage:
 - .1 Visible outside: 10
 - .2 Visible inside: 11
 - .3 Solar: 32

GLAZING

- .3 Thermal transmission coefficient (U coefficient): maximum 0.24 in winter, maximum 0.21 in summer.
- .4 Shading coefficient: 0.41
- .5 Solar Heat Gain Coefficient (SHGC): 0.36
- .6 Solar Heat Gain Coefficient light ratio: 1.81
- .2 Insulating glass (type VT-1): to CAN/CGSB 12.8, two glass panes, 25 mm thick.
 - .1 Glass: to CAN/CGSB 12.
 - .2 Outside pane: tempered float tinted, 6 mm thick. Color: chosen from manufacturer's full range.
 - .3 Air space: 13 mm with low thermal conductivity spacers, « Super Spacer Premium Plus et Premium », by Edgetech or equivalent approved by Architect.
 - .4 Inside pane: tempered float transparent, 6 mm thick.
 - .5 Coating applied on glass: low emissivity, « Ti-AC 36 » by AGC Flat Glass North America or equivalent approved by Architect, applied to side #2.
- .3 Inert gas fill: argon, fill proportion: 90%.
- .4 Sealant: in accordance with Section 07 92 00 - Joint Sealants.
- .5 Security Window Film: laminate labelled meeting ULC-S332 for burglar resistant by Ace, UL 972 listed or equivalent approved by Client.

2.3 ACCESSORIES

- .1 Setting blocks: neoprene or EPDM or silicone, 80-90 Shore A durometer hardness to ASTM D2240, to suit glazing method, glass light weight and area.
- .2 Spacer shims: neoprene or silicone, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application.
- .3 Glazing tape:
 - .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper; black colour.
 - .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2 %, designed for compression of 25 %, to effect an air and vapour seal.
- .4 Glazing splines: resilient, polyvinyl chloride or silicone, extruded shape to suit glazing colour: black.
- .5 Glazing clips: manufacturer's standard type.
- .6 Lock-strip extruded gaskets: to ASTM C542.

PART 3 EXECUTION**3.1 EXAMINATION**

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

GLAZING

- .1 Verify that openings for glazing are correctly sized and within tolerance.
- .2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
- .3 Visually inspect substrate in presence of Departmental Representative.
- .4 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .5 Proceed with installation only after unacceptable conditions have been remedied.

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

- .1 Manufacturer's instructions: in accordance with requirements and manufacturer's written recommendations and specifications including data sheets, technical information and implementation instructions displayed in product catalogues and packaging.
- .2 Perform work in accordance with GANA Glazing Manual, GANA Laminated Glazing Reference Manual for glazing installation methods.
- .3 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.
- .4 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.
- .5 Place setting blocks at 1/4 or 1/3 points, with edge block maximum 150 mm from corners.
- .6 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.
- .7 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line.
- .8 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.
- .9 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

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

- .1 Perform work in accordance with GANA Glazing Manual, GANA Laminated Glazing Reference Manual for glazing installation methods.
- .2 Cut glazing tape to length and install against permanent stops, projecting 1.6 mm above sight line.
- .3 Place setting blocks at 1/4 or 1/3 points, with edge block maximum 150 mm from corners.
- .4 Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of light or unit.
- .5 Install removable stops, with spacer shims inserted between glazing and applied stops at 600 mm intervals, 6 mm below sight line.

GLAZING

- .6 Fill gaps between light and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.
- .7 Trim protruding tape edge.

3.5 INSTALLATION SECURITY WINDOW FILM:

- .1 Security film is to be installed on the glass by the manufacturer at the manufacturer's facility
- .2 Laminate to be anchored to frame (mechanically anchored or wet-glazed)

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.
 - .1 Remove traces of primer, caulking.
 - .2 Remove glazing materials from finish surfaces.
 - .3 Remove labels.
 - .4 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.
 - .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse / 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 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

GYPSUM BOARD ASSEMBLIES**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 06 10 11 – Carpentry
- .2 Section 07 84 00 – Fire Stopping
- .3 Section 07 92 00 – Joint Sealants
- .4 Section 09 22 16 – Non Structural Metal Framing
- .5 Section 09 51 13 – Acoustical Panel Ceilings
- .6 Section 09 90 00 – Interior, Exterior Paints and Coatings
- .7 Division 22 - Plumbing
- .8 Division 23 - Mechanical
- .9 Division 26 - Electricity

1.2 REFERENCES

- .1 Aluminum Association (AA)
 - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 ASTM International
 - .1 ASTM C475-02(2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - .2 ASTM C514-04(2009e1), Standard Specification for Nails for the Application of Gypsum Board.
 - .3 ASTM C557-03(2009)e1, Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
 - .4 ASTM C840-08, Standard Specification for Application and Finishing of Gypsum Board.
 - .5 ASTM C954-07, 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 C1002-07, 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 C1047-09, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - .8 ASTM C1280-99, Standard Specification for Application of Gypsum Sheathing.
 - .9 ASTM C1177/C1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - .10 ASTM C1178/C1178M-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)

GYPSUM BOARD ASSEMBLIES

- .1 AWC 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.
- .5 Green Seal Environmental Standards (GS)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
 - .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
- .7 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 300 x 300 mm size sample of vinyl faced gypsum board and 300 mm long samples of corner and casing beads, vinyl mouldings, shadow mould, cornice cap, textured finishes, insulating strip.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store gypsum board assemblies materials level off ground, indoors, in a dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.

GYP SUM BOARD ASSEMBLIES

- .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 and strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
- .6 Replace defective or damaged materials with new.

1.5 AMBIENT CONDITIONS

- .1 Maintain temperature 10 degrees C minimum, 21 degrees C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.
- .2 Apply board and joint treatment to dry, frost free surfaces.
- .3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

PART 2 PRODUCTS**2.1 MATERIALS**

- .1 Standard board: to ASTM C1396/C1396M, thickness as indicated, Type X, 1200 mm wide x maximum practical length, ends square cut, edges bevelled.
- .2 Water-resistant board: to ASTM C1396/C1396M, Type X, thickness as indicated 1200 mm wide x maximum practical length.
- .3 Exterior gypsum soffit board: to ASTM C1396/C1396M, thickness as indicated, 1200 mm wide x maximum practical length.
- .4 Glass mat gypsum substrate sheathing with water-resistant core: to ASTM C1177/C1177M, thickness as indicated, 1200 mm wide x maximum practical length.
- .5 Metal furring runners, hangers, tie wires, inserts, and anchors: to CSA A82.30.
- .6 Drywall furring channels: 0.5 mm core thickness galvanized steel for screw attachment of gypsum board.
- .7 Resilient drywall furring: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.
- .8 Screws for internal partitioning, self-tapping, anticorrosive coating, trumpet head, by 'Phillips', appropriate length and size: to ASTM C954.
- .9 Stud adhesive: to CAN/CGSB-71.25 and ASTM C557.
- .10 Laminating compound: as recommended by manufacturer, asbestos-free.

GYPSUM BOARD ASSEMBLIES

- .11 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, zinc-coated by electrolytic process, 0.5 mm base thickness, perforated flanges, one piece length per location.
- .12 Sealants: 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, 12 mm wide, with self-sticking permanent adhesive on one face, lengths as required.
- .15 Joint compound: to ASTM C475, asbestos-free.

2.2 FINISHES

- .1 Texture finish: asbestos-free standard white texture coating and primer-sealer, recommended by gypsum board manufacturer.

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 ERECTION

- .1 Do application and finishing of gypsum board to ASTM C840 except where specified otherwise.
- .2 Do application of gypsum sheathing to ASTM C1280.
- .3 Erect hangers and runner channels for suspended gypsum board ceilings to ASTM C840 except where specified otherwise.
- .4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .5 Install work level to tolerance of 1:1200.
- .6 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.
- .7 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

GYPSUM BOARD ASSEMBLIES

- .8 Fur for gypsum board faced vertical bulkheads within and at termination of ceilings.
- .9 Fur 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 C840, except where specified otherwise.
- .11 Fur openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
- .12 Fur duct shafts, beams, columns, pipes and exposed services where indicated.
- .13 Erect drywall resilient furring transversely across studs, spaced maximum 400 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 25 mm drywall screw.
- .14 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

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, screw fasteners for second layer. Maximum spacing of screws 300 mm on centre.
 - .1 Single-Layer Application:
 - .1 Apply gypsum board on ceilings prior to application of walls to ASTM C840.
 - .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.
 - .2 Double-Layer Application:
 - .1 Install gypsum board for base layer and exposed gypsum board for face layer.
 - .2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250 mm.
 - .3 Apply base layers at right angles to supports unless otherwise indicated.
 - .4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.
- .3 Apply single or double layer gypsum board to 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 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.

GYP SUM BOARD ASSEMBLIES

- .5 Apply water-resistant gypsum board. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads.
- .6 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.
- .7 Apply board using laminating adhesive on base layer of gypsum board.
- .8 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.
- .9 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.
- .10 Install gypsum board with face side out.
- .11 Do not install damaged or damp boards.
- .12 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.
- .13 Acoustic sealant to be used at all possible sources of acoustic leaks, particularly at junctures.
- .14 Wall joints must be sealed from concrete floor slab to concrete ceiling.
- .15 All pipe/conduit penetrations shall have a 150mm (6") drywall patch on both sides of the wall surrounding the pipe.

3.4 INSTALLATION

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre.
- .2 Install casing beads 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 Construct control joints of preformed units set in gypsum board facing and supported independently on both sides of joint.
- .6 Provide continuous polyethylene dust barrier behind and across control joints.
- .7 Locate control joints at changes in substrate construction at approximate 10 m spacing on long corridor runs at approximate 15 m spacing on ceilings.

GYPSUM BOARD ASSEMBLIES

- .8 Install control joints straight and true.
- .9 Construct expansion joints as detailed, at building expansion and construction joints. Provide continuous dust barrier.
- .10 Install expansion joint straight and true.
- .11 Install cornice cap where gypsum board partitions do not extend to ceiling.
- .12 Fit cornice cap over partition, secure to partition track with two rows of sheet metal screws staggered at 300 mm on centre.
- .13 Splice corners and intersections together and secure to each member with 3 screws.
- .14 Install access doors to electrical and mechanical fixtures specified in respective sections.
 - .1 Rigidly secure frames to furring or framing systems.
- .15 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.
- .16 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:
 - .1 Level 4: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.
- .17 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.
- .18 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.
- .19 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .20 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.
- .21 Mix joint compound slightly thinner than for joint taping.
- .22 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.
- .23 Allow skim coat to dry completely.
- .24 Remove ridges by light sanding or wiping with damp cloth.

3.5 CLEANING

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

GYP SUM BOARD ASSEMBLIES

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

3.6 PROTECTION

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

END OF SECTION

NON STRUCTURAL METAL FRAMING**PART 1 GENERAL****1.1 RELATED SECTIONS**

- .1 Section 06 10 00 – Carpentry
- .2 Section 07 92 00 – Joint Sealants
- .3 Section 09 21 16 – Gypsum Board Assemblies
- .4 Division 23 – Mechanical
- .5 Division 26 – Electricity

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM C645-11a, Specification for Nonstructural Steel Framing Members.
 - .2 ASTM C754-11, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- .2 Environmental Choice Program (ECP).
 - .1 CCD-047a-98 (R2005) Paints - 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 sample of vinyl faced gypsum board and 300 mm long samples of non-structural metal framing.

NON STRUCTURAL METAL FRAMING**1.4 QUALITY ASSURANCE**

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

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

PART 2 PRODUCTS**2.1 MATERIALS**

- .1 Non-load bearing channel stud framing: to ASTM C645, 0.879 mm or 1.146 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board. Refer to architectural plans and wall assemblies for location of different stud framing thickness.
 - .1 Knock-out service holes at 460 mm centres.
- .2 Floor and ceiling tracks: to ASTM C645, thickness to match stud framing, in widths to suit stud sizes, 50 mm flange height.
- .3 Metal channel stiffener: 19 x 38 mm size, 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.
- .4 1.52mm sheet steel (16 ga) thick hot rolled commercial grade ASTM A366 and welded mesh to 305mm between axes closer to steel posts.
- .5 Acoustical sealant: to section 07 92 00 – Joint Sealants.
- .6 Insulating strip: rubberized, moisture resistant 3 mm thick foam strip, 12 mm wide, with self-sticking adhesive on one face, lengths as required.
- .7 Flattened expanded metal mesh: To EMMA 557-99. Style 19mm (¾") - 9F (10 Ga): nominal strand thickness of 0.120" (0.108" to 0.132"). Diamond opening of 0.563" x 1.688".
- .8 Sheet Steel: 16 Ga, A1008 / A1008M (cold rolled) or A1011/ A1011M (hot rolled) or equivalent.

NON STRUCTURAL METAL FRAMING**PART 3 EXECUTION****3.1 EXAMINATION**

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

3.2 ERECTION

- .1 Align partition tracks at floor and ceiling and secure at 300 mm on centre maximum.
- .2 Install damp proof course under stud shoe tracks of partitions on slabs on grade.
- .3 Place studs vertically at 300 mm on centre and not more than 50mm from abutting walls, and at each side of openings and corners.
 - .1 Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
- .4 Erect metal studding to tolerance of 1:1000.
- .5 Attach studs to bottom track using rivets.
- .6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.
- .7 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.
- .8 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified.
 - .1 Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.
- .9 Install heavy gauge single jamb studs at openings.
- .10 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs.
 - .1 Secure tracks to studs at each end, in accordance with manufacturer's instructions.
 - .2 Install intermediate studs above and below openings in same manner and spacing as wall studs.
- .11 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

NON STRUCTURAL METAL FRAMING

- .12 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.
- .13 Install steel studs or furring channel between studs for attaching electrical and other boxes.
- .14 Extend partitions to ceiling height except where noted otherwise on drawings.
- .15 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.
 - .1 Use double track slip joint as indicated.
- .16 Install continuous insulating strips to isolate studs from uninsulated surfaces.
- .17 Install two continuous beads of acoustical sealant and an insulating strip under studs and tracks around perimeter of sound control partitions.
- .18 Flattened expanded metal mesh installation: The expanded metal will be fillet welded 3mm along the strand at 200mm o.c. or 3/16" steel rivets and 1 1/2" "OD, 3/8" ID fender washer at 200mm (8") o.c. every 150mm (6") to vertical and horizontal supports of 18 gauge or greater that has been solidly and permanently attached to the concrete floor slab and concrete ceiling.
- .19 Sheet Steel installation: Steel attached 1.5mm (1/2") fillet weld 15mm (6") long at 200mm (8") o.c. or 8mm (5/16") plug weld at every 200mm or 3/16" steel rivets and 1 1/2" OD, 3/16" ID fender washer at 200mm (8") o.c..

3.3 CLEANING

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

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's installation.

END OF SECTION

CERAMIC TILING**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 03 35 00 – Concrete floor hardeners
- .2 Section 03 35 05 – Concrete finishing
- .3 Section 07 92 00 – Joint Sealants.

1.2 REFERENCES

- .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 C144-04, Specification for Aggregate for Masonry Mortar.
 - .2 ASTM C207-06, Specification for Hydrated Lime for Masonry Purposes.
 - .3 ASTM C847-06, Specification for Metal Lath.
 - .4 ASTM C979-05, 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.

CERAMIC TILING**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 reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

CERAMIC TILING**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 2% 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.

PART 2 PRODUCTS**2.1 FLOOR TILE**

- .1 Porcelain tile (TV2): to CAN/CGSB-75.1 & ANSI A118.4
 - .1 Commercial application: High Traffic
 - .2 Dimensions: 600mm x 300mm x 9.5mm
 - .3 Joint: 3mm
 - .4 Deep scratch resistance $\leq 145\text{mm}^3$
 - .5 Colour variation : V2
 - .6 Slip resistance :
 - .1 DCOF : ≥ 0.42
 - .2 ASTM 1028 – dry : ≥ 0.60
 - .3 ASTM 1028 – wet : ≥ 0.60
 - .7 Bending strength : $\geq 47\text{Nmm}^2$
 - .8 Frost resistant
 - .9 Stain resistant
 - .10 Chemical attack resistant
 - .11 Acceptable product: Collection “WIDE”, colour “Vapour” by Ceragres, or approved equivalent as selected by the architect.

2.2 WALL TILE

- .1 Porcelain tile (TV2): to CAN/CGSB-75.1 & ANSI A118.4
 - .1 Commercial application: High Traffic
 - .2 Dimensions: 600mm x 300mm x 9.5mm
 - .3 Joint : 3mm
 - .4 Deep scratch resistance $\leq 145\text{mm}^3$
 - .5 Colour variation : V2

CERAMIC TILING

- .6 Slip resistance :
 - .1 DCOF : ≥ 0.42
 - .2 ASTM 1028 – dry : ≥ 0.60
 - .3 ASTM 1028 – wet : ≥ 0.60
 - .7 Bending strength : $\geq 47\text{Nmm}^2$
 - .8 Frost resistant
 - .9 Stain resistant
 - .10 Chemical attack resistant
 - .11 Acceptable product: Collection “WIDE”, by Ceragres, colour “Vapour”, or approved equivalent as selected by the architect.
- .2 Ceramic mosaic tile: to CAN/CGSB-75.1 & ANSI A137.1
 - .1 Moisture absorption: Less than 5% to less than 20%
 - .2 Surface finish: Polished
 - .3 Trim Units: Matching bullnose, cove base, fabric bullnose, grooved bullnose, jolly shapes in sizes coordinated with field tile
 - .4 Acceptable product: Collection “Illustrations” by Daltile, “Whisper Blend” IS28, or approved equivalent as selected by the architect.

2.3**TRIM SHAPES**

- .1 Conform to applicable requirements of adjoining floor and wall tile.
- .2 Use slip resistant trim shapes for horizontal surfaces of showers, overflow ledges, recessed steps, shower curbs, drying area curbs, and stools.
- .3 Use trim shapes sizes conforming to size of adjoining field wall tile, including existing spaces, unless specified otherwise.
- .4 Internal and External Corners: provide trim shapes as follows where indicated.
 - .1 Bullnose shapes for external corners including edges.
 - .1 Acceptable product: “QUADEC” by Schluter, in anodized aluminum.
 - .2 Coved shapes for internal corners.
 - .1 Acceptable product: “DILEX-AHK” by Schluter, in anodized aluminum.
 - .3 Special shapes for:
 - .1 Base to floor internal corners to provide integral coved vertical and horizontal joint.
 - .2 Base to floor external corners to provide bullnose vertical edge with integral coved horizontal joint. Use as stop at bottom of openings having bullnose return to wall.
 - .3 Wall top edge internal corners to provide integral coved vertical joint with bullnose top edge.
 - .4 Wall top edge external corners to provide bullnose vertical and horizontal joint edge.
- .5 Provide cove and bullnose shapes for countertops, and where indicated and required to complete tile work.

CERAMIC TILING**2.4 BOND COAT**

- .1 Latex Cement mortar: to ANSI A108.1, two-component universal dry-set mortar.

2.5 GROUT

- .1 Colouring Pigments:
 - .1 Pure mineral pigments, limeproof and nonfading, complying with ASTM C979.
 - .2 Colouring pigments to be added to grout by manufacturer.
 - .3 Job coloured grout are not acceptable.
 - .4 Use in Commercial Cement Grout, Dry-Set Grout, and Latex Cement Grout.
- .2 Latex Cement Grout: to ANSI A108.1, fast curing, high early strength, polymer-modified, stain resistant,
 - .1 Floors: sanded mix
 - .1 Colour: selected from grout manufacturer's full colour range.
 - .2 Acceptable product: Keracolor S Sanded Grout, by Mapei, or approved equivalent as selected by the architect.
 - .2 Walls and floors with polished tiles commercial tile grout: unsanded mix
 - .1 Colour: selected from grout manufacturer's full colour range.
 - .2 Acceptable product: Keracolor U Unsanded Grout, by Mapei, or approved equivalent as selected by the architect.

2.6 ACCESSORIES

- .1 Transition Strips: purpose made metal extrusion; anodized aluminum type.
- .2 Reducer Strips: purpose made metal extrusion; anodized aluminum type; maximum slope of 1:2.
- .3 Prefabricated Movement Joints: purpose made, having a Shore A Hardness not less than 60 and elasticity of plus or minus 40 percent when used in accordance to TTMAC Detail 301EJ.
- .4 Uncoupling membrane: polyethylene membranes with a grid structure of square cavities, each cut back in a dovetail configuration complete with anchoring fleece laminated to the underside.
 - .1 Acceptable product: Ditra, by Schluter, or approved equivalent as selected by the architect.
- .5 Sealant: in accordance with Section 07 92 00 - Joint Sealants.

2.7 MIXES

- .1 Cement:
 - .1 Scratch coat: 1 part cement, 1/5 to 1/2 parts hydrated lime to suit job conditions, 4 parts sand, 1 part water, and latex additive where required. Adjust water volume depending on water content of sand.
 - .2 Slurry bond coat: cement and water mixed to creamy paste. Latex additive may be included.
 - .3 Mortar bed for floors: 1 part cement, 4 parts sand, 1 part water. Adjust water volume depending on water content of sand. Latex additive may be included.

CERAMIC TILING

- .4 Mortar bed for walls and ceilings: 1 part cement, 1/5 to 1/2 parts hydrated lime to suit job conditions, 4 parts sand and 1 part water. Adjust water volume depending on water content of sand. Latex additive may be included.
- .5 Levelling coat: 1 part cement, 4 parts sand, minimum 1/10 part latex additive, 1 part water including latex additive.
- .6 Bond or setting coat: 1 part cement, 1/3 part hydrated lime, 1 part water.
- .7 Measure mortar ingredients by volume.
- .2 Dry set mortar: mix to manufacturer's instructions.
- .3 Organic adhesive: pre-mixed.
 - .1 Adhesives: maximum VOC limit 65 g/L to SCAQMD Rule 1168.
- .4 Mix bond and levelling coats, and grout to manufacturer's instructions.
- .5 Adjust water volumes to suit water content of sand.

2.8 PATCHING AND LEVELLING COMPOUND

- .1 Cement base, acrylic polymer compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.
- .2 Have not less than the following physical properties:
 - .1 Compressive strength - 25 MPa.
 - .2 Tensile strength - 7 MPa.
 - .3 Flexural strength - 7 MPa.
 - .4 Density - 1.9.
- .3 Capable of being applied in layers up to 50 mm thick, being brought to feather edge, and being trowelled to smooth finish.
- .4 Ready for use in 48 hours after application.

2.9 CLEANING COMPOUNDS

- .1 Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.
- .2 Materials containing acid or caustic material are not acceptable.

PART 3 EXECUTION**3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- .2 Apply primer and other products as recommended by manufacturer for installation of tiles on gypsum product.

CERAMIC TILING**3.2 WORKMANSHIP**

- .1 Do tile work in accordance with TTMAC Tile Installation Manual 2006/2007, "Ceramic Tile", except where specified otherwise.
- .2 Apply tile or backing coats to clean and sound surfaces.
- .3 Fit tile around corners, fitments, fixtures, drains and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.
- .4 Maximum surface tolerance 1:800.
- .5 Make joints between tile uniform and approximately 1.5 mm wide, plumb, straight, true, even and flush with adjacent tile. Ensure sheet layout not visible after installation. Align patterns.
- .6 Lay out tiles so perimeter tiles are minimum 1/2 size.
- .7 Sound tiles after setting and replace hollow-sounding units to obtain full bond.
- .8 Make internal angles square, external angles bullnose.
- .9 Use bullnose edged tiles at termination of wall tile panels, except where panel abuts projecting surface or differing plane.
- .10 Install divider strips at junction of tile flooring and dissimilar materials.
- .11 Allow minimum 24 hours after installation of tiles, before grouting.
- .12 Clean installed tile surfaces after installation and grouting cured.

3.3 WALL TILE

- .1 Install in accordance with TTMAC detail 304W-2016-2017.

3.4 FLOOR TILE

- .1 Install in accordance with TTMAC detail 311F-2016-2017.

3.5 FLOOR SEALER AND PROTECTIVE COATING

- .1 Apply in accordance with manufacturer's instructions.

3.6 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.

3.7 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

PART 1 GENERAL

- .1 Section 09 53 00.01 – Acoustical Suspension.
- .2 Division 21 – Fire fighting.
- .3 Division 22 – Plumbing.
- .4 Division 23 – Heating, Ventilating And Air-Conditioning (HVAC).
- .5 Division 26 – Electricity.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C423-02a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - .2 ASTM E1264-98, Standard Classification for Acoustical Ceiling Products.
 - .3 ASTM E1477-98a(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 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Product Data: submit WHMIS MSDS in accordance with Section 01 47 15 - Sustainable Requirements: Construction.
- .4 Co-ordinate submittal requirements and provide submittals required by Section 01 47 15 - Sustainable Requirements: Construction.
- .5 Submit duplicate full size 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 10 m² minimum of each type acoustical tile ceiling including one inside corner and one outside corner.
 - .3 Construct mock-up where directed.
 - .4 Allow 48 hours for inspection of mock-up by Departmental 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 Departmental Representative.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction /Demolition Waste Management and Disposal.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).
 - .4 Separate for reuse, 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, TDGA, 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% 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 2% 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 Departmental Representative, upon completion of the work of this section.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Acoustic units for suspended ceiling system: to ASTM E1264.
 - .1 Acceptable Products: "Optima" as manufactured by Armstrong or equivalent approved by Architect, type XII, Form 2, Pattern E, Class A.
 - .1 Colour: white.
 - .2 Tile Type 01 (TA1), 3354 model, dimensions: 24 "x 24 " x 1 " thick.
 - .2 Acceptable Products: "Ultima " as manufactured by Armstrong or equivalent approved by Architect Type IV , Form 2, Pattern E, Class A.
 - .1 Colour: white.
 - .2 Tile Type 02 (TA2) 1941 model, dimensions: 24 "x 24" x 1 " thick.
- .2 Adhesive: low VOC type recommended by acoustic unit manufacturer.
- .3 Staples, nails and screws: to CSA B111 non-corrosive finish as recommended by acoustic unit manufacturer.
- .4 Hold down clips: purpose made clips to secure tile to suspension system, approved for use in fire-rated systems.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Do not install acoustical panels and tiles until work above ceiling has been inspected by Departmental Representative.

3.2 INSTALLATION

- .1 Install acoustical panels and tiles in ceiling suspension system.
- .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 APPLICATION

- .1 Install acoustic units to clean, dry and firm substrate.
- .2 Install acoustical units parallel to building lines with edge unit not less than 50% of unit width and with directional pattern running in same direction. Refer to reflected ceiling plan.
- .3 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.

3.4 INTERFACE WITH OTHER WORK

- .1 Co-ordinate with Section 09 53 00.01 - Acoustical Suspension.
- .2 Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

3.5 CLEANING

- .1 Arrange for the soundproofing elements to remain clean. Immediately remove all contamination, finger marks and other dirt. Scratched elements, damaged, improperly installed or badly cut-out will be removed and replaced.

3.6 PROTECTION

- .1 To protect soundproofing elements against damage, cover with polyethylene or cardboard.
- .2 Leave protective elements in place until risk of damage is eliminated.

END OF SECTION

ACOUSTICAL CEILING SUSPENSION ASSEMBLIES**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Division 1 – General Requirements
- .2 Section 09 22 16 – Non Structural Metal Framing
- .3 Section 09 21 16 – Gypsum Board Assemblies
- .4 Section 09 51 13 – Acoustical Panel Ceilings
- .5 Division 23 – Built In Mechanical Devices
- .6 Division 26 – Built In Lighting Devices

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM International)
 - .1 ASTM C 635-00, Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
 - .2 ASTM C 636-96, Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- .2 CISCA (The Ceilings & Interior Systems Construction Association) - « Ceiling System Handbook » 2012.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for acoustical suspension and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Submit reflected ceiling plans for special grid patterns as indicated.
 - .3 Indicate lay-out, insert and hanger spacing and fastening details, splicing method for main and cross runners, location of access splines, change in level details, access door dimensions, locations and acoustical unit support at ceiling fixture and lateral bracing and accessories.
- .4 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit 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.

ACOUSTICAL CEILING SUSPENSION ASSEMBLIES**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 acoustical suspension for incorporation into manual.

1.5 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 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 acoustical ceiling tiles and tracks from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

PART 2 PRODUCTS**2.1 DESIGN CRITERIA**

- .1 Design Requirements: maximum deflection: 1/360th of span to ASTM C635/ASTM C635M deflection test.

2.2 MATERIALS

- .1 Grids: to ASTM C635.
- .2 14mm (9/16") suspension Exposed Suprafine XL system tempered thermo steel to ASTM C635, Intermediate duty and having the following characteristics:
 - .1 Material; hot-dipped galvanized steel.
 - .2 Construction: Double-web construction, web height with peaked roof top bulb and bottom flange with prefinished thermo tempered steel capping.
 - .3 Cross Tee: Rotary-stitched for additional torsional strength and extra stability, Staked-on end detail allows easy cross tee removal and remounting.
 - .4 Face dimension: 14mm (9/16").
 - .5 Core height: main tees: 43 mm (1-11/16").
 - .6 Cross tees: 43 mm (1-11/16").
 - .7 Profile : Exposed tee
 - .8 Grid dimensions: appropriate to dimensions of soundproofing ceiling panels.

ACOUSTICAL CEILING SUSPENSION ASSEMBLIES

- .9 Colors; General: white.
- .10 Surface finish: baked polyester paint.
- .11 Connection cross tee /main tee: overlapping
- .3 Hanger wire: galvanized soft annealed steel wire:
 - .1 3.6 mm diameter for access tile ceilings.
- .4 Hanger inserts: purpose made.
- .5 Carrying channels: U Shape: hot dipped galvanized steel with dimensions and thickness as recommended by manufacturer of suspension assembly.
- .6 Accessories: splices, clips, wire ties, retainers and wall moulding flush, to complement suspension system components, as recommended by system manufacturer.
- .7 Ceiling suspension systems "Suprafine XL "by Armstrong, G-60 with dip galvanizing / aluminum coating.

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 INSTALLATION

- .1 Unless otherwise indicated, install frame elements in accordance with ASTM C 636 standards and CISCA - "Ceiling System Handbook"
- .2 Install suspension grids per manufacturer's instructions and calculating criteria used and tested by certification bodies.
- .3 Do not erect ceiling suspension system until work above ceiling has been inspected and approved by Departmental Representative.
- .4 Fix hangers to upper frame using mounting methods recommended by the system manufacturer.
- .5 Place hangers no more than 1200 mm center distance and less than 150 mm from ends of main Tees.
- .6 Trace two perpendicular medians on ceiling to ensure symmetry of installation on edges of the room. Place grid so that width of edge elements is not less than 50% of standard width of elements and in accordance with reflected ceiling drawing.
- .7 Coordinate installation of grid elements with location of other ceiling mounted elements.
- .8 Install wall-ceiling trim joints which mark off exact ceiling height.

ACOUSTICAL CEILING SUSPENSION ASSEMBLIES

- .9 Once completed, grid must be able to support additional loads, such as light fixtures, diffusers, meshes and speakers.
- .10 Where light fixtures and diffusers are, provide additional hangers installed 150 mm at the most from every angle, and every 600 mm at the most around the device.
- .11 Anchor transverse profiles to supporting profiles to obtain a rigid assembly.
- .12 Install a border around openings to accommodate light fixtures, diffusers and speakers, same thing where ceiling levels shift.
- .13 Edges of finished ceiling must be square along walls and they must show no flatness deviation larger than 1: 1000.

3.3 CLEANING

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

3.4 PROTECTION

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

END OF SECTION

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 03 35 00 – Concrete Finish
- .2 Section 09 69 00 – Access Flooring

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM F1066-04, 2010 e1, Standard Specification for Vinyl Composition Floor Tile.
 - .2 ASTM F1344-04, 12 e1, 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), California State
 - .1 SCAQMD Rule 1168-A2011, 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 tile flooring, size as prescribed, and duplicate 300 mmm long samples base.

1.4 EQUIPMENT/ REPLACEMENT MATERIAL

- .1 Equipment /replacement material
 - .1 Provide tiles, baseboards and adhesive required for flexible coatings maintenance, in accordance with section 01 78 00 – Closeout Submittals.
 - .2 Provide 5% of total quantity of flooring tiles of each color, pattern and type required to maintain work in good condition.
 - .3 Additional materials and equipment must come from same production batch as those installed.
 - .4 Identify each tile box and each adhesive container.
 - .5 Hand to Departmental Representative after completion of work covered by this section.
 - .6 Store them at location specified by Departmental Representative.

Resilient tile flooring

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

1.6 SITE CONDITIONS

- .1 Ambient Conditions
 - .1 Maintain ambient temperature in implementation area as well as temperature of the medium intended to receive coating above 20 degrees C for a period of 48 hours before installation, during installation and during 48 hours after completion of work.

PART 2 PRODUCTS**2.1 MATERIALS**

- .1 Vinyl tile (TV2): to ASTM F1913, Homogeneous Vinyl Sheet, 2 mm thick, size: 300mm x 300mm.
 - .1 Color: TA5 Colonial Grey CG
 - .2 Acceptable products: "IQ Optima" by Tarkett or equivalent approved by Architect.
- .2 Electro Static Dissipating tile (TV3): in accordance with ASTM F970, 2.0 mm thick, size: 610 mm x 610 mm
 - .1 Color: 710 Full Moon WG.
 - .2 Acceptable products: IQ granite SD manufactured by Tarkett or equivalent approved by Architect.
- .3 Flexible baseboard: vinyl, straight for carpets and coved for other floorings, at least 1200 mm long x 100 mm high x 3 mm thick, with precast salient angles and end pieces for coved baseboards only.
 - .1 Color: 48 Grey by Johnsonite or equivalent approved by Architect.
- .4 Primers and adhesives: waterproof, recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.
- .5 Metal edge strips (copper): According to the recommendations of the manufacturer.
- .6 Polish: electro static dissipating; according to the recommendations of the manufacturer of the floor covering.
- .7 Adhesive: maximum VOC limit 150 g/L to SCAQMD Rule 1168.
- .8 Adhesive: maximum VOC limit 150 g/L to SCAQMD Rule 1168.
 - .1 Adhesive: maximum VOC limit 60 g/L to SCAQMD Rule 1168.

Resilient tile flooring

- .2 Sheets of prefabricated rubber flooring: use two-component PU 105 polyurethane by Mapei.
- .9 Sub-floor filler and leveller: as recommended by flooring manufacturer for use with their product.
- .10 Reduction mouldings, vinyl, profile 2.0 mm to 0 mm thickness, appropriate model by "Johnsonite", or approved equivalent, width and color chosen from range of products offered by manufacturer.
- .11 Sealer: type recommended by manufacturer of floor covering.

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 INSPECTION

- .1 Ensure concrete floors are dry, by using test methods recommended by tile manufacturer.

3.3 SUB-FLOOR TREATMENT

- .1 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.
- .2 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
- .3 Prime to flooring manufacturer's printed instructions.

3.4 TILE APPLICATION

- .1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.
- .2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.
- .3 Install electro static dissipating tile strictly according to written instructions of manufacturer, using installation system for ESD (Electro Static Dissipation) tiles with ESD S-202 adhesive and copper grounding bands, in accordance with recommendations of tile manufacturer.
- .4 Install tiles forming joints parallel to building lines so as to obtain symmetric pattern. Width of a peripheral tile should not be less than half the width of a normal tile.

Resilient tile flooring

Proposal Ref : 7207528

June 12, 2018

- .5 Install flooring to square grid pattern.
- .6 As installation progresses, and after installation, roll flooring in 2 directions with 45 kg minimum roller to ensure full adhesion.
- .7 Cut tile and fit neatly around fixed objects.
- .8 Install flooring in pan type floor access covers. Maintain floor pattern.
- .9 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.
- .10 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.
- .11 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.5 BASE APPLICATION

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

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 Clean floor and baseboards in accordance with written instructions of the floor manufacturer.
- .3 Carefully remove excess adhesive on floor, baseboards and walls.
- .4 Remove debris from newly coated floor and clean all dirt or grease according to manufacturer's recommendations.
- .5 Do not seal or wax newly coated floor.
- .6 Proceeds to initial maintenance of floor covering once installed, according to flooring manufacturer's recommendations.
- .7 Waste Management: separate waste materials for reuse / recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.7

PROTECTION

- .1 Protect new floors from time of final set of adhesive until final inspection.
- .2 Prohibit traffic on floor for 48 hours after installation.

END OF SECTION

TILE CARPETING**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 09 65 19 - Resilient tile flooring
- .2 Section 09 69 00 - Access Flooring

1.2 REFERENCES

- .1 American Association of Textile Chemists and Colorists (AATCC)
 - .1 AATCC Test Method 16-2004, Colorfastness to Light.
 - .2 AATCC Test Method 23-2005, Colorfastness to Burn Gas Fumes.
 - .3 AATCC Test Method 129-2005, Colourfastness to Ozone in the Atmosphere Under High Humidities.
 - .4 AATCC Test Method 134-2006, Electrostatic Propensity of Carpets.
 - .5 AATCC Test Method 171-2005, Carpets: Cleaning of; Hot Water Extraction Method.
 - .6 AATCC Test Method 175-2008, Stain Resistance: Pile Floor Coverings.
 - .7 AATCC Test Method 189-2007, Fluorine Content of Carpet Fibers.
- .2 ASTM International
 - .1 ASTM D297-93(2006), Standard Test Methods for Rubber Products-Chemical Analysis.
 - .2 ASTM D1335-05, Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings.
 - .3 ASTM D2661-08, Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.
 - .4 ASTM D1667-05, Standard Specification for Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).
 - .5 ASTM D3574-08, Standard Test Methods for Flexible Cellular Materials - Slab, Bonded, and Molded Urethane Foams.
 - .6 ASTM D3936-05, Standard Test Method for Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-4.2 No. 22-2004, Textile Test Methods - Colourfastness to Rubbing (Crocking).
 - .2 CAN/CGSB-4.2 No.27.6M-2004, Textile Test Methods - Flame Resistance - Methemine Tablet Test for Textile Floor Coverings.
 - .3 CAN/CGSB-4.2 No. 76-94/ISO 2551: 1981, Textile Test Methods - Machine-Made Textile Floor Coverings - Determination of Dimensional Changes Due to the Effects of Varied Water and Heat Conditions.
 - .4 CAN/CGSB-4.2 No.77.1-94/ISO 4919:2000, Textile Test Methods - Carpets - Determination of Tuft Withdrawal Force.
 - .5 CAN/CGSB-4.129-93(R1997), Carpets for Commercial Use.
- .4 Carpet and Rug Institute (CRI)

TILE CARPETING

- .1 CRI Carpet Installation Standard 2009.
- .2 CRI Green Label Indoor Air Quality Testing Program.
- .3 CRI Green Label Plus Indoor Air Quality Testing Program.
- .5 Environmental Choice Program (ECP)
 - .1 CCD-152-2009, Flooring Products, Commercial Non-modular Textile Flooring.
- .6 Health Canada
 - .1 C.R.C., c.923-10, Hazardous Products Act - Carpet Regulations, Part II of Schedule 1.
- .7 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .8 National Floor Covering Association (NFCA)
 - .1 National Floor Covering Specification Manual 2007.
- .9 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.
- .10 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-07, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .2 CAN/ULC-S102.2-07, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting 2 weeks prior to beginning work of this Section with Contractor's Representative and Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other construction subtrades.
 - .4 Review manufacturer's written installation instructions and warranty requirements.
- .2 Sequencing: sequence with other work in accordance with Section 09 69 00 Access Flooring
- .3 Comply with manufacturer's written recommendations for sequencing construction operations.
- .4 Scheduling: schedule with other work in accordance with Section 09 69 00 Access Flooring

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

TILE CARPETING

- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for each carpet tile, undercushion, adhesive, carpet protection, subfloor patching compound, and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Information on shop drawings to indicate:
 - .1 Nap: direction, open edges, special patterns.
 - .2 Cutouts: show locations where cutouts are required.
 - .3 Edgings: show location of edge moldings and edge bindings.
- .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 each type of carpet tile specified and duplicate tiles for each colour selected, base, divider strips, 150 mm length binder bars.
- .5 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .6 Test and Evaluation Reports:
 - .1 Certified test reports showing compliance with specified performance characteristics and physical properties.
- .7 Manufacturer's Instructions: submit manufacturer's installation and storage instructions.
- .8 Manufacturers Reports:
 - .1 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance with specifications.
- .9 Qualification Statements:
 - .1 Compliance: to CAN/ULC-S102.
 - .2 Testing: passes testing requirements of:
 - .1 Green Label Plus # GLP0820 Indoor Air Quality Testing Program.
 - .3 Tuft bind: meets requirements of CAN/CGSB-4.129 when tested to CAN/CGSB-4.2 No.77.1.

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 installed products for incorporation into manual.
- .3 Warranty Documentation: submit warranty documents specified.

TILE CARPETING**1.6 MAINTENANCE MATERIAL SUBMITTALS**

- .1 Extra stock materials: deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.
 - .1 Quantity: provide minimum 2% of carpet tile, carpet base and adhesives.
 - .2 Delivery, storage and protection: comply with Owner's requirements for delivery and storage of extra materials. Protect as follows:

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Prequalification: compliance with Health Canada regulations under "Hazardous Products Act", Part II of Schedule 1, and to CAN/CGSB-4.2 No. 27.6.
- .2 Qualifications:
 - .1 Manufacturer: capable of providing field service representation during construction and approving application method.
 - .2 Flooring Installer, Applicator or Contractor:
 - .1 Experienced in performing work of this Section who has specialized in installation of work similar to that required for this project.
 - .2 Certified by carpet manufacturer prior to tender submission.
 - .3 Must not sub-contract labour without written approval of Departmental Representative.
 - .4 Responsible for proper product installation, including floor testing and preparation as specified and in accordance with carpet manufacturer's written instructions.

1.8 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 materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - .3 Store and protect carpet tile and adhesive in original containers or wrapping with manufacturer's seals and labels intact.
 - .4 Store and protect carpet tile and accessories in location as directed by Departmental Representative.
 - .5 Store carpet and adhesive at minimum temperature of 18 degrees C and relative humidity of maximum 65% for minimum of 48 hours before installation.
 - .6 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.

TILE CARPETING

.7 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

.8 Replace defective or damaged materials with new.

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

1.9 SITE CONDITIONS

.1 Ambient Conditions:

.1 Moisture: ensure substrate is within moisture limits and alkalinity limits recommended by manufacturer. Prepare moisture testing and provide report to Departmental Representative.

.2 Temperature: maintain ambient temperature of not less than 18 degrees C from 48 hours before installation to at least 48 hours after completion of work.

.3 Relative humidity: maintain between 10% and 65% for 48 hours before, during and 48 hours after installation.

.4 Install carpet after space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete.

1.10 WARRANTY

.1 Manufacturer's warranty: submit, for Departmental Representative's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and does not limit other rights Owner may have under Contract Documents.

.2 Warranty period: 1 year, commencing on date of substantial performance of work.

.1 Warranty covers labour and repair or replacement of defective components for 1 year after date of substantial performance.

.3 Static Control Warranty: Life time Properties meet ANSI/ESD S20.20

PART 2 PRODUCTS**2.1 MATERIALS**

.1 Manufacturers:

.1 Ensure manufacturer has minimum 5 years' experience in manufacturing components similar to or exceeding requirements of project.

.1 ShadowFX Static dissipative-Carpet Tile type: The Vermont Collection, color: 105012-SIDEWALK, size 610mm x 610mm, or equivalent approved by Departmental Representative.

.2 Sustainability Characteristics:

.1 Indoor Air Quality Certification: Green Label Plus # GLP0820

.3 Recycled Content

TILE CARPETING

Proposal Ref: 7207528

June 12, 2018

- .1 Post-industrial range: 50%
- .2 Post-consumer: 2%
- .3 Total recycled content: 51%
- .4 Adhesives: VOC limit 50g/L maximum to SCAQMD Rule 1168
- .5 Primer: in accordance with manufacturer's recommendations for surface conditions: VOC limit: 100 g/L maximum to SCAQMD Rule 1113
- .6 Carpet and Accessories: Green Label Plus certified.

2.2 PERFORMANCE

- .1 Flammability: certified for flammability to Health Canada regulations under "Hazardous Products - Carpet Regulations", Part II of Schedule 1. Passes Methenamine Pill Test (DOC-FF1-70)
- .2 Flame Spread: maximum flame spread rating 300, maximum smoke developed classification 500, when tested to CAN/ULC-S102.2.
- .3 Smoke Development: 450 or less per ASTM E662.
- .4 Dry Breaking Strength: to ASTM D2661, minimum acceptable tear strength in both length and width:
 - .1 11.3 kg for carpets installed by glue down installation.
- .5 Wear: maximum 10% of pile face fiber by weight for 10 years.
- .6 Edge Ravel: none for 10 years.
- .7 Static Resistance: permanent static control to AATCC 134, 3000 V maximum at 20% RH and 22 degrees C.
- .8 Static Generation: less than 4.0 kV per AATCC 134 for 15 years. (ANSI/ESD S97.2) < 25 volts Floor. Materials and Footwear – Voltage Measurement in combination with a person.
- .9 Preservative Efficacy:
 - .1 (AATCC 174 Parts 2&3) 99%
 - .2 Reduction/No Mold 7 Days
 - .3 (ASTM E-2471) Complete Inhibition
- .10 Electrical Resistance to Ground (RTG): (ANSI/ESD S7.1) > 1.0 x10⁶ and < 1.0 x, 10⁹ Meets ANSI/ESD S20.20, Motorola R56, ATIS 0600321, FAA 019e
- .11 Electrical Resistance Point to Point: (ANSI/ESD S7.1) > 1.0 x10⁶ and < 1.0 x, 10⁹ Meets ANSI/ESD S20.20, Motorola R56, ATIS 0600321, FAA 019e, IBM Burroughs.
- .12 System Resistance: (ANSI/ESD DSTM 97.1) < 3.5 x 10⁷ Floor. Material and Footwear – Resistance Measurement in Combination with a person.
- .13 Tuft Bind: Tuft Lock: to ASTM D1335 or CAN/CGSB-4.129, minimum acceptable 3.6 kilograms for loop pile product.
- .14 De-lamination of Secondary Backing: Lamination Strength of Secondary Backing: to ASTM D3936, minimum acceptable peel strength of 1.6 kg/25 mm.
- .15 Stain resistance: to AATCC 175, 8.
- .16 Soil Resistance: Fluorine Durability Level to AATCC 189

TILE CARPETING

- .17 Colourfastness to light: to AATCC 16 – E \geq 4.0 @ 60 AFU's.
- .18 Colourfastness to atmosphere: to AATCC 129 and AATCC 23.
- .19 Colourfastness to crocking: to CAN/CGSB-4.2 No. 22.
- .20 Atmospheric Fading AATCC Test Method 129 Ozone/AATCC Test Method 23, Burned Gas shall not be less than 3 on International Grey. Scale after two cycles on each test.
- .21 Crockfastness: AATCC Test Method 165 Minimum stain rating on International Grey Scale of not less than 5 wet and dry.
- .22 Grounding: Groundable Path
 - .1 Grounding Connector: 5 mm, 26 gauge Copper strip
 - .2 Grounding Frequency – 1 ground connector per 1000 square feet and minimum of 1 per room

2.3 FABRICATION

- .1 Provide carpet tiles type Shadow FX SDC, product Vermont Collection, colour 105012-SIDEWALK, size 610 mm x 610 mm.
- .2 Product construction:
 - .1 Tufted Pattern Loop.
- .3 Yarn Manufacturer: Universal.
- .4 Yarn System: Post consumer content
- .5 Pile Thickness 1.6mm
- .6 Pile fibre: to CAN/CGSB-4.129.
 - .1 Nylon: Branded.
 - .1 Type: Nylon 6.6.
- .7 Dyeing Method: 100% solution dyed.
- .8 Dye Lots: Non-Mergeable.
- .9 Tufted Carpet Backing: to CAN/CGSB-4.129.
- .10 Woven Carpet Backing: to CAN/CGSB-4.129.
 - .1 100% moisture resistant warp, filling and stuffer yarns.
- .11 Standard Backings:
 - .1 to CAN/CGSB-4.129,
 - .2 ShadowFx Static Dissipative GlasBac® or equivalent approved.
 - .3 Anti-microbial Resistance: to AATCC 174, 2 mm minimum halo of inhibition for gram positive bacteria.
 - .4 1 mm minimum halo of inhibition for gram negative bacteria.
 - .5 Ensure no fungal growth.
- .12 Stitches: 47.2 ends/10cm.
- .13 Gauge: 39.4 ends/10cm.

TILE CARPETING

Proposal Ref: 7207528

June 12, 2018

- .14 Pile Weight Density: 344.471.1 g/m3
- .15 Finished Pile Height: 2.8mm.
- .16 Surface Pile Weight: minimum 474 g.
- .17 Performance Rating: 3.0 minimum at 12,000 cycles to Hexapod test 22,000 cycles to Vetterman test.
- .18 Dimensional Stability: AACHEN Din 54318 <.10%
- .19 Fiber Modification Ratio: 1.7 to 1.9
- .20 Traffic classification: Heavy.

2.4 ACCESSORIES

- .1 Base:
 - .1 Resilient Base: Provide vinyl base with smooth finish, matching end stops and preformed outside corner units. Unless otherwise shown, provide 4" high base with carpet profile .
- .2 Binder Bars: aluminum finish.
- .3 Glue-free Installation – Use GroundBridge™ underlayment with Interface TacTiles®
- .4 Edge Strips:
 - .1 As selected by Departmental Representative.
- .5 Adhesive:
 - .1 Staticworx, Inc. GroundTack Low VOC releasable adhesive with Thunderon conductive fibers
 - .2 Staticworx GroundBridge™ conductive underlayment and Interface TacTiles™
 - .3 On site application VOC limit: 50g/L maximum to SCAQMD Rule 1168.
 - .4 Adhesive in compliance with CCD-152.
- .6 Transition Mouldings:
- .7 As selected by Departmental Representative Carpet protection: As recommended by manufacturer.
 - .1 VOC limit: 100 g/L maximum to SCAQMD Rule 1113.
- .8 Subfloor Underlayment:
 - .1 Base Portland cement powder, mixed with liquid latex recommended by the carpet manufacturer.

PART 3 EXECUTION**3.1 INSTALLERS**

- .1 Use experienced and qualified technicians to carry out assembly and installation of tile carpet.

TILE CARPETING**3.2 EXAMINATION**

- .1 Examine conditions, substrates and work to receive work of this Section, co-ordinate with Section 01 71 00 - Examination and Preparation.
- .2 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for carpet tile installation in accordance with manufacturer's written instructions.
 - .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
- .3 Where primers/sealers are used, their compatibility with adhesive shall be verified prior to starting work.

3.3 PREPARATION

- .1 Subfloor Preparation:
 - .1 Inspect concrete and determine special care required to make it a suitable for carpet.
 - .2 Fill and level cracks 3 mm wide or protrusions over 0.8 mm with appropriate and compatible latex or polymer fortified patching compound.
 - .3 Comply with manufacturer's written recommendations for maximum patch thickness.
 - .4 Prime large patch areas with compatible primer.
 - .5 Ensure concrete substrates are cured, clean and dry.
 - .6 Ensure concrete substrates are free of paint, dirt, grease, oil, curing or parting agents, and other contaminates, including sealers, that interfere with the bonding of adhesive.
 - .7 Where powdery or porous concrete surface is encountered, apply primer compatible with adhesive to provide a suitable surface for glue-down installation.
- .2 Surface Preparation: prepare surface in accordance with manufacturer's written recommendations and co-ordinate with Section 01 71 00 - Examination and Preparation.
 - .1 Prepare floor surfaces in accordance with CRI Carpet Installation Standard.
- .3 Tile Carpeting Preparation:
 - .1 Pre-condition carpeting: following manufacturer's written instructions.
- .4 Demolition / Removal:
 - .1 Remove and return carpet for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal. Co-ordinate with Departmental Representative.
 - .2 Vacuum used carpet before removal.
 - .3 Maintain possession of removed used carpet.
 - .4 Remove used tiles and pack in container, trailer or pallets. Use effective packing techniques to maximize amount of material in container.

TILE CARPETING

- .5 Sort only clean, dry carpet tiles for reclamation. Clean is defined as carpet free from demolition debris, asbestos contamination, garbage, knife blades and tack strips.
- .6 Carpet undercushion: provide recycling of carpet padding where locally available or as designated by carpet reclamation program.

3.4 INSTALLATION

- .1 Install carpet tiles in accordance with manufacturer's written instructions, and CRI Carpet Installation Standard and co-ordinate with Section 01 73 00 - Execution.
- .2 Co-ordinate tile carpeting work with work of other trades, for proper time and sequence to avoid construction delays.
- .3 Install carpet tile after finishing work is completed but before demountable office partitions and telephone and electrical pedestal outlets are installed.
- .4 Install carpet tile as per manufacturer's recommendation. This can include quarter-turn 90 degree format, monolithic, random, quarter turn ashlar, horizontal, herringbone or vertical ashlar.
- .5 Snugly join carpet tiles in completed installation.
 - .1 Measure distance covered by 11 carpet tiles (10 joints) and ensure distance is in compliance with manufacturer specifications.
 - .2 Do not trap yarn between carpet tiles.
- .6 Apply thin film of pressure-sensitive adhesive according to manufacturer's recommendations.
- .7 Ensure finished installation presents smooth wearing surface free from conspicuous seams, burring and other faults.
- .8 Use material from same dye lot.
 - .1 Ensure colour, pattern and texture match within visual areas.
 - .2 Maintain constant pile direction.
- .9 Fit around architectural, mechanical, electrical and telephone outlets, and furniture fitments, around perimeter of rooms into recesses, and around projections.
- .10 Install carpet tiles to underfloor duct system and to access covers.
- .11 Install carpeting in pan type floor access covers.
- .12 Extend carpet tiles into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- .13 Install carpet tiles smooth and free from bubbles, puckers, and other defects.
- .14 Protect exposed carpet tile edges at transition to other flooring materials with suitable transition strips.
- .15 Base Installation: Refer to section 09 65 19 - Resilient Tile Flooring

3.5 SITE QUALITY CONTROL

- .1 Site Tests and Inspections:
 - .1 Co-ordinate site test with Section 01 45 00 - Quality Control.

TILE CARPETING

- .2 Manufacturer's Field Services:
 - .1 Co-ordinate manufacturer's services with Section 01 45 00 - Quality Control. Have manufacturer review work involved in handling, installation / application, protection and cleaning of its products, and submit written reports, in acceptable format, to verify compliance of work with Contract.
 - .2 Manufacturer's field services: provide manufacturer's field services, consisting of product use recommendations and periodic site visits for inspection of product installation, in accordance with manufacturer's instructions.
 - .3 Schedule site visits:
 - .1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.
 - .4 Obtain reports within 3 days of review and submit immediately to Departmental Representative.

3.6 CLEANING

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

3.7 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Prohibit traffic on carpet for period of 24 hours minimum after installation and until adhesive is cured.
- .3 Install carpet protection to satisfaction of Departmental Representative.
- .4 Repair damage to adjacent materials caused by tile carpeting installation.

END OF SECTION

PART 1 GENERAL**1.1 REFERENCES**

- .1 Aluminum Association (AA)
 - .1 DAF 45-03, Designation System for Aluminum Finishes.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
 - .2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel Air Drying and Baking.
 - .3 CAN/CGSB-1.104-M91, Semigloss Alkyd Air Drying and Baking Enamel.
 - .4 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.
- .3 CSA International
 - .1 CAN/CSA-Z809-08, Sustainable Forest Management.
- .4 Ceilings and Interior Systems Construction Association (CISCA)
 - .1 Recommended Test Procedures for Access Floors - 2007.
- .5 Environmental Choice Program (ECP)
 - .1 CCD-046-95, Adhesives.
 - .2 CCD-126-95, Construction Film (Polyethylene Plastic Film Product).
- .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-36-11, Standard for Adhesives for Commercial Use.
- .8 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .9 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-installation Meetings: convene pre-installation meeting after Award of Contract and 2 week prior to commencing work of this Section to verify project requirements, substrate conditions and co-ordination with other building sub-trades, and to review manufacturer's written installation instructions.
 - .1 Convene pre-installation meeting 2 week prior to beginning work of this Section in accordance with Section 01 31 19 - Project Meetings.
 - .2 Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
 - .1 Departmental Representative.

- .2 Access flooring subcontractor.
- .3 Manufacturer's Technical Representative.
- .4 Electrical trade
- .3 Ensure meeting agenda includes review of methods and procedures related to access flooring installation including co-ordination with related work.
- .4 Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

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 access flooring 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:
 - .1 For caulking materials during application and curing.
 - .2 For adhesives.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Take measurements from finished area at site. Indicate where applicable information as follows:
 - .1 Layout of work.
 - .2 Sizes and details of components.
 - .3 Anchorage methods.
 - .4 Edge and fascia details.
 - .5 Elevation differences.
 - .6 Stair, handrail and ramp framing and details.
 - .7 Lateral bracing.
 - .8 Typical cutout details.
 - .9 Gasketting, return air details, supply air registers and perforated panels. Include air transfer capacity of grilles, registers and panels.
 - .10 Floor finishes.
 - .11 Location of connection to building grounding electrode.
 - .3 Structural Computations:
 - .1 Submit data on earthquake resistance in the form of structural computations that have been signed and sealed by a qualified professional. Include structural computations, material properties and other information required for structural analysis and verifications that access flooring system will withstand earthquake loads indicated.
- .4 Samples:

- .1 Submit one full size sample consisting of 4 panels of complete access flooring system, including finishes.
- .2 Submit one of each of following components.
 - .1 Full size floor panel.
 - .2 Pedestal.
 - .3 Stringer member.
 - .4 Carpet.
 - .5 Fasteners.
 - .6 Cove base 300 mm long.
 - .7 Accessories.
 - .8 Handrail.
- .3 Submit duplicate samples of each type floor covering.
 - .1 Colour chips from manufacturer's standard range of colours for specified floor covering material.
 - .2 Carpet: 300 x 300 mm, of each type of carpet specified.
- .5 Manufacturers' Field Reports: submit copies of manufacturers field reports.
- .6 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
- .7 Certificates: submit certification, to demonstrate compliance of access flooring system to specification as follows:
 - .1 CSA or ULC certification.
 - .2 Independent testing agency test reports certifying that the product meets standard.
 - .3 Letter of certification from responsible official of manufacturer.
 - .4 Method for testing access flooring in accordance with Ceilings and Interior Systems Construction Association (CISCA) standard test procedures.
 - .1 Have tests performed by an independent testing laboratory regularly engaged in testing of access floor components.

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.
- .3 Panel Lifting Device: Provide Departmental Representative 3 panel manufacturer's standard portable lifting device for each type of access flooring installed. Include wall mounting bracket for panel lifter.

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 access flooring from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- .1 Seismic Performance: Access flooring shall withstand the effects of earthquake motions.
- .2 Structural Performance: Provide access-flooring systems capable of complying with the following performance requirements according to testing procedures in CISCA's "Recommended Test Procedures for Access Floors":
 - .1 Concentrated Loads: 1250 lbf (5560 N) with the following deflection and permanent set:
 - .1 Top-Surface Deflection: 0.10 inch (2.54 mm).
 - .2 Permanent Set: 0.010 inch (0.25 mm).
 - .2 Ultimate Loads: 1800 lbf (8006 N).
 - .3 Rolling Loads: With local or overall deformation not to exceed 0.040 inch (1.02 mm).
 - .1 CISCA Wheel 1: 10 passes at 1200 lbf (5338 N).
 - .2 CISCA Wheel 2: 10,000 passes at 800 lbf (3559 N).
 - .4 Stringer Load Test: 450 lbf (2002 N) at center of span with a permanent set not to exceed 0.010 inch (0.25 mm).
 - .5 Pedestal Axial Load Test: 5000 lbf (22 240 N).
 - .6 Pedestal Overturning Moment Test: 1000 lbf x inches (113 N x meters) when bonded to clean concrete slab.
 - .7 Uniform Load Test: 600 lbf/sq. ft. (28.8 kPa) with a maximum top-surface deflection not to exceed 0.040 inch (1.02 mm) and a permanent set not to exceed 0.010 inch (0.25 mm).
 - .8 Drop Impact Load Test: 150 lb (68.0 kg).
 - .9 Location: rooms 120, 121, 121A, 121B, 121C, 126, 127, 128, 129, 140 and 141.
 - .10 Acceptable Products: "TecCrete 1250 Bare Panel" as manufactured by Haworth or equivalent approved by Architect.
- .3 Structural Performance: Provide access-flooring systems capable of complying with the following performance requirements according to testing procedures in CISCA's "Recommended Test Procedures for Access Floors":
 - .1 Concentrated Loads: 1500 lbf (6672 N) with the following deflection and permanent set:
 - .1 Top-Surface Deflection: 0.10 inch (2.54 mm).
 - .2 Permanent Set: 0.010 inch (0.25 mm).
 - .2 Ultimate Loads: 2500 lbf (11,121 N).

- .3 Rolling Loads: With local or overall deformation not to exceed 0.040 inch (1.02 mm).
 - .1 CISCA Wheel 1: 10 passes at 1500 lbf (6672 N).
 - .2 CISCA Wheel 2: 10,000 passes at 1250 lbf (5560 N).
- .4 Stringer Load Test: 450 lbf (2,002 N) at center of span with a permanent set not to exceed 0.010 inch (0.25 mm).
- .5 Pedestal Axial Load Test: 5000 lbf (22,240 N).
- .6 Pedestal Overturning Moment Test: 1000 lbf x inches (113 N x meters) when bonded to clean concrete slab.
- .7 Drop Impact Load Test: 150 lb (68.0 kg).
- .8 Location: rooms 122, 123 and 124.
- .9 Acceptable Products: "TecCrete 1500 Bare Panel" as manufactured by Haworth or equivalent approved by Architect.
- .4 Fire Performance:
 - .1 Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - .1 Flame-Spread Index: 25 or less.
 - .2 Smoke-Developed Index: 50 or less.
 - .2 Combustion Characteristics: ASTM E 136.

2.2 MANUFACTURERS

- .1 Source Limitations: Obtain access-flooring system from single source from single manufacturer.

2.3 FLOOR PANELS

- .1 Floor Panels, General: Provide modular panels interchangeable with other field panels without disturbing adjacent panels or understructure.
 - .1 Size: Nominal 24 by 24 inches (610 by 610 mm).
 - .2 Attachment to Understructure: Bolted.
- .2 Exposed-Concrete-Surface Panels: Fabricated with bottom pan that is die formed from metallic-coated steel sheet and filled with lightweight concrete that is reinforced and bonded to pan by shear ties.

2.4 UNDERSTRUCTURE

- .1 Pedestals: Assembly consisting of base, column with provisions for height adjustment, and head (cap); made of steel.
 - .1 Provide pedestals designed for use in seismic applications.
 - .2 Base: Square or circular base with not less than 16 sq. in. (103 sq. cm) of bearing area.
 - .3 Column: Of height required to bring finished floor to elevations indicated. Weld to base plate.
 - .4 Provide vibration-proof leveling mechanism for making and holding fine adjustments in height over a range of not less than 2 inches (51 mm) and for locking at a

selected height, so deliberate action is required to change height setting and prevent vibratory displacement.

- .5 Head: Designed to support the panel system indicated.
 - .1 Bolted Assemblies: Provide head with four holes aligned with holes in floor panels for bolting of panels to pedestals.
- .2 Stringer Systems: Modular steel stringer systems designed to bolt to pedestal heads and form a grid pattern. Protect steel components with manufacturer's standard galvanized or corrosion-resistant paint finish.

2.5 FABRICATION

- .1 Fabrication Tolerances:
 - .1 Size: Plus or minus 0.020 inch (0.50 mm) of required size.
 - .2 Squareness: Plus or minus 0.015 inch (0.38 mm) between diagonal measurements across top of panel.
 - .3 Flatness: Plus or minus 0.035 inch (0.89 mm), measured on a diagonal on top of panel.
- .2 Panel Markings: Clearly and permanently mark floor panels on their underside with panel type and concentrated-load rating.
- .3 Bolted Panels: Provide panels with holes drilled in corners to align precisely with threaded holes in pedestal heads and to accept countersunk screws with heads flush with top of panel.
- .4 Cutouts: Fabricate cutouts in floor panels for cable penetrations and service outlets. Provide reinforcement or additional support, if needed, to make panels with cutouts comply with structural performance requirements.
 - .1 Number, Size, Shape, and Location: As indicated.
- .5 Grommets: Where indicated, fit cutouts with manufacturer's standard grommets; or, if size of cutouts exceeds maximum grommet size available, trim edge of cutouts with manufacturer's standard plastic molding with tapered top flange. Furnish removable covers for grommets.

2.6 ACCESSORIES

- .1 Post-Installed Anchors: For anchoring pedestal bases to subfloor, provide four post-installed threaded concrete screws made from carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 (Mild), with the capability to sustain, without failure, a load equal to 1.5 times the loads imposed by pedestal overturning moment on fasteners, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- .2 Service Outlets: Standard UL-listed and -labeled assemblies, for recessed mounting flush with top of floor panels; for power, communication, and signal services; and complying with the following requirements:
 - .1 Structural Performance: Cover capable of supporting a 300-lbf (1334-N) concentrated load.
 - .2 Cover and Trim Ring Type: Painted steel cover with opening for passage of cables when cover is closed and including trim ring frame for use with steel box assembly for mounting electrical receptacles and/or communications outlets.

- .3 Location: In center of panel quadrant unless otherwise indicated.
- .3 Receptacles and Wiring: See Electrical.
- .4 Closures: Where underfloor cavity is not enclosed by abutting walls or other construction, provide metal-closure plates with manufacturer's standard finish.
- .5 Perimeter Support: Where indicated, provide manufacturer's standard method for supporting panel edge and forming transition between access flooring and adjoining floor coverings at same level as access flooring.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 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 components in accordance with system manufacturer's written recommendations.
- .2 Pedestals and stringers:
 - .1 Arrange pedestal assemblies to meet grid spacing required.
 - .2 Bond pedestals base plate to structural floor with adhesive. Secure base plate to concrete floor with power activated fasteners after adhesive has cured.
 - .3 When adhesive is cured no bond impairment acceptable when 178 N horizontal force is applied to 300 mm high pedestals.
 - .1 Install additional pedestal assemblies where grid pattern is disturbed by columns, walls, ramps, openings, and steps, and at cut-outs that impair floor load capacity.
 - .4 Install stringers rigidly brace floor pedestals four ways.
- .3 Floor panels:
 - .1 Install floor panels and floor finish solidly on pedestals, level to maximum variation over entire floor of 1:2000.
 - .2 Install grilles or perforated panels where indicated.
 - .3 Install step tread panels similar to floor panels, securely fixed. Include shoe at top and bottom of ramp.

- .4 Seal field cuts with plastic angles or channels. No exposed cut edges permitted.
- .5 Allow for cutting holes in floor panels for installation of computer and electrical equipment. Include cable protection edging or sheet.
 - .1 Location, number and size: see Electrical.
- .6 Provide floor, steps complete with necessary edge trims, end closures and lateral bracing at step edges and other locations where pedestal is not braced four ways.
- .4 Fascia panels:
 - .1 Install fascia panels at exposed sides, step risers and where indicated.
 - .2 Secure panels to continuous angles mechanically secured to structural floor and to edge of floor panels.
 - .3 Install metal trim at intersection of fascia panels and access floor and at abutting walls and columns.
- .5 Isolate floor system from RF shielded wall and floor.
- .6 Provide electrical grounding connectors.
- .7 Adjust floor panel system for smooth, quiet operation.

3.4 FIELD QUALITY CONTROL

- .1 Site Testing:
 - .1 Inspection and testing will be carried out by Testing Laboratory designated by Departmental Representative, as specified in Section 01 45 00 - Quality Control.
 - .2 Departmental Representative will pay costs for testing, as specified in Section 01 29 83 - Payment Procedures for Testing Laboratory Services.
- .2 Manufacturer's Field Services:
 - .1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits to review Work at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.
 - .4 Obtain reports within 3 days of review and submit.

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 surfaces after installation using manufacturer's recommended cleaning procedures.

- .2 Clean aluminum with damp rag and 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.

3.6 PROTECTION

- .1 Protect installed products and components from damage during construction.
 - .1 Protect finished access floor with 0.15 mm thick polyethylene film or kraft paper, sealed at edges to prevent tearing.
 - .2 Protect finished access floor with 19 mm plywood. Reinforce access floor as per manufacturer's recommendations.
- .2 Repair damage to adjacent materials caused by access flooring installation.

END OF SECTION

PART 1 GENERAL**1.1 SECTION INCLUDES**

- .1 Interior paint and coatings systems (LEED-09 NC/CI/CS Compliant) including surface preparation.
- .2 Exterior paint and coatings systems including surface preparation.

1.2 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 05 50 00 - Metal Fabrications.
- .3 Section 06 10 00 - Rough Carpentry
- .4 Section 06 40 00 - Architectural Woodwork.
- .5 Section 08 11 00 - Metal Doors and Frames
- .6 Section 08 14 16 - Flush Wood Doors
- .7 Section 23 05 00 - Common Work Results for HVAC.
- .8 Section 26 05 00 - Common Work Results for Electrical.

1.3 REFERENCES

- .1 Steel Structures Painting Council (SSPC):
 - .1 SSPC-SP 1 - Solvent Cleaning.
 - .2 SSPC-SP 2 - Hand Tool Cleaning.
 - .3 SSPC-SP 3 - Power Tool Cleaning.
 - .4 SSPC-SP5/NACE No. 1, White Metal Blast Cleaning.
 - .5 SSPC-SP6/NACE No. 3, Commercial Blast Cleaning.
 - .6 SSPC-SP7/NACE No. 4, Brush-Off Blast Cleaning.
 - .7 SSPC-SP10/NACE No. 2, Near-White Blast Cleaning.
 - .8 SSPC-SP11, Power Tool Cleaning to Bare Metal.
 - .9 SSPC-SP12/NACE No. 5, Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating.
 - .10 SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete.
- .2 Material Safety Data Sheets / Environmental Data Sheets: Per manufacturer's MSDS/EDS for specific VOCs (calculated per 40 CFR 59.406). VOCs may vary by base and sheen.
- .3 South Coast Air Quality Management District (SCAQMD): Rule 1113 - Architectural Coatings.
- .4 Green Seal, Inc.:
 - .1 GS-11 Standard for Paints and Coatings (1st Edition, May 20,1993).
 - .2 GC-03 - Environmental Criteria for Anti-Corrosive Paints.
- .5 United States Green Building Council (USGBC): LEED-09 NC/CI/CS.

1.4 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: For each paint system indicated, including.
 - .1 Product characteristics.
 - .2 Surface preparation instructions and recommendations.
 - .3 Primer requirements and finish specification.
 - .4 Storage and handling requirements and recommendations.
 - .5 Application methods.
 - .6 Cautions for storage, handling and installation.
 - .7 Submit WHMIS MSDS - Material Safety Data Sheets
- .3 Selection Samples: Submit a complete set of color chips that represent the full range of manufacturer's products, colors and sheens available.
- .4 Verification Samples: For each finish product specified, submit samples that represent actual product, color, and sheen.
- .5 Only submit complying products based on project requirements (i.e. LEED). One must also comply with the regulations regarding VOCs (CARB, OTC, SCAQMD, LADCO). To ensure compliance with district regulations and other rules, businesses that perform coating activities should contact the local district in each area where the coating will be used.

1.5 QUALITY ASSURANCE

- .1 Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- .2 Paint exposed surfaces. If a color of finish, or a surface is not specifically mentioned, Architect will select from standard products, colors and sheens available.
- .3 Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels unless indicated.
- .4 Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - .1 Finish surfaces for verification of products, colors and sheens.
 - .2 Finish area designated by Architect.
 - .3 Provide samples that designate primer and finish coats.
 - .4 Do not proceed with remaining work until the Architect approves the mock-up.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information.
 - .1 Product name, and type (description).
 - .2 Application and use instructions.
 - .3 Surface preparation.
 - .4 VOC content.
 - .5 Environmental handling.

- .6 Batch date.
- .7 Color number.
- .2 Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- .3 Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.
- .4 Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

1.7 PROJECT CONDITIONS

- .1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.8 EXTRA MATERIALS

- .1 Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
- .2 Furnish Owner with an additional one percent of each material and color, but not less than 1 gal (3.8 l) or 1 case, as appropriate.

PART 2 PRODUCTS

2.1 APPLICATIONS/SCOPE

- .1 Interior Paints and Coatings:(LEED-09 NC/CI/CS COMPLIANT)
 - .1 Metal: Aluminum, galvanized steel.
- .2 Exterior Paints and Coatings:
 - .1 Concrete: Cementitious siding, flexboard, transite, and shingles (non-roof).
 - .2 Masonry: Concrete masonry units, cinder or concrete block.
 - .3 Concrete: Concrete floors, patios, porches, steps and platforms, (non-vehicular).
 - .4 Metal: Aluminum, galvanized steel.
 - .5 Metal: Miscellaneous iron, ornamental iron, ferrous metal.
 - .6 Wood: Floors (non-vehicular), and platforms.
 - .7 Wood: Siding, trim, shutters, sash, and miscellaneous hardboard.
 - .8 Architectural PVC, plastic, fiberglass.
 - .9 Drywall: Gypsum board, and exterior drywall.
 - .10 Vinyl: Siding, EIFS, synthetic stucco.

2.2 PAINT MATERIALS - GENERAL

- .1 Paints and Coatings:
 - .1 Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to

coatings unless such procedure is specifically described in manufacturer's product instructions.

- .2 For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color. Or follow manufactures product instructions for optimal color conformance.
- .2 Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- .3 Coating Application Accessories: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.
- .4 Color: Refer to Finish Schedule for paint colors, and as selected.

2.3 INTERIOR PAINT SYSTEMS (LEED-V4 NC/CI/CS COMPLIANT)

- .1 METAL: Galvanized; Ceilings, Duct work, room# 114, 117, 118.
 - .1 Dryfall Waterborne Topcoats:
 - .1 Flat Finish:
 - .1 1st Coat: S-W Pro Industrial Waterborne Acrylic Dryfall, B42-80 Series or equivalent.
 - .2 2nd Coat: S-W Pro Industrial Waterborne Acrylic Dryfall, B42-80 Series (6.0 mils wet, 1.7 mils dry per coat) or equivalent.
 - .2 METAL – Steel; Doors, frames work.
 - .1 Latex Systems:
 - .1 Semi-Gloss Finish High Performance:
 - .1 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0 mils wet, 2.0 mils dry) or equivalent.
 - .2 2nd Coat: S-W Pro Industrial DTM Acrylic Semi-Gloss, B66 Series or equivalent.
 - .3 3rd Coat: S-W Pro Industrial DTM Acrylic Semi-Gloss, B66 Series (6-10 mils wet, 2.5-4.0 mils dry per coat) or equivalent.
 - .3 DRYWALL - Walls, Ceilings, Gypsum Board and similar items
 - .1 Latex Systems:
 - .1 Eg-Shel / Satin Finish:
 - .1 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry) or equivalent.
 - .2 2nd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series or equivalent.
 - .3 3rd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series (4 mils wet, 1.7 mils dry per coat) or equivalent.
 - .4 Room #102 WALLS ONLY: 1st Coat: S-W DryErase interior dry erase coating, KB66C2000 series (8 mils wet, 4 mils dry) or equivalent.
 - .5 2nd Coat: : S-W DryErase interior dry erase coating, KB66C2000 series (8 mils wet, 4 mils dry) or equivalent.

2.4 EXTERIOR PAINT SYSTEMS

- .1 METAL: Misc. Iron, Ornamental Iron, Structural Iron and Steel, Ferrous Metal.
 - .1 Epoxy Systems:
 - .1 Gloss Finish:
 - .1 1st Coat: S-W Macropoxy 646, B58-600 Series (13.5 mils wet, 10.0 mils dry) or equivalent.
 - .2 2nd Coat: S-W Acrolon 218HS Polyurethane Gloss, B65-600 Series (9.0 mils wet, 6.0 mils dry) or equivalent.
 - .3 3rd Coat: S-W Acrolon 218HS Polyurethane Gloss, B65-600 Series (9.0 mils wet, 6.0 mils dry per coat) or equivalent.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Do not begin installation until substrates have been properly prepared; notify Departmental Representative of unsatisfactory conditions before proceeding. If substrate preparation is the responsibility of another installer, notify Departmental Representative of unsatisfactory preparation before proceeding.
- .2 Proceed with work only after conditions have been corrected and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.
- .3 Previously Painted Surfaces: Verify that existing painted surfaces do not contain lead based paints, notify Departmental Representative immediately if lead based paints are encountered.

3.2 SURFACE PREPARATION

- .1 General: Surfaces shall be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.
 - .1 Prior to attempting to remove mildew, it is recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions are advised.
 - .2 Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow the surface to dry before painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.
 - .3 Remove items including but not limited to thermostats, electrical outlets, switch covers and similar items prior to painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
 - .4 No exterior painting should be done immediately after a rain, during foggy weather, when rain is predicted, or when the temperature is below 50 degrees F (10 degrees

C), unless products are designed specifically for these conditions. On large expanses of metal siding, the air, surface and material temperatures must be 50 degrees F (10 degrees F) or higher to use low temperature products.

- .2 Aluminum: Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP1, Solvent Cleaning.
- .3 Block (Cinder and Concrete): Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement, and hardeners. Concrete and mortar must be cured at least 30 days at 75 degrees F (24 degrees C). The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface. Fill bug holes, air pockets, and other voids with a cement patching compound.
- .4 Concrete, SSPC-SP13 or NACE 6: This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.
- .5 Cement Composition Siding/Panels: Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Pressure clean, if needed, with a minimum of 2100 psi pressure to remove all dirt, dust, grease, oil, loose particles, laitance, foreign material, and peeling or defective coatings. Allow the surface to dry thoroughly. The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments.
- .6 Copper and Stainless Steel: Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP 2, Hand Tool Cleaning.
- .7 Exterior Composition Board (Hardboard): Some composition boards may exude a waxy material that must be removed with a solvent prior to coating. Whether factory primed or unprimed, exterior composition board siding (hardboard) must be cleaned thoroughly and primed with an alkyd primer.
- .8 Drywall - Exterior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting. Exterior surfaces must be spackled with exterior grade compounds.
- .9 Drywall - Interior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting.
- .10 Galvanized Metal: Clean per SSPC-SP1 using detergent and water or a degreasing cleaner to remove greases and oils. Apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP16 is necessary to remove these treatments.
- .11 Plaster: Must be allowed to dry thoroughly for at least 30 days before painting, unless the products are designed to be used in high pH environments. Room must be ventilated while drying; in cold, damp weather, rooms must be heated. Damaged areas must be repaired

with an appropriate patching material. Bare plaster must be cured and hard. Textured, soft, porous, or powdery plaster should be treated with a solution of 1 pint household vinegar to 1 gallon of water. Repeat until the surface is hard, rinse with clear water and allow to dry.

- .12 Steel: Structural, Plate, And Similar Items: Should be cleaned by one or more of the surface preparations described below. These methods are used throughout the world for describing methods for cleaning structural steel. Visual standards are available through the Society of Protective Coatings. A brief description of these standards together with numbers by which they can be specified follow.
- .1 Solvent Cleaning, SSPC-SP1: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
 - .2 Hand Tool Cleaning, SSPC-SP2: Hand Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before hand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
 - .3 Power Tool Cleaning, SSPC-SP3: Power Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
 - .4 White Metal Blast Cleaning, SSPC-SP5 or NACE 1: A White Metal Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
 - .5 Commercial Blast Cleaning, SSPC-SP6 or NACE 3: A Commercial Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 33 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
 - .6 Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4: A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.
 - .7 Power Tool Cleaning to Bare Metal, SSPC-SP11: Metallic surfaces that are prepared according to this specification, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portions of pits if the original surface is pitted. Prior to power tool surface

- preparation, remove visible deposits of oil or grease by any of the methods specified in SSPC-SP1, Solvent Cleaning, or other agreed upon methods.
- .8 Near-White Blast Cleaning, SSPC-SP10 or NACE 2: A Near White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
 - .9 High- and Ultra-High Pressure Water Jetting for Steel and Other Hard Materials: SSPC-SP12 or NACE 5: This standard provides requirements for the use of high- and ultra-high pressure water jetting to achieve various degrees of surface cleanliness. This standard is limited in scope to the use of water only without the addition of solid particles in the stream.
 - .10 Water Blasting, SSPC-SP12/NACE No. 5: Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 psi at a flow of 4 to 14 gallons per minute.
 - .13 Vinyl Siding, Architectural Plastics, EIFS and Fiberglass: Clean vinyl siding thoroughly by scrubbing with a warm, soapy water solution. Rinse thoroughly. Do not paint vinyl siding with any color darker than the original color, unless the paint system features Sherwin-Williams VinylSafe technology. Painting with darker colors that are not Sherwin-Williams VinylSafe may cause siding to warp. Follow all painting guidelines of the vinyl manufacturer when painting. Only paint properly installed vinyl siding. Deviating from the manufacturer's painting guidelines may cause the warranty to be voided.
 - .14 Stucco: Must be clean and free of any loose stucco. If recommended procedures for applying stucco are followed, and normal drying conditions prevail, the surface may be painted in 30 days. The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments such as Loxon.
 - .15 Wood: Must be clean and dry. Prime and paint as soon as possible. Knots and pitch streaks must be scraped, sanded, and spot primed before a full priming coat is applied. Patch all nail holes and imperfections with a wood filler or putty and sand smooth.

3.3

INSTALLATION

- .1 Apply all coatings and materials with the manufacturer's specifications in mind. Mix and thin coatings according to manufacturer's recommendations.
- .2 Do not apply to wet or damp surfaces. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 30 days. Test new concrete for moisture content. Wait until wood is fully dry after rain or morning fog or dew.
- .3 Apply coatings using methods recommended by manufacturer.
- .4 Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.
- .5 Apply coatings at spreading rate required to achieve the manufacturers recommended dry film thickness.

- .6 Regardless of number of coats specified, apply as many coats as necessary for complete hide, and uniform appearance.
- .7 Inspection: The coated surface must be inspected and approved by the Architect just prior to the application of each coat.

3.4 PROTECTION

- .1 Protect finished coatings from damage until completion of project.
- .2 Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

END OF SECTION

SIGNAGE**1.1 RELATED REQUIREMENTS**

- .1 Section 09 21 16 – Gypsum Board Assemblies
- .2 Section 09 91 23 – Interior Painting

1.2 REFERENCES

- .1 Aluminum Association (AA)
 - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 ASTM International
 - .1 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A653/A653M-13, Standard Specification for Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
 - .3 ASTM B32-08, Standard Specification for Solder Metal.
 - .4 ASTM B456-11e1, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 31-GP-107Ma-90, Non-Inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.
 - .2 CGSB 41-GP-6M-1983, Sheets, Thermosetting Polyester Plastics, Glass Fibre Reinforced.
- .4 CSA Group
 - .1 CSA W47.2-11, Certification of Companies for Fusion Welding of Aluminum.
 - .2 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
 - .3 CSA W59.2-M1991(R2013), Welded Aluminum Construction.
- .5 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI SSF 6-2012, Sheet Steel Facts #6, Metallic Coated Sheet Steel for Structural Building Products.
- .6 Green Seal (GS)
 - .1 GS-11-2013, Standard for Paints and Coatings.
 - .2 GS-36-2013, Adhesives for Commercial Use.
- .7 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .8 South Coast Air Quality Management District (SCAQMD)
 - .1 SCAQMD Rule 1113-13, Architectural Coatings.
 - .2 SCAQMD Rule 1168-A2011, Adhesive and Sealant Applications.
- .9 Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
 - .1 MPI #76, Quick Dry Alkyd Metal Primer.
 - .2 MPI #96, Quick Dry Enamel Gloss.

SIGNAGE**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 signage and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit catalogue sheets.
 - .2 Indicate materials, thicknesses, sizes, finishes, colours, construction details, removable and interchangeable components, mounting methods, schedule of signs.
 - .3 Submit drawn-to-scale details for individually fabricated lettering indicating word and letter spacing.
- .4 Samples:
 - .1 Submit duplicate representative sample of each type sign, sign image and mounting method including, but not limited to: graphics, cast letters, sign box installation method, channel letters, and wall plates fixed mounting installation method.

1.4 CLOSEOUT SUBMITTALS

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

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location, indoors, 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.

PART 2 PRODUCTS**2.1 MATERIALS**

- .1 Sheet aluminum: anodizing quality.
- .2 PVC sheet: Polyvinyl Chloride cast sheet suitable for intended use in sign fabrication, colours as indicated.
- .3 Fibreglass sheet: to CGSB 41-GP-6M, flat sheet, smooth finish, colours as indicated.
- .4 Self-stick foam tape: 1.6 mm thick, 352.4 kg/m³ density polyurethane open-cell foam tape for sign purposes, with synthetic self-stick adhesive on both sides.
- .5 Adhesives, paints, sealants and solvents type recommended by sheet manufacturer for applicable condition.

SIGNAGE

Proposal Ref : 7207528

June 12, 2018

.1 Maximum VOC limit 30 g/L

.6 Acrylic top-coat: clear, non-yellowing, exterior grade, satin finish, acrylic polyester resin protective coating, compatible with fibreglass, metal, acrylic surface of type recommended by sheet manufacturer.

.1 Maximum VOC limit 50 g/L.

2.2 SIGN GRAPHICS

.1 Sign graphics: well defined, arranged for balanced appearance, and properly word and letter spaced.

.2 Silk screen process: apply 2, multi or 1 colour photographic produced silk screen printed images to face side of opaque sign faces.

.3 Engraving: apply sign images using pantograph mechanical engraving machine to obtain incised letters to match Departmental Representative's.

.4 Self-stick vinyl film: individual letters and numerals and symbols die cut from 0.1 mm thick integral colour, matte finish, exterior grade PVC film, with self-stick adhesive backing.

2.3 WALL PLATES

.1 Plastic wall plates:

.1 Fabricate from PVC sheet, colour, 3.2mm thick. Sizes as indicated.

.2 Sign graphics: apply by engraving.

.2 Metal wall plates:

.1 Fabricate from sheet aluminum sign plates, minimum 3.2 mm thick, with baked enamel finish.

.1 Sizes as indicated.

.2 Sign graphics: apply by engraving.

.3 Fixed mounting:

.1 Prepare wall plates for fixing by concealed tamperproof clips to match Departmental Representative's.

.2 Include back-up plates for fixing to uneven surfaces where required.

2.4 DOOR PLATES

.1 Fabricate sign faces of colour anodized aluminum.

.1 Size: as indicated.

.2 Sign graphics: apply by engraving.

.3 Interchangeable mounting:

.1 Supply door plates with approved type, semi-concealed, retaining holders that permit quick but vandal-resistant interchange of sign face.

.2 Exposed fasteners not permitted.

.3 Exposed portions to match sign face.

.4 Fixed mounting: use self-stick foam tape.

SIGNAGE

- .5 Mounting on transparent surfaces: use self-stick foam tape. Include blank back-up plate for opposite side.
- .6 Washroom pictographs: cut-out figures without backgrounds.

2.5 EXTERIOR SIGNAGE PLATES

- .1 Fabricate sign faces of colour anodized aluminum.
 - .1 Size: as indicated.
- .2 Sign graphics: apply by self-stick vinyl letters.
- .3 Exterior signage plate mounted on aluminum post 150mm x 150mm secure to ground or mechanically fastened on exterior wall.

2.6 FABRICATION

- .1 Fabricate signs in accordance with details, specifications and shop drawings.
- .2 Build units square, true, accurate to size, free from visual or performance defects.
- .3 Fit and securely join sections to obtain tight, closed joints.
- .4 Allow for thermal movement without distortion of components.
- .5 Polish exposed edges of plastic or metal to smooth, slightly convex profile.
- .6 Apply bituminous paint to aluminum in contact with dissimilar metals, concrete or masonry.
- .7 Manufacturer's nameplates on sign surface permitted in non visible locations in completed work.

2.7 FINISHES

- .1 Baked enamel:
 - .1 One coat of conditioner to CGSB 31-GP-107M one coat of primer.
 - .2 At least two coats of MPI # 96.
 - .3 One coat on interior surfaces.
 - .4 Individually bake each coat.

PART 3 EXECUTION**3.1 EXAMINATION**

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

SIGNAGE**3.2 INSTALLATION**

- .1 Manufacturer's Instructions: compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheets.
- .2 Erect and secure signs plumb and level at elevations Departmental Representative
- .3 Comply with sign manufacturer's installation instructions and approved shop drawings.
- .4 Mechanical attachment:
 - .1 To concrete or solid masonry: use lag screws and expansion bolts or screws and fibre plugs, as appropriate for stresses involved.
 - .2 To hollow masonry: use toggle bolts or equivalent.
 - .3 To steel: use bolts with nut and lock washers, self-tapping screws.
 - .4 To wood: use screws.
 - .5 Secure into framing members behind stud walls or above ceilings.
 - .6 Mechanical fasteners on exterior: non-staining, non-ferrous type.
 - .7 Fabricate special fasteners as required for installation conditions.
 - .8 Mechanical fasteners and methods of attachment subject to Departmental Representative's approval.
 - .1 Obtain Departmental Representative's approval before fixing to structural steel.
- .5 Adhesive attachment:
 - .1 Use self-stick adhesive foam tape to manufacturer's instructions to fix sign and prevent "rocking".
 - .2 Keep tape maximum 1.6 mm from edges.

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 Leave signs clean.
 - .2 Remove debris from interior of sign boxes.
 - .3 Touch up damaged finishes.

END OF SECTION

PLASTIC TOILET COMPARTMENTS**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 05 50 00 - Metal Fabrications.
- .2 Section 06 10 10 - Rough Carpentry
- .3 Section 06 40 00 - Architectural Woodwork
- .4 Section 09 21 16 - Gypsum Board Assemblies
- .5 Section 09 30 13 - Ceramic Tiling
- .6 Section 09 90 00 - Interior, Exterior Paints and Coatings
- .7 Section 10 28 10 – Toilet and Bath Accessories

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A167-2004, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-B651-04, Accessible Design for the Built Environment.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .5 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for toilet partitions or components, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.

PLASTIC TOILET COMPARTMENTS

- .2 Indicate fabrication details, plans, elevations, hardware, and installation details.
- .4 Samples:
 - .1 Submit duplicate 300 x 300 mm samples of panel showing finish on both sides, two finished edges and core construction.
 - .2 Submit duplicate representative samples of each hardware item, including brackets, fastenings and trim.
- .5 Quality control submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
- .6 Closeout Submittals:
 - .1 Provide maintenance data for plastic laminate for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 QUALITY ASSURANCE

- .1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section and on-site installation, with contractor's representative and Departmental Representative in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANNT) Chart to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Protect finished laminated plastic surfaces during shipment and installation. Do not remove until immediately prior to final inspection.
- .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 Remove only in quantities required for same day use.
 - .3 Store and protect asphalt shingles from nicks, scratches, and blemishes.
 - .4 Replace defective or damaged materials with new.

1.6 WARRANTY

- .1 For work part of section 10 21 13.19 – Plastic Toilet Compartments, warranty goes from 12 months to 60 months.

PLASTIC TOILET COMPARTMENTS**PART 2 PRODUCTS****2.1 MATERIALS**

- .1 Solid laminated plastic: to CAN3-A172-M79, self-supporting.
 - .1 19 mm (3/4 inches) thick
 - .2 Colour: Laminati – 437 Blue Giungla.
- .2 Adhesive for laminate: contact adhesive to ONGC 71-GP-20M.
- .3 Stainless steel sheet metal: to ASTM A167-82, Type 304 with brushed finish.
- .4 Sealer: in accordance with 07 92 00 – Joint sealants.
- .5 Headrails: tubular stainless steel dimensions recommended by manufacturer for abuse-resistant sturdy usage.
- .6 Pilaster shoe: 0.8 mm stainless steel, nonferrous metal, height recommended by manufacturer for abuse resistant sturdy usage.
- .7 Attachment: stainless steel tamper proof type screws and bolts.
- .8 Provide suspended channel support for ceiling hung partitions in accordance with Section 05 50 00 - Metal Fabrications.

2.2 COMPONENTS

- .1 Hinges:
 - .1 Heavy duty, non-lubricating and nylon bushings.
 - .2 Material/finish: stainless steel sturdy casting.
 - .3 Swing: inward
 - .4 Return movement: gravity
 - .5 Adjustable door-open angle.
 - .6 Emergency access feature.
- .2 Latch set: built-in, combination latch, door-stop, keeper and bumper, stainless steel, emergency access feature.
- .3 Wall and connecting brackets: stainless steel extrusion or casting.
- .4 Coat hook: combination hook and rubber door bumper, stainless steel.
- .5 Door pull: Barrier-free type suited for out swinging doors, stainless steel.
- .6 Top brace: extruded aluminum with clear anodized finish anti-seize type.
- .7 Stainless steel sheet: to ASTM A167-82, type 304 with brushed finish.

PLASTIC TOILET COMPARTMENTS

- .8 Fasteners: exposed screws: ordinary or tamper proof. Ordinary screws will be stainless steel and male/female type for hinges. Tamper proof screws will be stainless steel, type 410, for better hardness.
- .9 Sealant: water repellent or glue recommended by manufacturer of laminate.
- .10 Black polypropylene felt embedded on either side of partition (cover-view or talus)

2.3 FABRICATION

- .1 Doors and panels: 25 mm thick, solid plastic laminate panels, to sizes indicated on drawings.
- .2 Pilasters: 32 mm thick, constructed same as door, to sizes recommended by manufacturer, for abuse-resistant sturdy usage.
- .3 Laminate plastic to core material ensuring core and laminate profiles coincide to provide continuous support and bond over entire surface.
- .4 Provide formed and closed edges for doors, panels and pilasters.
 - .1 Mitre and weld corners and grind smooth.
- .5 Provide internal reinforcement at areas of attached hardware and fittings.
 - .1 Temporarily mark location of reinforcement for grab bars and benches.

2.4 FINITION

- .1 Steel parts must be cleaned, rid of grease and neutralized with a treatment product containing phosphate or chromate.
- .2 Doors, jambs , partitions and benches must be same color.

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 MANUFACTURER'S INSTRUCTIONS

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

PLASTIC TOILET COMPARTMENTS**3.3 INSTALLATION**

- .1 Ensure supplementary anchorage, if required, is in place.
- .2 Do work in accordance with CSA-B651.

3.4 ERECTION

- .1 Partition erection:
 - .1 Install partitions secure, plumb and square.
 - .2 Leave 12 mm space between wall and panel or end pilaster.
 - .3 Anchor mounting brackets to masonry or concrete surfaces using screws and shields: to hollow walls using bolts and toggle type anchors, to steel supports with bolts in threaded holes.
 - .4 Attach panel and pilaster to brackets with through type sleeve bolt and nut.
 - .5 Provide for adjustment of floor variations with screw jack through steel saddles made integral with pilaster. Conceal floor fixings with stainless steel shoes.
 - .6 Provide templates for locating threaded studs through finished ceilings.
 - .7 Equip each door with hinges, latch set, and each stall with coat hook mounted on door, mounting heights 1500 mm. Adjust and align hardware for proper function. Set door open position at 90 degrees from closed position. Install door bumper on wall.
 - .8 Equip out swinging doors with door pulls on inside of door in accordance with CSA-B651.
 - .9 Install hardware.
- .2 Floor supported and overhead braced partition erection:
 - .1 Attach pilasters to floor with pilaster supports and level, plumb, and tighten installation with levelling device.
 - .2 Secure pilaster shoes in position.
 - .3 Secure headrail to pilaster face with not less than two fasteners per face.
 - .4 Set tops of doors parallel with overhead brace when doors are in closed position.
- .3 Screen erection for urinal stalls/ entrance:
 - .1 Provide urinal stall/ entrance screens consisting of panel as indicated.
 - .2 Anchor screen panels to walls with 2 appropriate panel brackets.

3.5 ADJUSTMENTS

- .1 Adjust doors and bolts so as to obtain optimal performance.
- .2 Lubricate hardware parts and other moving parts.

3.6 FIELD QUALITY CONTROL

- .1 Verifications carried out on site by manufacturer.
 - .1 Manufacturer should make recommendations on product use and make periodic visits to verify whether installation was performed according to recommendations.

PLASTIC TOILET COMPARTMENTS

3.7 CLEANING

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

3.8 PROTECTION

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

END OF SECTION

WIRE MESH PARTITIONS**PART 1 GENERAL****1.1 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A653/A653M-01a, Standard Specification for Steel Sheet, Zinc-Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
 - .2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
 - .3 CAN/CGSB-1.104-M91, Semigloss Alkyd, Air Drying and Baking Enamel.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-G40.20-04/G40.21-F02, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA-G164-M92(C2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA W59-F03, Welded Steel Construction (Metal Arc Welding).
- .4 Green Seal Environmental Standards
 - .1 Standard GC-03-93, Anti-Corrosive Paints.
 - .2 Standard GS-11-97, Architectural Paints.
- .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
 - .1 SCAQMD Rule 1113-04, Architectural Coatings.
- .7 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - February 2004.
 - .1 MPI # 76, Quick Dry Alkyd Metal Primer.
 - .2 MPI # 81, Machinery Enamel.
 - .3 MPI # 96, Quick Dry Enamel Gloss.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for wire mesh partitions or components, 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.
- .3 Shop Drawings:

WIRE MESH PARTITIONS

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec in Canada.
- .2 Indicate partition panel modules and types, materials, gauges, finishes, door and other openings, hardware, fastening methods to adjacent structure, ceiling details, and assembly methods.
- .4 Samples:
 - .1 Submit duplicate 300 x 300 mm samples of each type partition and colour and finish on actual base metal.
 - .2 Sample to show basic construction, door construction, hardware, and finishes.
 - .3 Erect trial assembly of at least two modules of each type partition, on site where directed by Departmental Representative.
 - .4 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
- .5 Quality control submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.3 ACCEPTABLE MATERIAL OR PRODUCTS

- .1 When materials or products are prescribed by their brand, consult Instructions to Tenderers to know procedures concerning request for approval of materials or substitutes.

1.4 QUALITY ASSURANCE

- .1 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Erect one of each type door and two of each type partition panel.
 - .3 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with work.
 - .4 When accepted, mock-up will demonstrate minimum standard for this work.
 - .5 Mock-up may remain as part of finished work.
- .2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with Departmental Representative in accordance with 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.5 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.

WIRE MESH PARTITIONS

- .3 Storage and Handling Requirements:
 - .1 Store materials level off ground, indoors, in a dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Only right quantities of materials/equipment to be used on the day must leave the storage area
 - .3 Store and protect asphalt shingles from nicks, scratches, and blemishes.
 - .4 Replace defective or damaged materials with new.

PART 2 PRODUCTS**2.1 MATERIALS**

- .1 Partition mesh system: according to 'Directive on Physical Security for Controlled Substances Requirements' by Health Canada:
 - .1 Welded mesh: metal, diamond shaped 25 mm x 50 mm, 3.5 mm diameter laminated steel mesh, floor to ceiling.
 - .2 Frame: steel angle 32 mm x 32 mm x 2.7 mm
 - .3 Jamb: hollow steel tubes, square section, 50 mm x 50 mm, backing at least 1.52 mm thick.
 - .4 Anchor clips: brackets and fasteners: Secure anti-theft.
 - .5 Finish: powder coating.
 - .6 Color: to be chosen by Architect among full range of colors offered by manufacturer.
 - .7 Hinged doors: manufactured in same way as the panels, reinforced, pre-fitted with frame.
 - .1 Hinged door hardware parts: door stop, latch, three hinges, reinforcement element to attach panic bar, and panic bar 98EO by Von Duprin, finish 626
 - .8 Sliding doors: manufactured in same way as panels, reinforced, pre-fitted with frame.
 - .1 Sliding doors must be fitted with the following:
 - .1 box type slide and automatic closure withstanding load of 135 kg, galvanized steel 1.6 mm thick.
 - .2 suspensions each withstanding load of 70 kg, consisting of four (4) shaped bearings, galvanized steel, 54 mm diameter, cement ball type, mounted in forged cadmium-plated steel insert, and a suspension bolt 16 mm diameter for door height adjustment.
 - .3 three (3) suspensions per door.
 - .4 guides, stops, latch and lockout, monitoring contact model 3287 by Sargent.
 - .9 Acceptable Products: Cogan Partitions by Cogan Wire and Metal Products Ltd.

2.2 ACCESSORIES

- .1 Master Key Systems, Deadlocks and Locksets: refer to Section 08 71 00 - Door Hardware and to manufacturer's instructions.

2.3 FABRICATION

- .1 Panels consisting of wire mesh:

WIRE MESH PARTITIONS

Modular panels manufactured in workshop designed to be installed between jambs with all components, accessories, hardware and fasteners.

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 MANUFACTURER'S INSTRUCTIONS

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

3.3 ERECTION

- .1 Install mesh enclosures and doors in accordance with manufacturer's printed instructions.
- .2 Erect enclosures plumb, level, straight, rigidly supported, and securely fastened to abutting surfaces, free from superimposed loads.
- .3 Fix to masonry and concrete using lag bolts and shields; to hollow walls using bolts and toggle type anchors; to steel supports with bolts in threaded holes or spot welds.
 - .1 Locate fasteners on interior side where possible for maximum security.
- .4 Install doors and adjust for proper closing, locking and smooth operation.
 - .1 Mount sliding doors on interior side of enclosed area.

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 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.

END OF SECTION

TOILET AND BATH ACCESSORIES**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 09 21 16 – Gypsum Board Assemblies
- .2 Section 09 91 13 – Interior Painting
- .3 Section 10 21 13.19 - Plastic Toilet Compartments

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM A167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM B456-03, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
 - .3 ASTM A653/A653M-09, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .4 ASTM A924/A924M-09, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
 - .2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
 - .3 CGSB 31-GP-107MA-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.
- .3 CSA International
 - .1 CAN/CSA-B651-F04, Accessible Design for the Built Environment.
 - .2 CAN/CSA-G164-M92(C2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
 - .2 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, as well as building-in details of anchors for grab bars.
- .4 Samples:
 - .1 Submit samples.

TOILET AND BATH ACCESSORIES

.2 Samples will be returned for inclusion into work.

.5 Sustainable Standards Certification:

.1 Low-Emitting Materials: submit listing of laminate adhesives used in building, verifying that they contain no urea-formaldehyde.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Tools:

.1 Provide special tools required for assembly, disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.

.2 Deliver special tools to Departmental Representative.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect toilet and bathroom accessories from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.7 WARRANTY

.1 For work subject to section 10 28 10 - Toilet and Bath Accessories, 12 months warranty period is extended to 120 months.

PART 2 PRODUCTS**2.1 MATERIALS**

.1 Sheet steel: to ASTM A653/A653M with ZF001 designation zinc coating.

.2 Stainless steel sheet metal: to ASTM A167, Type 304 with # 4 finish.

.3 Sustainability Characteristics:

.1 Laminate Adhesives.

.1 Urea Formaldehyde Free.

.4 Stainless steel tubing: Type 304, commercial grade, seamless welded 1.2 mm wall thickness.

TOILET AND BATH ACCESSORIES

- .5 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 COMPONENTS

- .1 Soap dispenser: stainless steel lid assembly, tamper proof filler lock, mounted, capacity 1.18 l.
 - .1 Acceptable Products: Model B-4112 by Bobrick Washroom Equipment Inc.
- .2 Toilet tissue dispenser: double roll type, stainless steel, mounted.
 - .1 Acceptable Products: Model B-4288 by Bobrick Washroom Equipment Inc.
- .3 Grab bars: 32 mm diameter tubing of stainless steel, 1.6 mm wall thickness, and 85 mm diameter wall flanges, concealed screw attachment, welded to tubular bar. Grab bar material and anchorage to withstand downward pull of 2.2 kN.
 - .1 Acceptable Products: Model B-5806.99 by Bobrick Washroom Equipment Inc.
- .4 Paper towel dispenser and waste container: stainless and semi-recessed.
 - .1 Acceptable Products: Model B-3942 complete with Towelmate and Linermate accessories by Bobrick Washroom Equipment Inc.
- .5 Towel hooks: stainless steel, type 304, satin finish.
 - .1 Acceptable Products: Model B-233 by Bobrick Washroom Equipment Inc.
- .6 Feminine napkin disposal bin: stainless steel, type 304.
 - .1 Acceptable Products: Model B-4354 by Bobrick Washroom Equipment Inc. for bins mounted on toilet partitions.
 - .2 Acceptable Products: Model B-4353 by Bobrick Washroom Equipment Inc. for bins mounted on drywalls.
- .7 Mirrors: wall mounted units, fixed, 6 mm thick, with stainless steel frame.
 - .1 Acceptable Products: Model B-165 1830 or dimensions as per indications by Bobrick Washroom Equipment Inc.
 - .2 Acceptable Products: Tilt- Mirror, Model B-293 1830 or dimensions as per indications by Bobrick Washroom Equipment Inc.
- .8 Shower rods:
 - .1 Type 1 – For shower cubicles: stainless 25 mm diameter 1 mm wall thickness steel tubing required length 36" with satin chrome finished flanges, concealed mounting clamps, 7 shower curtain hooks.
 - .1 Acceptable Products: Tilt- Mirror, Model B-293 1830 or dimensions as per indications by Bobrick Washroom Equipment Inc.
 - .2 Type 2 – For locker rooms: shower rod, superior industrial strength stainless steel tubing, 1 1/4" diameter, size 18.
 - .1 Acceptable Products: Model 1204 by American Specialties Inc.
- .9 Hooks: stainless steel, type 304, 2 mm diameter. To be used with 25 and 32 mm diameter shower curtain rods.
 - .1 Acceptable Products: stainless steel, model 204-1 by Bobrick Washroom Equipment Inc.

TOILET AND BATH ACCESSORIES

- .10 Shower curtains: 0.2 mm thick vinyl, opaque white, matt finish, anti-bacterial fire resistive self-extinguishing. Washers in brass alloy, nickel plated along top. Bottom and sides will be hemmed. Size: full height x full width.
 - .1 Acceptable Products: vinyl shower curtains by Gary Manufacturing or approved equivalent.
- .11 Hand dryer: listed under re-examination service of ULC and CSA approved.
 - .1 Wall mounted.
 - .2 Wall box: 16 gauge steel.
 - .3 Cover: stainless steel
 - .4 Motor: universal type, 74.6 kW, 7500 RPM, resilient mounting, sealed, lubricated bearings, and fuse protected 115 V, 15 Amp.
 - .5 Fan: double inlet centrifugal type, dynamically balanced, directly mounted on motor shaft, 56.6 L/s.
 - .6 Heating element: protected by an automatic, resetting circuit breaker, isolated from nozzle.
 - .7 Electronic dryer: power controlled by infrared admitting, receiving electronic control device positioned to dryer on when hands are placed under nozzle. Operation to continue for no more than 80 seconds of continued use.
 - .8 Nozzle: stainless steel fixed 360 degrees revolving.

2.3 FABRICATION

- .1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.
- .2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.
- .3 Brake form sheet metal work with 1.5 mm radius bends.
- .4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- .5 Back paint components where contact is made with building finishes preventing electrolysis.
- .6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CAN/CSA-G164.
- .7 Shop assemble components and package complete with anchors and fittings.
- .8 Provide steel anchor plates and components for installation on studding and building framing.

2.4 FINISHES

- .1 Manufacturer's or brand names on face of units not acceptable.

PART 3 EXECUTION**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for non-structural metal framing application in accordance with manufacturer's written instructions.

TOILET AND BATH ACCESSORIES

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

3.2 INSTALLATION

- .1 Install and secure accessories rigidly in place as follows:
 - .1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.
 - .2 Hollow masonry units, existing plaster or drywall: use toggle bolts drilled into cell or wall cavity.
 - .3 Solid masonry, marble, stone or concrete: use bolt with lead expansion sleeve set into drilled hole.
 - .4 Toilet and shower compartments: use male to female through bolts.
- .2 Install grab bars on built-in anchors provided by bar manufacturer.
- .3 Use tamper proof screws/bolts for fasteners.
- .4 Fill units with necessary supplies shortly before final acceptance of building.

3.3 LISTS AND TABLES

- .1 Place accessories where indicated in accordance with following requirements.
 - .1 Towel hooks: provide one per toilet and per shower. Mounting height: 1400 mm from covered floor.
 - .2 Mirrors: where indicated. Mounting height: 1000 mm from covered floor.
 - .3 Shower curtain rods: where indicated. Mounting height: 2210 mm from covered floor.

3.4 ADJUSTING

- .1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.
- .2 Lubricate moving parts to operate smoothly and fit accurately.

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 reuse/ recycling in accordance with Section 01 74 21 - Construction.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

TOILET AND BATH ACCESSORIES

3.6 PROTECTION

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

END OF SECTION

ENTRANCE FLOOR GRILLES**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 03 35 00 - Concrete Finishing.
- .3 Section 07 92 00 - Joint Sealants

1.2 REFERENCES

- .1 The Aluminum Association.
 - .1 Aluminum Standards and Data 2009 Metric SI.
- .2 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM B117 - 09 Standard Practice for Operating Salt Spray (Fog) Apparatus.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations, in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit required shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Shop drawings must indicate dimensions, as well as location and dimensions of recessed areas to receive products specified in this section.
- .3 Provide operation and maintenance data for repair or replacement of worn parts.

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

ENTRANCE FLOOR GRILLES**PART 2 PRODUCTS****2.1 MATERIALS**

- .1 Supply and install, at locations and dimensions indicated on drawings of entrance floor grilles
 - .1 Acceptable product: BA-1 model as per fabricated by Grillage Bolar (Canada) Inc. or equivalent approved by Architect.
- .2 All aluminum components are fabricated of 6061-T6 alloy.
- .3 Deflection under live load:
 - .1 Floor grilles to be conceived to accept a uniform load of 1794 Newton applied on a surface of 100 mm square in order to not exceed a deflection of 1/180" for a span of 1220 mm.
- .4 Perimeter frame to be extrusion in shape of "Z" as model "TT" by Bola, for installation on finished floor. At installation, a silicone joint must be applied between the frame and the finished flooring in order to prevent water infiltrations (by others).
- .5 Slats are "T" shape, dimensions: 9,5mm x 3 mm x 32 mm. Spacing between slats must not exceed 4.7 mm Total depth 35 mm, from finished floor.
- .6 Spacing of slats and retaining rods to comply with required load capacity. Grilles to be supplied in sections having dimensions easy to manipulate, to facilitate maintenance.
- .7 Frames to be furnished without a basin. A waterproofing coat shall be applied to concrete surfaces to prevent water infiltrations (by others)
- .8 Sections to have a friction coefficient of 1, 10 and a cleaning efficiency of 59%. Percentage of openings of 40%.
- .9 Deformation under lateral load must not exceed 11 (visual) after application of a maximum load of 6130 Newton (1380 pounds) at an angle of 45 degrees in relation to surface.
- .10 All grille sections to comply to ASTM B117 and able to be subjected to a salty fog for 1000 hours without noticeable changes.
- .11 The manufacturer must be able to confirm this data and provide to Architect necessary documents at the same time as the shop drawings.

2.2 ACCESSORIES / OPTIONS

- .1 Locks, GB - 46 (only) 4 per grille: all grille sections will be provided with GB-46 locks. GB-46 locks are made of galvanized steel and Teflon and are secured under grille sections by the manufacturer. The locks will be supplied with a special key in order to use (one per vestibule). All locks must be lubricated (BSRS 2000 water resistant grease) during final implementation of the grilles by General Contractor.
- .2 Lifting hooks: all grilles will be supplied with lifting hooks to facilitate handling sections without effort or risk of damaging grille surface (one per vestibule).

ENTRANCE FLOOR GRILLES

- .3 All frame sections will be provided with noise-blocking cushion as specified by manufacturer. Its function is to reduce noise and vibration that may occur between frame and grille.
- .4 Sealants: mold resistant silicone in accordance with Section 07 92 00 – Joint Sealants.

2.3 BARRIER COATINGS

- .1 Aluminium surfaces should be coated with a bituminous paint so as to be isolated from the following materials:
 - .1 Metals of different nature, with the exception of stainless steel, zinc and white bronze (in small quantities).
 - .2 Concrete, mortar and other masonry materials.
 - .3 Wood

PART 3 EXECUTION**3.1 EXAMINATION**

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

3.2 INSTALLATION:

- .1 Install entrance floor grilles square and level with the floor finish in order to permit easy handling of all sections. All sections of frame and intermediate supports must be level and firmly supported on all their length In order to prevent any long term deflection. Repair concrete screed around the grille once in place, with a non-retracting grout.
- .2 Grilles are to be installed only at the end of the works to protect them from any damage. All frames and basins must be cleaned before placing on them the grille sections in order to not exceed the level of the finished floor. All sound deafening cushions damaged during construction must be replaced before final inspection. Protect grille surfaces during construction. Install hinges or notches if required. Ensure all latches are locked if required, and apply grease.

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.

ENTRANCE FLOOR GRILLES

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

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

3.4 PROTECTION

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

END OF SECTION