

Specifications for  
**Verona**  
**6094 Carleton Drive,**

Verona, Ontario

May 11, 2026

**Issued for Bid**



**PART 1 - THE CONSULTANTS**

**1.1. THE CONSULTANT**

- 1.1.1. Square Vis Architects Inc.  
930 The East Mall, Suite 100  
Toronto, Ontario M9B 6J9  
  
Telephone: (416) 568-8300  
Web: [sqvis.ca](http://sqvis.ca)

**1.2. STRUCTURAL CONSULTANT**

- 1.2.1. T.Smith Engineering Inc.  
  
707 Kipling Avenue,  
Toronto, Ontario M8Z 5G4  
  
Telephone:(416)798-8770  
Web:[tsmithengineering.com](http://tsmithengineering.com)

**1.3. MECHANICAL CONSULTANT**

- 1.3.1. T.Smith Engineering Inc.  
  
708 Kipling Avenue,  
Toronto, Ontario M8Z 5G4  
  
Telephone:(416) 798-8770  
Web:[tsmithengineering.com](http://tsmithengineering.com)

**1.4. ELECTRICAL CONSULTANT**

- 1.4.1. JLK Engineering Inc.  
  
Telephone:(437)4  
Web: [jlkengineering.ca/](http://jlkengineering.ca/)

**1.5. CIVIL CONSULTANT**

- 1.5.1. Groundwork Engineering Limited  
  
654 Norris Court, Unit 640,  
Kingston, ON, K7P 2Rp  
  
Telephone:(613)634-1789  
Web: [groundengineer.ca](http://groundengineer.ca)

**1.6. LANDSCAPE CONSULTANT**

- 1.6.1. BY PATH: Landscape Architecture Inc.  
  
Telephone:(416)9706025

***END OF SECTION***

<b>PROCUREMENT AND CONTRACTING REQUIREMENTS GROUP</b>					
<b>DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS</b>					
<b>INTRODUCTORY INFORMATION</b>					
<b>Section No.</b>	<b>Section Title</b>	<b>Rev. No.</b>	<b>Date</b>	<b>Consult.</b>	<b>Page No's</b>
00 00 01	PROJECT TITLE PAGE	--	2026-05-11	SQV	1 Only
00 01 05	LIST OF CONSULTANTS	00	2026-05-11	SQV	1 and 2
00 01 10	TABLE OF CONTENTS	00	2026-05-11	SQV	1 thru 4
00 01 15	LIST OF DRAWINGS	00	2026-05-11	SQV	1 Only
<b>PROCUREMENT REQUIREMENTS</b>					
00 30 00	AVAILABLE INFORMATION	00	2026-05-11	SQV	1 and 2
<b>CONTRACTING REQUIREMENTS</b>					
00 63 13	REQUEST FOR INTERPRETATION FORM	00	2026-05-11	SQV	1 Only
00 65 37	MAINTENANCE MATERIAL FORM (SPECIMEN)	00	2026-05-11	SQV	1 Only
*00 70 00	"AGREEMENT BETWEEN OWNER AND CONSTRUCTION MANAGER – FOR SERVICES", "SCHEDULES TO THE AGREEMENT", "DEFINITIONS" AND "GENERAL CONDITIONS", STANDARD CONSTRUCTION DOCUMENT CCDC 2 – 2020				Not Enclosed
00 71 00	AMENDMENTS TO DEFINITIONS	00	2026-05-11	SQV	1 and 2
*00 73 10	SUPPLEMENTARY CONDITIONS	00			1 thru
<b>SPECIFICATIONS GROUP</b>					
<b>GENERAL REQUIREMENTS SUBGROUP</b>					
<b>DIVISION 01 – GENERAL REQUIREMENTS</b>					
01 10 00	GENERAL REQUIREMENTS	00	2026-05-11	SQV	1 thru 4
01 30 00	ADMINISTRATIVE REQUIREMENTS	00	2026-05-11	SQV	1 thru 9
01 40 00	QUALITY REQUIREMENTS	00	2026-05-11	SQV	1 thru 7
01 50 00	TEMPORARY FACILITIES AND CONTROLS	00	2026-05-11	SQV	1 thru 6
01 60 00	PRODUCT REQUIREMENTS	00	2026-05-11	SQV	1 thru 5
01 70 00	EXECUTION AND CLOSEOUT REQUIREMENTS	00	2026-05-11	SQV	1 thru 12
<b>FACILITY CONSTRUCTION SUBGROUP</b>					
<b>DIVISION 02 – EXISTING CONDITIONS</b>					
02 41 00	DEMOLITION AND SALVAGE	00	2026-05-11	SQV	1 thru 6
<b>DIVISION 03 – CONCRETE</b>					
03 10 00	CONCRETE FORM AND ACCESSORIES	00	2026-05-11	TSM	1 thru 3

03 20 00	CONCRETE REINFORCEMENT & ACCESSORIES	00	2026-05-11	TSM	1 thru 3
03 03 00	CAST-IN-PLACE CONCRETE	00	2026-05-11	TSM	1 thru 7
03 35 13	CONCRETE FLOOR FINISHING	00	2026-05-11	SQV	1 thru 3
<b><i>DIVISION 04 – MASONRY</i></b>					
04 05 12	MASONRY MORTAR AND GROUT	00	2026-05-11	TSM	1 thru 6
04 05 19	MASONRY ANCHORAGE AND REINFORCING	00	2026-05-11	TSM	1 thru 5
04 21 13	BRICK MASONRY	00	2026-05-11	TSM	1 thru 4
<b><i>DIVISION 05 – METALS</i></b>					
05 50 00	METAL FABRICATIONS	00	2026-05-11	SQV	1 thru 7
05 51 29	METAL STAIRS AND LADDERS	00	2026-05-11	TSM	1 thru 4
05 73 13	GLAZED DECORATIVE METAL RAILINGS	00	2026-05-11	SQV	1 thru 10
<b><i>DIVISION 06 – WOOD, PLASTICS AND COMPOSITES</i></b>					
06 10 00	ROUGH CARPENTRY	00	2026-05-11	SQV	1 thru 4
06 17 53	SHOP – FABRICATED WOOD TRUSSES	00	2026-05-11	TSM	1 thru 4
06 90 00	GENERAL INSTALLATIONS	00	2026-05-11	SQV	1 thru 5
<b><i>DIVISION 07 – THERMAL AND MOISTURE PROTECTION</i></b>					
07 11 13	BITUMINOUS DAMPPROOFING	00	2026-05-11	SQV	1 thru 2
07 13 26	SELF-ADHERING SHEET WATERPROOFING	00	2026-05-11	SQV	1 thru 6
07 16 16	CRYSTALLINE WATERPROOFING	00	2026-05-11	SQV	1 thru 5
07 18 13	MECHANICAL ROOM WATERPROOFING	00	2026-05-11	SQV	1 thru 5
07 18 15	BALCONY WATERPROOFING	00	2026-05-11	SQV	1 thru 4
07 21 00	BUILDING INSULATION	00	2026-05-11	SQV	1 thru 7
07 21 19	FOAMED-IN-PLACE INSULATION	00	2026-05-11	SQV	1 thru 3
07 25 00	MISCELLANEOUS AIR/VAPOUR BARRIERS	00	2026-05-11	SQV	1 thru 8
07 46 16	ALUMINUM SIDING SYSTEM	00	2026-05-11	SQV	1 thru 6
07 46 19	METAL SIDING SYSTEM	00	2026-05-11	SQV	1 thru 6
07 55 56	FLUID-APPLIED PROTECTED MEMBRANE ROOFING	00	2026-05-11	SQV	1 thru 13
07 62 00	SHEET METAL FLASHING AND TRIM	00	2026-05-11	SQV	1 thru 4
07 84 00	FIRESTOPPING AND SMOKE SEALS	00	2026-05-11	SQV	1 thru 12
07 92 00	JOINT SEALANTS	00	2026-05-11	SQV	1 thru 10
<b><i>DIVISION 08 – OPENINGS</i></b>					
08 06 80	GLAZING SCHEDULE	00	2026-05-11	SQV	1 thru 4
08 11 13	HOLLOW METAL DOORS AND FRAMES	00	2026-05-11	SQV	1 thru 9
08 14 00	WOOD DOORS	00	2026-05-11	SQV	1 thru 5
08 31 13	ACCESS DOORS AND FRAMES	00	2026-05-11	SQV	1 thru 5
08 36 13	SECTIONAL OVERHEAD DOORS	00	2026-05-11	SQV	1 thru 6

08 51 66	ALUMINUM WINDOW WALL	00	2026-05-11	SQV	1 thru 26
08 71 00	DOOR HARDWARE	00	2026-05-11	SQV	1 thru 5
08 80 00	GLASS AND GLAZING	00	2026-05-11	SQV	1 thru 9
08 91 00	LOUVRES	00	2026-05-11	SQV	1 thru 7
<b>DIVISION 09 – FINISHES</b>					
09 21 16	GYPSUM BOARD ASSEMBLIES	00	2026-05-11	SQV	1 thru 15
09 30 00	TILING	00	2026-05-11	SQV	1 thru 13
09 60 13	TACTILE WARNING SURFACING	00	2026-05-11	SQV	1 thru 4
09 91 00	PAINTING	00	2026-05-11	SQV	1 thru 15
<b>DIVISION 10 – SPECIALTIES</b>					
10 28 00	WASHROOM ACCESSORIES	00	2026-05-11	SQV	1 thru 4
<b>DIVISION 11 – EQUIPMENT</b>					
11 30 13	APPLIANCES	00	2026-05-11	SQV	1 and 2
11 81 29	FACILITY FALL PROTECTION	00	2026-05-11	SQV	1 thru 9
<b>DIVISION 12 – FURNISHINGS</b>					
<b>DIVISION 13 – SPECIAL CONSTRUCTION</b>					
13 48 00	ACOUSTIC ISOLATED FLOATING FLOORS	00	2026-05-11	SQV	1 thru 3
<b>SITE AND INFRASTRUCTURE SUBGROUP</b>					
<b>DIVISION 31 – EARTHWORK</b>					
31 23 00	EXCAVATION AND FILL	00	2026-05-11	SQV	1 thru 7
31 23 20	EXCAVATION, TRENCHING, AND BACKFILL	00	2026-05-11	GWE	1 thru 5
<b>DIVISION 32 – EXTERIOR IMPROVEMENTS</b>					
32 17 23	PAVEMENT MARKINGS	00	2026-05-11	SQV	1 and 2
<b>DIVISION 33 – UTILITIES</b>					
33 31 16	PUBLIC SANITARY UTILITY SEWER PIPING	00	2026-05-11	GWE	1 thru 6
33 34 00	SANITARY SEWERAGE FORCE MAINS	00	2026-05-11	GWE	1 thru 5
33 46 13	FOUNDATION DRAINAGE	00	2026-05-11	SQV	1 and 2

**LEGEND**

\* - Specifications prepared by Consultants other than Square Vis Architects Inc. have been prefixed with an asterisk. These Specifications are not included under, nor governed by Square Vis Architects Inc.'s seal.

**Consultant's Abbreviations:**

SQV	Square Vis Architects Inc.
TSM	T.Smith Engineering
TSM	T.Smith Engineering
JLK	JLK Engineering
GWE	Groundwork Engineering Inc
BPL	By Path: Landscape Architecture Inc.

Architectural (A)
Structural Consultant (S)
Mechanical Consultant (M)
Electrical Consultant (E)
Civil Consultant ( C)
Landscape Consultant (L)

***END OF SECTION***

**PART 1 - GENERAL**

**1.1. ARCHITECTURAL DRAWINGS**

1.1.1. Architectural Drawings forming part of the Contract Documents are those listed on Drawing No. A000 dated "May 11, 2026" with the following statement in the revision column:

1.1.1.1. "Issued for Tender".

**1.2. CIVIL DRAWINGS**

1.2.1. Civil Drawings forming part of the Contract Documents are those listed on Drawing No. C000 dated "May 5, 2026" with the following statement in the revision column:

1.2.1.1. "Issued for Tender".

**1.3. STRUCTURAL DRAWINGS**

1.3.1. Structural Drawings forming part of the Contract Documents are those listed on Drawing No. S000 dated "May 13, 2026" with the following statement in the revision column:

1.3.1.1. "Issued for Tender".

**1.4. MECHANICAL DRAWINGS**

1.4.1. Mechanical Drawings forming part of the Contract Documents are those listed on Drawing No. M000 dated "May 13, 2026" with the following statement in the revision column:

1.4.1.1. "Issued for Tender".

**1.5. ELECTRICAL DRAWINGS**

1.5.1. Electrical Drawings forming part of the Contract Documents are those listed on Drawing No. E000 dated "May 13, 2026" with the following statement in the revision column:

1.5.1.1. "Issued for Tender".

**1.6. LANDSCAPE DRAWINGS**

1.6.1. Architectural Drawings forming part of the Contract Documents are those listed on Drawing No. MP-1 and L000 dated "May 11, 2026" with the following statement in the revision column:

1.6.1.1. "Issued for Tender".

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. AVAILABLE INFORMATION AVAILABLE TO BIDDERS \***

- 1.2.1. Following Available Information is bound in Specifications appended to this Section.
- 1.2.2. Following Reports are for information only. Neither Consultant nor Owner assumes any liability for items extracted from Reports.
- 1.2.3. Available Information forms part of Contract Documents.

**1.3. REPORTS \***

- 1.3.1. Geotechnical Investigation Reports:
  - 1.3.1.1. A copy of geotechnical investigation reports prepared by Owner's consultant for the Place of the Work are bound herein. Refer to following:
    - 1.3.1.1.1. "Wastewater Treatment System Assessment Report" dated October 12,2021 prepared by Ground work Engineering Limited and revised on October 20,2021
  - 1.3.1.2. Geotechnical investigation documents are not guaranteed to be representative of actual subsurface conditions.
  - 1.3.1.3. When calculating soil volumes for bidding purposes, assume flat plane geometric layers formed by straight lines drawn between subgrade elevations, for each material identified in soils report.

Submit a Base Bid Price which includes and accommodates work implied in, or reasonably inferable from, investigation documents. Owner's investigation consultant will be interpreter of documents. Consultant will be arbiter of a change to Construction Cost and/or Contract Time.

**LEGEND**

*\* - Documents provided by the Owner have been prefixed by an asterisk and are not included under, nor governed by, Square Vis Architects Inc.'s, seal.*

**END OF SECTION**







Request for Interpretation No.:			
Posted Date:		Initiated Date:	
Date Required:		Originated By:	
Specification Section:		Drawing/Detail No.:	
Subject: _____			
Description/Question: (required)			
Recommendations by Construction Manager: (required)			
Attachments:			
Response:			
Attachments:			
Response From:		Date Rec'd:	Date Rec'd:
Signed by:		Date:	
Copies: <input type="checkbox"/> Owner		Consultants: <input type="checkbox"/> Structural	
<input type="checkbox"/> Mechanical		<input type="checkbox"/> File	
<input type="checkbox"/> Electrical		<input type="checkbox"/> _____	

**PART 1 - GENERAL**

**1.1. SUPPLIER**

1.1.1. Supplier's name and address:

1.1.2. Date Product is released to Owner:

**1.2. SECTION NO: \_\_\_\_\_**

1.2.1. Product being released to the Owner:

1.2.2. Quantity of Product used for extent of the Work:

1.2.3. Quantity of Product released to the Owner:

**1.3. SIGNATURE**

1.3.1. Confirmation that Extra Materials were delivered to Owner in accordance with Section 01 70 00.

\_\_\_\_\_  
Owner's Signature

\_\_\_\_\_  
Owner's Name

\_\_\_\_\_  
Name typed

\_\_\_\_\_  
Date

**END OF SECTION**

The Definitions which forms part of the Standard Construction Document - CCDC 2 - 2020 are hereby amended as follows:

## **PART 1 - DEFINITIONS**

### **1.1. MODIFIED DEFINITIONS**

1.1.1. Delete following definition in its entirety and substitute new definition:

#### **“Consultant**

The *Consultant* is the person or entity identified as such in the Agreement. The *Consultant* is Square Vis Architects Inc. The term *Consultant* means the *Consultant* or the *Consultant's* authorized representative. For greater certainty, T. Smith Engineering is the *Consultant's* authorized representative on structural and mechanical matters, JLK Engineering is the *Consultant's* authorized representative with respect to electrical matters and Groundwork Engineering Limited is the *Consultant's* authorized representative with respect to civil matters.”

### **1.2. NEW DEFINITIONS**

1.2.1. Add following new definitions:

#### **“Day**

*Day* means a calendar day.

#### **Drawings**

*Drawings* are the graphic and pictorial portions of the *Contract Documents*, where located and whenever issued, showing the design, location and dimensions of the *Work*, generally including plans, elevations, sections, details, and diagrams.

#### **Install**

*Install* means completion of following activities, including associated labour, services, plant, *Construction Equipment* required to:

- Remove *Products* from storage and locate for placement,
- Position and adjust *Products* for final placement,
- Affix and anchor *Products* in final placement, in accordance with manufacturers' instructions and *Contract Documents*,
- Commission and adjust *Products* for proper operation.

#### **Make Good, Made Good, Making Good**

*Make Good, Made Good, Making Good* means repairing, restoring, refurbishing, rehabilitating, or performing filling operation on any existing components disturbed due to work of this *Contract*, to at least the condition existing at the commencement of the *Work*, in terms of construction integrity, finishes, alignment with existing adjoining surfaces, compatibility of materials, sound attenuation criteria, exfiltration/infiltration requirements, air/vapour barrier and thermal continuity.

#### **Product**

*Product* means material, machinery, equipment, and fixtures forming the *Work*, but does not include *Construction Equipment*.

#### **Shop Drawings**

*Shop Drawings* are drawings, diagrams illustrations, schedules, performance charts, brochures, *Product* data, and other data which the *Construction Manager* provides to illustrate details of portions of the *Work*.

**Specifications**

*Specifications* are that portion of the *Contract Documents*, wherever located and whenever issued, consisting of the written requirements and standards for *Products*, systems, workmanship, quality, and the services necessary for the performance of the *Work*.

**Submittals**

*Submittals* are documents or items required by the *Contract Documents* to be provided by the *Construction Manager*, such as:

- *Shop Drawings*, samples, models, mock-ups to indicate details or characteristics, before the portion of the *Work* that they represent can be incorporated in the *Work*; and
- As-built drawings and manuals to provide instructions to the operation and maintenance of the *Work*.

**Supply**

*Supply* means completion of following activities, including associated labour, services, plant, *Construction Equipment* required to:

- Fabricate or purchase *Products*,
- Deliver *Products* to the *Place of the Work*,
- Unload *Products*,
- Store *Products* in accordance with manufacturers' instructions."

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SPECIFICATION FORMAT**

- 1.2.1. Specifications are addressed to Construction Manager. Specifications are not intended as detailed description of installation methods but serve to indicate particular requirements in completing the Work.
- 1.2.2. Where Contract Documents do not provide sufficient information for complete installation of item, then as supplement, comply with manufacturer's written instructions for quality of work.
- 1.2.3. Portions of Specifications are written in short form. Therefore, it shall be understood that where item of the Work is stated in heading followed by material, equipment, component, or operation, words "shall be", "shall consist of" or similar words or phrases are implied which denote supply, fabricate and supply, install, provide or commission of such materials, equipment or operations for component of the Work designated by heading.
- 1.2.4. Where items in Contract Documents are referred to in singular, provide as many as required to complete the Work. Words used in 1 gender only shall mean females as well as males and conversely.
- 1.2.5. Drawings, Lists or Schedules of Items are intended to show scope and arrangement of work. For location of item described refer to such Drawings, Lists or Schedules unless location stipulated in Specifications.

**1.3. DISCREPANCIES/CONFLICTS/OMISSIONS**

- 1.3.1. If discrepancies or conflicts in, or omissions from Drawings, Specifications or other Contract Documents are suspected, or if there is doubt as to meaning or intent thereof, notify Consultant at once. Where there is conflict between Contract Documents, the most stringent requirement shall prevail.
- 1.3.2. Drawings, Specifications and other Contract Documents are intended to be in compliance with federal, provincial and municipal laws, by-laws, regulations and other requirements of authorities having jurisdiction. Perform work in conformity with such requirements. If discrepancies, conflicts or omissions are suspected, notify Consultant at once.
- 1.3.3. Comply with Consultant's written instructions or explanations. Consultant has final say when interpreting the Contract Documents, Building Inspector or authority having jurisdiction is not considered final say.
- 1.3.4. Promptly and not later than within 10 Working Days of becoming aware of circumstances which may require a change in the Work or other directions, give written notice to Consultant outlining such circumstances and request written instructions. Do no work in affected area, or that would prevent Consultant from properly assessing situation or evaluating change, without its prior written instructions. Consultant will act promptly to give Construction Manager instructions so the Work is not unreasonably delayed.

**1.4. DESCRIPTION OF THE WORK**

- 1.4.1. Work of this Contract includes supplying labour, materials, equipment, services and other related expenses to execute complete construction of facility specified under Contract Documents.

1.4.2. Term "NIC" means Work of this Project which is not being performed or provided under this Contract; term means "Not In this Contract" or "Not a Part of the Work to be Performed or Provided by Construction Manager".

1.4.3. "NIC" work may be specified or indicated on Drawings as an aid to Construction Manager in scheduling amount of time and materials necessary for completion of Contract.

**1.5. SCHEDULING**

1.5.1. Base sequence and scheduling of construction on maintaining continuous operation and access to the Work during construction.

**1.6. COMPLETION DEADLINES**

1.6.1. Phase and schedule the Work to meet deadlines originally committed to by Construction Manager.

**1.7. INTERRUPTIONS IN THE WORK SCHEDULE**

1.7.1. Suspend parts of the Work affected as required to allow Consultant to review mock-ups and to establish standards of workmanship for remainder of Work. Provide 2 Working Days notice.

**1.8. INCLEMENT WEATHER AND COLD WEATHER WORK**

1.8.1. Take precautions during inclement weather and provide adequate protection.

1.8.2. Continue the Work, including winter months, if applicable, until the Work is completed and reviewed.

1.8.3. Inclement weather or extra work caused thereby shall not be considered valid reason for additional payment or delay in satisfactory conclusion of the Work.

**1.9. OWNER OCCUPANCY**

1.9.1. Owner reserves right to occupy and use portions of premises, whether partially or entirely completed, or whether completed on schedule or not, provided such occupancy does not interfere with Construction Manager's continuing work. Provide required safety protection at fire exits at all times.

1.9.2. Partial occupancy or installation of equipment by Owner does not imply acceptance of the Work in whole, or in part, nor shall it imply acknowledgment that terms of Contract are fulfilled.

**1.10. COVID-19 PROCEDURES**

1.10.1. Submit to Owner at least 3 Days prior to mobilizing on site along with additional updates as may be required from time to time, a detailed safety procedure and protocol specifically dealing with how COVID-19 will be managed including but not limited to; screening of personal and individuals prior to entering site and while on premises, handling of materials/Products, scheduling of trades to maintain physical distancing, protocols as to what happens if an individual tests positive to COVID-19, restrictions.

1.10.2. In ensuring the health and safety of the workplace and in accordance with applicable Public Health guidelines, Construction Manager will submit to Owner details on: information, instruction, training, personal protective equipment to be provided, supervisory services to be provided related to COVID-19.

1.10.3. Construction Manager shall dedicate specific personal to deal with COVID-19 procedures to address: Contingency planning in the event of an outbreak, illness, work refusals, workplace layouts, controlled access, communication, staggering of work hours when necessary and policies and procedures.

1.10.4. If Construction Manager is found to be contravening any of the above procedures, Work will be immediately suspended without penalty or liability whatsoever to Owner until a satisfactory resolution is implemented.



**1.11. PLACE OF THE WORK**

- 1.11.1. Confine extent of construction activities to area indicated on Drawings as Place of the Work and/or within area defined by property lines. Confine equipment, materials, debris, offices, storage sheds and storage areas to area previously defined.
- 1.11.2. Construction Manager has complete and exclusive use of Place of the Work for performance of the Work. Assume responsibility for premises assigned, for performance of the Work.
- 1.11.3. Should Construction Manager require boundaries of Place of the Work be temporarily extended, obtain instructions from Consultant.
- 1.11.4. Certain restrictions are specified as to use by Construction Manager of various portions of Place of the Work. Become familiar with these restrictions and establish work plan to accommodate these restrictions. No claims for extra costs due to such restrictions will be considered by Owner.
- 1.11.5. Assume responsibility for care, custody and control of property which is assigned for performance of the Work. Assume responsibility for and Make Good damage to existing property attributable to performance of the Work.

**1.12. SETTING OUT THE WORK**

- 1.12.1. Employ the services of a Registered Ontario Land Surveyor, licensed for the location of the Place of the Work, to execute following:
  - 1.12.1.1. verify existing grades, lines, orientations, levels, dimensions, site services and bench marks.
  - 1.12.1.2. lay out the Place of the Work.
  - 1.12.1.3. locate building.
  - 1.12.1.4. establish new grades, lines, orientations, levels and dimensions:
    - 1.12.1.4.1. particularly locations and datum reference elevations of each floor, footings, foundations, piles and caissons.
  - 1.12.1.5. maintain iron pins, survey bars, monuments, geodetic datum and similar reference markers which are disturbed, moved or lost during construction.

**1.13. SITE DIMENSIONS**

- 1.13.1. Before proceeding with Shop Drawings, fabrication, or supply of each new part of the Work, examine installed parts of the Work and verify as-built site dimensions to coordinate previously built construction with pending construction.

**1.14. SIGNS, ADVERTISING AND PUBLICATIONS**

- 1.14.1. Do not erect or display devices, signs or advertisements of labour, materials or services provided to the Work. Signs relative to fire, danger and safety are exempted from this requirement.
- 1.14.2. Do not permit Trade Contractors to display any advertising of their Work, of any kind, without Construction Manager's written acceptance. Do not consent to mentioning the Work in any advertising or articles in any publication relating to the Work without approval of copy and written permission from Construction Manager.

**1.15. PROCEDURE AND SUPPLY OF CRITICAL MATERIALS**

- 1.15.1. Supply Products in ample time to be installed into the Work together with templates, measurements and other information required for placement.

**1.16. RESTRICTIONS**

- 1.16.1. Confine the Work to the Work site limits indicated on Drawings and/or within area defined by property lines. Carry out Work on Municipal property under regulations of respective Municipality and authorities having jurisdiction including without any limitations any associated fees, permits, insurance or bonding required.

- 1.16.2. Bring following restrictions to attention of workers on the Work and enforce them:
- 1.16.2.1. Restrict construction personnel to Place of the Work and necessary access routes to it. Restrict non-construction personnel from site, except for Construction Manager-authorized visitors.

**1.17. EXISTING SITE SERVICES**

- 1.17.1. Before commencing the Work, establish location and extent of existing services in area of the Work and notify Consultant of findings.
- 1.17.2. Consult public and service companies' records and become fully informed of locations and extent of buried and overhead services and utilities.
- 1.17.3. If disruption of services which affects operation of existing building is necessary, give minimum 5 Working Days notice to Consultant and Owner. Provide temporary services and obtain prior review from Consultant and Owner with regard to timing and methods for providing temporary services.
- 1.17.4. Should any piping, sewers, cables, or similar services be encountered during work of this Contract that are not known from Owner's and utility companies' records, notify Consultant and do not proceed with removal or cutting until directed.

**1.18. SITE WORK**

- 1.18.1. Restore existing paving, sidewalks, curbs and landscaping damaged during construction. Provide paving, walks, curbs and landscaping to match existing conditions where not otherwise shown.
- 1.18.2. Provide sod to replace damaged grass and maintain it until it has rooted properly.

**1.19. NO SMOKING POLICY**

- 1.19.1. Cooperate, respect and comply with Smoke Free Workplace policy requirements of Place of the Work. This policy applies to everyone who visits and works on this Project.
- 1.19.2. Ensure Construction Manager's staff, Subcontractors and Suppliers performing work on site on Construction Manager's behalf are instructed to comply with Smoke Free Workplace policy requirements.

**1.20. ACOUSTIC PARTITIONS/CEILINGS**

- 1.20.1. Partitions and/or ceilings with sound attenuation insulation are designated as "Acoustic Partitions and Ceilings". Provide sound rated partitions and ceilings in locations indicated to meet required minimum Sound Transmission Class (STC) ratings. If not stated otherwise, STC rating is 47. Ensure Construction Manager's staff, Subcontractors and Suppliers performing work on site on Construction Manager's behalf are instructed to comply with Smoke Free Workplace policy requirements.
- 1.20.2. Coordinate work of various Subcontractors to avoid "short circuiting" of the STC rating for "Acoustic Partitions and Ceilings". Carefully locate and treat ducts, grilles, diffusers, electrical outlets, boxes and other similar mechanical and electrical devices. Where electrical boxes are situated back-to-back serving each side of the partitions, locate them at least 250 mm (10") apart laterally and if interconnected, use flexible connections.
- 1.20.3. Ensure to seal around cutouts for lights, cabinets, pipes, ducts, electrical boxes and other similar items. Avoid back-to-back penetrations of the diaphragm, flanking paths and door/borrowed light openings. Refer to Section 09 21 16 for additional requirements.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. PROJECT COORDINATION**

- 1.2.1. Study Contract Documents to determine extent of work required by each Section and upon which work of other Sections depend and coordinate scope and extent of work to be performed by each trade. Neither organization of Specifications into Divisions and 3-part Section format nor arrangements of Drawings, Schedules and Standard Drawings shall affect in any way Construction Manager's control in, or diminish its responsibility for, dividing Work or establishing each trade's scope of work. Claims for additional compensation arising from disputes between trades due to lack of coordination by Construction Manager will not be considered.
- 1.2.2. Coordinate work of each Section as required for satisfactory and expeditious completion of Work. Take field dimensions required. Take into account existing installations to assure best arrangements of components in available space. Consult before commencing Work in critical locations. Fabricate and erect Work to suit field dimensions and field conditions.
- 1.2.3. Provide forms, templates, anchors, sleeves, inserts and accessories or other components required to be fixed to or inserted in Work. As applicable set them in place or instruct related Sections as to their location.
- 1.2.4. Pay cost of extra work caused by and make up time lost as result of failure to comply with these requirements at proper time.
- 1.2.5. Coordinate work of all trades including construction sequence, schedule and interfacing of all work. Coordinate work as required to incorporate metric modular components. Coordinate work of each trade as required for satisfactory and expeditious completion of Work. Ensure components to be built in are supplied in time with setting drawings and other related information. Fabricate and erect Work to suit field dimensions and field conditions.
- 1.2.6. Ensure Contract Documents are fully coordinated with respect to architectural, structural, mechanical, electrical and other specialty requirements.
- 1.2.7. Cooperate and coordinate with Consultant for moving Owner's equipment into building when Work or substantial part thereof is ready for use for purpose intended.

**1.3. DOCUMENTS ON SITE**

- 1.3.1. Further to GC 3.9, maintain in good condition and order on site 1 copy of Addenda, proposed changes in Work, Change Orders, test reports, manufacturer's installation and application instructions, progress photographs, as-built drawings, reviewed progress schedules, minutes of site meetings and other modifications to Contract Documents.

**1.4. START-UP MEETING**

- 1.4.1. Presided over by Consultant, after award of Contract.
- 1.4.2. Attendees:
  - 1.4.2.1. Consultant(s).
  - 1.4.2.2. Construction Manager.

- 1.4.2.3. Trade Contractors (Mechanical, Electrical).
- 1.4.2.4. Major Equipment Suppliers.
- 1.4.2.5. Others as appropriate.
- 1.4.3. Construction Manager shall prepare minutes. Construction Manager will distribute minutes to each participant within 5 Working Days.
- 1.4.4. Minimum Agenda:
  - 1.4.4.1. List of major Subcontractors and Suppliers.
  - 1.4.4.2. Tentative construction progress schedules.
  - 1.4.4.3. Start date; submission of schedules; long term delivery items.
  - 1.4.4.4. Insurance Certificates, Cash Flow Schedule, Construction Schedule, Shop Drawing submission schedule, bonds including Value Added Taxes, Trade Breakdown including value for Close Out, Workplace and Safety & Insurance Board Clearance Certificate, Project Sign.
  - 1.4.4.5. Critical work sequencing.
  - 1.4.4.6. Major equipment and Product deliveries and priorities.
  - 1.4.4.7. Designation of responsible personnel.
  - 1.4.4.8. Building Permit status.
  - 1.4.4.9. Procedures for maintaining record documents.
  - 1.4.4.10. Use of Premises: Office, keys, work and storage areas; Owner's requirements (storage delivery, path of construction activities, vehicle, by foot, carts, exterior and interior, elevator use, washrooms, bin location).
  - 1.4.4.11. Construction facilities, controls, temporary hoarding, dust partitions, parking, hours, noisy work, interruption of services, smoking, cell phone usage and construction aids.
  - 1.4.4.12. Construction scheduling (particularly drying time for concrete slabs).
  - 1.4.4.13. Temporary utilities.
  - 1.4.4.14. Safety and first-aid procedures.
  - 1.4.4.15. Security procedures.
  - 1.4.4.16. Housekeeping procedures.

**1.5. SITE COORDINATION AND PROGRESS MEETINGS**

- 1.5.1. Further to GC 3.1, conduct site meetings at regular intervals (every 2 weeks), to identify and resolve construction coordination items, record minutes including significant proceedings and decisions and identify "action by" parties; and reproduce and distribute to meeting participants, copies of minutes within 3 Working Days after each meeting. Consultant also reserves right to call additional special emergency site meetings on short notice without any cost to Owner.
- 1.5.2. Attendees:
  - 1.5.2.1. Construction Manager's project manager and site superintendent.
  - 1.5.2.2. Mechanical and Electrical Contractors.
  - 1.5.2.3. Trade Contractors invited by Construction Manager.
  - 1.5.2.4. Owner and/or Consultant(s).
- 1.5.3. Chair: Construction Manager.
- 1.5.4. Include following:
  - 1.5.4.1. Prepare agenda for meetings.

- 1.5.4.2. Distribute written notice of each meeting minimum 7 Days in advance of meeting date, stating time and place, to persons whose presence is required.
- 1.5.4.3. Make physical arrangements for meetings.
- 1.5.4.4. Record minutes and attendees; include significant proceedings and decisions.
- 1.5.4.5. Reproduce and distribute copies of minutes after each meeting to parties attending meeting, to parties affected by decisions made at meeting and to Consultant.
- 1.5.4.6. Ensure representatives of Construction Manager, Construction Manager's consultants, Trade Contractors and Suppliers attending meetings are qualified and authorized to act on behalf of entity each represents.
- 1.5.4.7. Ensure relative information is available to allow meetings to be conducted efficiently.
- 1.5.4.8. Consultant may attend meetings to ascertain Work is consistent with Contract.
- 1.5.4.9. Documents and Construction Progress Schedule.
- 1.5.4.10. Construction Progress Schedule may be reviewed to ensure rapid and efficient completion of Work in accordance with Contract requirements. Keep Consultant informed of progress, of delays and of potential delays during all stages of Work.
- 1.5.4.11. Review, approval or correction of minutes of previous meeting.
- 1.5.4.12. Review of work progress since previous meeting.
- 1.5.4.13. Field observations, problems, conflicts.
- 1.5.4.14. Problems which impede Construction Progress Schedule.
- 1.5.4.15. Review of off-site fabrication, delivery schedules.
- 1.5.4.16. Review of submittals schedules.
- 1.5.4.17. Review of mock-up and sample installation requirements and schedules.
- 1.5.4.18. Corrective measures and procedures to regain projected schedules.
- 1.5.4.19. Quality standards.
- 1.5.4.20. Pending changes and substitutions.
- 1.5.4.21. Safety and manpower issues.
- 1.5.4.22. Other business.

**1.6. PREINSTALLATION TRADE MEETINGS**

- 1.6.1. If a trade requires a meeting prior to starting work, arrange for such meeting of all parties associated with trade as designated in Contract Documents or as requested by Consultant. Presided over by Construction Manager, include Consultant who may attend, include Trade Contractor performing work of trade involved, Testing Company's Representative and Construction Manager's consultants of applicable discipline. Review Contract Documents for work included under trade and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of concrete placement and other matters affecting construction, to permit compliance with intent of trade under consideration.

**1.7. SCHEDULE OF THE WORK**

- 1.7.1. Submit a detailed "Gantt Chart" or "Critical Path Method" construction schedule with activities itemized to enable Construction Manager and Consultant to monitor progress of the Work.
- 1.7.2. Schedule shall indicate without limitations dates for:
  - 1.7.2.1. erection and dismantling of temporary facilities.

- 1.7.2.2. submission of Shop Drawings for various divisions of Work.
- 1.7.2.3. submission of Mechanical and Electrical trades coordination and interference drawings.
- 1.7.2.4. submission of samples and installation dates for mock-ups and sample installations.
- 1.7.2.5. commencement and completion of each major division of Work, including work to be done by Trade Contractors.
- 1.7.2.6. critical work sequencing.
- 1.7.2.7. drying time for concrete slabs to allow for placement of moisture sensitive floor coverings.
- 1.7.2.8. major equipment deliveries and priorities.
- 1.7.2.9. weather allowance.
- 1.7.2.10. final completion date.
- 1.7.3. Update and resubmit schedule on a monthly basis.

**1.8. SHORT TERM SCHEDULE**

- 1.8.1. On a bi-weekly basis, provide Owner with a 2 week short term schedule based on above schedule, indicating important construction activities as the Owner and Consultant may see suitable for Project requirements.

**1.9. PROGRESS PHOTOGRAPHS**

- 1.9.1. Submit progress photographs in digital format, from date of commencement of the Work until date of Substantial Performance of the Work.
- 1.9.2. During Work, submit agreed number of digital photographs, each month, taken from different vantage points to illustrate progress of Work, both exterior and interior.
- 1.9.3. Submit agreed number of exterior and interior photographs digitally when Work has been certified by Consultant as Substantially Performed.

**1.10. GENERAL REVIEW**

- 1.10.1. Consultant will conduct periodic field reviews of the Work for general conformance with Contract Documents, Code and authorities having jurisdiction.
- 1.10.2. Review includes review of Shop Drawings, review of field work and review of reports produced by various inspection and testing agencies.
- 1.10.3. Record each review in manner suitable for submission to Consultant at completion of Project along with inspection and testing reports at site meetings every second week.

**1.11. PRODUCT SUBSTITUTION PROPOSALS**

- 1.11.1. After award of Construction Contract, Product substitution proposals will not be reviewed except in cases where written proof from Product manufacturer/distributor has been submitted to verify specified Products:
  - 1.11.1.1. are unavailable (providing reasons why).
  - 1.11.1.2. were ordered in advance and in accordance with manufacturer's recommendations for lead time but timely delivery of specified Products is not possible in order to maintain construction schedule.
- 1.11.2. Submit following for each Product substitution proposal:
  - 1.11.2.1. fully detailed and clear description of Products, systems and assemblies proposed with a complete comparison made against original Products, systems and assemblies.
  - 1.11.2.2. Shop Drawings, including full details.
  - 1.11.2.3. technical Product data.

- 1.11.2.4. samples.
- 1.11.2.5. on site mock-up for review by Consultant prior to no objections recorded against the substitution.
- 1.11.2.6. difference in price, if any, in form of certified quotations of both selected and proposed substitutions.
- 1.11.3. Submit Construction Manager's written review with no objections recorded for use of substituted Products and certification substituted Products:
- 1.11.3.1. will not exceed space requirements allocated for originally specified Products or, if they do, Trade Contractor is including with substitution submission, design drawings, to accommodate substituted Product.
- 1.11.3.2. are compatible with and inert to adjacent materials.
- 1.11.3.3. will not affect Project schedule due to delays in delivery and installation.
- 1.11.3.4. have been priced to include design adjustments required to accommodate substituted Products.
- 1.11.4. Proposed substitutions require Consultant's review with no objections recorded and, if there is a difference in price, extra or credit requires Owner's acceptance.
- 1.11.5. Review with no objections recorded against proposed substitution by Consultant/Owner does not relieve Trade Contractor of his responsibility and cost for any effect proposed substitution has on other Products, systems and/or assemblies.

**1.12. CERTIFICATES AND TRANSCRIPTS**

- 1.12.1. Immediately after receiving notification of award of Contract, submit Workplace Safety & Insurance Certificate status, transcription of insurances and other certificates and transcripts required by Contract Documents or Consultant.

**1.13. SUBMITTAL PROCEDURES**

- 1.13.1. Submit to Consultant and authorities having jurisdiction as required, documents listed to be submitted for review. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time or extra costs and no claim for extension of Contract Time or increase to Construction Cost by reason of such default will be allowed. Obtain final approval of authorities having jurisdiction, where required, prior to submitting Shop Drawing or other documentation to Consultant.
- 1.13.2. Prior to submission to Consultant, Construction Manager shall review submittals. Submittals not stamped, signed, dated and identified as to specific Project will be returned without being examined and considered rejected. Verify field measurements and ensure affected adjacent Work is coordinated. Confirm and correlate information pertaining to fabrication processes, quantities, techniques of construction and installation and similar information.

**1.14. REQUEST FOR INTERPRETATION (RFI)**

- 1.14.1. RFI is a formal process used to request an interpretation to information already provided in Contract Documents from Consultant during the Work.
- 1.14.2. RFI is not used to expand Contract between Owner and Trade Contractor or to add any additional work resulting in an increase in Construction Cost or Contract Time. It is only for routine interpretation of Contract Documents.
- 1.14.3. Submit RFI on "Section 00 63 13, Request for Interpretation Form". Consultant will not respond to RFI if not submitted on this form.
- 1.14.4. Where RFI form does not provide sufficient space for complete information to be provided thereon, attach additional sheets as required.
- 1.14.5. Submit necessary supporting information with RFI form.

- 1.14.6. RFI Log: Maintain tracking log of RFIs sent to and responses received from Consultant complete with corresponding dates.
- 1.14.7. Submit RFIs sufficiently in advance of affected parts of the Work so not to cause a delay in the Work. Any costs resulting from failure to do this will not be paid by Owner.
- 1.14.8. Submit RFIs to Consultant only.
- 1.14.9. Number RFIs consecutively in 1 sequence in order submitted.
- 1.14.10. Consultant requires 7 Working Days for review of RFI from time of Consultant's receipt to time of Consultant's return to Trade Contractor. Construction Manager will establish a steady flow of RFIs for review and avoid accumulation of an excessive quantity of RFIs in a single submission.
- 1.14.11. A graphic response (ie, sketch, etc.) may be issued and Consultant will deem whether this information is required in the Record Documents.
- 1.14.12. Consultant's response (graphic or written) is not considered a Change Order or Change Directive, nor does it authorize changes in the Construction Cost or Contract Time or changes in the Work.
- 1.14.13. Undertake a thorough review of Contract Documents to satisfy a claim, dispute or other matters in question relating to performance of the Work or interpretation of Contract Documents cannot be resolved by direct reference to Contract Documents. Describe in detail this review on RFI form as part of RFI submission. RFIs lacking such detailed review description or where detail provided is in opinion of Consultant insufficient, Consultant will not review RFI and reject it.
- 1.14.14. Consultant may determine certain RFIs issued by Trade Contractor are unnecessary and in responding to such unnecessary RFIs, give reasons for the determination in each case:
  - 1.14.14.1. if Trade Contractor continues to issue unnecessary RFIs, Consultant after having identified a minimum of 10 RFIs as unnecessary, will invoice the Owner for additional administrative costs of responding to each subsequent unnecessary RFI.
  - 1.14.14.2. Consultant will notify Construction Manager and Owner each time such an additional administrative cost is charged.
  - 1.14.14.3. Owner will reimburse Consultant total of such additional administrative costs monthly.
  - 1.14.14.4. Construction Manager will be charged the monthly total of such additional administrative costs.
- 1.14.15. Any request for information from a Construction Manager will be deemed to be a Request for Interpretation and is subject to the provisions of this Article.

**1.15. SHOP DRAWINGS**

- 1.15.1. Shop Drawing Schedule: Submit a Shop Drawing schedule.
- 1.15.2. Fabrication: Do not fabricate until Shop Drawings are indicated as "REVIEWED" or "REVIEWED AS NOTED".
- 1.15.3. Consultant's Shop Drawing Review:
  - 1.15.3.1. Consultant's review of Shop Drawings is for sole purpose of ascertaining conformance with general design concept.
  - 1.15.3.2. Consultant's review does not provide approval of items which remain Trade Contractor's responsibility.
  - 1.15.3.3. Without limitation, among other things, Trade Contractor remains responsible for:
    - 1.15.3.3.1. detail design inherent in Shop Drawings.
    - 1.15.3.3.2. errors and omissions in Shop Drawings.
    - 1.15.3.3.3. meeting requirements of Contract Documents.
    - 1.15.3.3.4. confirmed and correlated site dimensions.



- 1.15.3.3.5. information that pertains solely to fabrication processes, techniques of construction and installation.
- 1.15.3.3.6. co-ordination of work of all trades.
- 1.15.4. Shop Drawing Requirements:
  - 1.15.4.1. Indicate following minimum requirements as applicable:
    - 1.15.4.1.1. plans, sections and details.
    - 1.15.4.1.2. verified site dimensions.
    - 1.15.4.1.3. materials thicknesses and finishes.
    - 1.15.4.1.4. methods of setting and sealing.
    - 1.15.4.1.5. methods of securing, fastening and anchoring including field connections.
    - 1.15.4.1.6. signed and sealed Shop Drawings and calculations where specifically required herein.
  - 1.15.4.2. Do not make Product substitutions on Shop Drawings without Consultant's written permission in accordance with Product substitution proposal process or they will be rejected. Replace rejected Product substitutions and complete Work in accordance with Contract Documents.
  - 1.15.4.3. Determine which Shop Drawings the local Building Department will require for its approval and submit 2 final copies of each Shop Drawing to local Building Department. Obtain approval and pay associated charges and fees.
- 1.15.5. Shop Drawing Procedures:
  - 1.15.5.1. Execute following prior to submitting Shop Drawings to Consultant:
    - 1.15.5.1.1. review, check and mark-up Shop Drawings with comments and revisions and re-direct back to Subcontractor ("REVISE AND RESUBMIT", etc.) in the first instance if required prior to forwarding to Consultant.
    - 1.15.5.1.2. stamp each Shop Drawing with Shop Drawing stamp.
    - 1.15.5.1.3. insert applicable Specification Section reference, e.g. "10 28 00" for Section 10 28 00, Washroom Accessories.
    - 1.15.5.1.4. insert next consecutive Shop Drawing number within that Section, e.g. "002" for second Drawing within Section 10 28 00.
    - 1.15.5.1.5. insert Construction Manager's review date and signature of Construction Manager's reviewer.
  - 1.15.5.2. Submit following for Consultant's review:
    - 1.15.5.2.1. 1 digital copy of each stamped Shop Drawing (legible PDF under 10 mB per transfer).
    - 1.15.5.2.2. If catalogue cuts are permitted by Consultant, submit a digital copy of catalogue cuts for review as agreed to.
  - 1.15.5.3. Reproductions of Consultant's Contract Documents are not permitted as Shop Drawings.
  - 1.15.5.4. Shop Drawings not conforming to above criteria will be automatically returned without review. Any resulting delays will be Construction Manager's responsibility.
  - 1.15.5.5. Shop Drawings submitted without specified licensed engineer's design and stamp will be automatically returned without review. Any resulting delays will be Trade Contractor's responsibility.
  - 1.15.5.6. Do not resubmit Shop Drawings indicated as "REVIEWED" and "REVIEWED AS NOTED".
  - 1.15.5.7. Resubmit Shop Drawings indicated as "REVISE AND RESUBMIT" with required changes and comments addressed. Insert letter "R" after Shop Drawing number on resubmitted Shop Drawings, re-date and re-sign. Identify revisions from earlier submissions graphically on revised Shop Drawings.

1.15.5.8. Consultant requires 14 Days for review of Shop Drawings from time of Consultant's receipt to time of Consultant's return to Construction Manager. Construction Manager will establish a steady flow of Shop Drawings for review and avoid accumulation of an excessive quantity of Shop Drawings in a single submission.

1.15.5.9. Provide Shop Drawings required by Contract Documents.

**1.16. SAMPLES**

1.16.1. Prior to fabrication or supply of Products, submit samples for Consultant's review. Remove and discard Products whose samples have not been reviewed by Consultant.

1.16.2. Deliver samples to Consultant as directed with charges prepaid and allow for 1 of samples to be kept by Consultant.

1.16.3. Unless otherwise specified, submit samples in duplicate.

1.16.4. Identify each sample with:

1.16.4.1. Project name and Project number.

1.16.4.2. date of sample submission.

1.16.4.3. component name using the Specification's terminology.

1.16.4.4. material (including alloy).

1.16.4.5. finish including colour, sheen, texture, grain and if needed, a Drawing showing proposed grain direction.

1.16.4.6. dimensions including thickness.

1.16.5. Exhibit each of following for each sample:

1.16.5.1. materials.

1.16.5.2. finishes:

1.16.5.2.1. material.

1.16.5.2.2. colour including maximum colour range within each specified colour.

1.16.5.2.3. sheen, tone.

1.16.5.2.4. texture.

1.16.5.2.5. range of blemishes and other markings.

1.16.6. Alter, refinish or provide additional samples until they are reviewed with no objections recorded by Consultant.

1.16.7. Fabricate samples using same tools and techniques to be employed in actual installation of the Work.

1.16.8. Provide Products in the Work which are identical to reviewed samples.

1.16.9. Provide samples required by Contract Documents.

**1.17. ACCESS PANELS AND ACCESS DOORS**

1.17.1. Before commencing installation of mechanical and electrical work, prepare, together with mechanical and electrical Subcontractors, on a set of Drawings provided for that purpose, a complete lay-out of all access panels and access doors which will be required. Submit these layouts for review as specified for Shop Drawings and show exact sizes and locations of access panels and doors. Revisions may be required to lay-out before final review. Allow Consultant to revise layout or quantity of access doors and panels, by relocating related building services a maximum of 2000 mm (6' - 7") at no extra cost to Owner. Should relocation exceed this measurement then Construction Cost will be adjusted in accordance with provisions for changes in Contract Documents.

- 1.17.2. Finish access panels and doors to match adjacent wall and/or ceiling finish unless otherwise specified or indicated.

**1.18. RECORD DRAWINGS AND SPECIFICATIONS**

- 1.18.1. Keep 1 set of Drawing prints and Specifications on site for use in maintaining record information. Ensure these Drawings and Specifications are kept on site at all times available for review by Owner and/or Consultant at any given time.
- 1.18.2. Accurately and neatly record deviations from Contract Documents, including Addenda, Supplemental Instructions and Change Orders, caused by site conditions.
- 1.18.3. Record information concurrently with construction progress. Do not conceal actual work until required information is recorded.
- 1.18.4. Legibly indicate each item to record actual construction including:
- 1.18.4.1. Field changes of dimension and details.
- 1.18.4.2. Details or information not on original Contract Drawings.
- 1.18.5. Catalogue field review reports and cross reference to relevant trade, building area and component. Submit inspection and testing reports in accordance with requirements of Specifications. Highlight unsatisfactory inspection and testing results with supplementary instructions issued by Consultant.
- 1.18.6. Identify Drawings as "Project Record Copy", maintained and available for inspection on site by Consultant.
- 1.18.7. Prior to applying for Certificate of Substantial Performance submit record Drawings and Specifications to Consultant.

**1.19. MISCELLANEOUS SUBMITTALS**

- 1.19.1. Supply submittals required by Contract Documents (e.g. plans, reports, certifications, results, records, etc.) for Consultant's review.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. REFERENCES**

- 1.2.1. Abbreviations and Acronyms:
  - 1.2.1.1. ELA: Equivalent Leakage Air.
- 1.2.2. Reference Standards:
  - 1.2.2.1. ASTM E96/E96M-21 - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
  - 1.2.2.2. ASTM E283/E283M-19 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
  - 1.2.2.3. ASTM E2178-21a - Standard Test Method for Determining Leakage Rate and Calculation of Air Permeance of Building Materials
  - 1.2.2.4. CSA W47.1-19 - Certification of Companies for Fusion Welding of Steel
  - 1.2.2.5. CSA W59-18 - Welded Steel Construction (Metal Arc Welding)
  - 1.2.2.6. CSA W178.1-18 - Certification of Welding Inspection Organizations
  - 1.2.2.7. CSA W178.2-18 - Certification of Welding Inspectors
  - 1.2.2.8. CAN/ULC-S741-08(20) - Standard for Air Barrier Materials - Specification

**1.3. REGULATORY REQUIREMENTS**

- 1.3.1. Comply with The Building Code Act, as amended, OBC as amended and Regulations and by-laws of other authorities having jurisdiction, including latest amendments thereto; all hereafter referred to as Code. Where Code or Contract Documents do not cover particular requirement which is covered by NBCC, as amended, conform to requirements of NBCC including its related supplements. Where Contract Documents exceed Code requirements, satisfy such additional requirements.
- 1.3.2. Unless otherwise indicated, obtain and pay for all other permits, licenses and certificates of inspection. Ensure permits, licenses and certificates included under specific Sections are provided as specified. Forward copies of all permits to Consultant before commencing work.

**1.4. REFERENCE DOCUMENTS**

- 1.4.1. Where reference is made to codes, specification standards, manuals, contract forms, installation, application and maintenance instructions, produced by various organizations, conform to edition of standards specified or, if not specified, to latest edition as amended and revised to date of Contract.
- 1.4.2. Amendments to reference documents after award of Contract affecting Construction Cost shall be dealt with in accordance with Part 5, Changes of General Conditions of the Construction Management Contract – for Services.

1.4.3. If requested provide copy on site of such standard(s).

**1.5. ACRONYMS**

1.5.1. Refer to Drawing and Specifications for acronyms are used in Contract Documents:

**1.6. ABBREVIATIONS**

1.6.1. Refer to Drawings and Specifications for abbreviations are used in Contract Documents:

**1.7. BUILDING SCIENCE REQUIREMENTS**

1.7.1. Obtain and be familiar with following references:

1.7.1.1. NRCC 13487 - Walls, windows and roofs for the Canadian climate

1.7.1.2. CBD 40 - Rain penetration and its control

1.7.1.3. CBD 48 - Requirements for exterior walls

1.7.1.4. CBD 55 - Glazing design

1.7.1.5. CBD 72 - Control of air leakage is important

1.7.1.6. CBD 95 - Roofing membrane design

1.7.1.7. CBD 96 - Use of sealants

1.7.1.8. CBD 151 - Drainage from roofs

1.7.1.9. CBD 155 - Joint movement and sealant selection

1.7.1.10. CBD 175 - Vapour barriers: what are they? are they effective?

1.7.2. Quality Assurance:

1.7.2.1. Study and be aware of principles discussed in above documents in order to understand their significance to Contract Documents.

1.7.2.2. Some information in above reference documents may not be applicable to the Work and no recommendations or statement therein is a mandatory requirement of Contract unless required by Contract Documents.

1.7.3. Procedures, Sequences and Coordination of Construction:

1.7.3.1. Employ procedures, sequences and coordination of construction to install the Work in accordance with principles of building science explained in above reference documents as applicable.

1.7.3.2. Provide special care at the sealed junction of different Products which make up airseal system to assure lasting continuity.

1.7.3.3. Verify compatibility of fasteners and adhesives with surfaces to which they are applied.

1.7.3.4. Fasten and adhere Products making up airseal system to withstand windloads required of exterior cladding system.

1.7.3.5. Design and provide airseals, firestopping at miscellaneous penetrations of airseal system including mechanical and electrical service penetrations. Accommodate vibration and thermal movement.

1.7.3.6. Provide exterior rain screen assemblies in accordance with building science principles. Compartmentalize rain screens to reduce air pressure differentials across assemblies.

1.7.3.7. Provide thermal insulation to exterior of vapour diffusion barrier. Note vapour diffusion barrier is often same as airseal system. Apply thermal insulation to vapour diffusion barrier to eliminate air pockets, channels and other discontinuities.

1.7.3.8. Minimize thermal bridges.

- 1.7.3.9. Apply building science principles to building interior spaces with differing environments, e.g. differing temperature and humidity conditions.
- 1.7.3.10. Comply with other building science requirements as part of application of building science principles identified in other Sections of the Work.
- 1.7.3.11. Do Work in neat and careful manner to retain Work plumb, square and straight.
- 1.7.3.12. Ensure Work is properly related to form close joints and appropriately aligned junctions, edges and surfaces and is free of warp, twist, wind, wave or other irregularities.
- 1.7.3.13. When required by Specifications or by manufacturer's recommendations, have manufacturer, Supplier or accredited agent, inspect work which incorporates their Products.
- 1.7.3.14. Do not permit materials to come in contact with other materials whether in presence of moisture, or otherwise, if conditions will result in corrosion, stain or discolouration or deterioration of completed Work. Provide compatible, durable separators where such contact is unavoidable.

**1.8. DESIGN INTEGRITY AND ARCHITECTURAL REQUIREMENTS**

- 1.8.1. Air/Vapour Barrier Integrity:
  - 1.8.1.1. This Project incorporates design principles of positive air leakage and vapour diffusion control at building enclosure line. Drawing details illustrate continuity of air/vapour barrier at penetrating elements such as door, window and louvre frames.
  - 1.8.1.2. Provide a continuous, unbroken and non-perforated air and vapour barrier to totally enclose building envelope and to separate interior and exterior environments. Provide particular attention to following areas:
    - 1.8.1.2.1. exterior wall systems.
    - 1.8.1.2.2. roofing systems including skylights.
    - 1.8.1.2.3. junctions of walls and roofs.
    - 1.8.1.2.4. seals at openings such as doors, windows.
  - 1.8.1.3. Ensure air barrier membranes have an air permeance of less than 0.02 l/s/m<sup>2</sup> (0.004 cfm/sq ft) under a pressure differential of 75 Pa (1.57 psf) when tested in accordance with ASTM E2178 or CAN/ULC-S741.
  - 1.8.1.4. Ensure vapour barrier membranes have a vapour permeance of less than 57 ng/Pa•sm<sup>2</sup> (1 US perm) when tested in accordance with ASTM E96/E96M.
  - 1.8.1.5. Air/vapour barrier membranes are able to withstand 2 kPa (42 psf) air pressure from either direction, with no increase in ELA.
  - 1.8.1.6. When membrane forms a dual role ensure it meets requirements for air tightness and vapour diffusion control in accordance with ASTM E283/E283M and ASTM E96/E96M.
  - 1.8.1.7. Air/vapour barrier extends nominally from foundation line, vertically along exterior walls and to positive contact with roof air/vapour barrier or roofing membrane as appropriate and to waterproofing at podia areas. Ensure continuity of air/vapour barrier to fenestration system at room-side surface of glazing, spandrel panels, etc.
  - 1.8.1.8. In order to maintain continuity of air/vapour barrier, interfacing of various building elements requires close coordination by all trades involved with exterior building envelope construction. Ensure positive connections and seal of transitions are made with proper construction sequencing established by Construction Manager to ensure such interfacing. Such transition installation may be inspected by Consultant and/or Inspection and Testing Company prior to concealing with subsequent construction.

- 1.8.2. Continuity of Fire Separations:
  - 1.8.2.1. Conform to following requirements to maintain continuity of fire separations:
    - 1.8.2.1.1. Fire separations may be pierced by openings for electrical and similar service outlets provided such boxes are noncombustible and are tightly fitted.
    - 1.8.2.1.2. Where a fire separation required to be of noncombustible construction terminates at exterior wall, underside of floor, ceiling or roof structures and at floors, fire stop opening with an approved Listed material referenced in Section 01 60 00.
  - 1.8.2.2. Do not use combustible members, fastenings and like to anchor fixtures to fire separations.

**1.9. TOLERANCES**

- 1.9.1. Unless more stringent tolerances are required by a Section of the Specifications or a referenced standard, meet following tolerances for installed work:
  - 1.9.1.1. "plumb" means plumb within 6 mm in 3 m (1/4" in 10' - 0").
  - 1.9.1.2. "level" means level within 6 mm in 3 m (1/4" in 10' - 0").
  - 1.9.1.3. "square" means not in excess of 10 seconds, less or more than 90°.
  - 1.9.1.4. "straight" means within 8 mm in 3 m (5/16" in 10' - 0"), under a 3 m (10' - 0") straightedge.

**1.10. QUALIFICATIONS**

- 1.10.1. For manufacturer's, fabricator's and installer's qualifications, conform to requirements specified under respective trade Section as applicable. Where applicable, manufacturer's field services shall be obtained as specified under respective trade Section.
- 1.10.2. Quality Control System Protocol:
  - 1.10.2.1. Prior to commencement of Work, establish quality control system protocols, rules, related chain of commands and commitment to provide quality work as intended in Contract Documents for Work.
  - 1.10.2.2. Retain services of quality control staff, shop and field supervisors complete with their skills, knowledge, duties and responsibilities. Upon request provide full resume of supervisors showing their qualifications.

**1.11. ENGINEER'S QUALIFICATIONS**

- 1.11.1. Employ a licensed engineer registered to practice in Province of Ontario carrying a minimum \$2,000,000.00 professional liability insurance to:
  - 1.11.1.1. design components of work of this Project specific to their license to practice.
  - 1.11.1.2. be responsible for determining sizes or other specific requirements within their license to practice in accordance with applicable codes and regulations.
  - 1.11.1.3. be responsible for production and review of Shop Drawings.
  - 1.11.1.4. inspect work of this Section during fabrication and erection/installation.
  - 1.11.1.5. be responsible for sealing and signing each Shop Drawing and associated calculations performed.
  - 1.11.1.6. provide site administration and inspection of this part of the Work.
- 1.11.2. Certification: Submit certification stating performance of engineered work will perform as required.

**1.12. WELDER QUALIFICATIONS**

- 1.12.1. Have welding executed by firms certified in accordance with CSA W47.1 Division 1 or 2.1 and submit copies of certificates to Consultant prior to start of work.

- 1.12.2. Ensure operators employed on the Work are qualified per CSA W47.1 for work as required by Contract and submit copies of certificates to Consultant prior to start of work.
- 1.12.3. Ensure Inspection/Testing Company and welding inspector and supervisors meet qualifications per CSA W178.1 and CSA W178.2 and are certified by the Canadian Welding Bureau in Category (a), Buildings.
- 1.12.4. Have welding undertaken by companies and welders fully approved to following codes and reference standards and carry proof with them while on site:
  - 1.12.4.1. CSA W47.1.
  - 1.12.4.2. Operators shall be qualified "Class O" per CSA W47.1.
  - 1.12.4.3. CSA W59.

**1.13. PAYMENT FOR QUALITY CONTROL SERVICES**

- 1.13.1. Owner may appoint separate inspection and testing companies for certain work where specifically stated or where it may later require. Wherever documents state that inspection and testing companies may be appointed by Owner, give adequate notice to Consultant to determine if such inspection and testing companies will be appointed.
- 1.13.2. Services performed by inspection and testing companies and other consultants are a function to assist Consultant and do not to replace Trade Contractor's responsibility for conforming to requirements of Contract Documents. Trade Contractor is responsible for continuous checking and inspections to ensure Contract performance is in accordance with Contract Documents as the Work proceeds. In such cases, following will apply:
  - 1.13.2.1. If tests or inspections reveal work not in accordance with Contract Documents then Trade Contractor shall bear cost of such tests and further tests as required, to verify acceptability of corrected work.
  - 1.13.2.2. Consultant will advise Trade Contractor of work to be inspected and companies appointed therefor and will supply them with necessary Drawings and Specifications.
  - 1.13.2.3. Advise Consultant and applicable inspection and testing companies not less than 5 Working Days prior to commencement of work to be inspected or tested and ensure proper facilities and coordination are provided. Do no work without required inspection and testing.
- 1.13.3. Establish schedule of testing, number of testing reports, submission and distribution of testing reports. Inspection and testing reports shall provide all pertinent data regarding site conditions, dates, test references, Product identification, procedures and description, instructions and recommendations and other relevant information. Identify clearly Products not meeting requirements of Contract Documents and provide measures and recommendations for correcting situation. Advise Consultant promptly when Product or system fails to meet applicable Standards.
- 1.13.4. Materials and work not in accordance with requirements of Contract Documents will be rejected at any time during progress of the Work. Defective material and work, whenever found prior to final completion of the Work, may be rejected regardless of previous inspection or testing.

**1.14. COOPERATION WITH TESTING AND INSPECTION COMPANIES**

- 1.14.1. Representatives of the testing laboratories shall have access to work at all times; provide facilities for such access in order that the laboratories may properly perform its function.
- 1.14.2. Cooperate with testing and inspection companies and give adequate notification of any changes in source of supply, additional work shifts and any other proposed changes.
- 1.14.3. Prior to commencing significant segments of work, give Consultant and independent testing and inspection agencies appropriate notification so as to afford them reasonable opportunity to review work previously completed. Failure to meet this requirement may be cause for the Consultant to classify the work as defective.



- 1.14.4. Ensure no Product is installed before it is tested when a test is specified, nor work executed where a test or inspection is required and the inspectors cannot attend.
- 1.14.5. Cooperate in permitting access for inspection to all places where work is being done or material is stored prior to shipping.
- 1.14.6. Allow free access to testing agencies and supply necessary sampling materials for tests. Supply additional labour required to assist the testing and inspection companies in making tests.
- 1.14.7. Cost of above labour and material shall be borne by individual Subcontractors concerned.
- 1.14.8. Testing and inspection service does not relieve Trade Contractor of their responsibility for normal shop inspection, quality control of production and for errors made by them.

**1.15. SCHEDULES FOR TESTING**

- 1.15.1. Establishing Schedule:
  - 1.15.1.1. By advance discussion with selected testing laboratories, determine the time required for laboratories to perform their tests and to issue each of their findings.
  - 1.15.1.2. Provide required time within construction schedule.
- 1.15.2. Adherence to Schedule:
  - 1.15.2.1. Advise testing laboratories in advance when testing of work is required.
  - 1.15.2.2. When testing laboratories are ready to test according to predetermined schedule, but are prevented from testing or taking specimens due to incompleteness of Work, extra costs for testing attributable to the delay may be back-charged to Construction Manager and not borne by Owner.

**1.16. SOURCE QUALITY CONTROL**

- 1.16.1. Refer to respective trade Sections for source quality control requirements.

**1.17. SITE QUALITY CONTROL**

- 1.17.1. Refer to respective trade Sections for field quality control requirements.

**1.18. TESTING AND INSPECTION OF MECHANICAL AND ELECTRICAL SYSTEMS**

- 1.18.1. Provide testing and inspection of Mechanical and Electrical Systems as defined in Contract Documents under trade Sections of Mechanical and Electrical respectively.

**1.19. PROJECT MOCK-UPS**

- 1.19.1. Arrange with Consultant to assist in preparing a schedule fixing dates for mock-up review.
- 1.19.2. Prior to manufacture and delivery of Products, arrange for Consultant's and Owner's review of mock-ups. Allow time for modifications and subsequent reviews.
- 1.19.3. Failure to review mock-ups in ample time will not be considered sufficient reason for extensions to Contract Time or for extra costs.
- 1.19.4. Provide following types of mock-ups:
  - 1.19.4.1. Transportable Mock-Ups. Refer to Sections for size requirements. Arrange and pay for delivery and pick-up.
  - 1.19.4.2. Site Mock-Ups: Refer to Sections to determine if mock-ups will form part of Work or are built separately. Demolish mock-ups built separately after work of applicable Section is completed and Consultant has reviewed that part of Work. Review with Consultant location of site mock-ups.
- 1.19.5. Modify mock-ups in accordance with Consultant's review at no additional cost to Owner.
- 1.19.6. Mock-ups are used to refine design of components. Changes to mock-ups will be made. Allow time in schedule for revisions to be made to mock-ups and Shop Drawings. Mock-up review and revisions will not be permitted as basis of claim for delay or additional cost.

- 1.19.7. Provide mock-ups using personnel assigned to the Work and Products and techniques to be used on the Work.
- 1.19.8. Mock-ups shall serve as standard for remaining parts of the Work.
- 1.19.9. Refer to each Section of the Work for additional mock-up requirements.
- 1.19.10. Provide mock-ups required by Contract Documents.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.
- 1.1.2. Be responsible for arranging, obtaining and paying for any permit necessary for temporary facilities and controls. Provide and maintain all temporary facilities and controls. Remove them when directed and/or when no longer required. Payment for temporary facilities and controls shall be made by Construction Manager unless specified otherwise.
- 1.1.3. Provide and maintain adequate temporary supports, structures, light, power and water in accordance with GC 3.3, as required by all trades and to produce environment for Work to proceed without delay at all times of year. Cost of temporary light, power and water shall be included in Construction Cost. Pay for installation, light, power and water used, maintenance and removal.

**1.2. REFERENCES**

- 1.2.1. Abbreviations and Acronyms:
  - 1.2.1.1. AWMAC/WI: Architectural Woodwork Manufacturers Association of Canada/Woodwork Institute; [www.awmac.com](http://www.awmac.com).
  - 1.2.1.2. COFI: Council of Forest Industries; [www.cofi.org](http://www.cofi.org).
  - 1.2.1.3. HVAC: Heating, Ventilating and Air Conditioning.

**1.3. TEMPORARY UTILITIES**

- 1.3.1. Temporary Water Supply:
  - 1.3.1.1. Arrange and pay for supply of water required for construction purposes.
  - 1.3.1.2. Provide connections, piping and fittings for distribution of water and, upon completion of the Work, remove such temporary distribution.
- 1.3.2. Temporary Power:
  - 1.3.2.1. Provide continuous temporary power and lighting service. Arrange and pay for energy charges and include costs for connection and the provision of a separate meter.
  - 1.3.2.2. Level of illumination on all floors and stairs shall be not less than 161 lux (15 lumens/sq ft or 15 foot candles). When finishing trades are performing work, provide illumination comparable to final illumination. Extension cords, lamps and hoses shall be provided by those using them in accordance with governing regulations and ordinances.
- 1.3.3. Temporary Heating, Ventilation and Air Conditioning:
  - 1.3.3.1. Provide temporary heating, ventilation and air conditioning for enclosed building until Substantial Performance of the Work to ensure adequate protection of work under way and of completed work. Temporary heating, ventilation and air conditioning without limitation includes heating, cooling and desiccant de-humidification equipment, associated power cables, gas lines, temporary duct work and accessories.

- 1.3.3.2. Provide controlled environment for construction drying and curing of construction work to prevent growth of mold and speed up drying of concrete to meet moisture emission levels required by finish flooring installation. Conform to following performance requirements, except where more stringent requirements are required by work of other Sections:
- 1.3.3.2.1. Supply Air: Minimum 1 air change every 120 minutes.
- 1.3.3.2.2. Filtration of Out Air: 100%.
- 1.3.3.2.3. Temperatures: Minimum between 15 deg C (59 deg F) and 27 deg C (80 deg F).
- 1.3.3.2.4. Relative Humidity: Maintain at or below 50% RH.
- 1.3.3.2.5. Ensure moisture content in wood and hardwood materials is stabilized to maximum percentage recommended by AWMAC/WI requirements.
- 1.3.3.2.6. Control condensation and maintain environmental conditions, including air and surface temperatures suitable for surface preparation, application and curing of paints and coatings.
- 1.3.3.2.7. Noise Criteria: Conform to requirements specified in Contract Documents.
- 1.3.3.3. Submit schematic equipment layout, duct and/or pipe route, staging, sequencing layouts, enclosure and barricade construction.
- 1.3.3.4. Submit Product data, climate control equipment, temperature and humidity controls, duct, duct accessories, pipe and piping accessories materials and construction. Where placed outside, anchor and securely attach temporary supply canvas spiral duct to withstand wind damage. Ensure interior distribution polyethylene tubing has perforations to distribute air evenly throughout areas being served.
- 1.3.3.5. Provide proper heating for drying out of new work. Maintain minimum temperature specified herein. Uniformly distribute heat to avoid hot or cool areas or excessive drying. Protect concrete, masonry, excavations, backfilling and other work from frost during construction.
- 1.3.3.6. Dehumidify interior spaces continuously during installation and curing periods required for moisture emitting work to maintain required relative humidity levels, including without limitations work of involving:
  - 1.3.3.6.1. joint compounds, skim coating, gypsum board work and plaster.
  - 1.3.3.6.2. cementitious materials.
  - 1.3.3.6.3. paints.
  - 1.3.3.6.4. spray applied fireproofing.
  - 1.3.3.6.5. finish carpentry, casework, wood paneling, wood flooring and other millwork.
- 1.3.3.7. Ensure environmental control company performing this work is specialized in this work and having documented 5 years continuous experience performing work of similar size, scope and type.
- 1.3.3.8. As soon as construction is sufficiently advanced, and in order to prevent delays in progress of Work, enclose building using necessary tarpaulins, plastic sheeting or glazing and temporary doors, with locks to doors.
- 1.3.3.9. Construction heaters used inside building must be vented to outside or be flameless type. Do not use direct fired space heaters and propane, salamander type heaters. Ventilate heated areas and keep building free of exhaust and combustion gases.
- 1.3.3.10. Maintain supervision of operation of temporary heating and ventilation equipment. Maintain temporary climate control equipment in service until completion of building commissioning or when use is no longer required as directed by Consultant.
- 1.3.3.11. Remove climate control equipment from site at successful commissioning of new HVAC equipment.

- 1.3.3.12. Do not use any of permanent facilities and controls without obtaining written permission from Consultant.
- 1.3.4. Temporary Drainage:
  - 1.3.4.1. Protect excavation, trenches and building from damage by rainwater, ground water, backing up of drains or sewers and other water, frost and other weather conditions. Provide sheeting, piling, shoring, pumps, equipment, temporary drainage, protective covering and enclosures. Provide necessary pumps including spare pump for keeping project free of water throughout construction period.
  - 1.3.4.2. Keep site properly and efficiently drained during construction and until completion. Be responsible for disturbances, dirt and damage which may be caused by or result from water backing up or flowing over, through, from or along any part of the Work or due to operations which may cause water to flow elsewhere. Drain water away from site without causing any danger to public health.
- 1.3.5. Temporary Protection: Provide and maintain following temporary protection at all times:
  - 1.3.5.1. Window Openings: Translucent, weatherproof protection until windows and glazing are installed.
  - 1.3.5.2. Door Openings: Minimum wood doors, frames, hinges, locks and bolts to exterior and interior to existing areas.
  - 1.3.5.3. Air Intakes: Provide protection against infiltration of dirt, dust and other deleterious matter.
  - 1.3.5.4. Stair treads and landings.
  - 1.3.5.5. Roof and Waterproofing Protection: planking or other protection to prevent damage from falling materials, construction traffic, etc.
  - 1.3.5.6. Scaffolding Enclosures: to enable the Work to continue during inclement weather and winter conditions.

#### **1.4. CONSTRUCTION FACILITIES**

- 1.4.1. Construction Manager's Field Offices and Sheds:
  - 1.4.1.1. Provide Construction Manager's field offices and storage sheds within the Place of the Work only. Provide offices and sheds, properly painted and maintained.
- 1.4.2. Sanitary Facilities:
  - 1.4.2.1. Provide and maintain temporary facilities for use by workers in compliance with Occupational Health and Safety Act, applicable codes and by-laws. Provide portable, weatherproof toilets, serviced at least weekly, which may be replaced by adequate, permanent or temporary water closets, urinals and basins when plumbing system has been installed, tested and approved.
  - 1.4.2.2. When water and drain connections within building are completed, provide temporary water closets, urinals and flushing devices complete with temporary screens and partitions and temporary wood washroom entrance doors. Install units in acceptable locations throughout building, convenient to labour force and clearly mark "For use of Trades only".
  - 1.4.2.3. Misuse of water closets and washing facilities or fouling of building by workers shall constitute grounds for instant dismissal from site.
- 1.4.3. Garbage Removal: Provide garbage bins and schedule pick up of garbage.
- 1.4.4. Safety Program:
  - 1.4.4.1. Owner will undertake role of "Constructor" as defined under The Occupational Health and Safety Act, as amended.
  - 1.4.4.2. Conform to Construction Safety Association of Ontario's Manual on Propane in construction. Watch work area for minimum of 30 minutes after hot work is completed. Provide site fire security when required by local building department and/or municipal fire department. Ensure water supply is adequate for fire fighting.

- 1.4.4.3. Provide on site such equipment and medical facilities as are necessary to furnish first aid to anyone who may be injured in connection with Work in accordance with regulations of *Occupational Health and Safety Act (Ontario)*.
- 1.4.4.4. Promptly report in writing to Consultant all accidents arising out of or in connection with performance of Work, whether on or adjacent to site, which caused death, personal injury or property damage, giving full details and statements of witnesses. In addition, in case of death, serious injuries or damages, report accident immediately by telephone or messenger to Consultant.
- 1.4.4.5. If any claim is made by anyone against Owner or any Trade Contractor on account of any accident or damage, promptly report facts in writing to Consultant, giving full details of claim.

**1.5. CONSTRUCTION AIDS**

- 1.5.1. Construction Hoists: Provide, install, maintain, locate where directed and pay costs for hoisting equipment if required. Position equipment so not to interfere with Work. Operate equipment by qualified hoist operator along with well trained flag and signal persons. Trade Sections shall make their own financial and schedule arrangements with Construction Manager for use thereof. Provide concrete pads for hoisting equipment.
- 1.5.2. Scaffolding: Erect fixed or mobile scaffolding as applicable independent of walls. Use it in manner as to interfere as little as possible with other Sections. When not in use, move it as necessary to permit installation of other work. Construct and maintain scaffolding in rigid, secure and safe manner. Remove it promptly when no longer required or remove it at end of each Day and store in secure place as directed.

**1.6. TEMPORARY BARRIERS AND ENCLOSURES**

- 1.6.1. Hoarding and Boardwalk:
- 1.6.1.1. Provide hoarding and gates in accordance with the requirements of the Municipality, the Occupational Health and Safety Act, Regulations for Construction Projects and other authorities having jurisdiction to:
- 1.6.1.1.1. Protect public, Owner's occupants, personnel and property from injury and damage.
- 1.6.1.1.2. Exclude non-construction personnel and public from parts of the Place of the Work under construction.
- 1.6.1.2. Framing, sheathing decking as per details indicated on Drawings and materials listed herein are minimum requirements which may be superseded by Engineer's design.
- 1.6.1.3. Wood Hoarding and Boardwalk Framing: National Lumber Grades Authority No. 1 Grade SPF.
- 1.6.1.4. Plywood Hoarding Sheathing: Exterior COFI Select tight face.
- 1.6.1.5. Plywood Boardwalk Decking: Exterior COFI Sheathing.
- 1.6.1.6. Wire Mesh: 50 mm x 50 mm x 3.4 mm (2" x 2" x 1/8") galvanized.
- 1.6.1.7. Gates and Pass Doors: Selected by Construction Manager.
- 1.6.1.8. Gate and pass door hardware shall be selected by Construction Manager including fire exit hardware.
- 1.6.1.9. Temporary Roofing and Cladding (Minimum): Waterproof tarpaulins.
- 1.6.1.10. Limit extent of the Place of the Work shall be as indicated on Drawings.
- 1.6.1.11. Prohibit use of roads outside of the Place of the Work except for construction purposes and as required for access to the Place of the Work.
- 1.6.1.12. Provide a 3-colour, graphic paint finish to hoarding system in accordance with Consultant's later design.
- 1.6.1.13. Provide extra framing and design to support Project signs mounted on top of hoarding wall.

- 1.6.1.14. Provide pass door access openings and gates including operating and security hardware.
- 1.6.1.15. Provide minimum 300 mm x 900 mm (12" x 36") pedestrian view ports in hoarding at maximum 4000 mm (13') on centres. Provide wire mesh screening to prevent entry into construction areas through view ports.
- 1.6.1.16. Provide temporary but effective protection, including roofing and cladding, continuous over hoarded boardwalk to protect Owner's tenants and patrons from weather. Detail and provide roofing and cladding systems to prevent damage to existing tenant spaces and to prevent damage and disfigurement to hoarded boardwalk, interior finishes and construction.
- 1.6.1.17. Maintain hoarding in a clean condition, free of unauthorized bills, signs and defacement.
- 1.6.1.18. Provide covered extensions of hoarding and boardwalks, beyond those indicated on Drawings, where risk of falling objects exists, to protect the Owner's personnel, tenants and patrons.
- 1.6.1.19. Post adequate warning signage, prominently displayed and within view of each other on hoarding, warning of the illegality and danger of unauthorized trespassing into the parts of the Place of the Work under construction.
- 1.6.1.20. Maintain Access to Exits and Exits, for emergency escape through or around hoarding to a safe area of refuge acceptable to authorities having jurisdiction.
- 1.6.1.21. Relocate and reconstruct hoarding to accommodate phasing of the Work.
- 1.6.1.22. Remove and dispose of hoarding upon completion of the parts of the Work.
- 1.6.2. Temporary Heated Enclosures:
  - 1.6.2.1. Conform to requirements of Occupational Health and Safety Act.
  - 1.6.2.2. Take precautions and provide temporary protection to prevent damage to Work affected by temperature, water, weather and other environmental conditions.
  - 1.6.2.3. Provide temporary heated enclosures in advance of cold weather to continue full scope of operations through cold climatic temperature and weather from commencement to completion without delay.
  - 1.6.2.4. Take precautions to protect openings made in existing building(s) from entry of elements and of persons during construction and to protect existing structure and finishes from damage. Protection of exterior enclosure shall be air tight and have minimum thermal resistance value of  $R = 5$  (RSI = 1).
  - 1.6.2.5. Provide heating to maintain the recommended Product storage, mixing, substrate, ambient air, placement, Product installation and curing temperatures recommended by respective Product manufacturers.
  - 1.6.2.6. Provide temporary enclosures and heating required by Contract Documents.
- 1.6.3. Barricades:
  - 1.6.3.1. Erect sturdy railings around shafts, stairwells and in similar areas to protect workers and public from injury.
  - 1.6.3.2. Close off access routes by placing barricades or posting guards to prevent unauthorized personnel from having access to Work. Unauthorized personnel means public and anyone not directly concerned with execution, supervision or inspection of Work.

**1.7. TEMPORARY CONTROLS**

- 1.7.1. Pollution Control: Take appropriate dust control measures to avoid contamination of adjacent areas near site from dust. Respond immediately to complaints of dust received from public, authorities, or Consultant. Keep public and private roads free of dust, mud and construction debris resulting from trucks employed on this Project.

- 1.7.2. Pest Control: Be responsible to provide control measures, restraining procedures and treatments to prevent infestation and spread of insects, rodents and other pests deemed to be present at site and/or noticed during course of the Work. Carry out fumigation, pest control procedure and posting of warning signs, notices including contents of such notices in accordance with requirements of Pesticides Act and any other authorities having jurisdiction.

**END OF SECTION**



**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. REFERENCES**

- 1.2.1. Reference Standards:
  - 1.2.1.1. ANSI/ASME B18.6.3-13 - Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series)
  - 1.2.1.2. CSA W47.1-19 - Certification of companies for fusion welding of steel
  - 1.2.1.3. CSA W47.2-11(20) - Certification of companies for fusion welding of aluminum
  - 1.2.1.4. CSA W59-18 - Welded Steel Construction (Metal Arc Welding)
  - 1.2.1.5. CSA W59.2-18 - Welded Aluminum Construction
  - 1.2.1.6. CAN/ULC-S101-14 - Standard Methods of Fire Endurance Tests of Building Construction and Materials
  - 1.2.1.7. CAN/ULC-S107-19 - Standard Methods of Fire Tests of Roof Coverings

**1.3. BASIC PRODUCT REQUIREMENTS**

- 1.3.1. Material, Machinery, Equipment and Fixtures: Product employed in the Work shall be those which affect indoor air quality as little as possible. Provide adequate ventilation during installation of finishing materials to avoid effect on indoor air quality.
- 1.3.2. Material, plant, equipment and fixtures specified shall form basis of Contract. Where more than 1 brand or manufacturer is named in Specifications, or on Drawings, Construction Manager shall have choice to use 1 of specified manufacturer or brand provided requirements of Drawings and Specifications are met.
- 1.3.3. Ensure materials, plant, equipment and fixtures are not damaged or defective and of quality specified and compatible for purpose intended. If requested provide evidence as to type, source and quality. Remove and replace defective Products, at own expense, regardless of previous reviews and be responsible for delays and expenses caused thereby. Replace factory finished equipment, or parts thereof, whose paint finish is damaged and cannot be reasonably remedied by paint touch-up.
- 1.3.4. In general Owner retains right to select all choices available within specified Products colours, finishes and other options unless specified otherwise.
- 1.3.5. Toxic or Hazardous Substances and Materials:
  - 1.3.5.1. Definitions:
    - 1.3.5.1.1. Normal Mould Concentrations: Indoor concentrations of spores, hyphae and mycelia fragment (both airborne and on surfaces) that are similar in concentration and species population distribution that would be found outdoors in natural environment.
    - 1.3.5.1.2. Mould Amplification: Growth or elevated population of mould (both airborne and on surfaces) including visible growth or staining on any building material. This amplification is most often caused by water damage to building materials.

- 1.3.5.2. Products and materials incorporated in the Work shall be as free as possible of noxious or toxic volatile emissions or emissions of irritating or toxic particles, so interior air of completed building is as pollution-free as possible. (For example, Products emitting benzene, mercury, lead or other known toxic compounds are not permitted.)
- 1.3.5.3. Products, materials and substances employed in the Work shall be free of mould amplification. In addition to requirements specified herein, take special care while handling, storing and installing materials, without limitation, such as particleboard, plywood, cellulose materials, wallpaper, ceiling panels, gypsum boards and insulation with kraft paper back up.
- 1.3.5.4. Product with visible or invisible signs of mould amplification whether installed or not, shall be considered defective and removed at Construction Manager's expense. Construction Manager is responsible to retain a qualified and experienced bio-contamination investigator to conduct at its expense sampling and laboratory analysis and other required assessment steps to determine whether or not materials are impacted by mould amplification and follow up recommended contamination management method. As a minimum requirement conform to New York City Department of Health and Mental Hygiene November 2008, "Guidelines on Assessment and Remediation of Fungi in Indoor Environments" and appropriate Levels of requirements for mould removal.
- 1.3.5.5. Ensure construction workers are not exposed to amplified moulds. Take every reasonable precaution in circumstances for protection of workers, as air movement and handling of contaminated material can release spores into atmosphere which can cause adverse health effects. Mould metabolites including mycotoxins, when in contact with skin or inhaled, may irritate skin, eyes, nose and throat resulting in allergy-like symptoms such as difficulty in breathing, runny nose, watery eyes, fatigue, headache, asthmatic attacks and general 'flu' like symptoms.
- 1.3.5.6. Where odourless Products are not available, Products shall be chosen where possible so odours are minimized within a 1 month gas-off period following installation at normal occupancy ventilation levels. Ventilation levels during the construction period shall be set sufficiently high to encourage the gassing off of materials to their minimum levels prior to occupancy of the building, where possible.
- 1.3.5.7. Products for installation within the air-handling and distribution systems shall be especially chosen to minimize the introduction of pollutants into the fresh air supply to the building.
- 1.3.6. Availability:
- 1.3.6.1. Immediately upon signing the Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of Products are likely or possible, or Products are no longer available, or a specified manufacturer is no longer in business, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the Work.
- 1.3.6.2. Products which are specified by their proprietary names, by part, or catalogue number form basis of the Contract. No substitutes for these are permitted.
- 1.3.6.3. In the event of failure to notify Consultant at commencement of the Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available Products of similar character, at no increase in Construction Cost.
- 1.3.6.4. No substitution of materials will be allowed on basis of long deliveries, unless such long delivery problems are identified at time of Bidding.
- 1.3.7. Mechanical & Electrical Location Drawings:
- 1.3.7.1. Mechanical and electrical drawings indicate approximate locations diagrammatically. Prior to installation, request and obtain final locations and arrangement drawings for mechanical and electrical items. Allow Consultant to adjust final locations within a 1500 mm (5') radius from diagrammatic position indicated, without change to Construction Cost.

- 1.3.7.2. Align and cluster devices and fitments neatly in accordance with specified mounting heights, properly aligned horizontally and vertically.
- 1.3.8. Gauges:
  - 1.3.8.1. Interpret gauges of uncoated steel sheet based on manufacturer's standard gauge (msg), stainless steel sheet based on "United States Standard Gauge (Revised)" and non-ferrous sheet metals based on "Brown & Sharpe Gauge". For galvanized steel sheet based on galvanized sheet gauge (ga).
  - 1.3.8.2. Interpret gauges specified for wire as "Steel Standard" and for non-ferrous wire, as "American".
- 1.3.9. Fire Rating:
  - 1.3.9.1. Where material, component or assembly is required to be fire rated, fire rating shall be determined on basis of results of tests conducted in conformance with CAN/ULC-S101 by 1 of following testing authorities acceptable to authorities having jurisdiction:
    - 1.3.9.1.1. Underwriters Laboratories of Canada (ULC); [www.canada.ul.com](http://www.canada.ul.com)
    - 1.3.9.1.2. Underwriters Laboratories Inc. (UL); [www.ul.com](http://www.ul.com)
    - 1.3.9.1.3. FM Global; [www.allendale.com](http://www.allendale.com)
    - 1.3.9.1.4. National Research Council of Canada; [www.nrc.ca](http://www.nrc.ca)
    - 1.3.9.1.5. National Board of Fire Underwriters.
    - 1.3.9.1.6. Warnock Hersey - Intertek; [www.intertek.com](http://www.intertek.com)
  - 1.3.9.2. Where reference is made to only 1 testing authority, an equivalent fire rating as determined or listed by another of aforementioned testing authorities is acceptable if approved by authorities having jurisdiction. Obtain and submit such approval of authorities, in writing, when requesting acceptance of a proposed equivalent rating or test design.
  - 1.3.9.3. Ensure engineering judgements are sealed by a licensed engineer.
- 1.3.10. Roof Covering Classification:
  - 1.3.10.1. Roof Covering classification shall be determined in accordance with CAN/ULC-S107.
  - 1.3.10.2. Unless permitted by Code, every roof covering shall have Class A, B, or C classification as determined in accordance with Code requirements.
- 1.3.11. Manufacturers' Written Instructions:
  - 1.3.11.1. Unless specified otherwise, use each Product in accordance with manufacturer's published written instructions regarding handling, storage, preparation, methods of installation, protection and cleaning. Take into account site conditions and provide ancillary Products or accessories.
  - 1.3.11.2. Conform to manufacturer's recommended installation temperatures. If finishes are installed at temperatures different from operation or service temperatures, make provisions for expansion and contraction in service as acceptable to manufacturer. Repair resulting damage should expansion provisions prove inadequate.
  - 1.3.11.3. Notify Consultant, in writing, of conflicts between Contract Documents and manufacturer's instructions, so Consultant may establish course of action to be taken. If requested, make a copy of those instructions available at site.
  - 1.3.11.4. Improper installation or erection of Products, due to failure to comply with these requirements, shall require removal and re-installation at no increase in Construction Cost.
  - 1.3.11.5. Whenever specific reference to following manufacturer's directions or instructions is made in Specifications, upon request submit copies thereof for review before commencing such work.

- 1.3.12. Anchors and Fasteners:
- 1.3.12.1. Supply appropriate anchors, fasteners, accessories and adhesives required for fabrication and erection of Work.
- 1.3.12.2. Unless specified otherwise use exposed metal fastenings and accessories of same texture, colour and finish as Product being fastened.
- 1.3.12.3. Use metal fastenings of same material as metal component being fastened, or of metal which will not generate electrolytic action and cause damage to fastening or metal component under moist conditions. In general use non-corrosive or hot dip galvanized steel anchors occurring on or in exterior wall, slab or other exterior locations, unless higher standard is indicated or specified.
- 1.3.12.4. Fastening devices or adhesives shall be of appropriate type, used in sufficient quantity and in such manner to provide positive, permanent fastening which will not shift, work loose or fail during occupancy of building due to vibration or other causes resulting from normal use of building. Install anchors at spacing to provide required load/stress carrying capacity. Do not use wood plugs.
- 1.3.12.5. Lay out fastenings neatly, evenly spaced and aligned. Keep exposed fastenings to minimum.
- 1.3.12.6. Supply adequate instructions and templates and, if necessary supervise installation, where fastenings or accessories for your Section are required to be built into work of other Sections.
- 1.3.12.7. Do not use fastenings which will cause spalling, cracking, or deformation or deterioration of material being fastened by or to.
- 1.3.12.8. Do not use powder actuated fastening devices, which are used in tension, without approval. Take stringent safety precautions when using powder actuated fastenings. Use only low velocity plunger-type devices.
- 1.3.12.9. Use adhesives specified, or if not specified, those recommended by manufacturer of materials involved, compatible with materials to be joined, and effective in forming permanent joint of adequate strength.
- 1.3.12.10. Use screws, nails, staples and other similar, driven fasteners suitable to materials to be joined and to conditions under which they are installed and used. Ensure in finished work, fasteners are sized to take durable hold under stress to be encountered without damage to, or weakening of, elements secured together and fastenings will not corrode or cause staining of exposed surfaces.
- 1.3.12.11. Security Screws: Complying with ANSI/ASME B18.6.3; provide only tamper-resistant Torx-Plus® or break off type screws as specified and noted on Drawings. Provide flathead security screws where Torx-Plus® or breakoff is indicated to be counter sunk otherwise provide only trusshead or buttonhead for Torx-Plus® and only roundhead for breakoff type. Torx-Plus® Tamper resistant screws with heads having a deep hex-lobular recess with a solid post formed in the centre requiring a special metal driver to install or remove screw. Ensure fasteners and tools are of type produced by licensed manufacturer. Break-Off head security screws with drive heads having an additional hexagonal shaped head designed to break off after installation at a predetermined torque level. Grind remaining portion of neck smooth after hex-head is broken off. Permitted Manufacturers: Tamperproof Screw Co., Inc.; [www.tamperproof.com](http://www.tamperproof.com) or Sentry Security Fasteners Inc.; [www.sentrysf.com](http://www.sentrysf.com).
- 1.3.12.12. Do brazing or soldering to form durable connections of strength adequate to resist stresses to be encountered without deformation of elements joined. Prepare base metals and use methods and materials to ensure clean joint, and to prevent staining, corrosion, discolouration, deformation or other damage to finished Work.
- 1.3.12.13. Do welding to CSA W59 for steel and to CSA W59.2 for aluminum, unless specified otherwise. Have welding performed by companies certified operatives to CSA W47.1 or CSA W47.2.
- 1.3.12.14. Provide accessory items or materials required, such as brackets, cleats, connectors, sealants, lubricants, cleaners, protection and similar items, whether specified or not, so Work is complete and performs as required.

- 1.3.13. Built in Items: Provide and coordinate location of chases, slots and reglets including frames, sleeves, inserts, anchors, fasteners and bolts, forms and templates.
- 1.3.14. Patents: Verify existence or exclusivity of patent licenses for Products prior to installation.
- 1.3.15. Trademarks and Labels: Do not expose trademarks and labels, including applied labels, in finished Work. Remove visible trademarks and labels except those which are essential to obtain identification of mechanical and electrical equipment for maintenance and replacement purposes and for mandatory fire ratings.

**1.4. PRODUCT DELIVERY, HANDLING AND STORAGE**

- 1.4.1. Package, crate and brace Products to prevent damage during delivery, storage and handling.
- 1.4.2. Provide protection to finished surfaces to prevent damage during delivery, storage and handling.
- 1.4.3. Store packaged materials in original, undamaged condition with manufacturers' labels and seals intact.
- 1.4.4. Handle and store materials in accordance with manufacturers' and Suppliers' recommendations, in protected locations.
- 1.4.5. Store materials susceptible to environmental damage in weather-tight enclosures, raised clear of the ground and protected from weather, dampness and deterioration.
- 1.4.6. Replace Products damaged during delivery to Place of the Work, storage, handling and installation.
- 1.4.7. Conform to written procedures for safe handling, storage and use of noxious and hazardous materials including special precaution, safe clean-up and disposal procedures. Conform to the environmental protection requirements under Code.
- 1.4.8. Mould Control During Product Storage and Handling:
  - 1.4.8.1. Do not bring building Products onto site containing toxic moulds.
  - 1.4.8.2. Exercise continuous quality control and enforce mould control requirements upon Subcontractors and establish proper Product storage and delivery sequence to protect Products from weather and other exposures conducive to mould growth.
  - 1.4.8.3. Take special care while handling and storing materials, without limitation, such as particleboard, plywood, cellulose materials, wallpaper, ceiling panels, gypsum boards and insulation with kraft paper back up.
  - 1.4.8.4. Monitor humidity levels and provide adequate ventilation in storage areas. Be watchful of any moisture condition in storage areas. Do not use materials which have been damaged by exposure to moisture and/or showing signs of mould growth.
  - 1.4.8.5. Take measures during Product storage and handling to provide mould free finished construction.

**1.5. CONCEALMENT OF SERVICES**

- 1.5.1. Conceal pipes, service lines and ducts in chases, behind furring or above ceilings, except where they are indicated as being exposed to view. Where no ceiling is provided, such items may be exposed, but must be neatly and logically arranged. Coordinate layout of exposed services with Consultant prior to installation.

**1.6. MANUFACTURED ITEMS**

- 1.6.1. Where a conflict occurs between specified technical description and manufacturer's standard model numbers and/or manufacturer's printed description of given model number, technical description specified herein governs. Manufacturers shall make necessary modifications in their manufacturing methods to meet all aspects of these Specifications.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. PROFESSIONAL ENGINEERS' SERVICE**

- 1.2.1. Obtain full time engineering service from professional engineer licensed to practice in Province of Ontario in applicable discipline. Engineering service shall include without limitation, design of structural elements and full inspection services during fabrication, erection and administration during construction.

**1.3. EXAMINATION**

- 1.3.1. Acceptance of Conditions:
  - 1.3.1.1. Examine site at no cost or risk to Owner for all matters relating to Work, extent of Work, means of access and egress, all obstacles, rights and interests of other parties which may be interfered with during execution of Work, all conditions and limitations Trade Contractor to take into consideration in performing Work, including obstructions, existing structures or facilities, local conditions, actual levels, character and nature of project and any other consideration which may affect performance of Work.
  - 1.3.1.2. Where available obtain existing drawings pertaining existing building layout, architectural, structural, mechanical, electrical details and assess impact in performing work of this Contract.
  - 1.3.1.3. Examine existing conditions at no additional cost to Owner, surfaces and substrata upon which your work depends. Drawings are, in part, diagrammatic and are intended to convey scope of Work and indicate general and approximate location, arrangement and sizes of fixtures, equipment, ducts, piping, conduit and outlets and similar items. Obtain more accurate information about locations, arrangement and sizes from study and coordination of Drawings, including Shop Drawings and manufacturers' literature and become familiar with conditions and spaces affecting these matters before proceeding with Work.
  - 1.3.1.4. Ensure each Trade Contractor has full understanding of extent of its work. Report in writing defects in such work and notify Trade Contractors responsible for unfavourable and unsatisfactory conditions. Do not commence Work until unsatisfactory conditions have been corrected. Verify corrected work prior to commencing work. Execution and application of your work is deemed accepted of work upon which your work depends.

**1.4. MATERIALS**

- 1.4.1. Where Specification requirements include design of a Product or system, and minimum material requirements are specified, design of such Product or system shall employ materials specified within applicable Section. Where materials or components are not specified, Construction Manager shall augment materials with those of its choice within applicable Code limitations while maintaining integrity of design and architectural requirements.
- 1.4.2. Defective Products, whenever identified prior to completion of Work, will be rejected, regardless of previous reviews. Review does not relieve responsibility but is a precaution against oversight or error. Remove and replace defective and/or damaged Products at own expense and be responsible for delays and expenses caused by rejection.
- 1.4.3. Ensure new materials used to repair damage are compatible with existing work.

**1.5. PREPARATION**

**1.5.1. Surveying:**

- 1.5.1.1. Owner may supply Drawings to show line of Place of the Work.
- 1.5.1.2. Engage registered Ontario Land Surveyor to make survey of perimeter footings (and foundations) once constructed, to verify they are properly located with respect to property lines, elevations, easements and other buildings. Submit 3 copies of survey showing such verification.
- 1.5.1.3. Engage registered Ontario Land Surveyor to lay out building, to determine unconfirmed dimensions and elevations, other construction work and to provide as-built survey identifying permanent benchmarks. Establish on site grades, lines, levels, dimensions, and location of existing roads, sidewalks, buried utilities and other similar features on site. Carefully preserve benchmarks, reference points and other reference marks.
- 1.5.1.4. Lay out work in accordance with lines, levels and dimensions indicated and/or provided on benchmarks established by survey.
- 1.5.1.5. Verify lines, levels and dimensions. Thicknesses shown on Drawings are nominal only. Ascertain actual sizes on site. Report errors or inconsistencies in Drawings and obtain direction before commencing Work. Ensure work is executed in accordance with verified dimensions and positions indicated which maintain levels and clearances to adjacent work as set out in Contract Documents.
- 1.5.1.6. Except as provided by survey, provide lines, levels and dimensions necessary to relate your work to work of other Sections.
- 1.5.1.7. Location of electrical and mechanical service lines, curbs, light standards, trees and contours shown or specified but not dimensioned are considered approximate.
- 1.5.1.8. Confer with Consultant to determine actual location of items not dimensioned as may be required to suit job conditions.
- 1.5.1.9. Relocate as directed within +/-1500 mm (5' - 0") horizontally. Do such relocation without increasing Construction Cost.
- 1.5.1.10. Owner will accept no claims for extra expenses incurred by Trade Contractor for not complying with requirements of this Section.

**1.5.2. Installation:**

- 1.5.2.1. Except where specified otherwise, use each Product in accordance with manufacturer's published or written instructions, Specifications or recommendations regarding handling, storage, preparation, site conditions, ancillary Products or accessories, methods of installation, protection and cleaning. Submit copy of such instructions and indicate if and where there is discrepancy between them and requirements of Specifications and obtain direction.
- 1.5.2.2. Whenever specific reference to following manufacturer's directions or instructions is made in Specifications, submit copies as requested thereof for review before commencing such work.
- 1.5.2.3. Do Work in accordance with industry practice for type of work unless Contract Documents stipulate more precise requirements. Do not let unskilled, incompetent workers perform work.
- 1.5.2.4. Do Work in neat and careful manner to retain Work plumb, square and straight.
- 1.5.2.5. Ensure Work is properly related to form close joints and appropriately aligned junctions, edges and surfaces and is free of warp, twist, wind, wave or other irregularities.
- 1.5.2.6. When required by Specifications or by manufacturer's recommendations, have manufacturer, supplier or accredited agent, inspect work which incorporates their Products.
- 1.5.2.7. Do not permit materials to come in contact with other materials whether in presence of moisture or otherwise if conditions will result in corrosion, stain or discolouration or deterioration of completed Work. Provide compatible, durable separators where such contact is unavoidable.

- 1.5.2.8. Load no part of structure during construction with load greater than it is calculated to bear safely when completed. Make every temporary support as strong as permanent support. Place no load on concrete structure until it has sufficient strength to safely carry such load.
- 1.5.2.9. Conceal pipes, ducts, conduits, tubing, wiring and other items requiring concealment in floor, wall and ceiling construction of finished areas except where indicated or specified otherwise. If in doubt as to method of concealment, or intention of Contract Documents in this connection, request clarification from Consultant before proceeding with work in question.
- 1.5.2.10. Install and arrange fixtures, equipment, ducts, piping and conduit to conserve as much headroom and space as possible and avoid interference and obstruction of access. Observe good installation practice for safety, access, maintenance and follow manufacturer's recommendations. Location of fixtures, access panels, outlets and mechanical and electrical components indicated are approximate. Make changes requested to comply with these requirements at no additional cost to Owner.
- 1.5.2.11. If requested by Consultant, and before their installation, relocate equipment, services, doors, openings, furring and other work at no additional cost to Owner; provided such relocation involves only reasonable minor adjustments and reasonable advance notice is given in writing. Ensure identification of electrical and mechanical system installations and other automated systems or equipment shall be provided in accordance with Contract Documents.
- 1.5.3. Lay out mechanical and electrical work in advance of concrete placement and furring installation to allow for its proper concealment.
- 1.5.4. Test and inspect work before applying pipe covering and before Work is concealed.

**1.6. CLEANING****1.6.1. Progress Cleaning:**

- 1.6.1.1. Keep access areas to Work in tidy condition, free from accumulation of waste products and debris during construction and on completion, other than caused by Owner's crew or other contractors. Do not dispose of volatile fluid wastes (such as mineral spirits, oil or paint thinner) in storm or sanitary sewer systems or into streams or waterways.
- 1.6.1.2. Keep site and building, including concealed spaces, free from accumulation of dirt, debris, garbage and excess material. Remove oily rags and waste from premises at close of each Day work is performed, or more often if required.
- 1.6.1.3. Remove waste material and debris from site at end of each Working Day. Remove from finished surfaces deposits which could stain, harden, set or become difficult to remove.
- 1.6.1.4. Remove rubbish and surplus materials promptly and dispose of in a legal manner. Do not allow scrap piles to accumulate. Do not permit fires.
- 1.6.1.5. Lower waste materials in a controlled manner with minimum handling; do not drop or throw materials from heights. Schedule cleaning operations so dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces. Sprinkle dusty debris with water.
- 1.6.1.6. Sweep adjacent roads and sidewalks daily to remove dirt and clods of earth deposited on adjacent public and private properties by construction traffic.
- 1.6.1.7. Vacuum-clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.
- 1.6.2. **Final Cleaning:**
  - 1.6.2.1. Prior to occupancy, clean the Place of the Work thoroughly, free of rubbish and surplus material. Dispose of rubbish and debris. Vacate the Place of the Work in a clean and tidy condition satisfactory to Consultant.
  - 1.6.2.2. Dismantle and remove work of Section 01 50 00 from the Place of the Work.



- 1.6.2.3. Prior to cleaning, submit to Consultant a complete list of manufacturers' cleaning/ maintenance instructions for all components of the Work.
- 1.6.2.4. Final finishing is in addition to and compatible with cleaning and finishing specified in trade Sections.
- 1.6.2.5. Clean new and existing components in accordance with manufacturers' recommendations including, but not limited to:
  - 1.6.2.5.1. floors:
    - 1.6.2.5.1.1. Sweep floor free of debris; clean corners and base boards free of marks and dirt. Scrub new flooring using appropriate solutions to remove factory installed protective coatings.
    - 1.6.2.5.1.2. Vacuum carpet flooring using power brush equipped vacuum cleaner. Remove stains using approved stain removal methodology. Where carpet is exposed to extensive dry wall dust and other fine dust particles, carpet shall be pile lifted using rotary pile lifting machine. In addition, carpet shall be cleaned using extraction method approved by manufacturer.
  - 1.6.2.5.2. completely dust and remove marks on walls. Where necessary wash wall if painting is not an option.
  - 1.6.2.5.3. ceilings.
  - 1.6.2.5.4. doors, windows and frames.
  - 1.6.2.5.5. exposed interior and exterior glazed surfaces.
  - 1.6.2.5.6. hardware.
  - 1.6.2.5.7. mechanical and electrical fixtures and equipment.
  - 1.6.2.5.8. stainless steel, anodized aluminum, brass, bronze and other metals.
  - 1.6.2.5.9. the Place of the Work outside building envelope: remove debris, rake sod, sweep sidewalks and pavement.
- 1.6.2.6. Use experienced cleaners or professional cleaners for final cleaning. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- 1.6.2.7. Final cleaning includes, without limitations, requirements specified herein, removal of surplus materials, tools, construction machinery and equipment from site. Carry out final cleaning in accordance with manufacturer's instructions for each material. Clean Work in accordance with applicable Sections and/or manufacturer's directions.
- 1.6.2.8. Remove stains, spots, marks, dust, smudges caused by Work within work areas of this Contract. Remove from decorative work, electrical and mechanical fixtures, furniture fitments, walls, ceiling and floors.
- 1.6.2.9. Clean and polish interior and exterior glass, windows, entrances, skylights, mirrors, hardware, wall tile, stainless steel, chrome, porcelain, baked enamel, plastic laminate, mechanical, plumbing fixtures and electrical fixtures.
- 1.6.2.10. Vacuum clean and dust building interiors, behind grilles, louvres and screens. Vacuum clean ducts, fans, blowers and coils if units were operated without filters during construction.
- 1.6.2.11. Broom clean and wash interior as well as exterior walks, paved surfaces, concrete floors, steps and other similar surfaces.
- 1.6.2.12. Replace broken, damaged, disfigured or scratched glass and mirrors, which are part of Work.
- 1.6.2.13. Make Good any damage caused outside work area. Include doing necessary cleaning required due to Work.
- 1.6.2.14. Use appropriate apparatus and cleaning materials.
- 1.6.2.15. Close rooms and areas finished by cleaners, painters and decorators to all but authorized persons.

- 1.6.2.16. Upon completion of final cleaning, remove cleaning equipment, excess materials and debris from building and site.

**1.7. STARTING AND ADJUSTING****1.7.1. Trial Usage and Instructions - Mechanical:**

- 1.7.1.1. Thoroughly instruct Owner's authorized representative(s) in safe operation of systems and equipment after installation and prior to Substantial Performance of the Work. Coordinate with Consultant and arrange schedule for instruction times. Ensure operating, maintenance and documents have been submitted to Consultant prior to demonstration. Submit a commissioning schedule to Consultant 1 week prior to commissioning of each system.

- 1.7.1.2. Arrange and pay for services of qualified service engineers and manufacturers' representatives to instruct Consultant on specialized portions of installation, such as refrigeration machines, boilers, automatic controls and water treatment.

- 1.7.1.3. Submit a complete record of instructions as part of maintenance instructions and data book given to Consultant. For each instructional period, supply following data:

- 1.7.1.3.1. date.

- 1.7.1.3.2. system or equipment involved.

- 1.7.1.3.3. names of persons giving instructions.

- 1.7.1.3.4. names of persons being instructed.

- 1.7.1.3.5. other persons present.

- 1.7.1.3.6. carry out instructional period during a continuous period of 30 Days unless otherwise agreed with Consultant.

- 1.7.1.4. Permit Consultant trial usage of systems or parts of systems for purpose of testing and learning operational procedures. Trial usage shall not affect warranties nor be construed as reviewed with no objections recorded and no claim for damage shall be made against Consultant for any injury or breakage to any part or parts of above due to aforementioned tests, where such injuries or breakage are caused by a weakness or inadequacy of parts, or by defective materials or quality of performance of any kind.

- 1.7.1.5. Obtain and submit to Consultant, signature of Owner's representatives stating they understand system and equipment installation, operation and maintenance requirements.

- 1.7.1.6. Obtain and submit to Consultant, letters from manufacturers of equipment and systems indicating their technical representatives have inspected and tested systems and have approved methods of installation, connections and operation.

- 1.7.1.7. Only exception to foregoing requirements for acceptance of equipment and systems, will be 'fine tuning' which may be performed after Substantial Performance of Work and prior to Completion of Contract.

- 1.7.1.8. In conjunction with foregoing requirements, arrange necessary inspections and obtain written approval and acceptance of equipment and systems requiring approval by authorities and correction of unacceptable items to satisfaction of authorities.

**1.7.2. Trial Usage and Instructions - Electrical:**

- 1.7.2.1. Provide services of manufacturers' specialized representatives to instruct Owner's representatives in operation of systems and equipment after installation and prior to Substantial Performance of Work. Coordinate with Consultant and arrange schedule for instruction times. Ensure operating, maintenance and documents have been submitted to Consultant prior to demonstration. Submit a commissioning schedule to Consultant, 1 week prior to commissioning of each system.

- 1.7.2.2. Permit Owner's representatives, in order to familiarize themselves with equipment, to operate systems for a reasonable period of time as arranged.
- 1.7.2.3. Trial usage of equipment by Owner's representatives shall not affect warranties, nor be construed as reviewed with no objections recorded of equipment or system and no claim for damage shall be made against Owner for injury or breakage to any part or parts of above due to aforementioned tests, where such injuries or breakage are caused by a weakness or inadequacy of parts, or by defective materials or quality of performance of any kind.
- 1.7.2.4. Review information provided in maintenance instructions and data book with Consultant to ensure Owner's representatives have a complete understanding of electrical equipment and systems and their operation.

**1.8. PROTECTING INSTALLED CONSTRUCTION**

- 1.8.1. Protection of Work During Construction:
  - 1.8.1.1. Provide continuous protection to public, Work, Owner's property and adjacent property during construction. Protect work of other trades from damage while performing subsequent work.
  - 1.8.1.2. Protect finished flooring from damage. Make special efforts and take measures when moving heavy loads or equipment over them. Keep floors free of oils, grime, grease or other materials likely to discolour them or affect bond of applied surfaces.
  - 1.8.1.3. Protect, relocate and maintain existing, active services wherever they are encountered. Wherever inactive services are encountered, cap them off and remove unwanted portion, with approval of authorities having jurisdiction or public utility concerned in manner approved by them.
  - 1.8.1.4. Adequately protect floors and roofs from damage. Take special measures when moving heavy loads or equipment on them.
  - 1.8.1.5. Keep floors free of oils, grease or other materials likely to discolour them or affect bond of applied surfaces including fumes generated by temporary heating devices. Take care not to spill or allow oil, grease, gasoline, diesel and fuel oil, chemicals and other substances to contaminate soil or water on or adjacent to site. Should such contamination accidentally occur report it immediately and clean up to satisfaction of Consultant.
  - 1.8.1.6. Protect work of other Sections from damage resulting from your work.
  - 1.8.1.7. Make Good damaged work wherever possible by Section whose work is damaged but at expense of those causing damage.
  - 1.8.1.8. Protect glass and other finishes against heat, slag and weld splatter using suitable protective shields or covers.
  - 1.8.1.9. Provide and maintain in working order, suitable Underwriters' labelled fire extinguishers and locate in suitable positions, to approval of authorities having jurisdiction.
  - 1.8.1.10. Provide minimum of 3 safety helmets for Consultant and any other authorized visitors to site if required.
  - 1.8.1.11. Protect public and those employed on Work from injury. Equipment (mobile) when not in use shall have keys removed and locked up in secure location.
- 1.8.2. Correction after Completion: In conformance with General Conditions of the Contract, Make Good any defects and deficiencies due to faulty materials or quality of performance that become apparent in Work within 12 months from date of Certificate of Substantial Performance or for such longer period as specified for certain Products in Contract Documents. Conform to requirements of General Conditions of the Contract and provide Warranty for 12 month period and for extended period where applicable, in writing in an approved form reviewed by Consultant, signed by authorized official of Construction Manager.

**1.9. CLOSEOUT PROCEDURES**

- 1.9.1. Final Site Review: Consultant will perform final review in accordance with provisions under final Certificate for Payment. Conform to Construction Act for commencement, procedure and release of hold back fund. Lien Period commencement, procedure and release of hold back monies will be in accordance with Construction Act.
- 1.9.2. Takeover Procedure:
- 1.9.2.1. Conform to requirements of following General Conditions of Contract for take-over procedure:
- 1.9.2.1.1. Comply also with recommended takeover procedures contained in OAA/OGCA Document No. 100-2018, except as modified by Contract Documents. In case of conflict with Contract Documents conform to more stringent requirements. Procedure described in document consists of following stages:
- |              |         |   |
|--------------|---------|---|
| 1.9.2.1.1.1. | Stage 1 | Contract Submissions  |
| 1.9.2.1.1.2. | Stage 2 | Contractor's Inspection for Substantial Performance                 |
| 1.9.2.1.1.3. | Stage 3 | Contractor's Application for Certificate of Substantial Performance |
| 1.9.2.1.1.4. | Stage 4 | Certificate of Substantial Performance                              |
| 1.9.2.1.1.5. | Stage 5 | Certificate for Payment of Basic Statutory Holdback Monies          |
| 1.9.2.1.1.6. | Stage 6 | Contractor's Completion of the Contract                             |
| 1.9.2.1.1.7. | Stage 7 | Certificate for Payment of Monies for Finishing Holdback            |
| 1.9.2.1.1.8. | Stage 8 | Final Payment Certificate   |
| 1.9.2.1.1.9. | Stage 9 | Warranty-Guarantee Period(s)  |
- 1.9.2.2. All stages will be reviewed at first Coordination Site Meeting to ensure all parties understand their responsibilities.
- 1.9.3. Substantial Performance Review: Provide a written request to Consultant for Substantial Performance review of Work. Such request shall include a reconciliation of compliance with money test given in Clause 2 (1) (b) of Construction Act in addition to all documentation specified in Contract Documents.
- 1.9.4. Certification of Substantial Performance: Prepare Certificate of Substantial Performance in a form required by Construction Act. When issued attach a normal progress Certificate showing statement of account to date and sub-titled "SUBSTANTIAL PERFORMANCE". Wherever practicable, accompany it with Final Change Order, sub-titled "FINAL". Consolidate all expenditures from cash allowances.
- 1.9.5. Defect and Deficiency:
- 1.9.5.1. A defect is an item of Work required by Contract which has been installed but requires repair and/or replacement at a specific time.
- 1.9.5.2. A deficiency is an item of Work required by Contract which has not been installed or put into operating condition.
- 1.9.5.3. A warranty item is an item of Work, installed under Contract which manufacturer or installer agrees to maintain in, or restore to perfect condition for a specific period of time, after Owner's acceptance of Work as being substantially performed.
- 1.9.5.4. When, in Consultant's opinion, Work under Contract is substantially performed and prior to final review by Owner, a preliminary review shall be made at which time defects and deficiencies are listed, taking care to distinguish between preliminary and final reviews.

- 1.9.6. Deficiency Review:
  - 1.9.6.1. Provide a written request to Consultant for deficiency review of Work. Ensure such request includes a statement by Construction Manager that Work to be reviewed by Consultant for deficiencies is, to best of his knowledge, in compliance with Contract Documents, reviewed Shop Drawings, samples and previously instructed corrections by Consultant have been corrected.
  - 1.9.6.2. Provide a schedule of planned deficiency reviews having regard to foregoing.
- 1.9.7. Deficiency Lists:
  - 1.9.7.1. Neither Owner's representatives, nor Consultant will be responsible for issue of extensive lists of deficiencies. Construction Manager assumes prime responsibility for ensuring items shown on Drawings and described in Specifications are completely his. Any reviews to approve Certificates of Substantial Performance will be immediately canceled if it becomes obvious that extensive deficiencies are outstanding.
  - 1.9.7.2. Promptly correct deficiencies noted by Consultant. Do not proceed with installation of subsequent parts of Work until deficiencies have been corrected. Make every effort to ensure both defects and deficiencies are Made Good prior to final review.
  - 1.9.7.3. During review, a decision will be made as to which elements must be completed at a later date due to uncontrollable circumstances such as weather, which defects must be rectified before building can be accepted and which defects are to be treated as warranty items.
  - 1.9.7.4. Make Good deficiencies before Contract is considered complete.
  - 1.9.7.5. Construction Manager will provide Consultant an electronic punch list prior to conducting their review. Ensure punch list includes a complete list of items identified in Contract that Construction and his Trade Contractors feel still incomplete or deficient in any way. Effectively identify each room or area so Consultant can reference that room or area in punch list during their review of Work. Deficiency list is made up of items identified in punch list plus any other items found by Consultant deemed to be incomplete or deficient.
- 1.9.8. Notification of Correction of Deficiencies: Advise Consultant in writing, upon completion of rectification of deficiencies noted by Consultant. Failure to provide such notification may be cause to withhold final payment.
- 1.9.9. Documents:
  - 1.9.9.1. Within 21 Days of commencement of Work, Construction Manager shall make first submittal required by OAA/OGCA Document No. 100-2018.
  - 1.9.9.2. Submit documents in accordance with requirements of Contract Documents.
  - 1.9.9.3. Submit required documents along with request for Certificate of Substantial Performance. Consultant's review for Substantial Performance is not required until such submittal is received.
- 1.9.10. Final Review for Final Payment:
  - 1.9.10.1. Further to requirements of GC 4.2, final review of Work shall constitute review precedent to issuance of final certificate of payment.
  - 1.9.10.2. If there are any further deficiencies determined by this review, they shall be listed by Consultant and provided to Construction Manager. This list is recognized as final deficiency list for purposes of acceptance of Work under Contract.
  - 1.9.10.3. Such deficiencies shall be corrected by a date mutually agreed upon between Consultant and Construction Manager, unless a specific date is required by Contract and a re-review by Consultant shall be called for by Construction Manager following his own review to take place within 7 Days from date of request.
  - 1.9.10.4. Construction Manager shall thereafter submit his invoice for final payment.

**1.9.11. End of Warranty Period Review:**

1.9.11.1. At beginning of 12th month after Substantial Performance of Contract, Owner, Construction Manager and Consultant, along with key Trade Contractors as designated by Consultant, carry out a complete review of building and its systems to determine which deficiencies are to be rectified under warranty.

1.9.11.2. Prior to completion of warranty period, arrange with Consultant to carry out complete review of defects and deficiencies which have been observed during warranty period to determine which are to be corrected.

**1.10. CLOSEOUT SUBMITTALS****1.10.1. Certificate of Substantial Performance:**

1.10.1.1. Conform to Construction Act and publish copy of Certificate of Substantial Performance once in a construction trade newspaper.

1.10.1.2. Submit promptly copies of construction trade newspaper containing publication of copy of Certificate of Substantial Performance.

**1.10.2. As-Built Drawings:**

1.10.2.1. Prior to applying for Certification of Substantial Performance, Consultant will provide Construction Manager an electronic set of requested Drawings for As-Built purposes.

1.10.2.2. Electronic copies of Drawings may be obtained from Consultant at an agreed cost plus Value Added Taxes, per Drawing.

1.10.2.3. Add "AS-BUILT" at each Drawing title block and on title page of Specifications.

1.10.2.4. Construction Manager is responsible for:

1.10.2.4.1. maintaining As-Built drawings during progress of work, in complete sets, at the Place of the Work.

1.10.2.4.2. including additional changes over and above those included in any Addenda, Request for Interpretations, Supplement Instructions, Change Directives and Change Orders.

1.10.2.4.3. including accurate locations, depths, sizes and types of underground utilities and concealed services in the As-Built Drawings.

1.10.2.4.4. having changes recorded in a manner consistent with original Drawings' software.

1.10.2.4.5. ensuring outline clouds and notations are removed from Drawings.

1.10.2.4.6. having 1 set As-Built Drawing prints submitted to Consultant for review before final submission.

1.10.2.4.7. incorporating any review comments made by Consultant.

1.10.2.4.8. resubmitting final reviewed set in following format:

1.10.2.4.8.1. 1 electronic set in CAD and PDF formats.

1.10.2.4.8.2. 1 set of white prints.

1.10.2.5. Refer to Mechanical and Electrical for supplementary requirements.

1.10.3. Operation and Maintenance Instructions and Data Book: Provide Consultant with 3 sets of operating and maintenance instructions and data books, 10 Days prior to advising Consultant that Work is substantially performed which include:

1.10.3.1. Complete listing of Trade Contractors' names, addresses and telephone numbers with notation as to which portions of Contract have been provided by them.

1.10.3.2. Complete listing of materials, Products and equipment including serial numbers, manufacturer's names and sources of supply.

1.10.3.3. Description of each system, with description of each major component of systems.

- 1.10.3.4. Operation and installation instructions for each assembly, component and system.
- 1.10.3.5. Complete cleaning and maintenance instructions for each finish, assembly, component and system, including warnings of harmful practices.
- 1.10.3.6. Lists of spare parts for each assembly, component and system complete with names, addresses and telephone numbers of Suppliers.
- 1.10.3.7. Operating curves of mechanical and electrical equipment.
- 1.10.3.8. A lubrication schedule of all equipment.
- 1.10.3.9. Page-size Valve Tag Schedule and Flow Diagrams.
- 1.10.3.10. Water treatment procedures and tests.
- 1.10.3.11. Final balancing reports for mechanical systems.
- 1.10.3.12. Installation manual or installation instructions for each mechanical, electrical or architectural item, stamped and signed by Trade Contractors submitting them.
- 1.10.3.13. Record drawings of mechanical, electrical and special installations.
- 1.10.3.14. Final reviewed Shop Drawings.
- 1.10.3.15. Copies of all warranties, properly executed.
- 1.10.3.16. Provide books consisting of 3-ring hard cover loose-leaf binders, indexed as to contents and identified on binding edges as "OPERATION AND MAINTENANCE INSTRUCTIONS AND DATA BOOK, FOR (PROJECT NAME)". Ensure binders contain name of Construction Manager and date of Substantial Performance of the Work.
- 1.10.3.17. Organize and label contents into applicable categories of work, parallel to Specification Sections and provide a Table of Contents.
- 1.10.3.18. Use consistent terminology.
- 1.10.3.19. Submit maintenance and operation instructions which are manufacturer's latest published editions at date of submission.
- 1.10.3.20. Should any finish, Product or assembly be injured or damaged by faulty maintenance materials, practices not warned against in maintenance manual or by failure to provide proper maintenance manuals in time, rectify such damage or injury at no additional cost to Owner.
- 1.10.4. Distribution System Diagrams: Prior to date of Substantial Performance, submit framed single line diagrams of electrical distribution systems.

**1.11. DEMONSTRATIONS FOR OWNER'S PERSONNEL**

- 1.11.1. Provide qualified technicians to demonstrate operation and/or maintenance of systems to Owner's staff.

**1.12. MISCELLANEOUS CLOSEOUT SUBMITTALS**

- 1.12.1. Submit following to Owner:
  - 1.12.1.1. keys.
  - 1.12.1.2. hydro certificate.
  - 1.12.1.3. one valve directory, framed behind glass and installed in main Mechanical Room.
  - 1.12.1.4. electrical panel directories, inside panels.
  - 1.12.1.5. elevator as-built circuit drawings, parts list, and date book.
  - 1.12.1.6. one electrical riser diagram, framed behind glass and mounted.
  - 1.12.1.7. final certified survey by OLS.

**1.13. WARRANTIES - GENERAL**

- 1.13.1. Warranties commence at date of possession as defined by Taron Warranty Corporation.
- 1.13.2. Submit warranties for applicable items, signed by the company responsible for provision of each warranty.
- 1.13.3. Owner shall be named in manufacturer's product warranties. Submit on relevant Product manufacturer's standard warranty or guarantee form.
- 1.13.4. Following list of warranties are required from Subcontractors responsible for the work relevant to listed warranty unless otherwise specified. Refer also to Taron requirements pertaining to the following list:
  - 1.13.4.1. Free from defects in work and materials: 1-year.
  - 1.13.4.2. Fit to live in: 1-year.
  - 1.13.4.3. Constructed in accordance with the Ontario Building Code: 1-year.
  - 1.13.4.4. Water penetration through basement or foundation walls, including parking garage: 2-years.
  - 1.13.4.5. Defects in materials and work including caulking and doors, such that the building envelope of the home prevents water penetration: 2-years.
  - 1.13.4.6. Defects in materials and work for windows: 5-years.
  - 1.13.4.7. Defects in materials and work in the electrical, plumbing and heating delivery and distribution systems: 2-years.
  - 1.13.4.8. Defects in materials and work which result in the detachment, displacement or physical deterioration of exterior cladding: 2-years.
  - 1.13.4.9. Violations of the Ontario Building Code's health and safety provisions: 2-years.
  - 1.13.4.10. Major Structural Defect (MSD) Coverage: 7-years.

**1.14. PRODUCT WARRANTIES**

- 1.14.1. Examine Sections of the Specifications to ensure inclusion of Warranties specified.
- 1.14.2. In addition to requirements of the General Conditions, Construction Manager shall note extended warranty periods required by Contract Documents for certain Products, systems and assemblies as specified under their respective Sections.
- 1.14.3. Typical clause: Similar clause applies to trades listed herein as applicable:

**"WARRANTY:** Warrant Work of aluminum windows against defects and deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to failure of system to remain completely weather tight, leaking in excess of specified tolerances and limits, deformation of members, failure of insulated glass units, glass breakage, condensation in excess of specified tolerances and limits, mechanical failure and discolouration of finishes."
- 1.14.4. Spare Parts:
  - 1.14.4.1. Supply extra maintenance materials and/or spare parts stated in completed "Maintenance Material Forms" (Section 00 65 37, Maintenance Material Form (Specimen)) and store in a locked room as directed by Owner.
  - 1.14.4.2. Suitably package maintenance materials in accordance with manufacturer's instructions and label to identify Product type, manufacturer, Product name, colour number, dye lot and quantity.



- 1.14.4.3. Store maintenance materials, e.g., positioning, proper side up, etc., in accordance with manufacturer's recommendations.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide demolition and salvage including but not limited to following:
  - 1.2.1.1. demolition of existing structures to accommodate new building.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. OBC: Ontario Building Code.
  - 1.3.1.2. OPSS: Ontario Provincial Standards Specifications.
- 1.3.2. Definitions:
  - 1.3.2.1. Hand Demolition: Systematic demolition of structures by workers using hand-held tools.
  - 1.3.2.2. Mechanical Demolition: Systematic demolition of structures using powered equipment.
  - 1.3.2.3. Systematic Demolition: Methodical dismantling of structure piece by piece, usually carried out in reverse order of construction.
- 1.3.3. Reference Standards:
  - 1.3.3.1. OPSS 1010-13 - Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material

**1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Pre-Demolition Meeting:
  - 1.4.1.1. Prior to start of work, arrange for site meeting of all parties associated with work of this Section. Presided over by Consultant, meeting shall include Construction Manager, demolition Trade Contractor, testing company's representative and structural engineer.
  - 1.4.1.2. Review Specification for work included under this Section and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, inspection of construction to be demolished, methods to be used, sequence and quality control, Project staffing, restrictions due to environmental protection requirements and other matters affecting demolition, to permit compliance with intent of this Section. Review structural load limitations of existing structures. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays. Review and finalize protection requirements.

**1.5. SUBMITTALS**

- 1.5.1. Plan of Action:
  - 1.5.1.1. Submit in accordance with Section 01 30 00.
  - 1.5.1.2. Submit "Plan of Action" immediately after award of Contract for review by Consultant.
  - 1.5.1.3. Coordinate demolition times, security requirements and access with Owner.

**1.6. QUALITY ASSURANCE**

1.6.1. Qualifications:

1.6.1.1. De-Installers: Employ for this work, a demolition company having 5 years Canadian experience in this type of work satisfactory to Consultant. If requested, submit proof of experience.

**1.7. SITE CONDITIONS**

1.7.1. Ambient Conditions:

1.7.1.1. Maintain Access Road to Buildings: Do not disturb existing temporary fencing. Maintain construction traffic reasonable distance away from fence line. Repair damage which is result of Work of this Contract.

1.7.1.2. Do not close or obstruct roads, streets, sidewalks, passageways without permits. Do not place or store materials in streets or passageways. Conduct operations with minimum interference with roads, streets, driveways and passageways.

**PART 2 - PRODUCTS**

**2.1. MATERIALS**

2.1.1. Description:

2.1.1.1. Regulatory Requirements:

2.1.1.1.1. Conform to The Occupational Health and Safety Act and Regulation for Construction Projects.

2.1.1.1.2. Conform to OBC, especially Division C, Part 1, Article 1.2.2.3 as applicable.

2.1.1.1.3. Conform to Fire Code, Regulation under Fire Marshal Act, especially Part 8.

2.1.1.1.4. Conform to requirements of Section 01 50 00 in particular, Article on engineering requirements for Temporary Construction.

2.1.2. Granular Fill: OPSS Form # 1010.5, Granular A.

2.1.3. Provide materials necessary for temporary bracing and shoring. On completion, remove temporary materials from site.

**PART 3 - EXECUTION**

**3.1. EXAMINATION**

3.1.1. Preliminary Survey:

3.1.1.1. Before commencing demolition operations, examine site and when requested, provide engineering survey to determine type of construction, condition of structure and site conditions. Assess strength and stability of damaged or deteriorated structures.

3.1.1.2. Assess potential effect of removal of any part or parts on remainder of structure before such part(s) are removed.

3.1.1.3. Assess effects of demolition on adjacent properties and consider need for underpinning, shoring and/or bracing.

3.1.1.4. Contact municipal authorities or utility companies for assistance in locating and marking services passing under, through, overhead or adjacent to structure to be demolished. Such services without limitations include:

3.1.1.4.1. electrical power lines.

3.1.1.4.2. gas mains.

3.1.1.4.3. oil pipelines.

- 3.1.1.4.4. communication cables.
- 3.1.1.4.5. water mains.
- 3.1.1.4.6. drainage piping (storm and sanitary).
- 3.1.1.5. After determining demolition methods, determine area of possible vibration. Carefully inspect beyond those adjacent areas. List potential damage areas and photograph each for record purposes before starting work.
- 3.1.2. Existing Services:
  - 3.1.2.1. Notify Municipality to cut-off, remove and cap Municipal services. Verify services are cut off and properly capped before commencing associated or effected demolition. Cap and cover catch basins outside the building during the work of this Section. Do not allow demolition debris into the drains.
  - 3.1.2.2. Provide and maintain temporary services required during demolition to satisfaction of authorities having jurisdiction, fire departments and utility companies.

### **3.2. PREPARATION**

- 3.2.1. Protection of In-Place Conditions:
  - 3.2.1.1. Post danger signs conspicuously around property. If requested, provide a watchman for patrolling site when work is not in progress to prevent public entering danger zone and to maintain barricades.
  - 3.2.1.2. Provide fire extinguishers acceptable to fire prevention authorities in locations and of type suitable to enable personnel to deal with fire occurring during progress of work.

### **3.3. APPLICATION**

- 3.3.1. Restrictions:
  - 3.3.1.1. Restrict demolition activities between hours of 7:30 a.m. and 5:00 p.m., Monday through Friday.
  - 3.3.1.2. Following methods of demolition will not be permitted in work of this Contract:
    - 3.3.1.2.1. Use of rapid progress failure methods (explosives).
    - 3.3.1.2.2. Mechanical method of demolition whereby wrecking is accomplished by smashing walls or floors with heavy weight suspended by cable from boom or hoist or where masonry walls are collapsed using power shovel, tractor or other mechanical contrivance.
- 3.3.2. Demolition action plans may indicate only general scope of work to be demolished and removed. It is Trade Contractor's sole responsibility to determine exact extent of demolition required. Trade Contractor may not rely solely on Drawings to limit scope of selective demolition work required. Review site conditions and assess exact scope of demolition and removal.
- 3.3.3. Examine and review existing conditions prior to starting demolition. Initially perform demolition only in selected and designated test areas prior to proceeding full scale demolition work. Review technique for demolition in test areas from Consultant. Only after review has occurred, proceed in other areas.
- 3.3.4. Do not stack materials and debris in building to extent that overloading of any part of structure will occur.
- 3.3.5. At end of each Day's work leave work in safe condition ensuring no parts of structure are in danger of collapsing.
- 3.3.6. Demolition:
  - 3.3.6.1. Demolish structure and remove materials from site. Use hand tools or pneumatic or hydraulic equipment. Adhere to manufacturer's recommendations in use of handheld tools while conforming to the Occupational Health and Safety Act requirements. Lower demolition materials and debris through chutes. Do not create falling materials hazard.

- 3.3.6.2. Remove mechanical and electrical items indicated to be removed.
- 3.3.6.3. Demolition shall proceed safely in systematic manner from roof to grade, as specified herein, and as necessary to accommodate remedial work indicated. Ensure work on each floor level is complete before commencing work on supporting structure and safety of its supports are impaired. Parts of building which would otherwise collapse prematurely shall be securely shored. Walls and piers shall not be undermined.
- 3.3.6.4. Neatly cut openings and holes plumb, square and true to dimensions required. Use cutting methods least likely to damage remaining or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
- 3.3.6.5. Separate attached structures by hand demolition prior to general demolition. Separation may be carried out floor by floor in advance of demolition at each level. Demolish masonry and concrete walls in small sections. Remove and lower structural members and other heavy objects with safe and suitable equipment.
- 3.3.6.6. Break up and completely remove basement floors at new building location. Completely remove basement walls within new building location. Footings for purpose of demolition, are considered part of walls.
- 3.3.6.7. Clear basements and underfloor crawl spaces of plumbing and heating apparatus, piping, fixtures and fittings, electrical equipment and wiring and wood work. Remove floors over basement construction. Remove concrete slabs or wood floor construction at grade level.
- 3.3.6.8. Fill basements or other open spaces more than 450 mm (18") below finished grade with specified granular fill, or other permitted material. For final 450 mm (18") of fill, place gravel or permitted earth and compact in accordance with requirements of Section 31 23 00.
- 3.3.6.9. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with materials in accordance with requirements of Section 31 23 00.
- 3.3.6.10. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.
- 3.3.6.11. Keep work wetted down to minimize dust.
- 3.3.6.12. Minimize noise. Avoid use of noisy machinery outside working hours.
- 3.3.6.13. Provide enclosed chutes for disposal of debris from heights more than 1 storey.
- 3.3.6.14. Provide protection around floor and/or roof openings.
- 3.3.6.15. Upon completion of demolition work, level and clear site or prevent access to excavations by means of fences or hoardings.
- 3.3.6.16. Maintain safety of site by shoring against collapse below-grade-structures and excavations resulting from demolition. Where required, provide structural supports for adjacent structures.
- 3.3.7. Building Services:
  - 3.3.7.1. Arrange with Owner to disconnect existing building services. Cut-off and cap existing building services under Owner's supervision. Provide caps to abandoned services.
  - 3.3.7.2. Prevent demolition debris from entering building drains.
- 3.3.8. Except as indicated on Drawings or designated on site by Consultant, materials forming permanent part of structure being demolished shall become property of this Section. Remove from site.
- 3.3.9. In event of unexpected discovery of buried fuel or other tanks, do no further work and immediately report discovery, orally and in writing to Consultant. Consultant will authorize remedial work, if any, in writing. Do such remedial work, as addition to Contract.

- 3.3.10. Remove electrical equipment scheduled for removal on Drawings and as required by Work.
- 3.3.11. Remove sewer and water lines to extent indicated on Drawing and cap to prevent leakage.

**3.4. SITE QUALITY CONTROL**

- 3.4.1. Site Tests and Inspections:
  - 3.4.1.1. Structural Inspection: Ensure a licensed engineer specified herein inspects work of this Section during erection/installation and submits sealed and signed Field Review Report within 5 Days of site visit.

**3.5. CLEANING**

- 3.5.1. Waste Management:
  - 3.5.1.1. Clear away dirt, rubbish and loose litter resulting from work of this Section, minimum daily. Keep dust to a minimum. When necessary and practical demolition works shall be sprayed periodically with water to reduce dust. Wet down debris from time to time to control dust. Maintain roadways, lanes and street sidewalks in the vicinity of the premises safe and clear.
  - 3.5.1.2. Selling or burning of materials on site is not permitted.
  - 3.5.1.3. Conform to requirements of authorities having jurisdiction regarding disposal of waste materials.
  - 3.5.1.4. Materials prohibited from municipality waste management facilities shall be removed from site and dispose of at recycling companies specializing in recyclable materials.
  - 3.5.1.5. Excavated material including contaminated excavated material shall be removed from site and dispose of to requirements of authorities having jurisdiction without any additional cost to Owner.
  - 3.5.1.6. Any additional materials prohibited from waste management facilities shall be removed from site and dispose of to requirements of authorities having jurisdiction without any additional cost to Owner.

**3.6. PROTECTION**

- 3.6.1. Do not interfere with use and activities of occupants where applicable and adjacent buildings. Maintain free and safe passage to and from buildings. Maintain integrity of existing fire exits.
- 3.6.2. Protect existing adjacent work against damages which might occur from falling debris or other causes due to work of this Section.
- 3.6.3. Provide, erect and maintain required hoarding, sidewalk sheds if applicable, catch platforms, lights and other protection around site before commencing work. Maintain such areas free of snow, ice, mud, water and debris. Lighting levels shall be equal to that prior to erection.
- 3.6.4. Provide flagmen where necessary or appropriate to provide effective and safe access to site to vehicular traffic and protection to pedestrian traffic.
- 3.6.5. Ensure scaffolds, ladders, equipment and other such equipment are not accessible to public. Protect with adequate fencing or remove and dismantle at end of each Day or when no longer required.
- 3.6.6. Where demolition operations prevent normal access to adjacent properties, provide and maintain suitable alternative access.
- 3.6.7. If at any time safety of adjacent buildings appear to be endangered, cease operations and notify Consultant; take precautions to support buildings; do not resume operations until permission is granted by Consultant.
- 3.6.8. If Consultant considers additional bracing and shoring necessary to safeguard and prevent such movement or settlement, install bracing or shoring upon Consultant's orders. Failure to comply promptly with such request, additional bracing or shoring may be placed by Consultant at Trade Contractor's expense.

- 3.6.9. Take precautions to guard against movement, settlement or collapse of adjacent services, sidewalks, driveways, or trees. Be liable for such movement, settlement or collapse caused by failure to take necessary precautions. Repair promptly such damage when ordered.

**END OF SECTION**

PART 1 – GENERAL

1.1 GENERAL CONDITIONS

.1 N/A

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
- .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA-O86S1, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
  - .3 CSA O121 Douglas Fir Plywood.
  - .4 CSA O151, Canadian Softwood Plywood.
  - .5 CSA O153 Poplar Plywood.
  - .6 CAN/CSA-O325.0, Construction Sheathing.
  - .7 CSA O437 Series Standards for OSB and Waferboard.
  - .8 CSA S269.1 Falsework for Construction Purposes.
  - .9 CAN/CSA-S269.3 Concrete Formwork, National Standard of Canada

- .2 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 SUBMITTALS

- .1 Submittals in accordance with Specifications
- .2 Submit shop drawings for formwork and falsework.
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
- .3 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings, Comply with CAN/CSA-S269.3 for formwork drawings.
- .4 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.
- .5 Indicate sequence of erection and removal of formwork/falsework as directed by Engineer



**1.2 DELIVERY, STORAGE AND HANDLING**

- .1 Store and manage hazardous materials in accordance with Specifications
- .2 Waste Management and Disposal:
  - .1 Place materials defined as hazardous or toxic in designated containers.
  - .2 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Municipality.

**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, CAN/CSA-O86, CSA O437 Series & CSA-O153.
  - .2 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.
  - .3 Rigid insulation board: to CAN/ULC-S701.
- .2 Pan forms: to be removable.
- .3 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 25 mm diameter in concrete surface.
  - .2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.
- .4 Form liner:
- .5 Form release agent: non-toxic, biodegradable, & low VOC.
- .6 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, free of kerosene, with viscosity between 70 and 110s Saybolt Universal at 40 degrees C, flashpoint minimum 150 degrees C, open cup.
- .7 Falsework materials: to CSA-S269.1.

**Part 3 Execution**

**3.1 FABRICATION AND ERECTION**

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Obtain Engineer 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.  
Refer to architectural drawings for concrete members requiring architectural exposed finishes.
- .5 Do not place shores and mud sills on frozen ground.
- .6 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .7 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 CSA-A23.1/A23.2.
- .8 Align form joints and make watertight.
- .1
  - Keep form joints to minimum.
- .9 Use 25mm chamfer strips on external corners and/or 25mm fillets at interior corners, joints, unless specified otherwise.
- .10 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .11 Construct forms for architectural concrete, and place ties as directed.
  - .1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
- .12 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
  - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .13 Line forms for following surfaces:
  - .1 Ensure lining is new and not reused material.
  - .2 Ensure lining is dry and free of oil when concrete is poured.
  - .3 Application of form release agents on formwork surface is prohibited where drainage lining is used.
  - .4 If concrete surfaces require cleaning after form removal, use only pressurized water stream so as not to alter concrete's smooth finish.
- .14 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

**END OF SECTION**

Part 1 General

**1.1 RELATED SECTIONS**

- .1 N/A.

**1.2 MEASUREMENT PROCEDURES**

- .1 Measure reinforcing steel in kilograms of steel incorporated into Work, computed from theoretical unit mass specified in CAN/CSA-G30.18 for lengths and sizes of bars as indicated or authorized in writing by Engineer.

- .2 No measurement will be made under this Section.

- .1 Include reinforcement costs in items of concrete work in Section 03 30 00 - Cast-In-Place Concrete

**1.3 REFERENCES**

- .1 American Concrete Institute (ACI)

- .1 SP-66, ACI Detailing Manual 2004.

- .1 ACI 315, Details and Detailing of Concrete Reinforcement.

- .2 ACI 315, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.

- .2 American Society for Testing and Materials International (ASTM)

- .1 ASTM A143/A143M, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

- .2 ASTM A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

- .3 ASTM A497/A497M, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.

- .4 ASTM A775/A775M, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

- .3 Canadian Standards Association (CSA International)

- .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

- .2 CSA-A23.3, Design of Concrete Structures.

- .3 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement, A National Standard of Canada.

- .4 CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

- .5 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles, A National Standard of Canada.

- .6 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

- .7 Reinforcing Steel Institute of Canada (RSIC)

RSIC, Reinforcing Steel Manual of Standard Practice.

**1.4 SUBMITTALS**

- .1 Submittals in accordance with Specifications.
  - .1 Mill Test Report: provide Engineer with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.
  - .2 Upon request submit in writing to Engineer proposed source of reinforcement material to be supplied.

**1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Store and manage hazardous materials in accordance with Specifications.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Substitute different size bars only if permitted in writing by Engineer.
- .2 Reinforcing steel: billet steel, grade 350, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
- .3 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-G30.18.
- .4 Cold-drawn annealed steel wire ties: to ASTM A497/A497M.
- .5 Deformed steel wire for concrete reinforcement: to ASTM A497/A497M.
- .6 Welded steel wire fabric: to ASTM A185/A185M.
- .7 Welded deformed steel wire fabric: to ASTM A497/A497M.
- .8 Epoxy Coating of non-prestressed reinforcement: to ASTM A775/A775M.
- .9 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .10 Mechanical splices: subject to approval of Engineer.
- .11 Plain round bars: to CSA-G40.20/G40.21.

**2.2 FABRICATION**

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 & Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain Engineers approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Engineer weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
  - .1 Ship epoxy coated bars in accordance with ASTM A775A/A775M.

Part 3            Execution

**3.1                FIELD BENDING**

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

**3.2                PLACING REINFORCEMENT**

- .1            Place reinforcing steel as indicated on placing drawings \in accordance with CSA-A23.1/A23.2.
- .2            Use plain round bars as slip dowels in concrete.
  - .1            Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.
  - .2            When paint is dry, apply thick even film of mineral lubricating grease.
- .3            Prior to placing concrete, obtain Engineers approval of reinforcing material and placement.
- .4            Ensure cover to reinforcement is maintained during concrete pour.
- .5            Protect epoxy coated portions of bars with covering during transportation and handling.

**3.3                FIELD TOUCH-UP**

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

END OF SECTION

Part 1            General

**1.1**            RELATED SECTIONS

.1            N/A

**1.2**            MEASUREMENT PROCEDURES

.1            Cast-in-place concrete in superstructure will not be measured but will be paid for as a fixed price item.

.2            Supply and installation of anchor bolts, nuts and washers and bolt grouting will not be measured but considered incidental to work.

.3            Measure supply and installation of waterstops in lineal metres installed.

**1.3**            REFERENCES

.1            American Society for Testing and Materials International (ASTM)

.1            ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.

.2            ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3            ASTM C330, Standard Specification for Lightweight Aggregates for Structural Concrete.

.4            ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.

.5            ASTM C1017/C1017M, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.6            ASTM D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

.7            ASTM D624, Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

.8            ASTM D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.9            ASTM D1752, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2            Canadian General Standards Board (CGSB)

.1            CAN/CGSB-37.2, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.

.2            CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3            Canadian Standards Association (CSA International)

.1            CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2            CSA A283, Qualification Code for Concrete Testing Laboratories.

- 
- .3 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
  - .1 CSA-A300, Cementitious Materials for Use in Concrete.

#### **1.4 ACRONYMS AND TYPES**

- .1 Cement: hydraulic cement or blended hydraulic cement (XXb -where b denotes blended).
  - .1 Type GU or GUb - General use cement.
  - .2 Type MS or MSb - Moderate sulphate-resistant cement.
  - .3 Type MH or MHb - Moderate heat of hydration cement.
  - .4 Type HE or Heb - High early-strength cement.
  - .5 Type LH or LHb - Low heat of hydration cement.
  - .6 Type HS or HSb - High sulphate-resistant cement.
- .2 Fly ash:
  - .1 Type F - with CaO content less than 8%.
  - .2 Type CI - with CaO content ranging from 8 to 20%.
  - .3 Type CH - with CaO greater than 20%.
- .3 GGBFS - Ground, granulated blast-furnace slag.

#### **1.5 DESIGN REQUIREMENTS**

- .1 Performance: in accordance with CSA-A23.1/A23.2 and as described in MIXES of PART 2 - PRODUCTS.

#### **1.6 SUBMITTALS**

- .1 Submittals in accordance with Specifications.
- .2 Submit testing & inspection results for review by Engineer and do not proceed without written approval when deviations from mix design or parameters are found.
- .3 Concrete pours: submit accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.
- .4 Concrete hauling time: submit for review by Engineer deviations exceeding maximum allowable time of 120 min for concrete to be delivered to site of Work and discharged after batching.

#### **1.7 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Specifications.
- .2 Schedule – Provide Critical Path Method (CPM Construction Progress Schedules - Bar
- .3 Submit to Engineer, minimum 4 weeks prior to starting concrete work, valid and

---

recognized certificate from plant delivering concrete.

.1 When plant does not hold valid certification, provide test data and certification by qualified independent inspection and testing laboratory that materials used in concrete mixture will meet specified requirements.

.4 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures for review by Engineer on following items:

- .1 Falsework erection.
- .2 Hot weather concrete.
- .3 Cold weather concrete.
- .4 Curing.
- .5 Finishes.
- .6 Formwork removal.
- .7 Joints.

.5 Contractor to arrange and pay for preparation, retrieval and 28 day compression test of cylinders, min 3 per pour for all suspended concrete, tests to include slump, provide results to project engineer.

## **1.8 DELIVERY, STORAGE AND HANDLING**

.1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.

- .1 Modifications to maximum time limit must be agreed to Engineer and concrete producer as described in CSA A23.1/A23.2.
- .2 Deviations to be submitted for review by Engineer.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

.3 Waste Management and Disposal:

- .1 Provide an appropriate area on the job site where concrete trucks can be safely washed.
- .2 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by the Municipality.
- .3 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
- .4 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal. Dispose of waste in accordance with applicable local & Provincial regulations.



Part 2 Products

**2.1 MATERIALS**

- .1 Cement: to CAN/CSA-A3001
- .2 Water: to CSA-A23.1
- .3 Aggregates: to CAN/CSA-A23.1/A23.2.
- .4 Admixtures:
  - .1 Air entraining admixture: to ASTM C260.
  - .2 Chemical admixture: to ASTM C494 or ASTM C1017 Engineer to approve accelerating or set retarding admixtures during cold and hot weather placing.
  - .3 Compressive strength: as noted on drawings
- .5 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 25 MPa at 28 days.
- .6 Curing compound: to CSA-A23.1/A23.2.
- .7 Dampproof membrane:
  - .1 Kraft/polyethylene membrane:
    - .1 Plain: .10 mm thick polyethylene film bonded to asphalt treated creped kraft.
    - .2 Reinforced: two .10mm thick polyethylene films bonded each side of asphalt treated creped kraft paper, reinforced with 13 x 13 mm fibreglass scrim.
    - .3 Membrane adhesive: as recommended by membrane manufacturer.
- .8 Dampproofing:
  - .1 Emulsified asphalt, mineral colloid type, unfilled: to CAN/CGSB-37.2.
- .9 Polyethylene film: to CAN/CGSB-51.34.

**2.2 MIXES**

- .1 Alternative 2 - Prescriptive Method for specifying concrete: owner's concrete mix in accordance with CAN/CSA-A23.1.
  - .1 Ensure materials to be used in concrete mix have been submitted for testing.
  - .2 Co-ordinate construction methods to suit Engineer concrete mix proportions and parameters.
  - .3 Identify and report immediately to Engineer when concrete mix design and parameters pose anticipated problems or deficiencies related to construction.
  - .4 Provide quality management plan to ensure verification of concrete quality to specified performance.

Part 3 Execution

**3.1 PREPARATION**

- .1 Obtain Engineer approval before placing concrete.
- .1 Provide 24 hours notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 During concreting operations:
  - .1 Development of cold joints not allowed.
  - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .4 Pumping of concrete is permitted only after approval of equipment and mix.
- .5 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .6 Prior to placing of concrete obtain Engineer approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .7 Protect previous Work from staining.
- .8 Clean and remove stains prior to application for concrete finishes.
- .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .10 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
  - .1 Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
- .11 Do not place load upon new concrete until authorized by Engineer.

**3.2 CONSTRUCTION**

- .1 Do cast-in-place concrete work in accordance with CSA-A23.1/A23.2.
- .2 Sleeves and inserts:
  - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by Engineer.
  - .2 Where approved by Engineer, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
  - .3 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Engineer.
  - .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Engineer before placing of concrete.
  - .5 Check locations and sizes of sleeves and openings shown on drawings.

- 
- .6 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 With approval of Engineer, grout anchor bolts in preformed holes or holes drilled after concrete has set. Formed holes to be minimum 100mm diameter. Drilled holes to be minimum 25mm larger in diameter than bolts used.
    - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
    - .4 Set bolts and fill holes with epoxy grout.
    - .5 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. If wood forms are used, remove them after concrete has set.
    - .2 Install weep hole tubes and drains.
    - .3 Install continuous vertical anchor slot to forms where masonry abuts concrete wall or columns.
  - .5 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.
  - .6 Finishing and curing:
    - .1 Finish concrete in accordance with CSA-A23.1/A23.2.
    - .2 Use procedures noted in CSA-A23.1/A23.2 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.
    - .4 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.
  - .7 Waterstops:
    - .1 Install waterstops to provide continuous water seal.
    - .2 Do not distort or pierce waterstop in way as to hamper performance.
    - .3 Do not displace reinforcement when installing waterstops.
    - .4 Use equipment to manufacturer's requirements to field splice waterstops.
    - .5 Tie waterstops rigidly in place.
    - .6 Use only straight heat sealed butt joints in field.
    - .7 Use factory welded corners and intersections unless otherwise approved by Engineer.
  - .8 Joint fillers:
    - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Engineer.
    - .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
-

- 
- .3 Locate and form construction joints as indicated.
  - .4 Install joint filler.
  - .5 Use 12mm thick joint filler to separate slabs-on-grade from vertical surfaces and  
extend joint filler from bottom of slab to within 12mm of finished slab surface unless indicated otherwise.
  - .9 Dampproof membrane:
    - .1 Install dampproof membrane under concrete slabs-on-grade inside building.
    - .2 Lap dampproof membrane minimum 150 mm at joints and seal.
    - .3 Seal punctures in dampproof membrane before placing concrete.
    - .4 Use patching material at least 150mm larger than puncture and seal.
  - 3.3 SURFACE TOLERANCE
    - .1 Concrete tolerance in accordance with CSA-A23.1/A23.2
  - 3.4 FIELD QUALITY CONTROL
    - .1 Site tests: conduct following test and submit report as described in PART 1 - SUBMITTALS.
      - .1 Concrete pours.
      - .2 Slump tests.
    - .2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Contractor, as approved by Engineer, for review in accordance with CSA-A23.1/A23.2
    - .3 Ensure testing laboratory is certified in accordance with CSA A283.
    - .4 Ensure test results are distributed for discussion within 48 hours of receipt.
    - .5 Contractor will pay for costs of tests
    - .6 Engineer may take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
    - .7 Non-Destructive Methods for Testing Concrete: in accordance with CSA-A23.1/A23.2.
    - .8 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

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 , Surface Sealer for Floors.
  - .2            Canadian Standards Association (CSA)
    - .1            CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
- 1.3            PERFORMANCE REQUIREMENTS
  - .1            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 Specifications.
  - .2            Include application instructions for concrete floor treatment.
- 1.5            WASTE MANAGEMENT AND DISPOSAL
  - .1            Place materials defined as hazardous or toxic waste in designated containers.
  - .2            Ensure emptied containers are sealed and stored safely for disposal away for children.
  - .3            Dispose of surplus chemical and finishing materials in accordance with federal, provincial and municipal regulations.
  - .4            Dispose of waste from stripping of floors in a manner that will not have unfavourable effects on the environment.
- 1.6            ENVIRONMENTAL REQUIREMENTS
  - .1            Temporary lighting:
    - .1            Minimum 1200 W light source, placed 2.5 m above floor surface, for each 40sq m of floor being treated.
  - .2            Electrical power:
    - .1            Provide sufficient electrical power to operate equipment normally used during construction.
  - .3            Work area:
    - .1            Make the work area water tight protected against rain and detrimental weather conditions.

- .4 Temperature:
  - .1 Maintain ambient temperature of not less than 10 °C from days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.
- .5 Moisture:
  - .1 Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer.
- .6 Safety:
  - .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.
- .7 Ventilation:
  - .1 Contractor to arrange for ventilation system to be operated during application of concrete floor treatment materials. Ventilate area of work as required to prevent moisture damage by use of approved portable supply and exhaust fans.
  - .2 Provide continuous ventilation during and after coating application.
- 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 1 - solvent-based or Type 2 solvent-based.
    - .2 Surface sealer: acrylic carnuba wax
  - 2.3 CURING COMPOUNDS
    - .1 Select low VOC, water-based curing compounds.
  - 2.4 MIXES
    - .1 Mixing, ratios and application in accordance with manufacturers instructions.
- Part 3 Execution
  - 3.1 EXAMINATION

- .1 Verify that slab & substrate surfaces are ready to receive work and elevations are as instructed by manufacturer.
- 3.2 PREPARATION OF EXISTING SLAB**
  - .1 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radiused edges.
  - .2 Saw cut control joints to CSA-A23.1, 24 hours maximum after placing of concrete.
  - .3 Use mechanical stripping to remove chlorinated rubber or existing surface coatings.
  - .4 Use protective clothing, eye protection & respiratory equipment during stripping of chlorinated rubber or existing surface coatings.
- 3.3 APPLICATION**
  - .1 After floor treatment is dry, seal control joints and joints at junction with vertical surfaces with sealant.
  - .2 Apply floor treatment in accordance with Sealer manufacturer's written instructions.
  - .3 Clean overspray. Clean sealant from adjacent surfaces.
- 3.4 PROTECTION**
  - .1 Protect finished installation in accordance with manufacturer's instructions.

END OF SECTION

Part 1 General

**1.1 RELATED REQUIREMENTS**

.1 N/A

**1.2 REFERENCES**

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA A179, Mortar and Grout for Unit Masonry.

.3 CAN/CSA A371, Masonry Construction for Buildings.

.4 CAN/CSA-A3000, Cementitious Materials Compendium; CAN/CSA-A3002, Masonry and Mortar Cement.

.2 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)

.1 SCAQMD Rule 1168, Adhesives and Sealants Applications.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

.1 Product Data:

.1 Provide submittals in accordance with Specifications.

.2 Provide manufacturer's printed product literature, specifications and datasheets. Include product characteristics, performance criteria, and limitations.

.3 Provide Workplace Hazardous Materials Information System (WHMIS) - Material Safety Data Sheets (MSDS), Indicate VOC's mortar, grout, parging, colour additives and admixtures. Expressed as grams per litre (g/L).

.2 Samples:

.1 Samples: provide unit samples as follows:

.1 Provide two samples of mortar & coloured mortar.

.2 Provide samples prior to mixing or preparation of mortars, to Engineer of:

.1 Aggregate: course aggregate and sand.

.2 Cement.

.3 Lime.

.4 Colour pigment samples.

.3 Manufacturer's Instructions:

.1 Provide manufacturer's installation instructions.

**1.4 QUALITY ASSURANCE**

.1 Test Reports: certified test reports including sand gradation tests in accordance with CAN/CSA A179 showing compliance with specified performance characteristics and physical properties.

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



- .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.
- .4 Mock-ups:
  - .1 Construct mock-ups as follows:
    - .1 Construct mock-up sample panel of pointing
    - .2 Sample panel: 600mm x 600mm using proposed procedures, colours, texture, finish and workmanship.
- 1.5 DELIVERY, STORAGE, AND HANDLING**
  - .1 Deliver, store and handles masonry mortar and grout materials in accordance with Specifications
    - .1 Deliver prepackaged, dry-blended mortar mix to project site in labelled plastic-lined bags each bearing name and address of manufacturer, production codes or batch numbers, and colour or formula numbers.
    - .2 Maintain mortar, grout and packaged materials clean, dry, and protected against dampness, freezing, traffic and contamination by foreign materials.
- 1.6 SITE CONDITIONS**
  - .1 Ambient Conditions: maintain materials and surrounding air temperature to:
    - .1 Minimum 10 degrees C prior to, during, and 48 hours after completion of masonry work.
    - .2 Maximum 32 degrees C prior to, during, and 48 hours after completion of masonry work.
  - .2 Weather Requirements: CAN/CSA A371.
- Part 2 Products**
- 2.1 MATERIALS**
  - .1 Use same brands of materials and source of aggregate for entire project.
  - .2 Cement:
    - .1 Portland Cement: to CAN/CSA-A3000, Type GU - General use hydraulic cement.
    - .2 Masonry Cement: to CAN/CSA-A3002 and CAN/CSA A179
    - .3 Mortar Cement: to CAN/CSA-A3002 and CAN/CSA A179.
    - .4 Packaged Dry Combined Materials for mortar: to CAN/CSA A179, Type.
  - .3 Aggregate: supplied by one supplier.
    - .1 Fine Aggregate: to CAN/CSA A179
    - .2 Course Aggregate: to CAN/CSA A179
  - .4 Water: clean and potable.

- .5 Lime:
  - .1 Quick Lime: to CAN/CSA A179, Type
  - .2 Hydrated Lime: to CAN/CSA A179, Type
- .6 Bonding Agent: latex or epoxy
- .7 Polymer Latex: organic polymer latex admixture of butadiene-styrene type non-emulsifiable bonding admixture.
- 2.2 COLOUR ADDITIVES
  - .1 Use colouring admixture not exceeding 10% of cement content by mass, or integrally coloured masonry cement, to produce coloured mortar to match approved sample.  
Admixtures to be approved prior to use. Use in accordance with the specific manufacturer's recommendations.
- 2.3 ADMIXTURES
  - .1 Water Repellent Agents: powdered, liquid or polymeric.
  - .2 Air Entrainment Agents: 5/8% air entrainment for exterior concrete.
- 2.4 MORTAR MIXES
  - .1 Mortar for exterior masonry above grade:
    - .1 Loadbearing: type S.
    - .2 Non-Loadbearing: N.
  - .2 Mortar for interior masonry:
    - .1 Loadbearing: type S.
    - .2 Non-Loadbearing: N.
  - .3 Mortar for Parapet walls, chimneys, unprotected walls: type N.
  - .4 Pointing Mortar: CAN/CSA A179, Type N
  - .5 Stain Resistant Pointing Mortar: one part Portland cement, 1/8 part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Add aluminum tristearate, calcium stearate, or ammonium stearate to 2 percent of Portland cement by weight.
  - .6 Parging mortar: type N to CAN/CSA A179.
  - .7 Mortar for foundation walls, manholes, sewers, pavements, walks, patios and other exterior masonry at or below grade: type M
  - .8 Following applies regardless of mortar types and uses specified above:
    - .1 Mortar for calcium silicate brick and concrete brick: type O based on proportion specifications.
    - .2 Mortar for grouted reinforced masonry: type S.

## **2.5 MORTAR MIXING**

- .1 Use pre-blended, pre-coloured mortar prepackaged under controlled factory conditions. Ingredients batching limitations to be within 1% accuracy.
- .2 Mix mortar ingredients in accordance with CAN/CSA A179 in quantities needed for immediate use.
- .3 Maintain sand uniformly damp immediately before mixing process.
- .4 Add mortar colour and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and colouration.
- .5 Do not use anti-freeze compounds including calcium chloride or chloride based compounds.
- .6 Do not add air entraining admixture to mortar mix.
- .7 Use a batch type mixer in accordance with CAN/CSA A179.
- .8 Pointing mortar: prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than 1 hour no more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.
- .9 Re-temper mortar only within two hours of mixing, when water is lost by evaporation.
- .10 Use mortar within 2 hours after mixing at temperatures of 32 degrees C, or 2-1/2 hours at temperatures under 10 degrees C.

## **2.6 GROUT MIXES**

- .1 Bond Beams: grout mix 10 to 12.5 MPa strength at 28 days;
- .2 Lintels: grout mix 10 to 12.5 MPa strength at 28 days;
- .3 Grout: Minimum compressive strength of 12.5 MPa at 28 days. Maximum aggregate size and grout slump: CAN/CSA A179.

## **2.7 GROUT MIXING**

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

## **Part 3 Execution**

### **3.1 EXAMINATION**

- 
- .1 Request inspection of spaces to be grouted.
- 3.2 PREPARATION
- .1 Apply bonding agent to existing surfaces.
  - .2 Plug clean-out holes with brick & block masonry units. Brace masonry for wet grout pressure.
- 3.3 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.
- 3.4 CONSTRUCTION
- .1 Do masonry mortar and grout work in accordance with CAN/CSA A179 except where specified otherwise.
  - .2 Apply parging in uniform coating not less than 10mm thick.
- 3.5 MIXING
- .1 All pointing mortar can be mixed using a regular paddle mixer. Only electric motor mixers are permissible. Mixers run on hydrocarbons are not permitted, due to fumes, Mixing by hand must be pre-approved by the Engineer.
  - .2 Clean all mixing boards and mechanical mixing machine between batches.
  - .3 Mortar must be weaker than the units it is binding.
  - .4 Contractor to appoint one individual to mix mortar, for duration of project. In the event that this individual must be changed, mortar mixing must cease until the new individual is trained, and mortar mix is tested.
- 3.6 MORTAR PLACEMENT
- .1 Install mortar to manufacturer's instructions.
  - .2 Install mortar to requirements of CAN/CSA A179.
  - .3 Remove excess mortar from grout spaces.
- 3.7 GROUT PLACEMENT
- .1 Install grout in accordance with manufacturer's instructions.
  - .2 Install grout in accordance with CAN/CSA A179.

- .3 Work grout into masonry cores and cavities to eliminate voids.
- .4 Do not install grout in lifts greater than 400mm, without consolidating grout by rodding.
- .5 Do not displace reinforcement while placing grout.

**3.8 FIELD QUALITY CONTROL**

- .1 Site Tests, Inspection:
  - .1 Test and evaluate mortar during construction] in accordance with CAN/CSA A179.
  - .2 Test and evaluate grout during construction to CAN/CSA A179; test in conjunction with masonry unit sections specified.

**3.9 CLEANING**

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.
- .2 Remove droppings and splashings using clean sponge and water.
- .3 Clean masonry with low pressure clean water and soft natural bristle brush.

**3.10 PROTECTION OF COMPLETED WORK**

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

END OF SECTION

Part 1 General

**1.1 RELATED REQUIREMENTS**

- .1 N/A

**1.2 REFERENCES**

- .1 ASTM International Inc.
- .1 ASTM A36/A36M, Standard Specification for Carbon Structural Steel.
  - .2 ASTM A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
  - .3 ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - .4 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  - .5 ASTM A580/A580M, Standard Specification for Stainless Steel Wire.
  - .6 ASTM A641/A641M, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
  - .7 ASTM-A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- .2 Canadian Standards Association (CSA International)
- .1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CAN/CSA A179, Mortar and Grout for Unit Masonry.
  - .3 CAN/CSA A370, Connectors for Masonry.
  - .4 CAN/CSA A371, Masonry Construction for Buildings.
  - .5 CAN/CSA G30.18, Billet-Steel Bars for Concrete Reinforcement.
  - .6 CSA-S304., Design of Masonry Structures.
  - .7 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Specifications
- .2 Product Data:
- .1 Provide manufacturer's printed product literature, specifications and datasheets illustrating products to be incorporated into project for specified products.
  - .2 Provide Workplace Hazardous Materials Information System (WHMIS)-Material Safety Data Sheets (MSDS)

**1.4 QUALITY ASSURANCE**

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

- .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

## **1.5 FIELD MEASUREMENTS**

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

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Bar reinforcement: Steel to CAN/CSA A371 and CAN/CSA G30.18, Grade S350.
- .2 Connectors: to CAN/CSA A370 and CSA-S304.1.
- .3 Corrosion protection: to CSA-S304.1, galvanized to CSA-S304.1 and CAN/CSA A370.
- .4 Fasteners: installed post-construction:
  - .1 Screw Shields and Plugs: plastic, fibre or nylon, install in mortar joints or placed directly into solid masonry units
  - .2 Bolts and Screws: size and type to suit application, locate where indicated.
  - .3 Nails: case-hardened cut or spiral nails, size and type to suit fastening application.
  - .4 Powder-Driven Fasteners: pin styles and lengths to suit fastening application in accordance with manufacturers use, load and hold recommendations.
  - .5 Adhesives: epoxies, mastics and contact cements for fastening applications, use in accordance with manufacturers' recommendations.
- .5 Ties: hot dip galvanized to CAN/CSA A370 Table 5.2.
  - .1 Corrugated to CAN/CSA A370.
  - .2 Unit ties, to CAN/CSA A370: Z style, fabricated from cold-drawn steel size to suit application.
  - .3 Adjustable Unit Ties: to CAN/CSA A370: proprietary type ties, type, style and size to suit application in accordance with manufacturer's recommendations.
  - .4 Joint Reinforcement Ties: to CAN/CSA A370:
- .6 Single Wythe Joint Reinforcement: ladder type:
  - .1 Steel wire, hot dip galvanized: to ASTM A641, Class 3 after fabrication.
  - .2 Cold drawn steel wire conforming to ASTM A82
  - .3 Stainless steel conforming to ASTM A580, Type 304
- .7 Multiple Wythe Joint Reinforcement: ladder type: without moisture drip;
  - .1 Steel wire, hot dip galvanized: to ASTM A641 Class 3 after fabrication.
  - .2 Cold drawn steel wire conforming to ASTM A82

- .8 Anchors: to CAN/CSA A370:
  - .1 Conventional Anchors: type steel bolts with bent bar anchors, plate anchors or through bolts sized to suit application.
  - .2 Wedge Anchors: expansion anchors type wedge and bolt sized to suit application.
  - .3 Sleeve Anchors: type sleeve and bolt, sized to suit application.
  - .4 Anchor Bolts: conventional (unpatented) anchors anchors steel, galvanized to CAN/CSA A370 Table 5.2
- .9 Conventional Bolts:
  - .1 Bolts: to ASTM A36, bar stock shop threaded, straight bolts with square or hex-headed nuts or bent bar anchors
  - .2 Plate anchors: steel to ASTM A36, weld square of circular steel plate perpendicular to axis of steel bar threaded on opposite end.
  - .3 Through bolt rods: to ASTM A307 threaded rod or threaded ASTM A36 bar stock.
- .10 Adhesive Anchors: proprietary systems, pre-mixed, self-contained system with double glass vial system to contain epoxy, consisting of resin, hardener and aggregate

## **2.2 FABRICATION**

- .1 Fabricate reinforcing in accordance with CAN/CSA-A23.1
- .2 Fabricate connectors in accordance with CAN/CSA A370.
- .3 Obtain Engineer approval for locations of reinforcement splices other than shown on placing drawings.
- .4 Upon approval of Engineer weld reinforcement in accordance with CSA W186.
- .5 Ship reinforcement and connectors, clearly identified in accordance with drawings.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

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

### **3.2 PREPARATION**

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

### **3.3 INSTALLATION**

- .1 Supply and install masonry connectors and reinforcement in accordance with CAN/CSA A370, CAN/CSA A371, CAN/CSA-A23.1 and CSA-S304.1 unless indicated otherwise.



- .2 Prior to placing concrete, mortar or grout, obtain Engineer approval of placement of reinforcement and connectors.
- .3 Supply and install additional reinforcement to masonry as indicated.

**BONDING AND TYING**

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

**REINFORCED LINTELS AND BOND BEAMS**

- .1 Reinforce masonry beams, masonry lintels and bond beams as indicated.
- .2 Place and grout reinforcement in accordance with CSA-S304.1, CAN/CSA A371, and CAN/CSA A179.
- .3 Support and position reinforcing bars in accordance with CAN/CSA A371.

**GROUTING**

- .1 Grout masonry in accordance with CSA-S304.1, CAN/CSA A371 and CAN/CSA A179 and as indicated.

**ANCHORS**

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

**LATERAL SUPPORT AND ANCHORAGE**

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

and as  
indicated.

**3.9 MOVEMENT JOINTS**

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

**3.10 FIELD BENDING**

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

**3.11 FIELD TOUCH-UP**

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement and connectors with compatible finish to provide continuous coating.

**3.12 CLEANING**

- .1 Clean surfaces as work progresses
  - .1 Remove surplus materials, excess materials, rubbish, tools and

END OF SECTION

Part 1 General

**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 19 - Masonry Anchorage and Reinforcing
- .2 04 05 12 - Masonry Mortar and Grout

**1.2 REFERENCES**

- .1 ASTM International Inc.
  - .1 ASTM C73, Standard Specification for Calcium Silicate Brick (Sand-Lime Brick).
  - .2 ASTM C216, Standard Specification for, Facing Brick (Solid Masonry Units Made of Clay or Shale).
- .2 Brick Industry Association (BIA)

.1 Technical Note No. 20, Cleaning Brick Work.

.3 Canadian Standards Association (CSA International)

- .1 CAN/CSA A82, Fired Masonry Brick Made From Clay or Shale).
- .2 CAN/CSA-A165 Series, CSA Standards on Concrete Masonry Units.
- .3 CAN/CSA A371, Masonry Construction for Buildings.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Specifications.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature, specifications and data sheet
- .3 Manufacturer's Instructions:
  - .1 Provide manufacturer's installation instructions
- .4 Samples:
  - .1 Provide unit samples

**1.4 SITE CONDITIONS**

- .1 Ambient Conditions: assemble and erect components only when temperature is above 4 degrees C.

Part 2 Products manufactured Units

.1 Face brick:

- .1 Fired clay brick: to CAN/CSA A82.
  - .1 Type: X
  - .2 Grade: EG.
  - .3 Colour and texture: to match approved sample

- 
- .4 Solid/hollow.
  - .2 Calcium silicate brick: to ASTM C73.
    - .1 Grade: SW.
    - .2 Colour and texture: to match approved sample
  - .3 Concrete brick: to CAN/CSA-A165 Series.
    - .1 Grade: I.
    - .2 Colour and texture: to match approved sample.
  - .2 Back-up brick:
    - .1 Burned clay brick: to CAN/CSA A82.
      - .1 Type: S.
      - .2 Grade: EG
      - .3 same as face brick.
      - .4 Solid/hollow.
    - .2 Calcium silicate brick: to ASTM C73.
      - .1 Grade: MW.
      - .2 Size: same as face brick.
    - .3 Concrete brick: to CAN/CSA A165 Series.
      - .1 Grade: II.
      - .2 Size: same as face brick.
  - .3 Reinforcement:
    - .1 Reinforcement in accordance with Section 04 05 19 -Masonry Anchorage and Reinforcing
  - .4 Connectors:
    - .1 Connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing
  - .5 Mortar Mixes:
    - .1 Mortar and mortar mixes in accordance with Section 04 05 12 - Masonry Mortar and Grout
  - .6 Grout Mixes:
    - .1 Grout and grout mixes in accordance with Section 04 05 12 - Masonry Mortar and Grout
  - .7 Cleaning Compounds:
    - .1 Use low VOC products in compliance with SCAQMD Rule 1168
    - .2 Compatible with substrate and acceptable to masonry manufacturer for use on products.
    - .3 Cleaning compounds compatible with brick masonry units and in accordance with manufacturer's written recommendations and instructions.
- Part 3 Execution
- 3.1 EXAMINATION
- .1 Verify surfaces and conditions are ready to accept work of this Section.

- .2 Commencing installation means acceptance of existing substrates

### **3.2 PREPARATION**

- .1 Protect adjacent finished materials from damage due to masonry work.

### **3.3 APPLICATION**

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

### **3.4 INSTALLATION**

- .1 Construction to conform to CAN/CSA A371.
- .2 Coursing height: 200 mm for three/two bricks and three/two joints
- .3 Jointing: concave where exposed or where paint or similar thin finish coating is specified.
  - .1 Mixing and blending: mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.
  - .2 Clean unglazed clay masonry as work progresses.
  - .3 Reinforcement:
    - .1 Install reinforcing in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing
  - .4 Connectors:
    - .1 Install connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing
  - .5 Flashings:
    - .1 Install flashings
  - .6 Mortar Placement:
    - .1 Place mortar in accordance with Section 04 05 12 - Masonry Mortar and Grout
  - .7 Grout Placement:
    - .1 Place grout in accordance with Section 04 05 12 - Masonry Mortar and Grout
  - .8 Repair/Restoration:
    - .1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.
  - .9 Tolerances:
    - .1 To CAN/CSA A371

### **3.5 CLEANING**

- .1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .2 Clean unglazed clay masonry: 10 m<sup>2</sup> area of wall mock up panel as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured, protect windows, sills, doors, trim and other work, and clean brick masonry as follows.
  - .1 Remove large particles with wood paddles without damaging surface. Saturate

---

masonry with clean water and flush off loose mortar and dirt.

- .2 Scrub with solution of 25 mL trisodium phosphate and 25 mL household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.
- .3 Repeat cleaning process as often as necessary to remove mortar and other stains.
- .4 Use acid solution treatment for difficult to clean masonry as described in Technical Note No.20 by the Brick Industry Association.
- .3 Clean concrete brick masonry as work progresses.
  - .1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of brick and finally by brushing.
- .4 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

### **3.6 PROTECTION**

- .1 Brace and protect brick masonry as required

END OF SECTION

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide metal fabrications including but not limited to following:
  - 1.2.1.1. handrails and guardrails.
  - 1.2.1.2. steel ladders.
  - 1.2.1.3. doors, openings and windows.
  - 1.2.1.4. overhead door jambs and headers.
  - 1.2.1.5. overhead door track and operator anchorage.
  - 1.2.1.6. lateral support for masonry walls.
  - 1.2.1.7. floor trench and sump pit cover plates.
  - 1.2.1.8. bollards.
  - 1.2.1.9. metal gratings, grating supports and fasteners.
  - 1.2.1.10. roof coping.
  - 1.2.1.11. miscellaneous steel fabrications and/or framing required for structural support not specifically described on Structural Drawings, engineered to suit applications indicated on Drawings.
  - 1.2.1.12. other miscellaneous sections and framing required to complete the Work and/or inferable in Contract Documents but not explicitly shown on Drawings.
  - 1.2.1.13. other miscellaneous sections and framing as defined under "Appendix F" of CISC Code of Standard Practice for Structural Steel.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Installation of miscellaneous metal fabrications in concrete: Structural.
  - 1.2.2.2. Installation of metal fabrications in masonry: Section 04 20 00, Masonry Units.
  - 1.2.2.3. Provision of metal siding: Section 07 46 19, Metal Siding System.
  - 1.2.2.4. Provision of finish paint system: Section 09 91 00, Painting.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. CISC: Canadian Institute of Steel Construction; [www.cisc-icca.ca](http://www.cisc-icca.ca).
  - 1.3.1.2. DFT: Dry Film Thickness.
  - 1.3.1.3. OBC: Ontario Building Code.
  - 1.3.1.4. SSPC: The Society for Protective Coatings (formerly known as Steel Structures Painting Council); [www.sspc.org](http://www.sspc.org).

- 1.3.2. Reference Standards:
- 1.3.2.1. ASME B46.1-2019 - Surface Texture (Surface Roughness, Waviness, and Lay)
  - 1.3.2.2. ASTM A53/A53M-18 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
  - 1.3.2.3. ASTM A123/A123M-17 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - 1.3.2.4. ASTM A153/A153M-16a - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - 1.3.2.5. ASTM A240/A240M-17 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
  - 1.3.2.6. ASTM A269/A269M-15a(19) - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
  - 1.3.2.7. ASTM A276/A276M-17 - Standard Specification for Stainless Steel Bars and Shapes
  - 1.3.2.8. ASTM A307-21 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
  - 1.3.2.9. ASTM A480/A480M-20a - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
  - 1.3.2.10. ASTM A511/A511M-21 - Standard Specification for Seamless Stainless Steel Mechanical Tubing
  - 1.3.2.11. ASTM A653/A653M-22 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - 1.3.2.12. ASTM A967/A967M-17 - Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts
  - 1.3.2.13. ASTM C881/C881M-20a - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
  - 1.3.2.14. ASTM C1107/C1107M-20 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
  - 1.3.2.15. CSA G40.20-13(18) - General Requirements for Rolled or Welded Structural Quality Steel
  - 1.3.2.16. CSA G40.21-13(18) - Structural Quality Steel
  - 1.3.2.17. CSA W48-18 - Filler Metals and Allied Materials for Metal Arc Welding
  - 1.3.2.18. CSA W59-18 - Welded Steel Construction (Metal Arc Welding)
  - 1.3.2.19. CSA W117.2-19 - Safety in Welding, Cutting, and Allied Processes
  - 1.3.2.20. SSPC-SP 6/NACE No. 3 - Commercial Blast Cleaning
  - 1.3.2.21. CISC Code of Standard Practices for Structural Steel, Eight Edition

#### **1.4. SUBMITTALS**

- 1.4.1. Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Section 01 30 00. In addition to minimum requirements indicate following:
  - 1.4.1.1. large scale details of members, materials and connections.
  - 1.4.1.2. jointing details.



- 1.4.1.3. methods of setting, sealing, securing, anchorage.
- 1.4.1.4. field connections.
- 1.4.1.5. Ensure a licensed engineer specified herein is responsible for:
  - 1.4.1.5.1. production and review of Shop Drawings.
  - 1.4.1.5.2. sealing and signing each Shop Drawing and any associated calculations performed.
- 1.4.2. Samples: Submit samples of exposed metal fabrications in accordance with Section 01 30 00 representing final finish.

## **1.5. QUALITY ASSURANCE**

- 1.5.1. Qualifications:
  - 1.5.1.1. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.
  - 1.5.1.2. Welding: Provide welding in accordance with CSA W59 performed by a fabricator and mechanics fully approved by the Canadian Welding Bureau.
  - 1.5.1.3. Licensed Professionals: Employ a licensed engineer carrying minimum \$2,000,000.00 professional liability insurance and is registered in the Province of Ontario.
- 1.5.2. Certifications:
  - 1.5.2.1. Submit certification from a licensed engineer registered in Province of Ontario, who shall affix his/her seal and signature to certificate, stating structure is capable of supporting its own weight and specified live loads.
  - 1.5.2.2. Welders employed on this Project may be asked by Consultant at any time for their welding certificate.

## **1.6. DELIVERY, STORAGE AND HANDLING**

- 1.6.1. Delivery and Acceptance Requirements: Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off-the-ground, undercover storage locations. Do not load areas beyond the designed limits.
- 1.6.2. Storage and Handling Requirements:
  - 1.6.2.1. Handle and store metal materials at job site in such a manner to prevent damage to other materials, (to existing buildings) or property.
  - 1.6.2.2. Handle components with care and provide protection for surfaces against marring or other damage. Ship and store members with cardboard or other resilient spacers between surfaces. Use lifting chokers of material that will not damage surface of steel members.

## **PART 2 - PRODUCTS**

### **2.1. MATERIALS**

- 2.1.1. Performance/Design Criteria:
  - 2.1.1.1. Ramp Railing Structural Performance: Provide railings capable of withstanding effects of gravity loads and following loads and stresses within limits and under conditions indicated:
    - 2.1.1.1.1. Uniform load of 730 N/m (50 lbf/ft) applied in any direction.
    - 2.1.1.1.2. Concentrated load of 890 N (200 lbf) applied in any direction.
  - 2.1.1.2. Structural Design: Employ a licensed engineer specified herein to:
    - 2.1.1.2.1. design components for work of this Section requiring structural performance.

- 2.1.1.2.2. be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations.
- 2.1.2. Structural Shapes, Plates, Etc.: New material conforming to CSA G40.20 and CSA G40.21, Grade 300W.
- 2.1.3. Hollow Structural Sections (HSS): New material conforming to CSA G40.20 and CSA G40.21, Grade 350W, Class H.
- 2.1.4. Stainless Steel:
  - 2.1.4.1. Seamless and Welded Austenitic Stainless Steel Tubing: Type 304 in accordance with ASTM A269/A269M, Seamless - ASTM A511/A511M tube polished to a "No. 4 Finish" typically having a surface roughness average (Ra) ranging from 20 - 25 micro inches when measured in accordance with ASME B46.1.
  - 2.1.4.2. Bars and Shapes: Type 304 to ASTM A276/A276M, Square Bar, Round Bar, Angle, Channel and/or Flat Bar polished to "No. 4 Finish" typically having a surface roughness average (Ra) ranging from 20 - 25 micro inches when measured in accordance with ASME B46.1.
  - 2.1.4.3. Flat-Rolled Plate and Sheet: Type 304 in accordance with ASTM A240/A240M and ASTM A480/A480M, plate and sheet polished to "No. 4 Finish" typically having a surface roughness average (Ra) ranging from 20 - 25 micro inches when measured in accordance with ASME B46.1.
  - 2.1.4.4. Provide highest architectural quality in various forms, straight and true. Ensure there are no scratches, scars, creases, buckles, ripples or chatter marks. Provide finish surfaces suitable for polishing where required. Ensure finished surfaces exposed to view are free of pitting, seam marks, roller marks, oil-canning, stains, discolourations or other imperfections.
  - 2.1.4.5. Refer to Drawings for stainless steel work.
- 2.1.5. Welding Materials: Conforming to CSA W48 and CSA W59.
- 2.1.6. Common or Ordinary Bolts and Anchor Bolts: Unfinished bolts conforming to ASTM A307, Grade A, with hexagon heads and nuts where exposed in the finish work. Supply common bolts of lengths required to suit thickness of material being joined, but not projecting more than 6 mm (1/4") beyond nut, without the use of washers. Supply anchor bolts of lengths noted but projecting not less than 13 mm (1/2") beyond nut unless otherwise noted.
- 2.1.7. Dielectric Separator: Provide best grade, quick drying non-staining alkali resistant bituminous paint or epoxy resin solution or membrane type.
- 2.1.8. Galvanized Primer Paint: "METALHIDE® ONE PAC | 97-676" by PPG Architectural Coatings; [www.ppg.com](http://www.ppg.com), "Zinc Clad® 5 Organic Zinc-Rich Primer" by The Sherwin-Williams Company; [www.sherwin-williams.com](http://www.sherwin-williams.com) or "ZRC® Cold Galvanizing Repair Compound" by ZRC Worldwide; [www.zrcworldwide.com](http://www.zrcworldwide.com).
- 2.1.9. Steel Pipe Handrails: Conforming to ASTM A53/A53M, Type "S", Schedule 40, Grade A steel pipe of sizes shown.
- 2.1.10. Steel Pipe Bumpers: Conforming to ASTM A53/A53M, Schedule 80 steel pipe of sizes shown.
- 2.1.11. Grout: Provide 1 of following:
  - 2.1.11.1. Epoxy Resin Grout: 2-component, mineral-filled epoxy resin conforming to ASTM C881/C881M, of type, grade and class to suit requirements; "Sika AnchorFix®-3001" by Sika Canada Inc., "REZI-WELD™-3/2 Epoxy Grout-Patch Kit" by W.R. Meadows of Canada or "EUCO #452 EPOXY SYSTEM" by Euclid Chemical Canada Inc.
  - 2.1.11.2. Pre-mixed, non-shrink, non-metallic, cementitious grout, containing no chlorides, conforming to ASTM C1107/C1107M; "M-Bed Standard" by Sika Canada Inc., "CG-86 Construction Grout" by W.R. Meadows of Canada or "NS Grout" by Euclid Chemical Canada Inc.
- 2.1.12. Galvanizing: Hot dipped galvanizing with minimum zinc coating of 600 g/m<sup>2</sup>.

- 2.1.13. Galvanized Sheet Steel: Supply 0.91 mm (20 ga) core thickness commercial quality to ASTM A653/A653M, CS Type A, with Z275 (G90) zinc coating designation to ASTM A653/A653M.
- 2.1.14. Metal Gratings: Maximum 20 mm x 20 mm porosity. Provide “Wheels n’ Heels® InVent®” by Ohio Gratings, Inc. [with slip resistant finish] or “BBF-12” by Borden Gratings with “ALGRIP®” finish. Grating, frames and fasteners are Type 304 stainless steel and sandblasted to SSPC-SP 6/NACE No. 3 post fabrication and passivated in accordance with ASTM A967/A967M. Provide complete with anchors, bases and fasteners.
- 2.1.15. Handrail Wall Brackets: In accordance with OBC requirements and to meet design requirements indicated on Drawings.
- 2.1.16. Fabrication:
  - 2.1.16.1. Fabricate each item of work of this Section in accordance with following general requirements:
    - 2.1.16.1.1. members square and straight.
    - 2.1.16.1.2. members plumb and true.
    - 2.1.16.1.3. joints accurately and tightly fitted.
    - 2.1.16.1.4. intersecting members in true, flush planes.
    - 2.1.16.1.5. fasteners concealed.
    - 2.1.16.1.6. steel connections.
  - 2.1.16.2. Fabricate, fit and assemble work in shop where possible. Where shop fabrication is not possible, make trial assembly in shop.
  - 2.1.16.3. Provide hangers, rods, bars, bolts, anchors, brackets, rivets, bearing plates and bracing, fitting, drilling, stopping, soldering, as required for a complete assembly.
  - 2.1.16.4. Isolate dissimilar metals including stainless steel and galvanized steel using dielectric separator to prevent galvanic corrosion.
  - 2.1.16.5. Weld connections unless otherwise indicated.
  - 2.1.16.6. Shop Welding:
    - 2.1.16.6.1. Execute welding to avoid damage or distortion to the Work. Should there be, in the opinion of Consultant or Inspection Company, doubt as to adequacy of welds, they shall be tested for efficiency and any work not meeting Standards be removed and replaced with new work satisfactory to Consultant. Carry out welding in accordance with following standards:
      - 2.1.16.6.1.1. CSA W48 - for Electrodes (If rods are used, only coated rods are allowed).
      - 2.1.16.6.1.2. CSA W59 - for design of connections and workmanship.
      - 2.1.16.6.1.3. CSA W117.2 - for safety.
    - 2.1.16.6.2. Thoroughly clean welded joints and steel exposed for a sufficient space to properly perform welding operation. Neatly finish welds. Ensure welds exposed to view and finish painted are continuous and ground smooth.
  - 2.1.16.7. Provide exposed metal fastenings and accessories of same material, texture, colour and finish as base metal to which they are applied or fastened.
- 2.1.17. Finishes:
  - 2.1.17.1. Cleaning and Shop Painting:
    - 2.1.17.1.1. Clean steel to SSPC-SP 6/NACE No. 3 and remove loose mill scale, weld flux and splatter.

- 2.1.17.1.2. Shop prime steel with 1 coat of primer paint to DFT of 0.025 mm (1 mil). Paint on dry surfaces, free from rust, scale and grease. Do not paint when temperature is lower than 7 deg C (45 deg F). Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature and humidity conditions.
- 2.1.17.1.3. Shop prime galvanized steel with galvanized primer paint.
- 2.1.17.1.4. Clean but do not paint surfaces being welded in the field and surfaces in contact after assembly.
- 2.1.17.2. Hot Dip Galvanizing:
  - 2.1.17.2.1. After fabrication, hot dip galvanize specific miscellaneous steel items noted on Drawings and/or called for herein. Plug relief vents air tight. After galvanizing, remove plugs, ream holes to proper size and re-tap threads. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with "METALHIDE® ONE PAC | 97-676" by PPG Architectural Coatings; [www.ppg.com](http://www.ppg.com), "Zinc Clad® 5 Organic Zinc-Rich Primer" by The Sherwin-Williams Company; [www.sherwin-williams.com](http://www.sherwin-williams.com) or "ZRC® Cold Galvanizing Repair Compound" by ZRC Worldwide; [www.zrcworldwide.com](http://www.zrcworldwide.com) in accordance with manufacturer's printed directions.
  - 2.1.17.2.2. Galvanize members exposed to elements when in final location; members embedded on exterior side of exterior walls; members imbedded in concrete; members specified in this Section or noted on Drawings.
  - 2.1.17.2.3. Hot-dip galvanize members in accordance with requirements of following ASTM standards with minimum coating weights or thicknesses as specified:
    - 2.1.17.2.3.1. Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123/A123M; average weight of zinc coating g/m<sup>2</sup> (oz/sq ft) of actual surface, for 4.8 mm (3/16") and less thickness members 460 g/m<sup>2</sup> (1.5 oz/sq ft), for 6 mm (1/4") and heavier members 705 g/m<sup>2</sup> (2.3 oz/sq ft).
    - 2.1.17.2.3.2. Iron and Steel Hardware: ASTM A153/A153M; minimum weight of zinc coating, in g/m<sup>2</sup> (oz/sq ft) of surface shall be in accordance with Table 1 of ASTM A153/A153M, for the various classes of materials used on the Project.
    - 2.1.17.2.3.3. Steel Sheet: ASTM A653/A653M; weight of zinc coating, per sq ft on both sides of sheet. Coating designation Z275 (G90), minimized spangle and chemically treated.
- 2.1.17.3. Colour: To be selected by Consultant.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. INSTALLATION**

- 3.2.1. Erect work of this Section plumb, square, true and level.
- 3.2.2. Securely anchor work of this Section and rivet, weld or bolt to structural framing of the building. Where secured to concrete, provide bolts for setting in concrete. Provide expansion bolt supports to masonry.
- 3.2.3. Provide necessary fitting, setting and cutting required in connection with the fitting of work of this Section to other parts of the Work.

- 3.2.4. Field Painting: Paint bolt heads, washers, nuts, field welds and previously unpainted items. Touch up with matching paint, shop primer damaged during transit and installation.

**3.3. SITE QUALITY CONTROL**

- 3.3.1. Site Tests and Inspections:

- 3.3.1.1. Structural Inspection: Ensure a licensed engineer specified herein inspects work of this Section during erection/installation and submits sealed and signed Field Review Report within 5 Days of site visit.

- 3.3.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.4. CLEANING**

- 3.4.1. On completion of installation, carefully clean metal work.

**END OF SECTION**

## Part 1 General

## 1.1 RELATED SECTIONS

- .1 N/A

## 1.2 REFERENCES

- .1 American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM)
  - .1 ANSI/NAAMM MBG531, Metal Bar Grating Manual.
  - .2 American Society for Testing and Materials International, (ASTM)
    - .1 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
    - .2 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
    - .3 ASTM A325M, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
  - .3 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-1.40, Anti-corrosive Structural Steel Alkyd Primer.
    - .2 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.
    - .3 CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel.
    - .4 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .4 Canadian Standards Association (CSA International)
    - .1 CSA W59, Welded Steel Construction (Metal Arc Welding/Imperial Version).
  - .5 National Association of Architectural Metal Manufacturers (NAAMM)
    - .1 AMP 510, Metal Stair Manual.
  - .6 Steel Structures Painting Council (SSPC), Systems and Specifications Manual, Volume 2.

## 1.3 SYSTEM DESCRIPTION

- .1 Design Requirements:
- .2 Design metal stair, balustrade and landing construction and connections to NBC vertical and horizontal live load requirements.
- .3 Detail and fabricate stairs to NAAMM Metal Stairs Manual.

## 1.4 SUBMITTALS

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and data sheet
  - .2 Submit WHMIS MSDS - Material Safety Data Sheets. Indicate VOC's:
    - .1 For finishes, coatings, primers and paints.

- .2 Shop Drawings
  - .1 Submit shop drawings to Engineer.
  - .2 Indicate construction details, sizes of steel sections and thickness of steel sheet.
  - .3 Submit shop drawing bearing stamp of a qualified professional engineer registered in Province of Ontario.
- 1.5 QUALITY ASSURANCE
  - .1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
  - .2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
  - .3 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.
- Part 2 Products
- 2.1 MATERIALS
  - .1 Steel sections: to CAN/CSA-G40.20/G40.21 Grade 300 W
  - .2 Steel plate: to CAN/CSA-G40.20/G40.21, Grade 260 W
  - .3 Floor plate: to CAN/CSA-G40.20/G40.21, Grade 260 W
  - .4 Steel pipe: to ASTM A53/A53M, standard weight, schedule 40 seamless black.
  - .5 Steel tubing: to CAN/CSA-G40.20/G40.21, Grade 350, wall thickness, sizes and dimensions as indicated.
  - .6 Welding materials: to CSA W59
  - .7 Bolts: to ASTM A307.
  - .8 High strength bolts: to ASTM A325M.
- 2.2 FABRICATION
  - .1 Fabricate to NAAMM, Metal Stair Manual.
  - .2 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.
    - .3 Accurately form connections with exposed faces flush; mitres and joints tight. Make risers of equal height.
    - .4 Grind or file exposed welds and steel sections smooth.

- .5 Shop fabricate stairs in sections as large and complete as practicable.

### **2.3 STEEL PAN STAIRS**

- .1 Fabricate stairs with closed riser steel pan construction.
- .2 Form treads and risers from 3mm thick steel plate. Secure treads and risers to L 35 x 35 x 5 horizontal and vertical welded to stringers.
- .3 Form wall stringers from MC 310 x 15.8
- .4 Form outer stringers from MC 310 x 15.8 with 5mm thick plate fascia welded on.
- .5 Form landings from 3mm thick steel plate, reinforced by L 55 x 55 x 6 mm spaced at 400 mm on centre.
- .6 Provide clip angles for fastening of furring channels, where applied finish is indicated for underside of stairs and landings.
- .7 Extend stringers around mid landings to form steel base.
- .8 Close ends of stringers where exposed.

### **2.4 PLATE/GRATING STAIRS**

- .1 Form treads from 6mm thick steel plate to profile indicated, and secure to stringers with L 35 x 35 x 5 supports. Form landings from 6 mm thick steel plate, reinforced by L 55 x 55 x 6 spaced at 600mm on centre.
- .2 Form steel grating treads and landings from metal bar grating to profile indicated and secure to stringers and supports as indicated. Form landings of steel grating and reinforce as required.
- .3 Form stringers from MC 310 x 15.8

### **2.5 PIPE/TUBING BALUSTRADES**

- .1 Construct balusters and handrails from steel pipe or steel tubing
- .2 Cap and weld exposed ends of balusters and handrails.
- .3 Terminate at abutting wall with end flange.

### **2.6 BAR BALUSTRADES**

- .1 Construct bar balustrades as follows:
  - .1 Balusters: 25 x 25mm bar.
  - .2 Top rail: 30 x 10mm bar.
  - .3 Bottom rail: 25 x 10mm bar.
  - .4 Pickets: 12 x 12mm bar at 100mm on centre.



- .2 Fabricate supports for wood balustrade from 38 x 38mm steel tubing with capped and welded.
- .3 Weld balustrades to stringers as indicated.
- 2.7 FINISHES
  - .1 Galvanizing: hot dipped galvanizing with zinc coating 600g/m<sup>2</sup> to CAN/C
  - .2 Shop coat primer: to CAN/CGSB-1.40.
  - .3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.
- 2.8 SHOP PAINTING
  - .1 Clean surfaces in accordance with Steel Structures Painting Council Manual 2.
  - .2 Apply one coat of shop primer except interior surfaces of pans.
  - .3 Apply two coats of primer of different colours to parts inaccessible after assembly.
  - .4 Use primer as prepared by manufacturer without thinning or adding additional Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 degrees C.
  - .5 Do not paint surfaces to be field welded.
- Part 3 Execution
  - 3.1 INSTALLATION OF STAIRS
    - .1 Install in accordance with NAAMM, Metal Stair Manual.
    - .2 Install plumb and true in exact locations, using welded connections whenever possible to provide rigid structure. Provide anchor bolts, bolts and plates connecting stairs to structure.
    - .3 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
    - .4 Do welding work in accordance with CSA W59 unless specified otherwise.
    - .5 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.
  - 3.2 INSTALLATION OF PLASTIC HANDRAIL
    - .1 Apply plastic handrails in accordance with manufacturer's printed instructions and recommended tools.

- .2 Make joints and mitres neat, tight and inconspicuous. Remove surplus material from joint. Provide solid return at exposed ends of handrail.

### **3.3 CLEANING**

- .1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .2 Clean and wax plastic handrails immediately prior to building hand over and final inspection
- .3 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide glazed decorative metal railings including but not limited to following:
  - 1.2.1.1. exterior tempered safety structural glass balustrades with custom aluminum handrails and guardrail cap.
  - 1.2.1.2. aluminum shoe caps.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of structural steel support structure: Structural.
  - 1.2.2.2. Provision of glazing types: Section 08 06 80, Glazing Schedule.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. GANA: Glass Association of North America; [www.glass.org](http://www.glass.org).
  - 1.3.1.2. NAAMM: National Association of Architectural Metal Manufacturers; [www.naamm.org](http://www.naamm.org).
  - 1.3.1.3. OBC: Ontario Building Code.
- 1.3.2. Reference Standards:
  - 1.3.2.1. AAMA CW-12-84 - Structural Properties of Glass
  - 1.3.2.2. ASTM B209/B209M-21a - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
  - 1.3.2.3. ASTM B221M-21 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
  - 1.3.2.4. ASTM C1048-19 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
  - 1.3.2.5. ASTM C1107/C1107M-20 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
  - 1.3.2.6. ASTM E488/E488M-18 - Standard Test Methods for Strength of Anchors in Concrete Elements
  - 1.3.2.7. ASTM E894-18 - Standard Test Method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings
  - 1.3.2.8. ASTM E935-21 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings
  - 1.3.2.9. ASTM E2353-21 - Standard Test Methods for Performance of Glazing in Permanent Railing Systems, Guards, and Balustrades

- |           |                    |  |
|-----------|--------------------|--|
| 1.3.2.10. | ASTM E2358-17      | - Standard Specification for the Performance of Glass in Permanent Glass Railing Systems, Guards, and Balustrades          |
| 1.3.2.11. | BS EN 14179-1:2005 | - Glass in building – Heat soaked thermally toughened soda lime silicate safety glass – Part 1: Definition and description |
| 1.3.2.12. | CAN/CGSB-12.1-17   | - Safety glazing   |
| 1.3.2.13. | CSA G40.20-013(18) | - General Requirements for Rolled or Welded Structural Quality Steel   |
| 1.3.2.14. | CSA G40.21-13(18)  | - Structural Quality Steel   |
| 1.3.2.15. | CSA W48-18         | - Filler Metals and Allied Materials for Metal Arc Welding   |
| 1.3.2.16. | CSA W59-18         | - Welded Steel Construction (Metal Arc Welding)  |
| 1.3.2.17. | GANAL 01-0300      | - Glass Information Bulletin – Proper Procedures for Cleaning Architectural Glass Products                                 |

#### **1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Preinstallation Meetings: Arrange preinstallation meeting 1 week prior to commencing work with all parties associated with trade as designated in Contract Documents or as requested by Consultant. Presided over by Construction Manager, include Consultant who may attend, Trade Contractor performing work of this trade, Owner's representative, testing company's representative and consultants of applicable discipline. Review Contract Documents for work included under this trade and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of work of this Section.
- 1.4.2. Scheduling:
- 1.4.2.1. Coordinate installation of anchorages for railings. Supply setting drawings, templates and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts and items with integral anchors, to be embedded in concrete or masonry. Deliver such items to site in time for installation.
- 1.4.2.2. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

#### **1.5. SUBMITTALS**

- 1.5.1. Product Data: Submit Product data for handrails and railings, structural glass system, grout, anchoring cement and paint Products indicated.
- 1.5.2. Shop Drawings:
- 1.5.2.1. Submit Shop Drawings in accordance with Section 01 30 00. Submit large scale details of members, materials and connections, attachments, reinforcing and anchorage.
- 1.5.2.2. Submit jointing details showing methods of setting, sealing, securing, anchorage and field connections. Submit necessary templates and instructions where fastenings or anchors have to be built in by other trades.
- 1.5.2.3. Ensure a licensed engineer specified herein is responsible for:
- 1.5.2.3.1. production and review of Shop Drawings.
- 1.5.2.3.2. sealing and signing each Shop Drawing and any associated calculations performed.
- 1.5.2.4. Calculations: Submit calculations proving structural glass systems performance and compliance with specified loads, signed and sealed by a licensed engineer registered to practice in the Province of Ontario.

- 1.5.3. Samples:
  - 1.5.3.1. Submit samples in accordance with Section 01 30 00. Submit samples of materials, fittings and finishes required for the Project. Prepare samples on metal of same alloy and gauge to be used for work.
  - 1.5.3.2. Provide 300 mm x 300 mm (12" x 12") samples of glass and 300 mm (12") long samples of trim, closures, handrails, sealants and gaskets.
  - 1.5.3.3. Submit sample of spring plate and attachments complete with glass, bolt and accessories.
- 1.5.4. Quality Assurance Submittals:
  - 1.5.4.1. Provide test reports indicating products meet or exceed specified requirements.
  - 1.5.4.2. Compatibility Test Report: From sealant manufacturer, indicating sealant compatibility with interlayer and is approved for full contact with sealant.
- 1.5.5. Test Reports: Submit test reports from an independent laboratory certifying fully suspended structural glass balustrade system proposed for use has been tested. System tested must be similar in type of materials and design shown on Consultant's drawings, utilizing counter sunk bolted attachments through glass. In addition, tested specimen must be equivalent in glass type and panel configuration shown on Drawings. If existing test reports are submitted, then those tests have been carried out to loads at least equal to or greater than those called for in this specification. If test reports are not available, test system. Costs for testing will be borne by glass system manufacturer.

## **1.6. QUALITY ASSURANCE**

- 1.6.1. Qualifications:
  - 1.6.1.1. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.
  - 1.6.1.2. Welding: Provide welding in accordance with CSA W59 performed by a fabricator and mechanics fully approved by the Canadian Welding Bureau.
  - 1.6.1.3. Licensed Professionals: Employ a full time licensed engineer carrying minimum \$2,000,000.00 professional liability insurance and is registered in the Province of Ontario.
- 1.6.2. Mock-Ups:
  - 1.6.2.1. Build mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
  - 1.6.2.2. Build on-site mock-ups for each form and finish of railing consisting of 2 full panels, top cap, handrail and anchorage system components that are full height and are not less than 1500 mm (60") in length.
  - 1.6.2.3. After review with no objections recorded, mock-ups serve as a standard for material, workmanship and finishes and may become part of final installation.
- 1.6.3. Certifications: Welders employed on this Project may be asked by Consultant at any time for their welding certificate.
- 1.6.4. Preconstruction Testing Service:
  - 1.6.4.1. Engage a qualified independent testing agency to test for compliance with specified requirements for performance and test methods. Conduct tests using specimens and assemblies representative of proposed materials and construction.
  - 1.6.4.2. Fabricate and install test assemblies using personnel who will perform same tasks for Project.
  - 1.6.4.3. Select sizes and configurations of assemblies to adequately demonstrate capability and to comply with performance requirements.

- 1.6.4.4. Notify Consultant 7 Days in advance of dates and times when assemblies will be constructed.
- 1.6.4.5. When testing is complete, remove assemblies; do not reuse materials on Project.
- 1.6.5. Test glazed decorative metal railings in accordance with ASTM E2353.

**1.7. DELIVERY, STORAGE AND HANDLING**

- 1.7.1. Delivery and Acceptance Requirements: Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off-the-ground, undercover storage locations. Do not load areas beyond designed limits.
- 1.7.2. Storage and Handling Requirements:
  - 1.7.2.1. Handle and store metal materials at site in a manner to prevent damage to other materials, to existing buildings or property where applicable.
  - 1.7.2.2. Handle components with care and provide protection for surfaces against marring or other damage. Ship and store members with cardboard or other resilient spacers between surfaces. Use lifting chokers of material which will not damage surface of steel members.
  - 1.7.2.3. Store laminated glass according to fabricator's written instructions.
  - 1.7.2.4. Protect laminated glass from condensation, temperature changes and exposure to direct sun.

**1.8. WARRANTY**

- 1.8.1. Manufacturer Warranty: Warrant work of this Section for period of 5 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to; delamination, bond failure and extensive colour fading of glass laminate.

**PART 2 - PRODUCTS**

**2.1. MATERIALS**

- 2.1.1. Performance/Design Criteria:
  - 2.1.1.1. Ensure design of railings, support steel, as well as welding and fixings complies with OBC, Fire Regulations, Health and Safety Regulations and any other regulations applying to these types of installations.
  - 2.1.1.2. Design railings to withstand vertical and horizontal live load requirements in OBC, transferred through supports and anchorages to building structure.
  - 2.1.1.3. Ensure gap between outer edge of balcony and portion of guard protecting balcony is 38 mm (1-1/2") maximum.
  - 2.1.1.4. Design railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on following:
    - 2.1.1.4.1. Steel: 72% of minimum yield strength.
    - 2.1.1.4.2. Glass: 25% of mean modulus of rupture (50% probability of breakage), as listed in "Mechanical Properties" in AAMA CW-12.
  - 2.1.1.5. Structural Performance: In accordance with ASTM E2358, System Type V: One-side Support with Protective Top Rail-Glazing as Structural Member, Performance Level: Level 1 (Type L1), provide railings capable of withstanding effects of gravity loads and following loads and stresses within limits and under conditions indicated:
    - 2.1.1.5.1. Handrails:
      - 2.1.1.5.1.1. Uniform load of 730 N/m (50 lbf/ft) applied in any direction.

- 2.1.1.5.1.2. Concentrated load of 890 N (200 lbf) applied in any direction.
- 2.1.1.5.2. Top Rails of Guards:
  - 2.1.1.5.2.1. Uniform load of 730 N/m (50 lbf/ft) applied in any direction.
  - 2.1.1.5.2.2. Concentrated load of 890 N (200 lbf) applied in any direction.
  - 2.1.1.5.2.3. Uniform and concentrated loads need not be assumed to act concurrently.
- 2.1.1.5.3. Infill of Guards:
  - 2.1.1.5.3.1. Concentrated load of 1623 N (365 lbf) applied horizontally on an area of 929 cm<sup>2</sup> (1 sq ft).
  - 2.1.1.5.3.2. Uniform load of 2.87 kPa (60 lbf/sq ft) applied horizontally.
  - 2.1.1.5.3.3. Infill load and other loads need not be assumed to act concurrently.
- 2.1.1.5.4. Glass-Supported Railings: Support each section of top rail by a minimum of 3 glass panels or by other means so top rail will remain in place if any 1 panel fails.
- 2.1.1.6. Structural Design: Employ a licensed engineer specified herein to:
  - 2.1.1.6.1. design components for work of this Section requiring structural performance.
  - 2.1.1.6.2. be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations.
- 2.1.2. Metal Surfaces: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolourations or blemishes.
- 2.1.3. Brackets, Flanges, Railings, Shoe Caps and Anchors: Same metal and finish as supported rails, unless otherwise indicated. Thicknesses as indicated on Drawings.
- 2.1.4. Shoe: Aluminum shoe meeting performance criteria listed herein of profile shown on Drawings.
- 2.1.5. Steel and Iron:
  - 2.1.5.1. Structural Shapes, Plates, Etc.: New material conforming to CSA G40.20 and CSA G40.21, Grade 300W.
  - 2.1.5.2. Hollow Structural Sections (HSS): New material conforming to CSA G40.20 and CSA G40.21, Grade 350W, Class H.
- 2.1.6. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required:
  - 2.1.6.1. Extruded Bars and Shapes: ASTM B221M, alloy 6063-T6.
  - 2.1.6.2. Drawn Seamless Tubes: Alloy 6063-T832.
  - 2.1.6.3. Plate and Sheet: ASTM B209/B209M, alloy 6061-T6.
- 2.1.7. Dielectric Separator: Provide best grade, quick drying non-staining alkali resistant bituminous paint or epoxy resin solution or membrane type for Consultant's review.
- 2.1.8. Glass:
  - 2.1.8.1. Free from bubbles, waves, discolouration and other defects. Ensure glass (particularly heat-strengthened, tempered and laminated) bears manufacturer's labels on bottom inner right hand corner indicating quality.
  - 2.1.8.2. Ensure glass meets following roller wave distortion criteria:
    - 2.1.8.2.1. maximum peak to valley measurement of 0.1 mm (0.003") for every 300 mm (12") in any direction.
    - 2.1.8.2.2. roller distortion and/or ripples runs in same direction for entire Project.

- 2.1.8.2.3. unless precluded by manufacturing process, orient roller-wave in the horizontal direction. Ensure glass is heat-treated through the horizontal tempering process.
- 2.1.8.2.4. Limit deviation from flatness over any 300 mm (12") span (vertical displacement from peak to valley) within 267 mm (10-1/2") of leading and trailing edges to 0.2 mm (0.006").
- 2.1.8.3. Tempered Glass (TGL):
  - 2.1.8.3.1. Clear transparent tempered glass conforming to ASTM C1048, Kind FT and meeting requirements of CAN/CGSB-12.1. Ensure surface compression is equal to or greater than 68.9 MPa (10 000 psi). Ensure tempered glass is heat-soaked in accordance with BS EN 14179-1.
  - 2.1.8.3.2. Ensure heat soaking records are kept in accordance with Section 01 70 00 and glass remains traceable.
  - 2.1.8.3.3. Retest heat soak batches with breakage greater than 1 in 100 units. Batches with additional breakages will be rejected and not used on this Project.
  - 2.1.8.3.4. "Statistical Heat Soak", "Partial Batch" and "On-Line" heat soaking are not permitted.
  - 2.1.8.3.5. Tempered glass at a height greater than 3 m (10') above a trafficable walkway and has 1 or more unframed edges or is point-fixed will treated as inclined glazing with requirements for secondary retention in case of breakage.
  - 2.1.8.3.6. Ensure glass does not have tong marks.
  - 2.1.8.3.7. Written warranties against nickel sulfide inclusions in lieu of heat soaking will not be permitted.
  - 2.1.8.3.8. Ensure edges are ground flat and polished unless otherwise noted.
  - 2.1.8.3.9. Ensure edgework, holes and notches in tempered glass panels are completed before tempering and comply with following requirements:
    - 2.1.8.3.9.1. Dimensional tolerance on panel size will be +/-0.8 mm (+/-1/32") of theoretical dimension required.
    - 2.1.8.3.9.2. Squareness of each panel will be within 1.6 mm (1/16").
    - 2.1.8.3.9.3. Bow allowance is 0.1%.
    - 2.1.8.3.9.4. Positional tolerances on all holes will be +/-0.8 mm (+/-1/32") from a single datum point.
  - 2.1.8.3.10. Prestress glass around holes to a level which is compatible with design and use of fittings. Check by differential surface refractometer on stress level.
- 2.1.8.4. Glass Units (GL): For single glass unit types, refer to Section 08 06 80.
- 2.1.8.5. Glazing Cement and Accessories for Structural Glazing: Provide glazing cement, setting blocks, shims and related accessories as recommended or supplied by railing manufacturer for installing structural glazing in metal subrails.
- 2.1.8.6. Glazing Gaskets for Stainless Steel Supports: Provide glazing gaskets and related accessories recommended or supplied by railing manufacturer for installing stainless steel rail supports on glass.
- 2.1.9. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- 2.1.10. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work, unless otherwise indicated.
- 2.1.11. Anchors: Provide cast-in-place or torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete, as determined by testing per ASTM E488/E488M conducted by a qualified independent testing agency.



- 2.1.12. Welding Materials: Conforming to CSA W48 and CSA W59.
- 2.1.13. Non-Shrink, Nonmetallic Grout: Factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior applications.
- 2.1.14. Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with water at site to create pourable anchoring, patching and grouting compound.
- 2.1.15. Fabrication:
  - 2.1.15.1. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish and anchorage, but not less than required to support structural loads.
  - 2.1.15.2. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
  - 2.1.15.3. Cut, drill and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 0.8 mm (1/32"), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
  - 2.1.15.4. Form work true to line and level with accurate angles and surfaces.
  - 2.1.15.5. Cut, reinforce, drill and tap as indicated to receive finish hardware, screws and similar items.
  - 2.1.15.6. Welded Connections:
    - 2.1.15.6.1. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
    - 2.1.15.6.2. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
    - 2.1.15.6.3. Obtain fusion without undercut or overlap.
    - 2.1.15.6.4. Remove flux immediately.
    - 2.1.15.6.5. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
  - 2.1.15.7. Mechanical Connections:
    - 2.1.15.7.1. Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
    - 2.1.15.7.2. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
  - 2.1.15.8. Form changes in direction as follows:
    - 2.1.15.8.1. As detailed on Drawings.
    - 2.1.15.8.2. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
    - 2.1.15.8.3. Close exposed ends of hollow railing members with prefabricated end fittings.
  - 2.1.15.9. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 6 mm (1/4") or less.
  - 2.1.15.10. Brackets, Flanges, Fittings and Anchors: Provide wall brackets, flanges, miscellaneous fittings and anchors to interconnect railing members to other work, unless otherwise indicated.

- 2.1.15.11. At brackets and fittings fastened to plaster or gypsum board partitions, provide fillers made from crush-resistant material, or other means to transfer wall loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- 2.1.15.12. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- 2.1.16. Finishes:
  - 2.1.16.1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 2.1.16.2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
  - 2.1.16.3. Isolate dissimilar metals using dielectric separator to prevent galvanic corrosion.
  - 2.1.16.4. Appearance of Finished Work: Noticeable variations in abutting, adjacent or same piece are not permitted.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions:
  - 3.1.1.1. Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
  - 3.1.1.2. Coordinate custom design and fabrication of multi-dimensional preformed silicone seals with construction of joints and adjacent elements constructed by others. Field verify dimensions and configurations prior to fabricating silicone seals. Verify requirements for joint movement.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. INSTALLATION**

- 3.2.1. Fit exposed connections together to form tight, hairline joints.
- 3.2.2. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment and elevation; measured from established lines and levels and free of rack.
- 3.2.3. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
- 3.2.4. Set posts plumb within a tolerance of 1.6 mm in 3 m (1/16" in 10').
- 3.2.5. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 3 mm in 3.66 m (1/8" in 12').
- 3.2.6. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- 3.2.7. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.
- 3.2.8. Railing Connections:
  - 3.2.8.1. Non-Welded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler coloured to match finish of railings.

- 3.2.8.2. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" whether welding is performed in the shop or in the field.
- 3.2.9. Anchoring Posts:
  - 3.2.9.1. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with non-shrink, non-metallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
  - 3.2.9.2. Form or core-drill holes not less than 125 mm (5") deep and 19 mm (3/4") larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts and fill annular space between post and concrete with non-shrink, non-metallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
  - 3.2.9.3. Cover anchorage joint with flange of same metal as post, attached to post with set screws.
  - 3.2.9.4. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
    - 3.2.9.4.1. For stainless steel railings, weld flanges to posts and bolt to metal-supporting surfaces.
    - 3.2.9.4.2. For steel railings, weld flanges to posts and bolt to metal-supporting surfaces.
- 3.2.10. Glass Panels:
  - 3.2.10.1. Glass-Supported Railings: Install assembly to comply with railing manufacturer's written instructions.
  - 3.2.10.2. Attach base channel to building structure, then insert and connect factory-fabricated and factory-assembled glass panels if glass was bonded to base and top rail channels in factory.
  - 3.2.10.3. Support glass panels in base channel at quarter points with channel-shaped setting blocks that also act as shims to maintain uniform space for glazing cement. Fill remaining space in base channel with glazing cement for uniform support of glass.
  - 3.2.10.4. Adjust spacing of glass panels so gaps between panels are equal before securing in position.
  - 3.2.10.5. Erect glass railings under direct supervision of manufacturer's authorized technical personnel.

### **3.3. SITE QUALITY CONTROL**

- 3.3.1. Site Tests and Inspections:
  - 3.3.1.1. Structural Inspection: Ensure a licensed engineer specified herein inspects work of this Section during erection/installation and submits sealed and signed Field Review Report within 5 Days of site visit.
  - 3.3.1.2. Extent and Testing Methodology: Consultant in conjunction with testing agency will randomly select completed railing assemblies for testing that are representative of different railing designs and conditions in the completed Work. Railings will be tested according to ASTM E2353, ASTM E2358, ASTM E894 and ASTM E935 for compliance with performance requirements.
  - 3.3.1.3. Remove and replace railings where test results indicate they do not comply with specified requirements unless they can be repaired in a manner satisfactory to Consultant and will comply with specified requirements.
  - 3.3.1.4. Additional testing and inspecting, at Contractor's [Construction Manager's] expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 3.3.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.4. CLEANING**

- 3.4.1. Clean and polish glass in accordance with GANA 01-0300 including removal of markings indicating presence of glass.

**3.5. PROTECTION**

- 3.5.1. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Performance.
- 3.5.2. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit or provide new units.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide rough carpentry including but not limited to following:
  - 1.2.1.1. miscellaneous interior carpentry.
  - 1.2.1.2. equipment mounting panels.
  - 1.2.1.3. roofing carpentry.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of concrete formwork: Section 03 10 00, Concrete Formwork.
  - 1.2.2.2. Removal of temporary treads and landings: Section 03 30 00, Cast-In-Place Concrete.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. CCA: Chromated Copper Arsenate.
  - 1.3.1.2. COFI: Council of Forest Industries; [www.cofi.org](http://www.cofi.org).
  - 1.3.1.3. NLGA: National Lumber Grades Authority; [www.nlga.org](http://www.nlga.org)
  - 1.3.1.4. ULC: Underwriters Laboratories of Canada; [www.canada.ul.com](http://www.canada.ul.com).
  - 1.3.1.5. UL: Underwriters Laboratories Inc.; [www.ul.com](http://www.ul.com).
- 1.3.2. Definitions:
  - 1.3.2.1. Dimension Lumber: Lumber of 50 mm (2") nominal or greater but less than 5" nominal in least dimension.
  - 1.3.2.2. Timber: Lumber of 125 mm (5") nominal or greater in least dimension.
- 1.3.3. Reference Standards:
  - 1.3.3.1. CAN/CSA-O80 Series-15(20) - Wood Preservation
  - 1.3.3.2. CSA O121-17 - Douglas Fir Plywood
  - 1.3.3.3. CAN/ULC-S102-18 - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

**1.4. QUALITY ASSURANCE**

- 1.4.1. Certifications:
  - 1.4.1.1. Grading:
    - 1.4.1.1.1. Provide lumber bearing the grading stamps of an agency certified by the Canadian Lumber Standards Administration Board for identification.

- 1.4.1.1.2. Provide roof sheathing bearing the COFI grading stamp for identification.
- 1.4.1.1.3. Provide "treated" and "fire treated" wood and plywood bearing the stamp of the Canadian Wood Preservers Bureau.

**1.5. DELIVERY, STORAGE AND HANDLING**

- 1.5.1. Storage and Handling Requirements:
  - 1.5.1.1. Store lumber in a dry place and protect from dampness and damage.
  - 1.5.1.2. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

**PART 2 - PRODUCTS**

**2.1. MATERIALS**

- 2.1.1. Softwood Lumber: Of grades conforming to NLGA's "Standard Grading Rules for Canadian Lumber", graded as follows:
  - 2.1.1.1. Light Framing: Species Group D, Standard Grade.
  - 2.1.1.2. Studding: Species Group D, Stud Grade.
  - 2.1.1.3. Structural Light Framing: Species Group D, No. 1 Grade.
  - 2.1.1.4. Appearance Lumber: Species Group B, Appearance Grade.
- 2.1.2. Hardwood Lumber: Of grades conforming to grading rules of U.S. National Hardwood Lumber Association, solid Yellow Birch, select or better.
- 2.1.3. Concealed Framing Lumber: No. 2 White Pine, No. 2 Red Pine, or No. 1 Construction Eastern Spruce, Balsam Fir or Jack Pine, kiln dried, free from sap, shakes, splits, knots and other defects.
- 2.1.4. Grounds, Nailing Strips and Blocking: No. 2 White Pine, No. 2 Red Pine, or No. 1 Construction Eastern Spruce, kiln dried, free from sap, shakes, splits, knots and other defects.
- 2.1.5. Exterior Plywood: 19 mm (3/4") thick, waterproof, grade stamped exterior grade Douglas Fir plywood, select grade, unsanded conforming to CSA O121.
- 2.1.6. Glue: Waterproof.
- 2.1.7. Field Applied Wood Preservative: For field cut ends, supply "Wolman™ Woodlife® Coppercoat™" by Rust-Oleum; [www.rustoleum.com](http://www.rustoleum.com) or same CCA preservative as used for shop impregnation.
- 2.1.8. Rough Hardware: Supply rough hardware to frame and fix rough carpentry. This includes bolts, anchors, nails, expansion shields and other fastenings required. Hot dip galvanize hardware for exterior work; elsewhere, provide cadmium plated hardware. Provide spiral thread nails except as indicated otherwise.
- 2.1.9. "Treated" Wood and Plywood (Decay and Termite Resistant):
  - 2.1.9.1. Provide vacuum/pressure impregnated lumber treated in accordance with CAN/CSA-O80 Series.
  - 2.1.9.2. Retention/Penetration Standards: Conforming to CAN/CSA-O80 Series.
  - 2.1.9.3. Provide treated wood kiln dried to maximum 12% moisture content.
  - 2.1.9.4. Cut end liquid wood preservative as recommended by manufacturer of treated wood.
  - 2.1.9.5. Permitted Products: "K-33® CCA" by Timber Specialties Co.; [www.timberspecialties.com](http://www.timberspecialties.com) or "Wolman® AG" by Lonza; [www.wolmanizedwood.com](http://www.wolmanizedwood.com).
- 2.1.10. "Fire Treated" Wood and Plywood:
  - 2.1.10.1. Flame Spread: Max 25 in 30 minutes in accordance with CAN/ULC-S102.
  - 2.1.10.2. Provide fire treated wood kiln dried to max 19% moisture content.

- 2.1.10.3. Do not resurface or rip fire treated wood if it affects the ULC Label.
- 2.1.10.4. Provide fire treated material bearing stamp of Canadian Wood Preservers Bureau and ULC stamp.
- 2.1.10.5. Permitted Product: "Dricon® FRT" by Lonza; [www.wolmanizedwood.com](http://www.wolmanizedwood.com).
- 2.1.11. Interior Fire Retardant Treated Lumber and Plywood: Pressure treated lumber and plywood with fire retardant chemicals to meet an UL FR-5 rating with a surface-burning characteristics rating of 25 or less for flamespread, fuel contributed and smoke developed. Ensure each piece of fire retardant treated lumber and plywood bears a ULC label or imprint attesting to this rating.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. INSTALLATION**

- 3.2.1. Properly frame together parts of the Work with members accurately cut to size, closely fitted, well spiked and erected in a substantial manner, plumb, level, square and true to dimension.
- 3.2.2. Locate joints over bearing or supporting surfaces.
- 3.2.3. Provide running members full length wherever possible.
- 3.2.4. Design for expansion and contraction of the materials.
- 3.2.5. After cutting, drilling and fitting "treated" wood and plywood but before installation, apply 1 full coat of wood preservative to exposed surfaces, including ends of blocking, furring, nailers and rough carpentry.
- 3.2.6. Provide fasteners and rough hardware for a rigid and secure installation.
- 3.2.7. Miscellaneous Interior Carpentry: Provide "fire treated" plywood, blocking, furring, nailers, rough carpentry, grounds and nailing strips as indicated and/or as required for proper installation.
- 3.2.8. Equipment Mounting Panels:
  - 3.2.8.1. Provide 19 mm (3/4") thick exposed plywood backboard panels. Refer to Electrical Drawings for sizes and locations and securely mount panels to wall surfaces.
  - 3.2.8.2. Provide "fire treated" plywood.
- 3.2.9. Roof Carpentry:
  - 3.2.9.1. Install continuous wood nailers around roof perimeters, curbs and roof openings at edges of insulation. Use cadmium plated self tapping screws for securing wood to metal deck and cadmium plated lag screws for securing wood to concrete as shown. Install cut cant strips and continuous nailers on copings and curbs as detailed.
  - 3.2.9.2. Install continuous wood nailers along roof control joints, building and roof expansion joints as shown. Fasten nailers as specified.

#### **3.3. SITE QUALITY CONTROL**

- 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.4. PROTECTION**

3.4.1. Protect rough carpentry from weather.

**END OF SECTION**



---

Part 1 General

## 1.1 SUMMARY

## .1 Section Includes:

- .1 Material and installation for prefabricated wood trusses.

## .2

## Related Sections:

- .1 N/A

## 1.2 REFERENCES

## .1 Canadian Standards Association (CSA International)

- .1 CSA O80 Series, Wood Preservation.
- .2 CAN/CSA-O86, Engineering Design in Wood.
- .3 CAN/CSA-O14, Softwood Lumber.
- .4 CSA S307, Load Test Procedure for Wood Roof Trusses for Houses and Small Buildings.
- .5 CSA S347, Method of Test for Evaluation of Truss Plates Used in Lumber Joints.
- .6 CSA W47.1, Certification of Companies for Fusion Welding of Steel.

## .2 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

## .1 Material Safety Data Sheets (MSDS).

## .3 National Lumber Grades Authority (NLGA)

## .1 NLGA, Standard Grading Rules for Canadian Lumber.

## .4 National Research Council (NRC)/Institute for Research in Construction (IRC) - Canadian Construction Materials Centre (CCMC)

## .1 CCMC, Registry of Product Evaluations.

## .5 Truss Plate Institute of Canada (TPIC)

- .1 TPIC, Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses (Limit States Design).

## 1.3 DESIGN REQUIREMENTS

## .1 Design light metal plate connected wood trusses in accordance with TPIC truss design procedures for wood truss chords and webs in accordance with engineering properties in CAN/CSA-O86.

## .2 Design light metal plate connected wood trusses in accordance with TPIC truss design procedures for truss joint designs to test engineering properties in accordance with CSA S347 and listed in CCMC Registry of Product Evaluations.

## .3 Design trusses, bracing &amp; bridging in accordance with CAN/CSA-O86.1 for loads indicated

## .4 Limit live load deflection to 1/360th of span where gypsum board ceilings are hung directly from trusses.

- .5 Limit live load deflections to 1/240th of span unless otherwise specified or indicated.
- .6 Provide camber for trusses as indicated.

#### **1.4 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Fabricator for trusses to show evidence of quality control program such as provided by regional wood truss associations, or equivalent.
  - .2 Fabricator for welded steel connections to be certified in accordance with CSA W47.1.
- .2 Pre-Installation Meeting:
  - .1 Convene pre-installation meeting one week prior to beginning on-site installations
    - .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 SUBMITTALS**

- .1 Submittals in accordance with Specifications
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet
- .3 Shop Drawings:
  - .4 Each shop & erection drawing submission showing connection details to be signed and stamped by professional engineer registered or licensed in province of Ontario, Canada.
  - .5 Indicate special structural application and specification as according to local authorities having jurisdiction.
  - .6 Indicate TPIC Truss Design Procedure and CSA O86 Engineering Design in Wood and specific CCMC Product Registry number of the truss plates
  - .7 Indicate species, sizes, and stress grades of lumber used as truss members. Show pitch, span, camber, configuration and spacing of trusses. Indicate connector types, thicknesses, sizes, locations and design value. Show bearing details. Indicate design load for members.
  - .8 Submit stress diagram or print-out of computer design indicating design load for truss members. Indicate allowable load and stress increase.
  - .9 Provide certification that trusses meet requirements of CSA S307 and CSA S347.
  - .10 Indicate arrangement of webs or other members to accommodate ducts and other specialties.

- .11 Show location of lateral bracing for compression members.
- .12 Test reports: submit certified test reports for prefabricated wood trusses from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
- .13 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .14 Instructions: submit manufacturer's installation instructions.

**1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, handle, store and protect materials in a manner that avoids damage to trusses
- .2 Storage and Protection:
  - .1 Store trusses on job site in accordance with manufacturer's instructions. Provide bearing supports and bracings. Prevent bending, warping and overturning of trusses.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Lumber: to following standards:
  - .1 CAN/CSA-O141.
  - .2 NLGA (National Lumber Grading Association), Standard Grading Rules for Canadian Lumber.
- .2 Fastenings: to CAN/CSA-O86.

**2.2 FABRICATION**

- .1 Fabricate wood trusses in accordance with approved shop drawings.
- .2 Provide for design camber and roof slopes when positioning truss members.
- .3 Connect members using bolts and nuts, metal, plywood gussets or metal connector plates.

**2.3 SOURCE QUALITY CONTROL**

- .1 Identify lumber by grade stamp of an agency certified by Canadian Lumber Standards Administration Board.

**Part 3 Execution**

**3.1 MANUFACTURER'S INSTRUCTIONS**

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

### **3.2 ERECTION**

- .1 Erect wood trusses as indicated on approved shop drawings.
- .2 Handling, installation, erection, bracing and lifting in accordance with manufacturers instructions.
- .3 Make adequate provisions for handling and erection stresses.
- .4 Exercise care to prevent out-of-plane bending of trusses.
- .5 Install temporary horizontal and cross bracing to hold trusses plumb and in safe condition until permanent bracing and decking are installed.
- .6 Install permanent bracing in accordance with approved shop drawings, prior to application of loads to trusses.
- .7 Do not cut or remove any truss material without approval of Engineer.
- .8 Remove chemical and other surface deposits on treated wood, in preparation for applied finishes.

### **3.3 FIELD QUALITY CONTROL**

- .1 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 product[s], and submit written reports, in acceptable format, to verify compliance of work with Contract.
  - .2 Manufacturer's field services: provide manufacturer's field services, consisting of product use recommendations and periodic site visits for inspection of product installation, in accordance with manufacturer's instructions.
  - .3 Schedule site visits to review work 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.
- .2 Upon completion of work, after cleaning is carried out.

### **3.4 CLEANING**

- .1 Remove surplus materials, excess materials, rubbish, tools and equipment on completion of installation.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide general installations including but not limited to following:
  - 1.2.1.1. installation of hollow metal doors and frames.
  - 1.2.1.2. continuous grouting of fire rated frames in concrete and concrete block walls.
  - 1.2.1.3. spot grouting of door frames in gypsum board partitions.
  - 1.2.1.4. installation of wood doors.
  - 1.2.1.5. installation of door hardware.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of concrete wall: Section 03 30 00, Cast-In-Place Concrete.
  - 1.2.2.2. Provision of concrete block wall: Section 04 20 00, Masonry Units.
  - 1.2.2.3. Supply of hollow metal doors and frames: Section 08 11 13, Hollow Metal Doors and Frames.
  - 1.2.2.4. Supply of wood doors: Section 08 14 00, Wood Doors.
  - 1.2.2.5. Supply of door hardware: Section 08 71 00, Door Hardware.
  - 1.2.2.6. Installation of gypsum wall board partition steel frames and wall boards: Section 09 21 16, Gypsum Board Assemblies.
  - 1.2.2.7. Electrical fittings and services: Electrical.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. DHI: Door and Hardware Institute Canada; [www.dhicanada.ca](http://www.dhicanada.ca).
  - 1.3.1.2. NFPA: National Fire Protection Association; [www.nfpa.org](http://www.nfpa.org).
- 1.3.2. Reference Standards:
  - 1.3.2.1. ANSI/NAAMM/HMMA 840-16 - Guide Specification for Receipt, Storage and Installation of Hollow Metal Doors and Frames
  - 1.3.2.2. ANSI/WDMA I.S. 1A-13 - Industry Standard for Interior Architectural Flush Wood Doors
  - 1.3.2.3. ASTM C305-20 - Standard Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency
  - 1.3.2.4. ASTM C1107/C1107M-20 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
  - 1.3.2.5. NFPA 80-20 - Standard for Fire Doors and Other Opening Protectives

- 1.3.2.6. CAN/ULC-S702.1-21 - Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification

#### **1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Preinstallation Meeting:
- 1.4.1.1. Prior to start of work, arrange for site meeting of parties associated with work of this Section. Presided over by Construction Manager, include Consultant, Trade Contractor, Testing Company's Representative and manufacturer's representative.
- 1.4.1.2. Review work included under this Section and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of hardware, hardware to be used, installation of methods and procedures related to electrified door hardware, sequence and quality control, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of this Section. Also discuss following items:
- 1.4.1.2.1. electrical roughing in and other preparatory work performed by other trades.
- 1.4.1.2.2. sequence of operation of each type of electrified door hardware.
- 1.4.1.2.3. construction schedule and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
- 1.4.1.2.4. required testing, inspecting and certifying procedures.

### **PART 2 - PRODUCTS**

#### **2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
- 2.1.1.1. ChemRex Inc.; [www.chemrex.com](http://www.chemrex.com)
- 2.1.1.2. CPD Construction Products; [www.cpd.ca](http://www.cpd.ca)
- 2.1.1.3. Euclid Canada; [www.euclidchemical.com](http://www.euclidchemical.com)
- 2.1.1.4. Sika Canada Inc.; [www.sikacanada.com](http://www.sikacanada.com)
- 2.1.1.5. W.R. Meadows of Canada; [www.wrmeadows.com](http://www.wrmeadows.com)

#### **2.2. MATERIALS**

- 2.2.1. Doors, Frames and Hardware: Refer to following Sections for Products to be installed as part of the work of this Section:
- 2.2.1.1. Section 08 11 13, Hollow Metal Doors and Frames.
- 2.2.1.2. Section 08 14 00, Wood Doors.
- 2.2.1.3. Section 08 71 00, Door Hardware.
- 2.2.2. Spot Grout: Proportion when used at metal door frames; 1 part hardwall plaster to not more than 2-1/2 parts "Perlite" by weight, with enough water added for "hand pack" consistency and/or use "Gyproc 90" by Georgia-Pacific Canada, Inc. or "Durabond 90" by CGC Inc.
- 2.2.3. Continuous Grout: Pre-mixed, non-shrink, non-metallic, cementitious grout, containing no chlorides, conforming to ASTM C1107/C1107M; "M-Bed Standard" by Sika Canada Inc., "CG-86 Construction Grout" by W.R. Meadows of Canada Ltd., "Set Grout" by ChemRex Inc., or "NS Grout" by Euclid Canada.

- 2.2.4. Batt Insulation: Preformed mineral (glass and stone wool) fibre, conforming to CAN/ULC-S702.1. Permitted Products: "QUIETZONE® PINK NEXT GEN™ FIBERGLAS® Insulation" by Owens Corning Canada LP; [www.owenscorning.ca](http://www.owenscorning.ca), "ROCKWOOL™ AFB - Acoustical Fire Batt Insulation" by ROCKWOOL™ International A/S; [www.rockwool.com](http://www.rockwool.com) or "Thermafiber® SAFB™ Mineral Wool Insulation" by Thermafiber, Inc. (Owens Corning Canada LP); [www.thermafiber.com](http://www.thermafiber.com), of sufficient thickness and of width to suit metal framing spacing and other miscellaneous spacings.
- 2.2.5. Threshold Sealant: As recommended by installer in accordance with Section 07 92 00.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Verify frames comply with indicated requirements for type, size, location, swing characteristics and have been installed with plumb jambs and level heads. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. INSTALLATION**

- 3.2.1. Hollow Metal Frames:
- 3.2.1.1. Install hollow metal frames in accordance with manufacturer's instructions and ANSI/NAAMM/HMMA 840.
- 3.2.1.2. Set frames plumb, square, level and at correct elevation, maintaining uniform door width and height.
- 3.2.1.3. Secure anchorages and connections to adjacent construction.
- 3.2.1.4. Remove temporary steel shipping jamb spreaders prior to setting 1-piece welded frames. Brace frames rigidly in position while being built in. Use precisely-dimensioned installation spreaders at sill and third-points of door opening height to maintain door opening width during building-in. Follow manufacturer's instructions regarding proper use of floor and jamb anchors. Remove installation spreaders only after mortar has set, where applicable.
- 3.2.1.5. Allow for deflection to prevent structural loads from being transmitted to frame.
- 3.2.1.6. Provide batt insulation to completely fill pressed steel frames of exterior doors and adjacent cavities.
- 3.2.1.7. Spot Grouting:
- 3.2.1.7.1. Coordinate spot grouting with Section 09 21 16.
- 3.2.1.7.2. Provide spot grout to increase rigidity of frame and improve resistance to frame rotation caused by weight of door.
- 3.2.1.7.3. Comply with manufacturer's recommendations for surface preparation, cleaning, forming, mixing, placement and curing of grout.
- 3.2.1.7.4. Mix grout in accordance with ASTM C305 requirements.
- 3.2.1.7.5. Spot grout at strike and hinge side jambs at steel door frames set in gypsum board partitions, walls and other similar locations in accordance with manufacturer's recommendations. Immediately insert gypsum panels into jamb and attach to framing. Do not terminate gypsum board against trim.
- 3.2.1.7.6. Do not use pumped slurry method to perform spot grouting.

- 3.2.1.8. Continuous Grouting:
  - 3.2.1.8.1. Coordinate continuous grouting with Section 03 30 00 and Section 04 20 00 respectively.
  - 3.2.1.8.2. Comply with manufacturer's recommendations for surface preparation, cleaning, forming, mixing, placement and curing of grout.
  - 3.2.1.8.3. Mix grout in accordance with ASTM C305 requirements.
  - 3.2.1.8.4. Provide grouting employing established procedures recommended by manufacturers. Use minimum water required to produce placement consistency.
  - 3.2.1.8.5. Grout pressed steel door, screen and sidelight frames in masonry and concrete fire rated walls solid with grout. Do not use pumped slurry method to perform grouting.
- 3.2.2. Fire Labeled Doors and Frames:
  - 3.2.2.1. Install fire labeled doors and frames in accordance with manufacturer's printed instructions and NFPA 80.
  - 3.2.2.2. Verify labeled doors and frames are placed in their designated openings. Review, inspect and certify where required by authorities having jurisdiction.
- 3.2.3. Hollow Metal Doors:
  - 3.2.3.1. Install hollow metal doors in accordance with manufacturer's instructions and ANSI/NAAMM/HMMA 840.
  - 3.2.3.2. Install in accordance with following edge clearances unless otherwise indicated:
    - 3.2.3.2.1. Between doors and frames at head and jambs: 3 mm (1/8").
    - 3.2.3.2.2. At door bottom: 19 mm (3/4") maximum to unfinished floor, 16 mm (5/8") maximum to finished floor unless indicated to be undercut.
    - 3.2.3.2.3. Between meeting edges of pairs of doors: 3 mm (1/8").
- 3.2.4. Wood Doors and Frames:
  - 3.2.4.1. Install wood doors and frames in accordance with manufacturer's instructions and recommendations of ANSI/WDMA I.S. 1A.
  - 3.2.4.2. Condition doors and frames to average temperature and humidity in area of installation for not less than 48 hours prior to installation.
  - 3.2.4.3. Install doors in a neat and workmanlike manner free from hammer or tool marks, open joints or slivers.
  - 3.2.4.4. Set plumb, level, square and true. Install doors after building humidity is at an allowable level.
  - 3.2.4.5. Install in accordance with following edge clearances unless otherwise indicated:
    - 3.2.4.5.1. Between doors and frames: at head and jambs: 3 mm (1/8").
    - 3.2.4.5.2. At door bottom: 19 mm (3/4") maximum to unfinished floor unless doors are indicated to be undercut.
    - 3.2.4.5.3. Between meeting edges of pairs of doors: 3 mm (1/8").
  - 3.2.4.6. Cut, drill and prepare doors to template to receive hardware.
  - 3.2.4.7. Ensure smoke gaskets are in-place before pre-finished door installation.
- 3.2.5. Door Hardware:
  - 3.2.5.1. Install hardware to doors and frames in accordance with manufacturer's packaged installation, template and adjusting instructions.



- 3.2.5.2. Adjust hardware to provide smooth operation of doors and ensure clearances are maintained. Provide lubricants to allow smooth function of hardware consistent with manufacturer's recommendations.
- 3.2.5.3. Mount hardware at heights in accordance with "Recommended Locations for Builder's Hardware" by DHI Canada except as otherwise indicated on the Documents or required by authorities having jurisdiction.
- 3.2.5.4. Install frame bumpers.
- 3.2.5.5. Tighten fastening components snugly. Do not burr or otherwise mar the edges of surfaces of hardware components. Repair defects resulting from work of this Section in accordance with Consultant's review.
- 3.2.5.6. Set exterior door thresholds in a continuous bed of sealant to prevent water and air intrusion beneath sill.
- 3.2.5.7. Unless otherwise indicated, mounting heights for door hardware is as follows:
  - 3.2.5.7.1. Locksets - 1023 mm (40-5/16") from floor to centre line of knob.
  - 3.2.5.7.2. Deadlocks - 1100 mm (43-5/16") from floor to centre line of cylinder.
  - 3.2.5.7.3. Panic Bolts - 1023 mm (40-5/16") from floor to centre line of bar.
  - 3.2.5.7.4. Pulls - 1041 mm (41") from floor to centre line of pull.
  - 3.2.5.7.5. Push Plates - 1100 mm (43-5/16") from floor to centre line of plate.
  - 3.2.5.7.6. Guard Bars - 1066 mm (42") from floor to centre line of bar.
- 3.2.5.8. Provide locked room for storage of door hardware at the job site and a person responsible for control and distribution of door hardware.

**3.3. SITE QUALITY CONTROL**

- 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.4. ADJUSTING**

- 3.4.1. Adjust doors and hardware and other moving or operating parts to function smoothly and correctly.

**3.5. CLEANING**

- 3.5.1. Carefully wipe clean doors of dust created due to work of this Project.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide bituminous dampproofing including but not limited to following:
  - 1.2.2. bituminous dampproofing horizontal and vertical foundation walls.
- 1.2.3. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.4. Provision of cast-in-place concrete foundation walls: [Section 03 30 00, Cast-In-Place Concrete.] [Structural.]
  - 1.2.5. Parging of masonry foundation wall: Section 04 20 00, Masonry Units.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
- 1.3.2. MSDS: Material Safety Data Sheets.
- 1.3.3. Reference Standards:
- 1.3.4. CGSB 37-GP-9Ma - Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing
- 1.3.5. CAN/CGSB-37.2-M88 - Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings

**1.4. SUBMITTALS**

- 1.4.1. Product Data:
- 1.4.2. Submit manufacturer's literature, data sheets for each type of material provided under this Section for Project. Data sheets shall provide all required information. Submit 3 copies of detailed instructions for maintaining, preserving and keeping materials in clean and safe conditions and give adequate warning of maintenance practices or materials detrimental to specified materials. Submit manufacturer's installation instructions.
- 1.4.3. Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for primer, asphalt, patching and leveling compound and as designated later by Consultant.

**1.5. QUALITY ASSURANCE**

- 1.5.1. Qualifications:
- 1.5.2. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

**1.6. SITE CONDITIONS**

- 1.6.1. Ambient Conditions:
- 1.6.2. Do not proceed with work when wind chill effect would tend to set bitumen before proper curing takes place.
- 1.6.3. Do not apply dampproofing in wet weather.

**2 PRODUCTS****2.1.1. MATERIALS**

- 2.1.2. Obtain components and materials as a single-source from membrane manufacturer to ensure total system compatibility and integrity.
- 2.1.3. Dampproof Coatings for Temperature Below 4 deg C (40 deg F):
- 2.1.4. Primer: Primer conforming to CGSB 37-GP-9Ma, "910-01 Penetrating Asphalt Primer" by Bakor Inc.; [www.bakor.com](http://www.bakor.com)
- 2.1.5. Premium Grade Fibrated Coating: Asphalt emulsion "710-11 Premium Grade Foundation Coating" by Bakor Inc.; [www.bakor.com](http://www.bakor.com) or "SEALMASTIC™ Emulsion Dampproofing" by W.R. Meadows of Canada; [www.wrmeadows.com](http://www.wrmeadows.com).
- 2.1.6. Dampproof Coatings for Temperature Above 4 deg C (40 deg F):
- 2.1.7. Primer: Primer conforming to the requirements of CAN/CGSB-37.2, "700-01 Asphalt Emulsion Dampproofing" by Bakor Inc.; [www.bakor.com](http://www.bakor.com) or "MEL-ROL® LM Single-Component, Water-Based, Polymer-Modified, Cold-Applied Waterproofing Membrane" by W.R. Meadows of Canada; [www.wrmeadows.com](http://www.wrmeadows.com), diluted 20% with clean water.
- 2.1.8. Dampproof Coating: "700-01 Asphalt Emulsion Dampproofing" by Bakor Inc.; [www.bakor.com](http://www.bakor.com) or "MEL-ROL® LM Single-Component, Water-Based, Polymer-Modified, Cold-Applied Waterproofing Membrane" by W.R. Meadows of Canada; [www.wrmeadows.com](http://www.wrmeadows.com).

**3 EXECUTION****3.1.1. EXAMINATION**

- 3.1.2. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.3. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.1.4. APPLICATION**

- 3.1.5. *Delete bracketed words if not using concrete block foundation walls.*
- 3.1.6. Apply dampproofing to [parged surfaces of] foundation walls extending from 50 mm (2") below grade level to toe of footing.
- 3.1.7. Dampproofing Application at Temperatures Below 4 deg C (40 deg F):
- 3.1.8. Primer: Apply a coat of primer at a rate of 0.5 to 2.0 l/m<sup>2</sup> (100 to 400 sq ft/gal) and allow to cure until touch dry.
- 3.1.9. Dampproof Coating: Apply a coat of fibrated asphalt dampproofing at a rate of 1.0 to 1.5 l/m<sup>2</sup> (2 to 3 gal/100 sq ft) and allow to cure.
- 3.1.10. Dampproofing Application at Temperatures Above 4 deg C (40 deg F):
- 3.1.11. Primer: Apply a coat of asphalt emulsion dampproofing diluted 20% with clean water at a rate of 0.5 l/m<sup>2</sup> (100 sq ft/gal) and allow to dry.
- 3.1.12. Dampproof Coating: Apply a second coat of asphalt emulsion dampproofing at a rate of 1.0 to 1.5 l/m<sup>2</sup> (2 to 3 gal/100 sq ft) and allow to dry.
- 3.1.13. Protect cured application from damage caused by backfilling using protection board adhered with adhesive in spot adhered pattern as recommended by manufacturers.
- 3.1.14. Obtain Consultant's acceptance before permitting backfilling.
- 3.1.15. SITE QUALITY CONTROL**
- 3.1.16. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**END OF SECTION**

**PART 1 - GENERAL**

**3.2. GENERAL INSTRUCTIONS**

- 3.2.1. Read and conform to:
  - 3.2.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 3.2.1.2. Division 1 requirements and documents referred to therein.

**3.3. SUMMARY**

- 3.3.1. Section Includes: Provided self-adhering sheet waterproofing including but not limited to following:
  - 3.3.1.1. priming.
  - 3.3.1.2. self-adhering sheet waterproofing below grade.
  - 3.3.1.3. protection board.
  - 3.3.1.4. drainage board.
- 3.3.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 3.3.2.1. Provision of concrete foundation walls: Section 03 30 00, Cast-In-Place Concrete.

**3.4. REFERENCES**

- 3.4.1. Abbreviations and Acronyms:
  - 3.4.1.1. SBS: Styrene Butadiene Styrene.
- 3.4.2. Reference Standards:
  - 3.4.2.1. ASTM D412-16(21) - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
  - 3.4.2.2. ASTM D882-18 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting
  - 3.4.2.3. ASTM D1621-16 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics
  - 3.4.2.4. ASTM D1970/D1970M-21 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
  - 3.4.2.5. ASTM D4716/D4716M-13(21) - Standard Test Method for Determining the (In-Plane) Hydraulic Transmissivity of a Geosynthetic by Radial Flow
  - 3.4.2.6. ASTM E96/E96M-22 - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials

**3.5. ADMINISTRATIVE REQUIREMENTS**

- 3.5.1. Coordination: Ensure continuity of waterproofing membrane throughout work of this Section.
- 3.5.2. Scheduling: Schedule work to provide a watertight seal at the end of each Working Day on areas worked upon during the Day.

**3.6. SUBMITTALS**

- 3.6.1. Samples: Submit samples of self-adhering sheet membrane waterproofing material and drainage board in accordance with Section 01 30 00.

**3.7. QUALITY ASSURANCE**

- 3.7.1. Qualifications:

- 3.7.1.1. Installers: Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

**3.8. DELIVERY, STORAGE AND HANDLING**

- 3.8.1. Delivery and Acceptance Requirements: Deliver materials to site in undamaged and original packaging indicating name of manufacturer and Product.

- 3.8.2. Storage and Handling Requirements:

- 3.8.2.1. Store cold applied elastomeric membrane in closed containers outdoors.

- 3.8.2.2. Store membrane at temperature of 5 deg C (41 deg F) and above to facilitate handling.

- 3.8.2.3. Membrane contains petroleum solvents and are flammable. Do not use near open flame.

- 3.8.2.4. Store roll materials horizontally in original packaging.

- 3.8.2.5. Store adhesives and primers at temperatures of 5 deg C (41 deg F) and above to facilitate handling.

- 3.8.2.6. Keep solvents away from open flame or excessive heat.

**3.9. SITE CONDITIONS**

- 3.9.1. Ambient Conditions: Do not perform installation during rainy or inclement weather and on frost or wet covered surfaces.

**3.10. WARRANTY**

- 3.10.1. Manufacturer Warranty: Warrant work of this Section for period of 5 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner Representative. Defects include but are not limited to actual leakage.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:

- 2.1.1.1. Carlisle Coatings & Waterproofing; [www.carlisle-ccw.com](http://www.carlisle-ccw.com)

- 2.1.1.2. GCP Applied Technologies, Inc.; [www.gcpat.com](http://www.gcpat.com)

- 2.1.1.3. Henry Company; [www.henry.com](http://www.henry.com)

- 2.1.1.4. W.R. Meadows of Canada; [www.wrmeadows.com](http://www.wrmeadows.com)

**2.2. MATERIALS**

2.2.1. Performance/Design Criteria:

2.2.1.1. Provide self-adhering sheet waterproofing on exterior vertical face of foundation walls incorporating full width of top of footings to walls, including but not limited to following:

2.2.1.1.1. foundation walls and footings.

2.2.1.1.2. primer.

2.2.1.1.3. self-adhering sheet waterproofing membrane.

2.2.1.1.4. protection board.

2.2.1.1.5. drainage board.

2.2.2. Primer for Self-Adhering Waterproofing Membrane: Provide "Bituthene® Adhesive Primer B2 LVC" by GCP Applied Technologies, Inc., "Mel-Prime™ W/B Water-Based Adhesive" by W.R. Meadows of Canada, "Bakor Hi-Tac™ Primer" or "Blueskin® Adhesive" by Henry Company or "CCW-702" by Carlisle Coatings & Waterproofing, a synthetic rubber based adhesive type, quick setting for all temperatures, having following physical properties:

2.2.2.1. Weight: Minimum 0.8 kg/l (6 lb/US gal).

2.2.2.2. Solids by Weight: Minimum 35%.

2.2.3. Waterproofing Membrane (WP-03): Provide "Bituthene® 3000" by GCP Applied Technologies, Inc., "MEL-ROL® Rolled, Self-Adhering Waterproofing Membrane" by W.R. Meadows of Canada, "Bakor Blueskin® WP200 Self-Adhesive Waterproofing Membrane" by Henry Company or "CCW MiraDRI 860/861 Self-Adhering Waterproofing Membrane" by Carlisle Coatings & Waterproofing, SBS modified bitumen, self-adhering sheet membrane with a cross-laminated polyethylene film and having following physical properties:

2.2.3.1. Thickness: 1.5 mm (60 mils) minimum.

2.2.3.2. Flexibility: Pass @ -40 deg C (-40 deg F) to ASTM D1970/D1970M.

2.2.3.3. Vapour Permeance: 2.8 ng/Pa.s.m<sup>2</sup> (0.05 perms) to ASTM E96/E96M.

2.2.3.4. Tensile Strength (Membrane): 2.24 MPa (325 psi) to ASTM D412.

2.2.3.5. Tensile Strength (Film): 34.5 MPa (5000 psi) to ASTM D882.

2.2.3.6. Elongation: Minimum 300% to ASTM D412.

2.2.3.7. Puncture Resistance: 222 N (50 lb) minimum.

2.2.4. Liquid Membrane and Termination Sealant: Provide "Bituthene® Liquid Membrane" by GCP Applied Technologies, Inc., "Henry® 925 BES Sealant" by Henry Company, "CCW LM-800XL Liquid Mastic" and "CCW-704 Mastic" by Carlisle Coatings & Waterproofing or "Pointing Mastic" by W.R Meadows of Canada, compatible with sheet waterproofing membrane, substrate and insulation materials, remains flexible with ageing and chemically resistant to alkalis, calcium chloride, mild acid and salt solutions.

2.2.5. Protection Board: Provide "990-31 Polypropylene Protection Board", "CCW Protection Boards" by Carlisle Coatings & Waterproofing or "Protection Course (Vibraflex® PC)" by W.R. Meadows of Canada.

2.2.6. Drainage Board: Provide "Hydroduct® 220" by GCP Applied Technologies, Inc., "Delta-Drain" by Cosella-Dörken Products Inc.; [www.cosella-dorken.com](http://www.cosella-dorken.com), "MiraDRAIN 1000" by Carlisle Coatings & Waterproofing, "Bakor DB 2000 Prefabricated Drainage Composites" by Henry Company or "Mel-Drain™" by W.R. Meadows of Canada, a high density polyethylene sheet, dimpled throughout field of sheet, with flat flanges on manufactured edges; polypropylene filter fabric heat bonded to top of dimples with following properties:

2.2.6.1. Dimpled Thickness: 8 mm (5/16").

- 2.2.6.2. Water Flow Rate in Vertical Orientation: 1.25 l/min/m (6 gal/min/ft) when tested in accordance with ASTM D4716/D4716M.
- 2.2.6.3. Compressive Strength: Approximately 250 kN/m<sup>2</sup> (5,200 psf), when tested in accordance with ASTM D1621.
- 2.2.6.4. Sheet Width: As required to result in as few seams as possible.
- 2.2.6.5. Colour: Brown.
- 2.2.6.6. Working Temperature Range: -30 deg C (-22 deg F) to 80 deg C (176 deg F).

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. PREPARATION**

- 3.2.1. Surface Preparation:
  - 3.2.1.1. Ensure surfaces are sound, dry, clean and free of oil, grease, dirt, excess mortar, frost or other contaminants. Fill spalled areas in substrate to provide an even plane.
  - 3.2.1.2. Ensure new concrete is cured for a minimum of 7 Days and must be dry before waterproofing membranes are applied. Cure lightweight structural concrete a minimum of 14 Days.

#### **3.3. INSTALLATION**

- 3.3.1. Primer:
  - 3.3.1.1. Apply primer for self-adhered sheet waterproofing membrane by roller or spray at rate recommended by manufacturer.
  - 3.3.1.2. Allow minimum 30 minutes open time. Primed surfaces not covered by sheet waterproofing membrane during the same Working Day must be re-primed.
- 3.3.2. Joint and Crack Treatment:
  - 3.3.2.1. Pre-treat cracks in concrete 1.5 mm to 3 mm (1/16" to 1/8") wide with a 1.5 mm (60 mil) coating of liquid membrane 50 mm (2") wide centred on the crack. Alternately, apply a 150 mm (6") wide strip sheet of waterproofing membrane centred over crack. Provide 75 mm (3") end laps.
  - 3.3.2.2. Pre-treat horizontal to vertical inside corner transition areas with a liquid membrane fillet extending 19 mm (3/4") vertically and horizontally from the corner. Apply a minimum 225 mm (9") strip of waterproofing membrane centred at the joint.
  - 3.3.2.3. Pre-treat outside corners with a minimum 225 mm (9") strip of waterproofing membrane centred at joint.
  - 3.3.2.4. Where 3 or more planes come into contact reinforce with cut sections of waterproofing membrane reinforcing sheet as per manufacturer's instructions.
- 3.3.3. Projections: Extend waterproofing membrane tight to projection and seal with liquid membrane extending 65 mm (2-1/2") along projection and 65 mm (2-1/2") onto waterproofing membrane.
- 3.3.4. Waterproofing Membrane - Vertical Applications:
  - 3.3.4.1. Apply waterproofing membrane to prepared substrate in lengths of 2400 mm (8') or less.

- 3.3.4.2. Provide 65 mm (2-1/2") laps at both sides and ends. Position for alignment and remove protective film. Press firmly into place. Promptly roll laps with a counter top roller to effect seal. If more than 1 length is required on a vertical surface, apply in a shingle fashion.
- 3.3.4.3. Terminate membrane using termination mastic or termination bar, reglet or counter flashing as indicated. Refer to manufacturer's standard details.
- 3.3.4.4. Seal laps within 300 mm (12") of a 90° change in plane with termination sealant.
- 3.3.5. Waterproofing Membrane - Horizontal Applications:
  - 3.3.5.1. Apply 2 plies of waterproofing membrane to prepared substrate in lengths of 2400 mm (8') or less.
  - 3.3.5.2. Provide 65 mm (2-1/2") laps at both sides and ends. Position for alignment and remove protective film. Press firmly into place. Promptly roll laps with a counter top roller to effect seal. If more than 1 length is required on a vertical surface, apply in a shingle fashion.
  - 3.3.5.3. Terminate membrane using termination mastic or termination bar, reglet or counter flashing as indicated. Refer to manufacturer's standard details.
  - 3.3.5.4. Seal laps within 300 mm (12") of a 90° change in plane with termination sealant.
- 3.3.6. Protection Board: Install protection board directly on waterproofing membrane as soon as the membrane has set. Use manufacturer's recommended adhesive.
- 3.3.7. Drainage Board (Vertical):
  - 3.3.7.1. Align and hang drainage board up to foundation wall. Position bottom edge of drainage board to be in moderate contact with weeping tile system.
  - 3.3.7.2. Secure drainage board to foundation wall with nails and washers spaced 450 mm (18") oc horizontally. Install minimum of 2 rows staggered and spaced 150 mm (6") apart and min 150 mm (6") from top edge.
  - 3.3.7.3. Align and install termination strip along top edge with nails spaced 300 mm (12") oc and seal with termination sealant.
  - 3.3.7.4. Align and install moulding strip over completed top edge detail.
  - 3.3.7.5. Overlap end laps, pull back loose fabric to expose drain core and position core of second panel over overlap flange of first panel.
  - 3.3.7.6. Bend drainage board to create inside corners and cut board to create outside corners, provide 75 mm (3") of extra fabric to wrap corner.
  - 3.3.7.7. Stagger or offset joints of drainage board sheets.
  - 3.3.7.8. Place subsequent sheets in an overlapping shingle fashion.
  - 3.3.7.9. Backfill bottom edge in conjunction with weeping tile system.
- 3.3.8. Drainage Board (Horizontal):
  - 3.3.8.1. Ensure edge of core flange is at the higher edges of substrate, away from drains.
  - 3.3.8.2. Overlap in direction of water flow. Pull back loose fabric to expose drain core and position core of second panel over overlap flange of first panel.
  - 3.3.8.3. Bend drainage board to create inside corners and cut drainage board to create outside corners, provide 75 mm (3") of extra fabric to wrap corner.
  - 3.3.8.4. Stagger or offset joints of drainage board sheets.
  - 3.3.8.5. Place subsequent sheets in an overlapping shingle fashion.



**3.4. SITE QUALITY CONTROL**

- 3.4.1. Site Tests and Inspections: Carry out inspection and testing of waterproofing application by testing laboratory designated by Consultant when requested.
- 3.4.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.5. PROTECTION**

- 3.5.1. Provide adequate protection of materials and work of this Section from damage by weather, backfilling operations and other causes.
- 3.5.2. Protect work of other trades from damage resulting from work of this Section. Make Good such damage at own expense to satisfaction of Consultant.
- 3.5.3. Apply drainage board as soon as possible after installation of waterproofing membrane.

**END OF SECTION**



**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide crystalline waterproofing including but not limited to following:
  - 1.2.1.1. application of crystalline waterproofing to interior of elevator pits, sumps and other pits or depressions in slabs on grade and elsewhere where indicated.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of cast-in-place concrete: Section 03 30 00, Cast-In-Place Concrete.

**1.3. REFERENCES**

- 1.3.1. Reference Standards:
  - 1.3.1.1. ASTM C267-20 - Standard Test Methods for Chemical Resistance of Mortars, Grouts and Monolithic Surfacing and Polymer Concretes

**1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Coordination: Coordinate work of this Section with items to be cast-in or grouted into surfaces to receive crystalline waterproofing to ensure compatibility and continuity of waterproofing application.

**1.5. SUBMITTALS**

- 1.5.1. Product Data: Submit Product data, including manufacturer's specifications and general recommendations for waterproofing applications.
- 1.5.2. Test and Evaluation Reports: Submit test reports from permitted independent testing laboratories certifying waterproofing system conforms to performance characteristics and testing requirements specified herein.
- 1.5.3. Certificates: Provide certificate signed by manufacturer's representative certifying materials installed comply with requirements of this Specification and applicator is qualified and approved to install Product in accordance with manufacturer's recommendations.

**1.6. QUALITY ASSURANCE**

- 1.6.1. Qualifications:
  - 1.6.1.1. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

**1.7. SITE CONDITIONS**

- 1.7.1. Ambient Conditions: Ensure surfaces and ambient air temperature is not less than 5 deg C (41 deg F) for a minimum period of 48 hours before, during and for 48 hours after applications.

**1.8. WARRANTY**

- 1.8.1. Manufacturer Warranty: Warrant work of this Section for a period of 2 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to; water leakage, except as result of structural failure of concrete substrate. Cracks arising from normal shrinkage and/or expansion of concrete which are 0.3 mm (1/100") wide or less are not to be considered as structural failure. Hairline cracks which result from these causes are to be considered normal and consequently warranty will not be invalidated as a result of these minor defects.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
- 2.1.1.1. Aquafin, Inc.; [www.aquafin.net](http://www.aquafin.net)
- 2.1.1.2. Edco Technologies Inc.; [www.edcotechnologies.com](http://www.edcotechnologies.com)
- 2.1.1.3. Euclid Chemical Canada Ltd.; [www.euclidchemical.com](http://www.euclidchemical.com)
- 2.1.1.4. Kryton International Inc.; [www.kryton.com](http://www.kryton.com)
- 2.1.1.5. Tremco Canada; [www.tremcosealants.com](http://www.tremcosealants.com)
- 2.1.1.6. W.R. Meadows of Canada; [www.wrmeadows.com](http://www.wrmeadows.com)
- 2.1.1.7. Xypex Chemical Corporation; [www.xypex.com](http://www.xypex.com)
- 2.1.2. Substitution Limitations: This Specification is based on Tremco Canada's "Permaquik Products". Comparable Products from manufacturers listed herein may be reviewed provided they meet requirements of this Specification.

**2.2. MATERIALS**

- 2.2.1. Performance/Design Criteria:
- 2.2.1.1. Cementitious crystalline waterproofing is a blend of Portland cement, fine treated silica sand active proprietary chemicals. When mixed with water and applied as cementitious coating, active chemicals cause a catalytic reaction which generates a non-soluble crystalline formation of dendritic fibers within pores and capillary tracts of concrete causing concrete to become permanently sealed against penetration of liquids from any direction.
- 2.2.1.2. Ensure chemical resistance in accordance with ASTM C267 exhibits no detrimental effects after exposure.
- 2.2.1.3. Ensure waterproofing treatment prevents passage of water under pressure and capable of spanning cracks up to 0.3 mm (1/100") without failure.
- 2.2.2. Crystalline Waterproofing: "Permaquik® Crystalline Waterproofing" by Tremco Canada, "Vandex Super/Super White" by Euclid Chemical Canada Ltd., "Krystol T1®" by Kryton International Inc. or "Cem-Kote CW Plus" by W.R. Meadows of Canada surface applied waterproofing compound, consisting of a patented formula of chemicals, cement and specially treated quartz which waterproofs by crystalline growth through cementitious voids in concrete substrate.
- 2.2.3. Slurry Coat: "Permaquik® 200" by Tremco Canada, "Vandex Super/Super White" by Euclid Chemical Canada Ltd., "Krystol T2®" by Kryton International Inc. or "Cem-Kote CW Plus" by W.R. Meadows of Canada applied in slurry consistency or powder application on concrete surfaces to prevent passage of water under pressure.

- 2.2.4. Premixed Mortar: Ensure premixed waterproofing material is "Permaquik Mortar 300" used in connection with "Permaquik® 200" by Tremco Canada, "Vandex Uni Mortar 1 ZSR" by Euclid Chemical Canada Ltd., "Krystol T1®" used in connection with "Krystol T2®" by Kryton International Inc. or "Meadow-Crete OV" by W.R. Meadows of Canada; mixed to mortar consistency for filling of form tie holes, honeycombed areas, routed out cracks and seal strips and coves at construction joints, to assure water tightness of structure.
- 2.2.5. Water: Free from matter deleterious to waterproofing materials.
- 2.2.6. Sealant: Compatible with waterproofing material, of type which will not re-emulsify and acceptable to manufacturer of waterproofing material.
- 2.2.7. Mixes:
  - 2.2.7.1. Slurry Consistency: Use separate containers for measuring by volume powdery materials. Add water to materials (not vice versa) and mix thoroughly. Ensure ratio of water to powder is as recommended by waterproofing material manufacturer. Prepare only as much slurry mixture as can be applied within 20-30 minutes. Do not add more water when mixture starts to thicken. Stir mixture frequently.
  - 2.2.7.2. Mortar Consistency: Measure "Slurry Coat" and "Premixed Mortar" material and mix powder thoroughly. Add water to powdery mixture and work with trowel until a medium stiff consistency is reached. Prepare only as much mortar as can be applied within 10-15 minutes. Ensure ratio of water and powder is as recommended by waterproofing manufacturer.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Examine concrete surfaces to be waterproofed for visible structural defects. Report unacceptable surface conditions. Report in writing, location of cracks exceeding 0.3 mm (1/100").
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. PREPARATION**

- 3.2.1. Surface Preparation:
  - 3.2.1.1. Remove form scale, laitance, oil, form release agents and other foreign materials likely to affect bond, penetration and performance of waterproofing. Employ steam cleaning or sandblasting as required.
  - 3.2.1.2. Prepare smooth surfaces resulting from steel formwork and similarly smooth surfaces by light sandblasting or high pressure water blasting.
  - 3.2.1.3. Ensure prepared surfaces use an open crystalline system to assure permanent bonding of waterproofing application.
  - 3.2.1.4. Horizontal Concrete Surfaces:
    - 3.2.1.4.1. Do not treat concrete surfaces with floor hardener or curing agents prior to waterproofing application.
    - 3.2.1.4.2. Rout out to minimum 38 mm (1-1/2") wide by 19 mm (3/4") deep, construction joints and visible cracks exceeding 0.3 mm (1/100") in size. Thoroughly rinse with water all concrete slab surfaces. Remove free water a Day prior to waterproofing application. Ensure concrete surfaces are damp at time slurry coating is applied.
  - 3.2.1.5. Vertical Concrete Surfaces:
    - 3.2.1.5.1. Ensure form tie holes are left approximately 25 mm (1") back of surface.
    - 3.2.1.5.2. Ensure honeycombed pockets and faulty construction joints are routed out to sound concrete.

- 3.2.1.5.3. Ensure vertical and horizontal construction joints and visible cracks in concrete surfaces exceeding 0.3 mm (1/100") are routed out 38 mm (1-1/2") wide by 19 mm (3/4") deep.
- 3.2.1.5.4. Rinse surfaces to be waterproofed thoroughly with water a Day prior to waterproofing application. Ensure moisture is present in concrete substrate to achieve maximum initial penetration of activated waterproofing chemicals. Ensure surfaces are moist only (not wet) when waterproofing is applied.

### **3.3. APPLICATION**

- 3.3.1. Waterproofing:
  - 3.3.1.1. Apply waterproofing material to concrete surfaces as soon as possible after stripping of formwork.
  - 3.3.1.2. Carry waterproofing up to pipes, standards and other items projecting through substrate, cut back to receive sealant.
  - 3.3.1.3. Waterproof concrete construction joints and pipes, standards and other items projecting through substrate.
  - 3.3.1.4. Apply slurry coatings by using a stiff masonry brush, or with suitable spray equipment.
  - 3.3.1.5. Allow each successive coat to reach initial set before recoating.
  - 3.3.1.6. Horizontal Concrete Surfaces:
    - 3.3.1.6.1. Dry sprinkle and power trowel or wood float application for slabs unless otherwise directed. When concrete of structure slab starts to reach initial set, dry sprinkle Slurry Coat 1.4 kg/m<sup>2</sup> (2.5 lbs/sq yd) on concrete surfaces and power trowel or wood float surfaces until uniformity in coverage and specified finish is reached.
    - 3.3.1.6.2. Where it is not possible or practical to float waterproofing into concrete structure and where permitted, apply slurry coating to concrete surfaces, "Slurry Coat" 1.4 kg/m<sup>2</sup> (2.5 lbs/sq yd) in slurry consistency. Apply slurry coatings uniformly in quantities specified (in 1 or 2 successive coatings). Second slurry coating of "Slurry Coat" may be applied while first coat is still green but after it has reached an initial set.
    - 3.3.1.6.3. Ensure vertical construction joints are treated with "Slurry Coat" 1.4 kg/m<sup>2</sup> (2.5 lbs/sq yd) in slurry consistency or powder form on pre-wetted surface immediately prior to pouring of concrete.
    - 3.3.1.6.4. Install seal strip 19 mm x 38 mm (3/4" x 1-1/2") at construction joints and at routed out cracks. Ensure seal strips consists of 2 laminating layers of "Slurry Coat" and "Premixed Mortar" material 1:6 in mortar consistency.
  - 3.3.1.7. Vertical Concrete Surfaces:
    - 3.3.1.7.1. Treat horizontal construction joints where accessible with "Slurry Coat" at rate of 0.8 kg/m<sup>2</sup> (1.5 lbs/sq yd) in slurry consistency or dry sprinkled on pre-wetted surfaces immediately prior to pouring of concrete.
    - 3.3.1.7.2. Rout out honeycombed areas, faulty construction joints and cracks, apply slurry coating of "Slurry Coat" 1.4 kg/m<sup>2</sup> (2.5 lbs/sq yd) and fill with mortar ("Slurry Coat" and "Premixed Mortar") 1:6 in laminating layers.
    - 3.3.1.7.3. Ensure form tie holes are filled with "Slurry Coat" and "Premixed Mortar" material 1:6 in mortar consistency after slurry coat of "Slurry Coat" has been applied.
    - 3.3.1.7.4. Install seal strip 19 mm x 38 mm (3/4" x 1-1/2") at construction joints and junction of walls and slab with "Slurry Coat" and "Premixed Mortar" material 1:6 (mortar consistency) in 2 laminating layers.

- 3.3.1.7.5. Apply to concrete surfaces "Slurry Coat" 1.4 kg/m<sup>2</sup> (2.5 lbs/sq yd). Ensure slurry coating is uniformly applied in quantities specified (minimum 2 coatings). Fill small pockets in concrete surfaces with "Premixed Mortar" in mortar consistency. Second slurry coating of "Slurry Coat" can be applied while first coat is still green, but after it has reached an initial set. Ensure waterproofing is continuous through recesses to receive horizontal slabs and is installed prior to slab pour.
- 3.3.2. Curing:
- 3.3.2.1. When temperatures fall below freezing, cover waterproofed surfaces with tarpaulins, or other protection, and maintain surface temperature above 5 deg C (41 deg F) for a minimum period of 3 Days after completion of waterproofing application.
- 3.3.2.2. Protect freshly waterproofed surfaces from rain for a minimum of 24 hours.
- 3.3.2.3. Moist cure waterproofed surfaces for a minimum of 3 Days, starting with fine water fog spraying Day following completion of application.
- 3.3.2.4. During extreme hot weather, apply, as required, a light water fog spray to freshly applied slurry application in order to prevent dehydration of waterproofing.
- 3.3.3. Waterbars and Sealant:
- 3.3.3.1. Examine installed waterbars to ensure that proper waterbars are provided, correctly welded at joints and that placing of concrete does not destroy purpose of waterbars, as required to make foundation walls and slabs on grade watertight. Cooperate with and coordinate work of this Section with work of Section providing waterbars.
- 3.3.3.2. Seal around pipes and other protrusions with sealant.

**3.4. SITE QUALITY CONTROL**

- 3.4.1. Site Tests and Inspections: Owner may engage services of an independent inspection and testing company to carry out inspection and testing of work of this Section. Cost of such inspection and testing, if required, will be paid by Owner.
- 3.4.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.5. CLEANING**

- 3.5.1. Clean and repair surfaces soiled or otherwise damaged in connection with work of this Section. Replace materials or finishes that cannot be satisfactorily cleaned at no cost to Owner.
- 3.5.2. Waste Management: Upon completion of work remove debris, equipment and excess material from site.

**3.6. PROTECTION**

- 3.6.1. Protect surfaces which are not to be waterproofed from soiling or other damage resulting from work of this Section.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide mechanical room waterproofing including but not limited to following:
  - 1.2.1.1. elastomeric mechanical room waterproofing.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Concrete slab finishing and curing: Section 03 35 13, Concrete Floor Finishing.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. DFT: Dry film thickness.
  - 1.3.1.2. RH: Relative Humidity.
  - 1.3.1.3. WFT: Wet film thickness.
- 1.3.2. Reference Standards:
  - 1.3.2.1. ASTM D412-16(21) - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
  - 1.3.2.2. ASTM D2240-15(21) - Standard Test Method for Rubber Property–Durometer Hardness
  - 1.3.2.3. ASTM D4060-19 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
  - 1.3.2.4. ASTM D4541-17 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
  - 1.3.2.5. ASTM F1869-16a - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
  - 1.3.2.6. ASTM F2170-19a - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

**1.4. SUBMITTALS**

- 1.4.1. Product Data: Provide cured film data based on following:
  - 1.4.1.1. Tensile Elongation and Strength based on ASTM D412.
  - 1.4.1.2. Hardness (Shore A) based on ASTM D2240.
  - 1.4.1.3. Tensile Adhesion to Concrete based on ASTM D4541.
  - 1.4.1.4. Abrasion Resistance based on ASTM D4060.



**1.5. QUALIFICATIONS**

1.5.1. Qualifications:

1.5.1.1. Installers: Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of Product manufacturers.

1.5.2. Mock-Ups: Construct minimum 10 m<sup>2</sup> (100 sq ft) mock-up sample at Project location designated by Consultant for review. Once reviewed with no objections recorded, sample remains part of finished work and used as a quality reference standard for balance of Project.

**1.6. WARRANTY**

1.6.1. Manufacturer Warranty:

1.6.1.1. Warrant work of this Section for period of 2 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner.

1.6.1.2. Cracks arising from normal shrinkage and/or expansion of concrete are not considered as structural failure. Hairline cracks which result from these causes are considered normal and consequently warranty will not be voided as a result of these minor defects.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:

2.1.1.1. BASF; [www.master-builders-solutions.basf.us](http://www.master-builders-solutions.basf.us)

2.1.1.2. MAPEI Inc.; [www.mapei.ca](http://www.mapei.ca)

2.1.1.3. Neogard; [www.neogard.com](http://www.neogard.com)

2.1.1.4. R&D Technical Solutions Ltd.; [www.kelmar.com](http://www.kelmar.com)

2.1.1.5. Sika Canada Inc. [www.sika.ca](http://www.sika.ca)

2.1.1.6. Tremco Canada; [www.tremcosealants.com](http://www.tremcosealants.com)

**2.2. MATERIALS**

2.2.1. Performance/Design Criteria: Ensure waterproofing treatment prevents passage of water under pressure and capable of spanning cracks up to 1.5 mm (1/16") without failure.

2.2.2. Concrete Moisture Emission Reducer: Provide 1 of following:

2.2.2.1. "Planiseal™ VS" by MAPEI Inc.

2.2.2.2. "Kelmar® MVB" by R&D Technical Solutions Ltd.

2.2.2.3. "Sikafloor® 81 EpoCem<sup>CA</sup>" by Sika Canada Inc.

2.2.3. Mechanical Room Waterproofing (MRW): 2 component flexible, chemical resistant, flame retardant coating capable for pedestrian traffic. Permitted systems are:

2.2.3.1. "MasterSeal® Traffic 2500" by BASF consisting of following:

2.2.3.1.1. Primer: "MasterSeal P 255".

2.2.3.1.2. Basecoat: "MasterSeal M 265" (0.635 mm (25 mils)) WFT.

- 2.2.3.1.3. Topcoat: "MasterSeal TC 275" (0.381 - 0.508 mm (15 - 20 mils)) WFT.
- 2.2.3.2. "Peda-Gard M Pedestrian Traffic Coatings" by Neogard consisting of following:
  - 2.2.3.2.1. Primer: "7797/7798 or 7790".
  - 2.2.3.2.2. Basecoat: "FC7500/FC7960" (0.508 mm (20 mils)) DFT.
  - 2.2.3.2.3. Topcoat: "FC7510/FC7961" (0.305 mm (12 mils)) DFT.
- 2.2.3.3. "Sikafloor® Resoclad MRW Type II" by Sika Canada Inc., consisting of following:
  - 2.2.3.3.1. Primer: "Sikalastic®-377".
  - 2.2.3.3.2. Basecoat: "Sikalastic®-390 Membrane" (0.762 - 0.889 mm (30 - 35 mils)) DFT.
  - 2.2.3.3.3. Topcoat: "Sikafloor Duochem-6001" (0.051 - 0.076 mm (2 - 3 mils)) or "Sikafloor Duochem-942" (0.051 - 0.076 mm (2 - 3 mils)) DFT.
- 2.2.3.4. "Mapei Mechanical Room Waterproofing" by MAPEI Inc. consisting of following:
  - 2.2.3.4.1. Primer: "Primer SN™" (0.254 mm (10 mils)) DFT.
  - 2.2.3.4.2. Basecoat: "Mpaefloor™ PU 418" (0.635 mm (25 mils)) DFT.
  - 2.2.3.4.3. Topcoat: "Mapefloor™ Finish 54 W/S" (0.051 - 0.102 mm (2 - 3 mils)) WFT.
- 2.2.3.5. "Vulkem OC810" by Tremco Canada consisting of following:
  - 2.2.3.5.1. 2 coats of "Vulkem OC810" (0.762 - 1.016 mm (30 - 40 mils)).
- 2.2.3.6. "Kelmar® MERDEK LD" by R&D Technical Solutions Ltd. consisting of following:
  - 2.2.3.6.1. Primer: "Kelmar® Dualox Epoxy Primer/Bonding Agent".
  - 2.2.3.6.2. Basecoat: "Kelmar® MERDEK Membrane" (0.508 mm (20 mils)) DFT.
  - 2.2.3.6.3. Topcoat: "Kelmar® 1910 Interior and Exterior Coating" (0.152 - 0.178 mm (6 - 7 mils)) DFT.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Preinstallation Testing:
  - 3.1.2.1. Perform calcium chloride test no earlier than 28 Days after concrete has been placed in accordance with requirements of ASTM F1869 and/or RH testing in accordance with ASTM F2170 immediately prior to installation of mechanical room waterproofing for moisture on concrete floors around perimeter of areas, at columns and where moisture may be anticipated. Conduct 3 tests for first 93 m<sup>2</sup> (1000 sq ft) and 1 additional test for every 93 m<sup>2</sup> (1000 sq ft) of flooring. Ensure moisture emission from concrete floor does not exceed 2.27 kg/93 m<sup>2</sup> (5 lbs/1000 sq ft) in 24 hours or has a maximum RH of 85%. Do not proceed with installation until moisture problem has been corrected. Provide results to Consultant prior to commencement of installation including diagram of area tested showing location of each moisture test.
  - 3.1.2.2. When concrete moisture emission rate is between 2.27 kg/93 m<sup>2</sup> (5 lbs/1000 sq ft) and 4.53 kg/93 m<sup>2</sup> (10 lbs/1000 sq ft) in 24 hours use either a concrete moisture emission reducer or a high moisture tolerant adhesive.
  - 3.1.2.3. When concrete moisture emission rate is between 4.53 kg/93 m<sup>2</sup> (10 lbs/1000 sq ft) and 6.79 kg/93 m<sup>2</sup> (15 lbs/1000 sq ft) and in 24 hours use a concrete moisture emission reducer.

- 3.1.2.4. Conduct pH test no earlier than 28 Days after concrete has been placed to ensure alkali salt residue is within limitation acceptable to manufacturer and to avoid adhesive failure, discolouration, shrinkage and softening of mechanical room waterproofing. If pH results are higher than 10, report to Consultant, Construction Manager or Owner for investigation and remedial. Also refer to manufacturer for ways to neutralize floor prior to beginning of installation. Neutralize by sanding, vacuuming and/or by water plus mild muriatic acid application as recommended by manufacturer. Retest to assure pH has been neutralized.

- 3.1.3. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

### **3.2. PREPARATION**

- 3.2.1. Surface Preparation:

- 3.2.1.1. Free surfaces to receive work of this Section from dust and loose particles, grease, paint, frost, form oil and other material detrimental to bond of membrane traffic topping. Employ steam cleaning where necessary to remove form oil.

- 3.2.1.2. Sandblast, or abrade and clean using a steel shot blast machine having vacuum pick-up, whichever is deemed necessary, depending on condition of concrete.

- 3.2.1.3. Ensure substrate surfaces are free from cavities and/or shutter marks which will damage traffic topping membrane.

- 3.2.1.4. Ensure surfaces are dry at commencement of work and cured minimum of 28 Days. Remove dust and dirt with industrial type vacuum cleaner.

- 3.2.1.5. Ensure ambient and surface temperatures are at least 10 deg C (50 deg F) for a minimum period of 48 hours before, during and after membrane application.

- 3.2.1.6. Ensure substrates slope properly to drains.

### **3.3. APPLICATION**

- 3.3.1. Ensure preparation of substrate, crack control and membrane application complies with detailed requirements recommended by membrane manufacturer.

- 3.3.2. Apply primer at coverage rate recommended by manufacturer for particular surface porosity. Do not permit primer to collect in pools. Prevent seepage through joints. Allow to dry thoroughly.

- 3.3.3. Apply 13 mm x 13 mm (1/2" x 1/2") cant to internal angles. Ensure cant is a 2 part rubber set sealant and compatible with waterproofing membrane.

- 3.3.4. Provide membrane in thicknesses specified in addition to crack treatment membrane application.

- 3.3.5. Apply top coat and minimal amount of silica aggregate for slip resistance, in accordance with reviewed mock-up.

### **3.4. SITE QUALITY CONTROL**

- 3.4.1. Site Tests and Inspections:

- 3.4.1.1. Inspect work of other Sections where such is associated with waterproofing membrane system including placement, finishing and curing of concrete substrate.

- 3.4.1.2. Owner may engage services of an independent inspection and testing company to carry out inspection and testing of materials and application.

- 3.4.1.3. Cost of such inspection and testing for Consultant's quality control, if required, shall be paid by Owner.

- 3.4.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

- 3.4.3. Manufacturer Services: Provide membrane manufacturer's supervision during preparation and application.

**3.5. CLEANING**

- 3.5.1. Clean and Make Good to Consultant's satisfaction, surfaces soiled or otherwise damaged in connection with work of this Section. Pay cost of replacing finishes or materials that cannot be satisfactorily cleaned.

**3.6. PROTECTION**

- 3.6.1. Protect surfaces which are not to be treated from soiling by spillage, overspray or other causes in connection with work of this Section.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
- 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide balcony waterproofing including but not limited to following:
  - 1.2.1.1. elastomeric balcony waterproofing.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Structural concrete slab, finishing and curing: Section 03 30 00, Cast-In-Place Concrete.

**1.3. REFERENCES**

- 1.3.1. Reference Standards:
  - 1.3.1.1. ASTM D412-16(21) - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
  - 1.3.1.2. ASTM D2240-15(21) - Standard Test Method for Rubber Property–Durometer Hardness
  - 1.3.1.3. ASTM D4060-19 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
  - 1.3.1.4. ASTM D4541-17 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

**1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Preinstallation Meetings: Arrange preinstallation meeting 1 week before commencing work with all parties associated with trade as designated in Contract Documents or as requested by Consultant. Presided over by Construction Manager, include Consultant who may attend, Trade Contractor performing work of this trade, Owner's representative, testing company's representative and consultants of applicable discipline. Review Contract Documents for work included under this trade and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of work of this Section.

**1.5. SUBMITTALS**

- 1.5.1. Product Data: Provide cured film data based on following:
  - 1.5.1.1. Tensile Elongation and Strength based on ASTM D412.
  - 1.5.1.2. Hardness (Shore A) based on ASTM D2240.
  - 1.5.1.3. Tensile Adhesion to Concrete based on ASTM D4541.

1.5.1.4. Abrasion Resistance based on ASTM D4060.

**1.6. QUALIFICATIONS**

1.6.1. Qualifications:

1.6.1.1. Installers: Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of Product manufacturers.

1.6.2. Mock-Ups: Construct minimum 10 m<sup>2</sup> (100 sq ft) mock-up sample at Project location designated by Consultant for review. Once reviewed with no objections recorded, sample remains part of finished work and used as a quality reference standard for balance of Project.

**1.7. WARRANTY**

1.7.1. Manufacturer Warranty:

1.7.1.1. Warrant work of this Section for period of 2 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner.

1.7.1.2. Cracks arising from normal shrinkage and/or expansion of concrete are not considered as structural failure. Hairline cracks which result from these causes are considered normal and consequently warranty will not be voided as a result of these minor defects.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:

2.1.1.1. Kemper System Canada, Inc.; [www.kemper-system.com](http://www.kemper-system.com)

2.1.1.2. Neogard; [www.neogard.com](http://www.neogard.com)

2.1.1.3. Sika Canada Inc. [www.sika.ca](http://www.sika.ca)

2.1.1.4. Tremco Canada; [www.tremcosealants.com](http://www.tremcosealants.com)

2.1.2. Substitution Limitations: Comparable Products from manufacturers listed or not listed herein may be reviewed provided they meet requirements of this Specification.

**2.2. MATERIALS**

2.2.1. Performance/Design Criteria: Ensure waterproofing treatment prevents passage of water under pressure and capable of spanning cracks up to 1.5 mm (1/16") without failure.

2.2.2. Balcony Waterproofing: Ensure elastomeric waterproof membrane and 2 component flexible, flame retardant epoxy topping capable for pedestrian traffic are 1 of following:

2.2.2.1. "Coelan® Balcony System" by Kemper System Canada, Inc. 0.813 mm (32 mils).

2.2.2.2. "Peda-Gard" by Neogard, 0.813 mm (32 mils).

2.2.2.3. "Sikalastic® Resoflex" by Sika Canada Inc., membrane and top coat total thickness: 0.813 mm (32 mils).

2.2.2.4. "Vulkem 350/351 Pedestrian Deck Coating System" by Tremco Canada, 0.762 mm - 1.270 mm (30 - 50 mils).

---

**PART 3 - EXECUTION**

**3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.2. PREPARATION**

- 3.2.1. Surface Preparation:
  - 3.2.1.1. Free surfaces to receive work of this Section from dust and loose particles, grease, paint, frost, form oil and other material detrimental to bond of waterproofing. Employ steam cleaning where necessary to remove form oil.
  - 3.2.1.2. Sandblast, or abrade and clean using a steel shot blast machine having vacuum pick-up, whichever is deemed necessary, depending on condition of concrete.
  - 3.2.1.3. Ensure substrate surfaces are free from cavities and/or shutter marks which will damage traffic topping membrane.
  - 3.2.1.4. Ensure surfaces are dry at commencement of work and cured minimum of 28 Days. Remove dust and dirt with industrial type vacuum cleaner.
  - 3.2.1.5. Ensure ambient and surface temperatures are at least 10 deg C (50 deg F) for a minimum period of 48 hours before, during and after membrane application.
  - 3.2.1.6. Ensure substrates slope properly to drains.

**3.3. APPLICATION**

- 3.3.1. Apply in accordance with manufacturer's printed application instructions.
- 3.3.2. Ensure preparation of substrate, crack control and membrane application complies with detailed requirements recommended by membrane manufacturer.
- 3.3.3. Apply primer at coverage rate recommended by manufacturer for particular surface porosity. Do not permit primer to collect in pools. Prevent seepage through joints. Allow to dry thoroughly.
- 3.3.4. Provide membrane in thickness specified in addition to crack treatment membrane application.
- 3.3.5. Apply top coat and minimal amount of silica aggregate for slip resistance, in accordance with reviewed samples.

**3.4. SITE QUALITY CONTROL**

- 3.4.1. Site Tests and Inspections:
  - 3.4.1.1. Inspect work of other Sections where such is associated with waterproofing membrane system including placement, finishing and curing of concrete substrate.
  - 3.4.1.2. Owner may engage services of an independent inspection and testing company to carry out inspection and testing of materials and application.
  - 3.4.1.3. Cost of such inspection and testing for Consultant's quality control, if required, shall be paid by Owner.
- 3.4.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

- 3.4.3. Manufacturer Services: Provide membrane manufacturer's supervision during preparation and application.

**3.5. CLEANING**

- 3.5.1. Clean and Make Good to Consultant's satisfaction, surfaces soiled or otherwise damaged in connection with work of this Section. Pay cost of replacing finishes or materials that cannot be satisfactorily cleaned.

**3.6. PROTECTION**

- 3.6.1. Protect surfaces which are not to be treated from soiling by spillage, overspray or other causes in connection with work of this Section.

**END OF SECTIO**



**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide building insulation including but not limited to following:
  - 1.2.1.1. board, batt and loose insulation throughout building, except as specified under other Sections. This Section establishes insulation and accessory Products and minimum performance criteria which apply to board, batt and loose insulation types used throughout this Project. Read and become familiar with insulation requirements of all Sections.
  - 1.2.1.2. where combustible insulation or vapour barrier materials are specified herein, comply with applicable Code requirements including supply and installation of approved non-combustible backing and independently-supported, non-combustible insulation covering except where these provisions are expressly specified as work of other Sections.
  - 1.2.1.3. ensure material types (trade names), compatibility, sealing and adhesive qualities for each combination of insulation, adhesive and substrate encountered in work are reviewed for compatibility and suitability prior to commencement of installation. Include manufacturer's laboratory reports on adhesive quality and compatibility of each of these conditions.
  - 1.2.1.4. air sealing to supplement and provide continuity of main and primary air/vapour barrier assembly including sealing and/or filling of perimeter of door and window openings, crevices, gaps, cracks in walls, roof/wall connections, mechanical and electrical penetrations in walls, floors, roofs, curtain wall mullions, beams, columns enclosures and other similar locations with polyurethane foam consisting of a single mix of chemical in pressurized container formulated to cure when exposed to moisture present in air to provide and maintain air/vapour barrier integrity and impermeable barrier to air infiltration or loss.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of foamed-in-place insulation: Section 07 21 19, Foamed-In-Place Insulation.
  - 1.2.2.2. Insulation within metal wall siding system: Section 07 46 19, Metal Siding System.
  - 1.2.2.3. Provision of roof insulation in inverted roofing system: Section 07 55 56, Fluid-Applied Protected Membrane Roofing.
  - 1.2.2.4. Acoustic sealant: Section 07 92 00, Joint Sealants.
  - 1.2.2.5. Provision of insulation within curtain wall system: Section 08 44 13, Glazed Aluminum Curtain Wall.
  - 1.2.2.6. Provision of insulation within window wall system: Section 08 51 66, Aluminum Window Wall.
  - 1.2.2.7. Insulation for mechanical work: Division 21, Fire Suppression, Division 22, Plumbing and Division 23, Heating, Ventilating and Air Conditioning.
- 1.3. REFERENCES**
  - 1.3.1. Abbreviations and Acronyms:
    - 1.3.1.1. LTTR: Long Term Thermal Resistance.

- 1.3.1.2. NRCC: National Research Council of Canada; [www.nrc-cnrc.gc.ca](http://www.nrc-cnrc.gc.ca).
- 1.3.1.3. OBC: Ontario Building Code.
- 1.3.2. Definitions:
- 1.3.2.1. Rain Screen Principle: A theory governing the design of a building enclosure in such a way as to prevent water penetration due to rain; in other words, a scientific approach to eliminating water leakage.
- 1.3.3. Reference Standards:
- 1.3.3.1. ASTM C165-07(17) - Standard Test Method for Measuring Compressive Properties of Thermal Insulations
- 1.3.3.2. ASTM C518-21 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- 1.3.3.3. ASTM C1136-21 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
- 1.3.3.4. ASTM C1303/C1303M-19 - Standard Test Method for Predicting Long-Term Thermal Resistance of Closed-Cell Foam Insulation
- 1.3.3.5. ASTM C1338-19 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
- 1.3.3.6. ASTM D2842-19 - Standard Test Method for Water Absorption of Rigid Cellular Plastics
- 1.3.3.7. ASTM E96/E96M-21 - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
- 1.3.3.8. CAN/CGSB-51.34-M86 - Vapour Barrier, Polyethylene Sheet for Use in Building Construction
- 1.3.3.9. CGSB 71-GP-24M - Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation
- 1.3.3.10. CAN/ULC-S102-18 - Test Method of Surface Burning Characteristics of Building Materials and Assemblies
- 1.3.3.11. CAN/ULC-S114-18 - Standard Method of Test for Determination of Non-Combustibility in Building Materials
- 1.3.3.12. CAN/ULC-S701-17 - Standard for Thermal Insulation, Polystyrene Boards
- 1.3.3.13. CAN/ULC-S702.1-21 - Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification
- 1.3.3.14. CAN/ULC-S704-17 - Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced
- 1.3.3.15. CAN/ULC-S770-15(20) - Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams

#### **1.4. QUALITY ASSURANCE**

- 1.4.1. Qualifications:
- 1.4.1.1. Installers:
- 1.4.1.1.1. Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

- 1.4.1.1.2. Employ only skilled mechanics having experience in the work specified and having an understanding of the design principles of the thermal and air/vapour barriers which they are providing.

**1.5. DELIVERY, STORAGE AND HANDLING**

- 1.5.1. Delivery and Acceptance Requirements: Deliver materials to site in original wrappings with labels intact and store in areas directed by Consultant.
- 1.5.2. Storage and Handling Requirements:
- 1.5.2.1. Store insulation on raised platforms and protect with waterproof covers. Prevent exposure of insulation to sun.
- 1.5.2.2. Store materials inside buildings for 24 hours prior to installation.

**1.6. SITE CONDITIONS**

- 1.6.1. Ambient Conditions: Maintain surface and ambient temperatures during application and curing of adhesive at temperature recommended by manufacturer of type of adhesive used.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
- 2.1.1.1. Atlas EPS; [www.atlaseps.com](http://www.atlaseps.com)
- 2.1.1.2. Atlas Roofing Corporation; [www.atlasroofing.com](http://www.atlasroofing.com)
- 2.1.1.3. CertainTeed Corporation; [www.certainteed.com](http://www.certainteed.com)
- 2.1.1.4. DuPont de Nemours Inc.; [www.dupont.com](http://www.dupont.com)
- 2.1.1.5. IKO Industries Ltd.; [www.iko.com](http://www.iko.com)
- 2.1.1.6. Johns Manville Canada Inc.; [www.jm.com](http://www.jm.com)
- 2.1.1.7. Owens Corning Canada LP; [www.insulation.owenscorning.ca](http://www.insulation.owenscorning.ca)
- 2.1.1.8. ROCKWOOL™ International A/S; [www.rockwool.com](http://www.rockwool.com)
- 2.1.1.9. Thermafiber, Inc. (Owens Corning Canada LP); [www.thermafiber.com](http://www.thermafiber.com)
- 2.1.2. Substitution Limitations: Comparable Products from other manufacturers not listed herein may be reviewed provided they meet requirements of this Specification.

**2.2. MATERIALS**

- 2.2.1. Performance/Design Criteria:
- 2.2.1.1. Exterior envelope is based on "Rain Screen Principle" by NRCC. This requires construction behind cladding act as an air/vapour barrier to prevent passage of moisture laden air and diffusion of water vapour. To ensure continuity of air/vapour barrier within construction specified herein and with adjacent barrier construction is part of responsibility of this Section.
- 2.2.1.2. Refer to Drawings for thicknesses of insulation required. Select appropriate products from list of materials on basis of their maintaining thermal value of envelope, total compatibility when incorporated into finished system while ensuring substrate conditions as well as their ability to adhere components permanently, where applicable in rigid manner and maintain flexibility where required in finished work.
- 2.2.1.3. Ensure insulation materials and their facings do not support fungal growth when tested in accordance with ASTM C1338.

- 2.2.2. High Density Insulation Under Concrete Slab: CAN/ULC-S701, Type 4, extruded polystyrene insulation with LTTR of RSI (R) value of 0.87 (5) when determined in accordance with CAN/ULC-S770 and ASTM C1303/C1303M, compressive strength 415 kPa (60 psi), thickness as indicated on Drawings. Water Absorption: Max. 0.70% by volume to ASTM D2842, "STYROFOAM™ HIGHLOAD 60 (60 psi)" by DuPont de Nemours Inc. or "FOAMULAR® NGX 600 (60 psi)" by Owens Corning Canada LP.
- 2.2.3. Cavity Insulation: Semi-rigid stone wool board, CAN/ULC-S702.1, Type 1, minimum RSI (R) value of 0.75 (4.3) per 25 mm (1"), "ROCKWOOL™ CAVITYROCK®" by ROCKWOOL™ International A/S, "JM CladStone™ Water & Fire Block Insulation" by Johns Manville Canada Inc., minimum RSI (R) value of 0.75 (4.3) per 25 mm (1"), thickness as indicated on Drawings.
- 2.2.4. Wall Insulation: CAN/ULC-S701, Type 3, extruded polystyrene insulation with LTTR of RSI (R) value of 0.88 (5) when determined in accordance with CAN/ULC-S770 and ASTM C518, minimum compressive strength 140 kPa (20 psi), thickness as indicated on Drawings. Supply boards with shiplapped edges at horizontal locations and butt joints elsewhere; "STYROFOAM™ Brand Cladmate™ CM20 Extruded Polystyrene Foam Insulation" by DuPont de Nemours Inc. or "FOAMULAR® NGX C-200" by Owens Corning Canada LP.
- 2.2.5. Rigid Fibrous Glass and Semi-Rigid Stone Wool Board Insulation: Fibrous glass or stone wool rigid or semi-rigid board insulation, "Fiberglas® 703" by Owens Corning Canada LP, "ROCKWOOL™ CURTAINROCK®" by ROCKWOOL™ International A/S, "MinWool® Curtainwall CW4" by Johns Manville Canada Inc. or "Thermafiber® FireSpan® 40 Mineral Wool Insulation" by Thermafiber, Inc. (Owens Corning Canada LP). Ensure insulation has a thermal resistance value of not less than RSI=0.704 (R=4) at a mean temperature of 24 deg C (75 deg F) and a minimum nominal density of 64 kg/m<sup>3</sup> (4 pcf). Ensure deformation of fibrous glass rigid board does not exceed 10% when tested at 1.2 kPa (25 psf) in accordance with CAN/ULC-S702.1, Type 1 and ASTM C165. Thickness as indicated.
- 2.2.6. Parking Garage Underdecking:
- 2.2.6.1. Insulation: Non-combustible semi-rigid mineral wool insulation board, "FABROCK™ LT" by ROCKWOOL™ International A/S or "Thermafiber® VersaBoard® 40 Mineral Wool Insulation" by Thermafiber, Inc. (Owens Corning Canada LP) with a white reflective facing added. Ensure insulation has a thermal resistance value of not less than RSI=0.702 (R=4) at a mean temperature of 24 deg C (75 deg F) and a minimum nominal density of 64 kg/m<sup>3</sup> (4.0 pcf).
- 2.2.6.2. Vapour-Retarder Facing: Provide a white [black] coloured facing in accordance with ASTM C1136, having a vapour permeance less than 57 ng/Pa•sm<sup>2</sup> (1 US perm) when tested in accordance with ASTM E96/E96M, Procedure A, a Flame Spread rating less than 25 and Smoke Developed less than 50 in accordance with CSA/ULC-S102. Permitted Product: "WMP-10 Standard Duty" by LAMTEC® Corporation; [www.lamtec.com](http://www.lamtec.com).
- 2.2.6.3. Thickness as indicated by 1 of following fabricators:
- 2.2.6.3.1. ARTIK/OEM; [www.artikoem.com](http://www.artikoem.com)
- 2.2.6.3.2. Insultech Insulation Products Inc.; [www.insultech.com](http://www.insultech.com)
- 2.2.6.3.3. Multiglass Insulation Ltd.; [www.multiglass.com](http://www.multiglass.com)
- 2.2.6.3.4. Total Laminating Products Ltd.; [www.tlpinsulation.com](http://www.tlpinsulation.com)
- 2.2.7. Batt or Roll Insulation:
- 2.2.7.1. Miscellaneous Batt or Roll Insulation: CAN/ULC-S702.1.
- 2.2.7.2. Soffit or Ceiling Insulation: Preformed glass fibre or stone wool batt or roll insulation, conforming to CAN/ULC-S702.1, thickness as indicated on Drawings.

- 2.2.8. Rigid Polyisocyanurate Cavity Wall Insulation Boards: Square edged, closed cell polyisocyanurate foam manufactured using Zero Ozone Depleting Potential (ZeroODP) CFC -, HCFC- and HFC-free blowing agents and integrally laminated to a radiant barrier quality reflective foil facer on 1 side and non-reflective, red acrylic-coating facer on other side, meeting requirements of CAN/ULC-S704, Type 1 or 2, Class 1. Provide total thickness as shown on Drawings and following:
- 2.2.8.1. Thermal Value: Ensure insulation has minimum compressive strength of 110 kPa (16 psi) and LTTR R-value of 5.6 when determined in accordance with CAN/ULC-S770 per square edged layer.
- 2.2.8.2. Dimension Stability: 2% maximum linear change when conditioned at 70 deg C (158 deg F) and 97% relative humidity for 7 Days; curing time 24 hours minimum, plus an additional 24 hours minimum per inch (25 mm) of thickness, at a minimum of 16 deg C (60 deg F) before shipment from manufacturer.
- 2.2.8.3. Maximum board size is 1220 mm x 2743 mm, (4' x 9').
- 2.2.8.4. Ensure insulation is without limitations devoid of face-sheet delamination, edge cavitation, cupping, bowing, crushing or powdering. Provide thermal value and in multiple layers to thickness shown on Drawings. Provide "EnergyShield®" by Atlas Roofing Corporation, "AP™ Foil-Faced Foam Sheathing" Johns Manville Canada Inc., "THERMAX™ Sheathing" by DuPont de Nemours Inc. or "IKO Enerfoil™ Sheathing" by IKO Industries Ltd.
- 2.2.9. Rigid Polyisocyanurate Cavity Wall Insulation Boards: Square edged, closed cell polyisocyanurate foam manufactured using Zero Ozone Depleting Potential (ZeroODP) CFC -, HCFC- and HFC-free blowing agents and integrally laminated to non-reflective coated glass-mat facers both sides, meeting requirements of CAN/ULC-S704, Type 2, Class 3. Provide total thickness as shown on Drawings and following:
- 2.2.9.1. Thermal Value: Ensure insulation has minimum compressive strength of 110 kPa (16 psi) and LTTR R-value of 5.6 when determined in accordance with CAN/ULC-S770 per square edged layer.
- 2.2.9.2. Dimension Stability: 2% maximum linear change when conditioned at 70 deg C (158 deg F) and 97% relative humidity for 7 Days; curing time 24 hours minimum, plus an additional 24 hours minimum per inch (25 mm) of thickness, at a minimum of 16 deg C (60 deg F) before shipment from manufacturer.
- 2.2.9.3. Maximum board size is 1220 mm x 2743 mm, (4' x 9').
- 2.2.9.4. Ensure insulation is without limitations devoid of face-sheet delamination, edge cavitation, cupping, bowing, crushing or powdering. Provide thermal value and in multiple layers to thickness shown on Drawings. Provide "Rboard®" by Atlas Roofing Corporation, "R-Panel™" by Johns Manville Canada Inc. "THERMAX™ Sheathing" by DuPont de Nemours Inc.
- 2.2.10. Sound Attenuation Batts: CAN/ULC-S702.1, mineral (glass and stone wool) fibre, flame spread and smoke developed in conformance with OBC requirements and other authorities having jurisdiction in accordance with CAN/ULC-S102. Non-combustible in accordance with requirements of CAN/ULC-S114. Permitted Products: "EcoTouch™ QuietZone® PINK™ FIBERGLAS® Acoustic Insulation" by Owens Corning Canada LP, "ROCKWOOL™ AFB - Acoustical Fire Batt Insulation" by ROCKWOOL™ International A/S, "Sound-SHIELD® Formaldehyde-Free Fiber Glass Insulation" by Johns Manville Canada Inc., "NoiseReducer™ Sound Attenuation Batts" by CertainTeed Corporation or "Thermafiber® SAFB™ Mineral Wool Insulation" by Thermafiber, Inc. (Owens Corning Canada LP), of sufficient thickness to meet required STC rating for sound-rated partitions and of width to suit metal framing spacing and other miscellaneous spacings.
- 2.2.11. Vapour Barrier: Polyethylene film, CAN/CGSB-51.34-M, 0.15 mm (6 mils) thick.
- 2.2.12. Adhesive Tape for Sealing Vapour Barrier Joints:
- 2.2.12.1. Polyethylene Adhesive Tape: "Scotch brand No. 483" by 3M Canada Inc.

- 2.2.13. Adhesive: As recommended by manufacturer of insulating materials:
- 2.2.13.1. Type A: For glass fibre rigid insulation. Synthetic rubber base, solvent type, trowel consistency for use with glass fibre rigid insulation, "230-38 Fire Resistive Adhesive" by Henry Company; [www.henry.com](http://www.henry.com) or "TacToo® GPA-72 General Purpose Adhesive" by AGM Industries, Inc.; [www.agmind.com](http://www.agmind.com).
- 2.2.13.2. Type B: For polystyrene rigid insulation. CGSB 71-GP-24M, Type 1, for bead application and Type 2 for trowel application.
- 2.2.13.3. Type C: For polystyrene or glass fibre rigid insulation. Vapour barrier type, medium trowel consistency, or "Air-Bloc® 21" by Henry Company.
- 2.2.14. Mechanical Fasteners:
- 2.2.14.1. Insulation Fasteners: 60 mm (2-3/8") diameter high density polyethylene (HDPE) fastener with integrated cap. Permitted Product: "Ramset T3 InsulFast™ System" by ITW Construction Products; [www.itwconstruction.ca](http://www.itwconstruction.ca).
- 2.2.14.2. Self-Adhered Insulation Clips: Impale type, perforated 50 mm x 50 mm (2" x 2") cold rolled steel adhesive back, spindle of length to suit insulation plus 25 mm (1") with speed washers. Permitted Products: "Self-Adhering TACTOO® Insul-Hangers" by AGM Industries, Inc.; [www.agmind.com](http://www.agmind.com) or "Self-Adhering TACTOO® Insul-Hangers" by Continental Studwelding Ltd.; [www.constud.ca](http://www.constud.ca).
- 2.2.14.3. Glued Insulation Clips: Impale type, perforated 50 mm x 50 mm (2" x 2") cold rolled galvanized steel, spindle of length to suit insulation plus 25 mm (1") with speed washers. Permitted Products: "Perforated TACTOO® Insul-Hangers" by AGM Industries, Inc.; [www.agmind.com](http://www.agmind.com) or "Perforated TACTOO® Insul-Hangers" by Continental Studwelding Ltd.; [www.constud.ca](http://www.constud.ca).
- 2.2.14.4. Strip Impalement Clips: 25 mm (1") wide strip of "Insul Hold Clips" by Insul Hold Canada Ltd., fabricated from galvanized sheet in rolls with punch out insulation securement arrows.
- 2.2.14.5. Nails: Galvanized steel, length 25 mm (1") longer than insulation thickness.
- 2.2.14.6. Staples: Galvanized wire, 13 mm (1/2") minimum.

### **PART 3 - EXECUTION**

#### **3.1. PREPARATION**

- 3.1.1. Surface Preparation: Ensure surfaces to receive adhesive or insulation are dry, firm, straight and free from loose material, projections, ice, frost, slick, grease, oil or other matter detrimental to bond of adhesive or uniform bedding of insulation.

#### **3.2. INSTALLATION**

- 3.2.1. Install insulation when conditions meet requirements specified under "Preparation".
- 3.2.2. Install insulation to maintain continuity of thermal protection to building elements and spaces as indicated on Drawings.
- 3.2.3. Fit insulation tight to electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other projections or openings.
- 3.2.4. Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation panels free from ripped backs or chipped or broken edges. Ensure integrity and continuity of insulation at juncture with different types of materials and seal in permitted manner. Stagger joints in row.
- 3.2.5. Install materials in accordance with manufacturer's instructions.
- 3.2.6. Do not cover insulation and air/vapour barrier installed under this Section or other Sections until it has been reviewed by Consultant.

- 3.2.7. Rigid Insulation:
- 3.2.7.1. With glass fibre insulation apply Type A adhesive to insulation board at rate of 1  $\text{l/m}^2$  (50 sq ft/gal) by notched trowel with 5 mm (3/16") notches at 10 mm (3/8") oc or apply at rate of 0.35  $\text{l/m}^2$  (130 +/-10 sq ft/gal) by spot method with daubs 25 mm - 40 mm (1" to 1-1/2") dia x 25 mm (1") high at 200 mm (8") oc each way or by bead method with 8 mm (5/16") diameter beads 350 mm (14") oc.
- 3.2.7.2. With glass fibre or polystyrene insulation, apply Type B adhesive to insulation board at a rate of 0.35  $\text{l/m}^2$  (130 +/-10 sq ft/gal), by spot method with daubs, 25 mm - 40 mm (1" to 1-1/2") dia x 25 mm (1") high at 200 mm (8") oc each way or by bead method with 8 mm (5/16") dia beads 350 mm (14") oc.
- 3.2.7.3. With polystyrene and glass fibre insulation apply Type C adhesive to substrate material at rate of 3  $\text{l/m}^2$  (16 sq ft/gal) 3 mm (1/8") thick, to achieve a continuous vapour retardant film. Butter edges of board for continuous seal.
- 3.2.7.4. Fix insulation using either clip or fastener type fasteners on substrate, 5 per 600 mm x 1200 mm (24" x 48") board minimum. Impale insulation board on insulation clips, butting joints firmly together and secure with washers, cut off spindles 3 mm (1/8") beyond washer or apply insulation fasteners through insulation with a "Ramset T3IGT Gas Tool".
- 3.2.7.5. Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm (6") wide 0.15 mm (6 mils) polyethylene strip over joint using compatible adhesive prior to application of insulation.
- 3.2.7.6. Provide flexible insulation of equivalent thickness and thermal insulation to fit areas where application of rigid insulation is not possible to provide continuous coverage.
- 3.2.7.7. Under Concrete Floor Slab Insulation: Lay insulation boards on level compacted fill extending a minimum of 600 mm (24") in from perimeter foundation wall.
- 3.2.8. Batt or Roll Insulation:
- 3.2.8.1. Install batt or roll insulations where indicated on Drawings.
- 3.2.8.2. Fit batt between framing and press firmly into place. Butt tightly at joints, free of gaps.
- 3.2.8.3. Insulate behind pipes, ducts, electric conduits and outlets or junction boxes. Cut insulation to fit around and behind obstructions and non-standard spaces.
- 3.2.8.4. Place insulation over soffit grid system sealing around metal hangers and at wall on all sides. Carry insulation up wall and fit around steel or in masonry voids and over plaster ceiling.
- 3.2.9. Vapour Barrier:
- 3.2.9.1. Staple vapour barrier to inside face of insulation. Ensure continuous vapour barrier envelope of entire building.
- 3.2.9.2. Staple vapour barrier securely in place at 400 mm (16") oc both directions.
- 3.2.9.3. Lap joints 150 mm (6").
- 3.2.9.4. Tape joints with polyethylene tape.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 5A - 2010, Construction Management Contract – for Services as amended in the Contract Documents.
  - 1.1.1.2. CCDC 17 - 2010, Stipulated Price Contract between Owner and Trade Contractor for Construction Management Projects as amended in the Contract Documents.
  - 1.1.1.3. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide foamed-in-place insulation including but not limited to following:
  - 1.2.1.1. spray foamed-in-place insulation and air barrier.
  - 1.2.1.2. field testing of spray foamed-in-place insulation and air barrier.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of cast-in-place concrete: Section 03 30 00, Cast-In-Place Concrete.
  - 1.2.2.2. Provision of concrete block masonry: Section 04 20 00, Masonry Units.
  - 1.2.2.3. Provision of structural steel studs and exterior sheathing: Section 05 41 00, Structural Metal Stud Framing System.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. LTTR: Long Term Thermal Resistance.
- 1.3.2. Reference Standards:
  - 1.3.2.1. ASTM E96/E96M-21 - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
  - 1.3.2.2. CAN/ULC-S705.1-18 - Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density – Material Specification
  - 1.3.2.3. CAN/ULC-S705.2-20 - Standard for Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density - Application
  - 1.3.2.4. CAN/ULC-S770-15(20) - Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams

**1.4. QUALITY ASSURANCE**

- 1.4.1. Qualifications:
  - 1.4.1.1. Installers: Provide work of this Section executed by competent installers with minimum of 5 years experience application of Products, systems and assemblies specified and with approval and training of the Product manufacturers. Provide written proof from spray foam manufacturer confirming these requirements have been met prior to installation.



---

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
- 2.1.1.1. BASF Canada Inc.; [www.basf.com](http://www.basf.com)
- 2.1.1.2. Carlisle Spray Foam Insulation; [www.carlislesfi.com](http://www.carlislesfi.com)
- 2.1.1.3. Genyk Inc.; [www.genyk.com](http://www.genyk.com)
- 2.1.1.4. Huntsman Building Solutions; [www.huntsmanbuildingsolutions.com](http://www.huntsmanbuildingsolutions.com)

**2.2. MATERIALS**

- 2.2.1. Foamed-In-Place Insulation: Provide 2 component closed cell foam-in-place polyurethane foam with following requirements:
- 2.2.1.1. Minimum Core Density: 28 kg/m<sup>3</sup> (1.75 lb/cu ft) in accordance with CAN/ULC-S705.1.
- 2.2.1.2. LTTR Value: 5.2/inch minimum in accordance with CAN/ULC-S770.
- 2.2.1.3. Water Vapour Permeance: Maximum of 57 ng/Pa•s•m<sup>2</sup> (1 US Perm) when tested in accordance with ASTM E96/E96M.
- 2.2.1.4. Permitted Products: "Walltite® CM01" by BASF Canada Inc., "SealTite™ One" by Carlisle Spray Foam Insulation, "BOREAL ELITE" by Genyk Inc. or "HEATLOK® SOYA HFO™" by Huntsman Building Solutions.

**PART 3 - EXECUTION**

**3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.2. PREPARATION**

- 3.2.1. Surface Preparation:
- 3.2.1.1. Prepare substrate surfaces dry and free of dew, frost, voids, loose material, oil, grease, asphalt and curing compounds in accordance with CAN/ULC-S705.2.
- 3.2.1.2. Provide masking as necessary to prevent overspray.

**3.3. INSTALLATION**

- 3.3.1. Provide foamed-in-place insulation in accordance with CAN/ULC-S705.2 and manufacturer's recommendations.
- 3.3.2. Provide foamed-in-place insulation to full area of surfaces indicated to be insulated and to provide a uniform and continuous thermal and airseal barrier.
- 3.3.3. Provide foamed-in-place insulation over projecting anchors and fastenings, around pipes, ducts, obstructions, openings and corners.
- 3.3.4. Provide foamed-in-place insulation free of voids and imbedded foreign materials.
- 3.3.5. Prevent overspray and remove masking materials.

**3.4. SITE QUALITY CONTROL**

3.4.1. Site Tests and Inspections:

3.4.1.1. Arrange and pay for cost of site reviews/tests in accordance with CAN/ULC-S705.2 by manufacturer's authorized third party testing agent. Schedule number of site reviews/tests in accordance with following schedule:

	<b>Coverage Area</b>	<b>No. of Site Reviews/Tests</b>
3.4.1.1.1.	3252 - 6503 m <sup>2</sup> (35,000 - 70,000 sq ft)	1
3.4.1.1.2.	6503 - 9755 m <sup>2</sup> (70,000 - 105,000 sq ft)	2
3.4.1.1.3.	9755 - 13 006 m <sup>2</sup> (105,000 - 140,000 sq ft)	3
3.4.1.1.4.	over 13 006 m <sup>2</sup> (over 140,000 sq ft)	4+

3.4.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide miscellaneous air/vapour barriers including but not limited to following:
  - 1.2.1.1. air/vapour barriers required to maintain air/vapour integrity of building envelope not shown or identified on Drawings or specified under another Section.
  - 1.2.1.2. coordination of work of this Section with other trades working on building envelope.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of exterior sheathing: Section 05 41 00, Structural Metal Stud Framing System.
  - 1.2.2.2. Thermal insulation and non-air/vapour type adhesives: Section 07 21 00, Building Insulation.
  - 1.2.2.3. Stick fasteners for rigid insulation: Section 07 21 00, Building Insulation.
  - 1.2.2.4. Provision of gypsum board work: Section 09 21 16, Gypsum Board Assemblies.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. DFT: Dry Film Thickness.
  - 1.3.1.2. ELA: Equivalent Leakage Air.
  - 1.3.1.3. NBCC: National Building Code of Canada.
  - 1.3.1.4. SAT: Self Adhesive Type.
  - 1.3.1.5. SBS: Styrene-butadiene-styrene.
  - 1.3.1.6. WFT: Wet Film Thickness.
- 1.3.2. Reference Standards:
  - 1.3.2.1. ASTM E96/E96M-21 - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
  - 1.3.2.2. ASTM E283/E283M-19 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
  - 1.3.2.3. ASTM E2178-21a - Standard Test Method for Determining Leakage Rate and Calculation of Air Permeance of Building Materials
  - 1.3.2.4. CAN/CGSB-51.33-M89 - Vapour Barrier Sheet, Excluding Polyethylene for Use in Building Construction
  - 1.3.2.5. CAN/ULC-S741-08(20) - Standard for Air Barrier Materials - Specification

**1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Preinstallation Meetings: Arrange preinstallation meeting 1 week prior to commencing work with all parties associated with trade as designated in Contract Documents or as requested by Consultant. Presided over by Construction Manager, include Consultant who may attend, Trade Contractor performing work of this trade, Owner's representative, testing company's representative and consultants of applicable discipline. Review Contract Documents for work included under this trade and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of work of this Section.

**1.5. SUBMITTALS**

- 1.5.1. Samples: Submit samples in accordance with requirements of Section 01 30 00.

**1.6. QUALITY ASSURANCE**

- 1.6.1. Qualifications:
- 1.6.1.1. Installers: Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.
- 1.6.2. Mock-Ups: To identical substrate materials scheduled for use in finished building, provide on site in location as directed, mock-up panels to which each combination of materials to be used under this Section is installed, interlapped, reinforced and secured to demonstrate compatibility, adhesion and cohesion qualities, fastening systems of flats and general workmanship to be used throughout finished work. For liquid applied Products, provide both WFT and DFT required to meet specified performance values.

**1.7. DELIVERY, STORAGE AND HANDLING**

- 1.7.1. Storage and Handling Requirements:
- 1.7.1.1. Store materials in weathertight enclosure raised clear of ground so they are protected from sunlight, weather exposure, moisture and deterioration.
- 1.7.1.2. Comply with manufacturer's printed recommendations for handling of materials.

**1.8. WARRANTY**

- 1.8.1. Manufacturer Warranty: Warrant materials of this Section for period of 3 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to; material remaining air and water tight.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
- 2.1.1.1. 3M Canada; [www.3m.ca](http://www.3m.ca)
- 2.1.1.2. BASF Wall Systems; [www.enershield.basf.com](http://www.enershield.basf.com)
- 2.1.1.3. Corsella-Dorken Products, Inc.; [www.corsella-dorken.com](http://www.corsella-dorken.com)
- 2.1.1.4. GCP Applied Technologies, Inc.; [www.gcpat.com](http://www.gcpat.com)

- 2.1.1.5. Henry Company; [www.henry.com](http://www.henry.com)
- 2.1.1.6. IKO Industries Ltd.; [www.iko.com](http://www.iko.com)
- 2.1.1.7. Kemper System Canada, Inc.; [www.kempersystem.ca](http://www.kempersystem.ca)
- 2.1.1.8. Soprema Inc.; [www.soprema.ca](http://www.soprema.ca)
- 2.1.1.9. SRP Canada Inc.; [www.srpcanada.ca](http://www.srpcanada.ca)
- 2.1.1.10. Tremco Canada; [www.tremcosealants.com](http://www.tremcosealants.com)
- 2.1.1.11. W.R. Meadows of Canada; [www.wrmeadows.com](http://www.wrmeadows.com)

## **2.2. MATERIALS**

### **2.2.1. Performance/Design Criteria:**

- 2.2.1.1. Ensure air/vapour membrane system controls air leakage, moisture and thermal transfer while maintaining its structural integrity in accordance with NBCC. Ensure air/vapour membrane is continuous and compatible with interfacing materials in plane of air-tightness and sealed at interfaces to provide proper air barrier system in construction. Provide greater attention for air/vapour barrier continuity at physical connections of material components between window frames and wall assembly while taking into consideration construction tolerance, reduction of unnecessary interfaces in system and providing proper structural support to air/vapour barrier connections, such that wind loads, deflection and air pressure differentials do not cause connections to fail.
- 2.2.1.2. Ensure air barrier membranes have an air permeance of less than 0.02 l/s/m<sup>2</sup> (0.004 cfm/sq ft) under a pressure differential of 75 Pa (1.57 psf) when tested in accordance with ASTM E2178 or CAN/ULC-S741.
- 2.2.1.3. Ensure vapour barrier membranes have a vapour permeance of less than 57 ng/Pa•sm<sup>2</sup> (1 US perm) when tested in accordance with ASTM E96/E96M.
- 2.2.1.4. Air/vapour barrier membranes are able to withstand 2 kPa (42 psf) air pressure from either direction, with no increase in ELA.
- 2.2.1.5. When membrane forms a dual role ensure it meets requirements for air tightness and vapour diffusion control in accordance with ASTM E283/E283M and ASTM E96/E96M.
- 2.2.2. Material Compatibility: Of various materials specified herein, select combination of base materials, transition, bridging and reinforcing membranes, adhesives and accessories so when cured, they are compatible and give bonding characteristics equivalent to shear strength of selected air/vapour barrier materials used.
- 2.2.3. Air/Vapour Barrier Membrane: Supply 1 of following systems:
  - 2.2.3.1. SAT System (with Primer):
    - 2.2.3.1.1. Primer: As recommended by membrane manufacturer.
    - 2.2.3.1.2. Mastic: As recommended by membrane manufacturer.
    - 2.2.3.1.3. SAT Membrane: SBS modified bitumen or rubberized asphalt membrane, minimum 0.56 mm (22 mils) thick with polyethylene or polypropylene film membrane on 1 side and siliconized release paper on the other, cut to suit design and lap requirements, "Perm-A-Barrier Wall Membrane" by GCP Applied Technologies, Inc., "Blueskin® SA/Blueskin® SA LT" by Henry Company, "Air Shield" by W. R. Meadows of Canada, "ExoAir 110/110AT Self-Adhered" by Tremco Canada or "SOPRASEAL STICK 1100T" by Soprema Inc.
  - 2.2.3.2. SAT System (No Primer): Provide "LexShield SA" by Lexcor; [www.lexcor.net](http://www.lexcor.net) or "3M™ Air and Vapor Barrier Membrane 3015" by 3M Canada.

- 2.2.3.3. SAT System (High Temperature Resistant):
  - 2.2.3.3.1. Primer: As recommended by membrane manufacturer.
  - 2.2.3.3.2. Mastic: As recommended by membrane manufacturer.
  - 2.2.3.3.3. SAT Membrane: Self-adhering SBS modified bitumen or rubberized asphalt membrane with high softening point, minimum 1.016 mm (40 mils) thick with anti-slip coating on polyethylene or polypropylene film membrane on 1 side and siliconized release paper on the other, cut to suit design and lap requirements, "Blueskin® Roof High Temperature Underlayment - PE 200 HT" by Henry Company or "LASTOBOND SHIELD HT" by Soprema Inc.
- 2.2.3.4. Liquid Membrane System:
  - 2.2.3.4.1. Performance Requirements: Provide 1 of following systems to provide maximum permeance of 1.92 ng/Pa•s•m<sup>2</sup> (0.034 perms) at specified DFT in accordance with ASTM E96/E96M:
    - 2.2.3.4.1.1. Two component Dibromo polybutadiene trowel applied coating system; "Watertight TPM Air Seal" by PennKote Limited, complete with recommended reinforcing fabric and primers.
    - 2.2.3.4.1.2. One component elastomeric rubber, high solids trowel applied coating system; "Air-Bloc® 32MR" by Henry Company, complete with recommended primers.
    - 2.2.3.4.1.3. One component cold liquid applied, water based, polymer-modified, seamless, elastomeric air/vapour barrier, "Air-Shield LM" by W. R. Meadows of Canada.
    - 2.2.3.4.1.4. One component synthetic rubber high solids trowel applied coating system; "Air-Bloc® 21" by Henry Company or "Aquabarrier Mastic" by IKO Industries Ltd.
    - 2.2.3.4.1.5. One component water based synthetic rubber liquid applied coating system; "SOPRASEAL LM 203" by Soprema Inc.
    - 2.2.3.4.1.6. One component polymer-modified emulsion liquid applied coating system; "ExoAir 120" by Tremco Canada.
    - 2.2.3.4.1.7. One component, latex based membrane that cures to form a resilient monolithic, fully-bonded elastomer sheet when applied to substrate; "Perm-A-Barrier® NPL 10/NPL 10 LT" by GCP Applied Technologies, Inc.
    - 2.2.3.4.1.8. One component fluid-applied vapour impermeable air/water-resistive barrier, "Enershield™-I" by BASF Wall Systems.
  - 2.2.3.4.2. Ensure appropriate manufacturer approved accessories and materials are used in conjunction with liquid applied membrane.
- 2.2.3.5. Polyethylene sheet of minimum 150 µm (6 mils) thickness to CAN/CGSB-51.33-M, Type 2. Supply minimum 1800 mm (6') roll widths.
- 2.2.4. Vapour Permeable Air Barriers:
  - 2.2.4.1. SAT System:
    - 2.2.4.1.1. Self-adhesive vapour permeable air barrier membrane with a tri-laminated polypropylene complex facer.
    - 2.2.4.1.2. Vapour Permeance: Greater than 570 ng/Pa•s•m<sup>2</sup> (10 US perms).
    - 2.2.4.1.3. Primer: "ELASTOCOL STICK H<sub>2</sub>O" by Soprema Inc., "Blueskin® Adhesive" or "Aquatac Primer", "Hi-Tac™" by Henry Company or "DELTA®-LVC Primer" by Corsella-Dorken Products, Inc.
    - 2.2.4.1.4. SAT Membrane: "SOPRASEAL STICK VP" by Soprema Inc., "Blueskin® VP160" by Henry Company, "SRP AirOutshield™ SA 280" by SRP Canada Inc. or "DELTA®-VENT SA" by Corsella-Dorken Products, Inc.
  - 2.2.4.2. Liquid Membrane System:
    - 2.2.4.2.1. One component liquid made from modified rubber. Minimum application temperature 4 deg C (40 deg F).

- 2.2.4.2.2. "SOPRASEAL LM 202 VP", complete with "SOPRASEAL QUICK CORNER" and "SOPRASEAL MESH" by Soprema Inc.
- 2.2.4.2.3. One component, synthetic permeable air barrier membrane, monolithic elastomeric liquid applied coating system; "ExoAir® 230" by Tremco Canada.
- 2.2.4.2.4. One component elastomeric rubber, high solids trowel applied coating system; "Air-Bloc® 31MR" by Henry Company, complete with recommended primers.
- 2.2.4.2.5. One component fluid-applied, water based vapour-permeable membrane "Wall Guardian FW-100A" by Kemper System Canada, Inc.
- 2.2.4.2.6. One component cold liquid applied, water based, polymer-modified, seamless, elastomeric air/vapour barrier, "Air-Shield LMP" by W. R. Meadows of Canada.
- 2.2.5. Joint Sealing Tape: Air resistant pressure sensitive adhesive tape, type recommended by air/vapour barrier manufacturer, 50 mm (2") wide for lap joints and perimeter seals, 25 mm (1") wide elsewhere.
- 2.2.6. Adhesive: As recommended by sheet manufacturers.
- 2.2.7. Air/Vapour Barrier Sealant Tape: 50 mm (2") wide polyethylene with laminated cloth backing with high-tack rubber-based adhesive in total minimum thickness of 38 µm (1-1/2 mil); "483 Tape" by 3M Canada.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions:
  - 3.1.1.1. Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
  - 3.1.1.2. Examine surface to receive membranes to assure they are smooth, dry and free from conditions that will adversely affect execution, permanence, or quality of work.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. INSTALLATION**

- 3.2.1. Do not install air/vapour barrier until other work which penetrates membrane has been completed.
- 3.2.2. Apply air/vapour barrier envelope to this Project with utmost care to ensure positive support and continuity.
- 3.2.3. SAT System (with Primer):
  - 3.2.3.1. Begin installation after mechanical insulation clips have been applied to substrate, have cured and are examined for bond.
  - 3.2.3.2. Priming:
    - 3.2.3.2.1. Apply fluid primer to surfaces and allow to dry tack-free. Prime only areas to be covered by membrane within same Day. Re-prime surfaces not covered within same Day.
    - 3.2.3.2.2. Apply primers at a rate recommended by membrane manufacturer.
  - 3.2.3.3. Flashing, Corner Reinforcing and Transition Membrane:
    - 3.2.3.3.1. Install membrane flashing in 900 mm (36") widths wherever possible. Where applicable, bring flashing a minimum of 150 mm (6") onto horizontal surfaces and a minimum of 200 mm (8") up walls from horizontal elevation shown.
    - 3.2.3.3.2. SAT membrane is a permitted material for transition conditions at frames and the like.

- 3.2.3.3.3. Stagger flashing and membrane seams.
- 3.2.3.3.4. Install flashing to protrusions, expansion joints, control joints and the like. Bring flashing a minimum of 150 mm (6") onto membrane.
- 3.2.3.4. Installation:
  - 3.2.3.4.1. Install membrane in accordance with manufacturer's printed instructions over flashings and corner reinforcement.
  - 3.2.3.4.2. Lay membrane without buckles, fishmouths and avoid stretching membrane. Where membrane cannot extend at least 100 mm (4") onto horizontal surface, terminate in a horizontal reglet and seal.
  - 3.2.3.4.3. Lap membranes 50 mm (2") on side laps and 100 mm (4") on end laps. Stagger end laps.
  - 3.2.3.4.4. Roll membrane with a hand roller.
- 3.2.3.5. Inspection: Inspect membrane for punctures, misaligned seams and fishmouths, apply additional layer of membrane over affected area, extending minimum of 150 mm (6") beyond damaged area in all directions.
- 3.2.4. SAT System (No Primer):
  - 3.2.4.1. Execute air/vapour barrier installation for this Project with utmost care to ensure positive support of barrier. Ensure membrane acts as both air/vapour barrier and as such requires accurate cutting and placement over supports.
  - 3.2.4.2. Ensure continuity of this envelope where Drawings indicate locations which require 2-phase installation, such as at steel beams and the like.
  - 3.2.4.3. Lap joints minimum 100 mm (4"), adhere continuously to steel framing with double-sided tape and tape joints with air/vapour-proof tape.
- 3.2.5. SAT System (High Temperature Resistant):
  - 3.2.5.1. Begin installation after mechanical insulation clips have been applied to substrate, have cured and are examined for bond. Install this SAT System under parapet flashings and other areas where high temperature can occur.
  - 3.2.5.2. Priming:
    - 3.2.5.2.1. Apply fluid primer to surfaces and allow to dry tack-free. Prime only areas to be covered by membrane within same Day. Re-prime surfaces not covered within same Day.
    - 3.2.5.2.2. Apply primers at a rate recommended by membrane manufacturer.
  - 3.2.5.3. Flashing, Corner Reinforcing and Transition Membrane:
    - 3.2.5.3.1. Install membrane flashing in 900 mm (36") widths wherever possible. Where applicable, bring flashing a minimum of 150 mm (6") onto horizontal surfaces and a minimum of 200 mm (8") up walls from horizontal elevation shown.
    - 3.2.5.3.2. SAT membrane is a permitted material for transition conditions at frames and the like.
    - 3.2.5.3.3. Stagger flashing and membrane seams.
    - 3.2.5.3.4. Install flashing to protrusions, expansion joints, control joints and the like. Bring flashing a minimum of 150 mm (6") onto membrane.
  - 3.2.5.4. Installation:
    - 3.2.5.4.1. Install membrane in accordance with manufacturer's printed instructions over flashings and corner reinforcement.
    - 3.2.5.4.2. Lay membrane without buckles, fishmouths and avoid stretching membrane. Where membrane cannot extend at least 100 mm (4") onto horizontal surface, terminate in a horizontal reglet and seal.



- 3.2.5.4.3. Lap membranes 50 mm (2") on side laps and 100 mm (4") on end laps. Stagger end laps.
- 3.2.5.4.4. Roll membrane with a hand roller.
- 3.2.5.5. Inspection: Inspect membrane for punctures, misaligned seams and fishmouths, apply additional layer of membrane over affected area, extending minimum of 150 mm (6") beyond damaged area in all directions.
- 3.2.6. Liquid Applied System:
  - 3.2.6.1. Ensure surfaces to receive air/vapour barrier are free from laitance, loose aggregates, oil, grease, wax, mastic compounds and form release agents.
  - 3.2.6.2. Install joint reinforcements and transition membranes in accordance with requirements specified herein, bridging cracks greater than 3 mm (1/8") wide, rough openings, bends up to 120° and transitions to framing members and similar items penetrating air/vapour membrane.
  - 3.2.6.3. Apply primers as required to substrate in accordance with manufacturer's instructions.
  - 3.2.6.4. Install air/vapour barrier in accordance with manufacturer's instructions.
  - 3.2.6.5. Begin installation after mechanical insulation clips have been applied to substrate, have cured and are examined and tested for bond.
  - 3.2.6.6. Fill insulation joints with air/vapour barrier membrane. Seal voids or cracks around components, protruding anchors and the like with air/vapour membrane.
  - 3.2.6.7. Immediately after application of air/vapour barrier membrane, embed insulation into still fluid and unskinned membrane. Ensure insulation is firmly adhered to air/vapour membrane.
- 3.2.7. Flexible Membrane, Reinforcement and Accessories:
  - 3.2.7.1. Unless otherwise noted, it is responsibility of this Section to provide and maintain continuity of air seal to adjacent dissimilar materials. Fit flexible seals at locations required to provide air/vapour/water resistant and weathertight junctions. Ensure continuity of seal at end joints between lengths of material by overlapping and cementing. Seal junctions of system components to themselves and other Work with sealant to maintain effective vapour, air and water barrier.
  - 3.2.7.2. Ensure air seal membrane termination consists of a compatible flexible membrane reinforcement sheet embedded in a permanent, compatible sealant or fluid type air/vapour barrier material, lapping a minimum of 200 mm (8") on to base materials and having free edge installed to penetrating framing by combination of adhesive or fluid coating.
  - 3.2.7.3. Where deflection of structure will cause dynamic joint movement between metal framing work and dissimilar materials, provide flexible seals of sufficient width to allow formation of bellows to take up any torsional and shear stresses.
  - 3.2.7.4. Where SAT membranes are used as base air/vapour barrier, same material may also be used as flexible transition material.
  - 3.2.7.5. This work is considered as 2-phase work, with final attachment of reinforced bridging sheet being made at time of installation of door frames and windows under separate contract.
  - 3.2.7.6. Where air/vapour barrier crosses junction between concrete block and concrete columns or beams, provide flexible membrane of 150 mm (6") minimum width to bridge possible openings at such locations.
- 3.2.8. Provide flexible sheet membrane at junctions with dissimilar materials and corners as indicated. Where attaching air seal membrane to metal frames and the like, apply sealant in addition to fluid adhesive.
- 3.3. SITE QUALITY CONTROL**
  - 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

- 3.3.2. Manufacturer Services: Ensure membrane manufacturer's representative is on site at beginning of installation to provide training and supervision of Trade Contractor's personnel in installation of air/vapour barrier. Ensure manufacturer's representative provides frequent inspection visits thereafter to assure quality and competence of membrane installation.
- 3.3.3. Air Seal Membrane Continuity: Ensure air/vapour barrier provides an impermeable membrane seal to resist infiltration and exfiltration of air and moisture. Ensure function of air/vapour membrane as indicated.

**3.4. PROTECTION**

- 3.4.1. Protect surrounding surfaces against damage from this work.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide aluminum siding system including but not limited to following:
  - 1.2.1.1. aluminum siding (batten style).
  - 1.2.1.2. sub-girts.
  - 1.2.1.3. closures, flashings and corner stiffeners.
  - 1.2.1.4. caulking and sealants.
  - 1.2.1.5. backpainting.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of "Maintenance Material Form" for receiving extra/spare material for Owner's future use: Section 00 65 37, Maintenance Material Form (Specimen).
  - 1.2.2.2. Provision of structural steel studs and exterior sheathing: Section 05 41 00, Structural Steel Stud Framing System.
  - 1.2.2.3. Provision of air/vapour barrier system: Section 07 25 00, Miscellaneous Air/Vapour Barriers.
  - 1.2.2.4. Sealing of joints between siding and adjacent construction: Section 07 92 00, Joint Sealants.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. PVDF: Polyvinylidene Fluoride.
- 1.3.2. Reference Standards:
  - 1.3.2.1. AAMA 2604-22
    - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusion and Panels (with Coil Coating Appendix)
  - 1.3.2.2. ASTM B117-19
    - Standard Practice for Operating Salt Spray (Fog) Apparatus
  - 1.3.2.3. ASTM B209/B209M-21
    - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
  - 1.3.2.4. ASTM B221M-21
    - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
  - 1.3.2.5. ASTM B244-09(21)
    - Standard Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments
  - 1.3.2.6. ASTM D523-14(18)
    - Standard Test Method for Specular Gloss
  - 1.3.2.7. ASTM D714-02(17)
    - Standard Test Method for Evaluating Degree of Blistering of Paints

- |           |                   |  |
|-----------|-------------------|--|
| 1.3.2.8.  | ASTM D968-22      | - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive                                      |
| 1.3.2.9.  | ASTM D2244-22     | - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates |
| 1.3.2.10. | ASTM D2247-15(20) | - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity                                       |
| 1.3.2.11. | ASTM D3363-22     | - Standard Test Method for Film Hardness by Pencil Test  |
| 1.3.2.12. | ASTM D4214-07(15) | - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films  |

**1.4. SUBMITTALS**

- 1.4.1. Product Data: Submit Product data sheets on each Product being used, including:
- 1.4.1.1. preparation instructions and recommendations.
  - 1.4.1.2. storage and handling requirements and recommendations.
  - 1.4.1.3. installation methods.
- 1.4.2. Shop Drawings: Submit Shop Drawings for fabrication and installation of aluminum siding in accordance with Section 01 30 00. Show materials, gauges, dimensions, layouts and installation details.
- 1.4.3. Samples: Submit 2 - 300 mm (12") long sample sections of (each) siding profile and (each) colour specified. Ensure finished work matches reviewed samples in colour, gloss and texture.

**1.5. CLOSEOUT SUBMITTALS**

- 1.5.1. Operational and Maintenance Data: Submit maintenance instructions to Owner for recommended cleaning materials and methods for panels and trim.

**1.6. MAINTENANCE MATERIAL SUBMITTALS**

- 1.6.1. Extra Stock Materials:
- 1.6.1.1. Supply to Owner at completion of job, full size metal siding panels equaling 2% of amount installed as spare siding paneling of each colour, packaged in original cartons. Ensure maintenance materials are from same production run as installed materials.
  - 1.6.1.2. Supply to Owner at completion of job, quantity of each grid and exposed component equaling 2% of amount installed as spare, packaged in original cartons. Execute Section 00 65 37.

**1.7. QUALITY ASSURANCE**

- 1.7.1. Qualifications:
- 1.7.1.1. Installers: Provide work of this Section executed by competent installers with minimum 5 years' experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.
- 1.7.2. Mock-Ups: Construct minimum 10 m<sup>2</sup> (100 sq ft) mock-up sample at Project location designated by Consultant for review. Once reviewed with no objections recorded, sample remains part of finished work and used as a quality reference standard for balance of Project.

**1.8. DELIVERY, STORAGE AND HANDLING**

- 1.8.1. Delivery and Acceptance Requirements: Conduct transport of materials to site storage compound in such a manner to prevent in-transit damage. These measures include, but are not limited to crating, polyethylene wrapping system, etc.
- 1.8.2. Storage and Handling Requirements:
  - 1.8.2.1. Store materials on site in a manner to prevent damage thereto, or deterioration of finish.
  - 1.8.2.2. Stockpile panels tilted to provide water run-off, free from ground contact on firm, level, non-staining supports extending full width of sheet and spaced not more than 450 mm (36") apart. Where possible, pile individual sheets or panel length and types separately. Cover components with opaque polyethylene sheet to protect from direct sunlight and moisture penetration. Vent to allow air movement.

**PART 2 - PRODUCTS****2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
  - 2.1.1.1. Alumarch Aluminum Architectural Products; [www.alumarch.com](http://www.alumarch.com)
  - 2.1.1.2. Longboard® Architectural Products; [www.longboardproducts.com](http://www.longboardproducts.com)
- 2.1.2. Substitution Limitations: This Specification is based on Alumarch Aluminum Architectural Products' "Knotwood Battens System". Comparable Products from manufacturers listed or not listed herein may be reviewed provided they meet requirements of this Specification.

**2.2. MATERIALS**

- 2.2.1. Performance/Design Criteria:
  - 2.2.1.1. Design aluminum siding and fasteners to support a positive wind load of 0.9 kN/m<sup>2</sup> (20 psf) and a negative wind load of 0.5 kN/m<sup>2</sup> (12 psf), with maximum deflection of L/180 of the span at full load.
  - 2.2.1.2. 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.
  - 2.2.1.3. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
- 2.2.2. Aluminum Extrusions: ASTM B221M, minimum 3 mm (1/8") wall thickness, size accurately formed as shown on Drawings, extruded aluminum alloy AA-6063-T6 for aluminum. Ensure surfaces are free from defects impairing appearance, strength and durability.
- 2.2.3. Aluminum Sheet: ASTM B209/B209M, minimum thickness 0.635 mm (0.025") of type and characteristics to match finished extrusions; ensure sheet which is not exposed is Utility Aluminum mill finished; for intricate forming with decorative finishes use AA-1100 and for siding and exposed panels use AA-3003 with specified finish.
- 2.2.4. Extruded Aluminum Siding (Battens):
  - 2.2.4.1. Sizes:
    - 2.2.4.1.1. Batten Base: 50 mm x 50 mm x 5650 mm (2" x 2" x 18'-6").
    - 2.2.4.1.2. Batten: 50 mm x 50 mm x 5650 mm (2" x 2" x 18'-6").
    - 2.2.4.1.3. Batten: 50 mm x 200 mm x 5650 mm (2" x 8" x 18'-6").

- 2.2.4.1.4. Batten Cap: 50 mm x 200 mm (2" x 8").
- 2.1.1.1. Permitted Product: "Knotwood Batten System" by Alumarch Aluminum Architectural Products.
- 2.1.2. Finishes: Provide 1 of following systems:
- 2.1.2.1. High Performance Coating Finish Process: (2 Coat Wet System) including thermal setting application of 70% fluoropolymer resin minimum, PVDF with added colour pigment finish exceeding or meeting AAMA 2604 requirements. Ensure fluoropolymer baked resins form a continuous physically locked finish during manufacturing process. Apply fluoropolymer finish after multistage chemical treatment cleaning providing corrosion resistance surface ready to receive primer. During baking process apply acrylic or epoxy primer in accordance with manufacturer's recommendations followed by a flash process whereby evaporating solvent and then fluoropolymer finish sprayed on to aluminum; apply another flash procedure and then bake for approximately 10 minutes when aluminum surface reaches a temperature of 232 deg C (450 deg F). Permitted Products: "Duramar" by PPG Industries; [www.ppgideascape.com](http://www.ppgideascape.com) or "Fluoropon® Classic" by Sherwin-Williams Coil Coatings; [www.coil.sherwin.com](http://www.coil.sherwin.com) with following characteristics:

Description		Performance Characteristics
2.1.2.1.1.	Coating Thickness:	0.0063 +/-0.0013 mm (0.25 mil +/-0.05 mils) primer 0.025 mm (1.0 mil) colour coat
2.1.2.1.2.	Pre-Treatment:	Multi-Stage Cleaning with Chemical Conversion Coating
2.1.2.1.3.	Gloss (ASTM D523 @ 60°):	Low and medium gloss
2.1.2.1.4.	Pencil Hardness	(ASTM D3363): F minimum
2.1.2.1.5.	Abrasion Resistance	Falling Sand (ASTM D968): 20 l/ml
2.1.2.1.6.	Acid Resistance	10% Muriatic Acid Spot Test: 15 minutes - no attack
2.1.2.1.7.	Alkali Resistance-Mortar	Pat Test 100% R.H. @ 100°F: 24 hours - no attack
2.1.2.1.8.	Colour Retention 5 yrs, 45° South Florida	(ASTM D2244): ΔE <5.0
2.1.2.1.9.	Humidity Resistance: ASTM D714, ASTM D2247, 4000 hrs, 100% R.H. @ 100°F: Few #8 blisters maximum	
2.1.2.1.10.	Salt Spray Resistance: ASTM B117, 4000 hrs	5% NaCl @ 100°F: 1/16" maximum undercutting
2.1.2.1.11.	Chalking Resistance: 10 yrs, 45° South Florida	(ASTM D4214): No more than #8 (#6 for Whites)
2.1.2.1.12.	Erosion Resistance: 10 yrs, 45° South Florida	(ASTM B244): Maximum 5%

- 2.2.4.2. High Performance Coating Finish Process: (1 Coat Dry System) meeting or exceeding AAMA 2604. Permitted Product: "Interpon D2000 Ultra Durable Polyester Powder Coating" by Akzo Nobel Coatings, Inc.; [www.akzonobel.com](http://www.akzonobel.com) with following characteristics:

**Description**

**Performance Characteristics**

2.2.4.2.1.	Coating Thickness:	0.060 mm to 0.115 mm (2.4 mils to 4.5 mils) with no reading less than 0.045 mm (1.8 mils)
2.2.4.2.2.	Pre-Treatment:	Multi-Stage Cleaning with Chemical Conversion Coating
2.2.5.2.3.	Gloss (ASTM D523 @ 60°):	20% - 80%
2.2.5.2.4. (ASTM D3363):	Pencil Hardness	F minimum
2.2.5.2.5. Falling Sand (ASTM D968):	Abrasion Resistance	40 l/ml
2.2.5.2.6. 10% Muriatic Acid Spot Test:	Acid Resistance	15 minutes - no attack
2.2.5.2.7. Pat Test 100% R.H. @ 100°F:	Alkali Resistance-Mortar	24 hours - no attack
2.2.5.2.8. 5 yrs, 45° South Florida (ASTM D2244):	Colour Retention	$\Delta E < 5.0$
2.2.5.2.9. ASTM D714, ASTM D2247, 3000 hrs, 100% R.H. @ 100°F: Few #8 blisters maximum	Humidity Resistance	
2.2.5.2.10. ASTM B117, 4000 hrs 5% NaCl @ 100°F:	Salt Spray Resistance	1/16" maximum undercutting
2.2.5.3.	Colours and Sheens:	To be selected by Consultant. Include for texture and specialty finishes.

**PART 3 - EXECUTION**

**3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.2. PREPARATION**

- 3.2.1. Surface Preparation:
- 3.2.1.1. Clean surfaces thoroughly prior to installation.
- 3.2.1.2. Prepare surfaces using methods recommended by manufacturer for achieving best result for material under Project conditions.

**3.3. INSTALLATION**

- 3.3.1. Install in accordance with manufacturer's installation instructions.
- 3.3.2. Barrier Protection: Do not install over cementitious materials, dissimilar metals or pressure treated material without adequate barrier protection.

- 3.3.3. Fasten battens to structural supports; aligned, level and plumb.
- 3.3.4. Locate joints over supports.
- 3.3.5. Use concealed fasteners in accordance with manufacturer's instructions unless otherwise directed by Consultant.
- 3.3.6. Install battens and accessories including mounts, end caps, joiners/splices/etc. in accordance with best practice, with joint members plumb and true.
- 3.3.7. Allow for expansion and contraction of materials according to manufacturer's instructions.

**3.4. REPAIR**

- 3.4.1. Touch up marred siding surfaces with air dry formulation to match pre-finished siding or replace if necessary.

**3.5. SITE QUALITY CONTROL**

- 3.5.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.6. CLEANING**

- 3.6.1. Leave siding work clean and free of grime, dirt and sealant stains. Remove stains on adjacent work of other trades resulting from sealant work.

**END OF SECTION**



**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide metal siding system including but not limited to following:
  - 1.2.1.1. insulated metal siding system.
  - 1.2.1.2. adjustable Z-bars.
  - 1.2.1.3. sub-girts.
  - 1.2.1.4. closures, flashings and corner stiffeners.
  - 1.2.1.5. caulking and sealants.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Prepainted coping cap flashings: Section 07 62 00, Sheet Metal Flashing and Trim.
  - 1.2.2.2. Provision of metal wall louvres: Section 08 91 00, Louvres.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. CSSBI: Canadian Sheet Steel Building Institute; [www.cssbi.ca](http://www.cssbi.ca).
- 1.3.2. Reference Standards:
  - 1.3.2.1. ASTM A653/A653M-22
    - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - 1.3.2.2. ASTM B117-19
    - Standard Practice for Operating Salt Spray (Fog) Apparatus
  - 1.3.2.3. ASTM C165-07(17)
    - Standard Test Method for Measuring Compressive Properties of Thermal Insulations
  - 1.3.2.4. ASTM C303-10 (16)e1
    - Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation
  - 1.3.2.5. ASTM C920-18
    - Standard Specification for Elastomeric Joint Sealants
  - 1.3.2.6. ASTM D523-14(18)
    - Standard Test Method for Specular Gloss
  - 1.3.2.7. ASTM D714-02(17)
    - Standard Test Method for Evaluating Degree of Blistering of Paints
  - 1.3.2.8. ASTM D968-17
    - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
  - 1.3.2.9. ASTM D2244-16
    - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

- |           |                   |   |
|-----------|-------------------|---|
| 1.3.2.10. | ASTM D2247-15     | - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity        |
| 1.3.2.11. | ASTM D3363-20     | - Standard Test Method for Film Hardness by Pencil Test                                       |
| 1.3.2.12. | ASTM D4214-07(15) | - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films         |
| 1.3.2.13. | CSA S136-16(21)   | - North American specification for the design of cold-formed steel structural members         |
| 1.3.2.14. | CAN/ULC-S702.1-21 | - Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification |

**1.4. SUBMITTALS**

- 1.4.1. Shop Drawings:
- 1.4.1.1. Submit Shop Drawings for fabrication and installation of metal siding in accordance with Section 01 30 00. Show materials, gauges, dimensions, layouts and installation details.
- 1.4.1.2. Ensure a licensed engineer specified herein is responsible for:
- 1.4.1.2.1. production and review of Shop Drawings.
- 1.4.1.2.2. sealing and signing each Shop Drawing and any associated calculations performed.
- 1.4.2. Samples: Submit 2 - 300 mm x 300 mm (12" x 12") prepainted sample sections of (each) siding profile and (each) colour specified. Ensure finished work matches reviewed samples in colour, gloss and texture.

**1.5. QUALITY ASSURANCE**

- 1.5.1. Qualifications:
- 1.5.1.1. Installers: Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.
- 1.5.1.2. Licensed Professionals: Employ a licensed engineer carrying minimum \$2,000,000.00 professional liability insurance and is registered in the Province of Ontario.

**1.6. DELIVERY, STORAGE AND HANDLING**

- 1.6.1. Delivery and Acceptance Requirements: Transport materials to site storage compound in a manner to prevent in-transit damage. These measures include, but are not limited to crating, polyethylene wrapping system, etc.
- 1.6.2. Storage and Handling Requirements:
- 1.6.2.1. Store materials on site in a manner to prevent damage thereto, or deterioration of finish. Galvanized surfaces which show evidence of "white rust" will not be permitted.
- 1.6.2.2. Stockpile panels tilted to provide water run-off, free from ground contact on firm, level, non-staining supports extending full width of sheet and spaced not more than 450 mm (36") apart. Where possible, pile individual sheets or panel length and types separately. Cover components with opaque polyethylene sheet to protect from direct sunlight and moisture penetration. Vent to allow air movement.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
- 2.1.1.1. Agway Metals Inc.; [www.agwaymetals.com](http://www.agwaymetals.com)
- 2.1.1.2. Mitten Building Products; [www.mittensiding.com](http://www.mittensiding.com)
- 2.1.1.3. Vicwest; [www.vicwest.com](http://www.vicwest.com)
- 2.1.2. Substitution Limitations: Comparable Products from other manufacturers not listed herein may be reviewed provided they meet requirements of this Specification.

**2.2. MATERIALS**

- 2.2.1. Performance/Design Criteria:
- 2.2.1.1. Design metal siding, soffits and fasteners to support a positive wind load of 0.9 kN/m<sup>2</sup> (20 psf) and a negative wind load of 0.5 kN/m<sup>2</sup> (12 psf), with maximum deflection of L/180 of the span at full load. Ensure minimum base steel thickness for siding and liner sheet is 0.607 mm (24 ga).
- 2.2.1.2. Ensure unit stress does not exceed 138 MPa (20,000 psi).
- 2.2.1.3. Ensure general design is based on CSA S136.
- 2.2.1.4. Structural Design: Employ a licensed engineer specified herein to:
- 2.2.1.4.1. design components for work of this Section requiring structural performance.
- 2.2.1.4.2. be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations.
- 2.2.2. Exterior Sheets:
- 2.2.2.1. Steel Sheet: Conforming to ASTM A653/A653M, CS, Type A, with a minimum base steel thickness of 0.607 mm (24 ga), finished with Z275 (G90) zinc coating in accordance with CSSBI Standards and prepainted with finishes specified herein.
- 2.2.2.2. Exterior Sheet Profile: "LUX V-Grove 6" Panel" by Mitten Building Products.
- 2.2.3. Insulation: Fibrous glass or stone wool rigid or semi-rigid board insulation, "Fiberglas™ Type 703" by Owens Corning Canada LP, "ROCKWOOL PLUS™ MB" by ROCKWOOL™ International A/S; [www.rockwool.com](http://www.rockwool.com). Ensure insulation has a thermal resistance value of not less than RSI=0.70 (R=4) at a mean temperature of 24 deg C (75 deg F) and a minimum nominal density of 32 kg/m<sup>3</sup> (2 pcf) in accordance with ASTM C303. Ensure deformation of fibrous glass rigid board does not exceed 10% when tested at 1.2 kPa (25 psf) in accordance with CAN/ULC-S702.1, Type 1 and ASTM C165. Thickness as indicated.
- 2.2.4. Fasteners for Rigid Insulation: Type N "Stik-Klip" fasteners and Type S neoprene adhesive, with self-locking washers manufactured by Eckel Industries of Canada Ltd., Morrisburg, "Insul-Anchors" by Continental Stud Welding Inc., or impale type, perforated 50 mm x 50 mm (2" x 2") cold rolled steel, 0.759 mm (22 ga) adhesive pack, spindle of 0.098 x 0.106" dia. annealed steel, length to suit insulation 25 mm (1") dia. washers of self-locking nylon manufactured by Fleck Bros.
- 2.2.5. Insulation Adhesive: Rubber asphalt adhesive, compatible with insulation, "Bakor 230-21" by Henry Company; [www.henry.com](http://www.henry.com).
- 2.2.6. Sub-Girts, Z-bars: Sheet steel conforming to ASTM A653/A653M, Grade A Zinc coating to Z275 (G90) designation, formed from minimum 1.219 mm (18 ga) base thickness.
- 2.2.7. Type A Fasteners: Supply standard concealed fasteners compatible with preformed siding used.

- 2.2.8. Type C Fasteners: Supply type B hex head cadmium plated high carbon steel, self-tapping sheet metal screws.
- 2.2.9. Type D Fasteners: Supply Weatherguard "Confas" or Tapcon equivalent.
- 2.2.10. Concealed Sealant: Supply butyl rubber, "Curtain Wall Sealant" by Tremco Canada.
- 2.2.11. Exposed Sealant: Non-sag type, 1 component medium-modulus, pre-pigmented, neutral cure elastomeric silicone sealant conforming to ASTM C920, Type S, Grade NS, Class 50, Use NT, G, M, A and O. Supply in standard colours as selected. Supply 1 of following:
- 2.2.11.1. "DOWSIL™ 795 Silicone Building Sealant" by The Dow Chemical Company.
- 2.2.11.2. "GE SilPruf SCS2000" by Momentive Performance Materials.
- 2.2.11.3. "Spectrem 2" by Tremco Canada.
- 2.2.12. Closures and Flashings: Provide same material as specified for exterior sheets, prepainted to match adjacent siding where exposed to view. Ensure metal thickness is as required but not less than 0.759 mm (22 ga) base thickness.
- 2.2.13. Corner Stiffeners: Steel sheet in required thickness, finished with Z275 (G90) zinc coating.
- 2.2.14. Zinc Rich Primer: Supply primer for touch up if galvanized, supply "METALHIDE® ONE PAC | 97-676" by PPG Architectural Coatings; [www.ppg.com](http://www.ppg.com), "Zinc Clad® 5 Organic Zinc-Rich Primer" by The Sherwin-Williams Company; [www.sherwin-williams.com](http://www.sherwin-williams.com) or "ZRC® Cold Galvanizing Repair Compound" by ZRC Worldwide; [www.zrcworldwide.com](http://www.zrcworldwide.com) in accordance with manufacturer's printed directions.
- 2.2.15. Finishes:
- 2.2.15.1. Primer and silicone modified polyester - SMP, 2 coat system (primer/colour coat), "WeatherXL™" by Sherwin-Williams Coil Coatings; [www.coil.sherwin.com](http://www.coil.sherwin.com) with following characteristics:
- | <b>Description</b>  | <b>Performance Characteristics</b>  |
|---|---|
| 2.2.15.1.1. Coating Thickness:  | 0.005 mm to 0.0075 mm (0.20 to 0.30 mils) primer<br>0.0175 mm to 0.02 mm (0.70 to 0.80 mils) colour topcoat |
| 2.2.15.1.2. Gloss (ASTM D523 @ 60°):  | 25 to 35 for matte finish <10   |
| 2.2.15.1.3. Pencil Hardness (ASTM D3363):   | F minimum   |
| 2.2.15.1.4. Abrasion Resistance Falling Sand (ASTM D968):   | 35 t/ml   |
| 2.2.15.1.5. Colour Retention 30 yrs South Florida (ASTM D2244):                                       | ΔE <5.0 at 90° vertical angle and ΔE <7.0 at non-vertical   |
| 2.2.15.1.6. Humidity Resistance ASTM D714, ASTM D2247, 1000 hrs, 100% R.H. @ 100°F: No field blisters |   |
| 2.2.15.1.7. Salt Spray Resistance ASTM B117, 1000 hrs 5% NaCl @ 100°F:                                | 1/8" maximum undercutting   |
| 2.2.15.1.8. Chalking Resistance 30 yrs South Florida (ASTM D4214):                                    | No less than #8 at 90° vertical angle and #6 at non-vertical  |
- 2.2.15.2. Colours and Sheens: Cedar.

**PART 3 - EXECUTION**

**3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.2. INSTALLATION**

- 3.2.1. Apply continuous bead of specified concealed caulking on face of top and bottom supports of siding liner sheet to provide a complete seal.
- 3.2.2. Install Z-bars and/or sub-girts to structural steel using manufacturer's recommended spacing and to suit wind loads and siding design, using specified Type C fasteners.
- 3.2.3. Use specified Type D fasteners to secure Z-bars to concrete block.
- 3.2.4. Install insulation with adhesive. Tightly butt joints.
- 3.2.5. Install corner supports, interior corner pieces, closures and related accessories etc. with specified Type C fasteners.

**SPEC NOTE:** *Edit below to suit type of siding used. Flat profile siding sections utilize concealed clips while ribbed siding utilizes exposed fasteners. Type A fasteners are used for concealed fastening.*

- 3.2.6. Install exterior face sheets with Type A fasteners. Secure to sub-girts in accordance with manufacturer's standards for non-exposed fastenings.
- 3.2.7. Vertical Rib Orientation: Ensure face sheets are 1-piece full height of siding (to a maximum of 12 m (40')) except at profile or colour changes. Ensure there is no apparent difference between face sheets of same colour. Remove and replace off-colour sheets as directed by Consultant.
- 3.2.8. Horizontal Rib Orientation: Ensure face sheets are 1 piece to a maximum of 12 m (40') except at profile or colour changes. Ensure there is no apparent difference between face sheets of same colour. Remove and replace off-colour sheets as directed by Consultant.
- 3.2.9. Install corner pieces, closures, flashings, etc. where shown and where required. Provide formed steel closures around openings.
- 3.2.10. Bed flashings, closures and corner pieces in sealant to provide a weathertight installation.
- 3.2.11. Prime surfaces and apply sealant around siding and openings in siding and below metal flashings to siding in accordance with manufacturer's printed directions for a weatherproof siding assembly. Tool caulked joints. Remove excess sealant.

**3.3. REPAIR**

- 3.3.1. Touch up marred siding surfaces with air dry formulation to match pre-finished siding or replace if necessary.
- 3.3.2. Clean and touch up marred galvanized surfaces after installation, with zinc rich primer.

**3.4. SITE QUALITY CONTROL**

- 3.4.1. Site Tests and Inspections:
  - 3.4.1.1. Structural Inspection: Ensure a licensed engineer specified herein inspects work of this Section during erection/installation and submits sealed and signed Field Review Report within 5 Days of site visit.

- 3.4.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.5. CLEANING**

- 3.5.1. Leave siding work clean and free of grime, dirt and sealant stains. Remove stains on adjacent work of other trades resulting from sealant work.

**END OF SECTION**



**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide sheet metal flashing and trim including but not limited to following:
  - 1.2.1.1. pre-painted metal coping flashings.
  - 1.2.1.2. miscellaneous metal flashings on roof.
  - 1.2.1.3. flashings at roof openings.
  - 1.2.1.4. scupper drains.
  - 1.2.1.5. caulking.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Wood copings, cants and curbs: Section 06 10 00, Rough Carpentry.
  - 1.2.2.2. Provision of high temperature resistant air/vapour barriers: Section 07 25 00, Miscellaneous Air/Vapour Barriers.
  - 1.2.2.3. Fluid-applied protected membrane roofing system: Section 07 55 56, Fluid-Applied Protected Membrane Roofing.
  - 1.2.2.4. Sealing and caulking: Section 07 92 00, Joint Sealants.
  - 1.2.2.5. Flashing at curtain wall: Section 08 44 13, Glazed Aluminum Curtain Wall.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. CRCA: Canadian Roofing Contractors' Association; [www.roofingcanada.com](http://www.roofingcanada.com).
  - 1.3.1.2. EPDM: Ethylene Propylene Diene Monomer.
  - 1.3.1.3. OIRCA: Ontario Industrial Roofing Contractors' Association; [www.ontarioroofing.com](http://www.ontarioroofing.com).
- 1.3.2. Reference Standards:
  - 1.3.2.1. ASTM A653/A653M-22 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - 1.3.2.2. ASTM C920-18 - Standard Specification for Elastomeric Joint Sealants

**1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Preinstallation Meetings: Prior to commencing work for this Section, arrange for Construction Manager, installer and manufacturer's representative to meet on site and review conditions under which work is to be performed, installation procedures and inspect surfaces to receive this work.



**1.5. SUBMITTALS**

- 1.5.1. Shop Drawings: Submit fully detailed Shop Drawings showing proposed method of shaping, forming, jointing, fastening and application of sheet metal work, in accordance with the Contract Documents. Submit lists of materials to be used to Consultant.

**1.6. QUALITY ASSURANCE**

- 1.6.1. Qualifications:
- 1.6.1.1. Installers:
- 1.6.1.1.1. Ensure work of this Section is installed by a company specializing in sheet metal flashing work with 5 years documented experience and a member in good standing of CRCA.
- 1.6.1.1.2. Conform to requirements contained in CRCA manual.

**1.7. WARRANTY**

- 1.7.1. Manufacturer Warranty: Warrant work of this Section for period of 2 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are limited to actual leakage, loosening and splitting of seams of flashings. Ensure warranty is on either CRCA's or OIRCA's "Standard Form of Warranty".

**PART 2 - PRODUCTS**

**2.1. MATERIALS**

- 2.1.1. Sheet Steel Concealed from View: Commercial quality galvanized sheet to ASTM A653/A653M, 0.455 mm (26 ga) thick minimum, Z275 (G90) zinc coated by hot-dip process.
- 2.1.2. Pre-painted Sheet Steel Exposed to View: Supply 0.607 mm (24 ga) minimum thickness, commercial quality, Type A to ASTM A653/A653M with Z275 (G90) zinc coating designation, pre-painted with "Perspectra Plus Series™" by Baycoat; [www.baycoat.com](http://www.baycoat.com) or "WeatherXL™" by Sherwin-Williams Coil Coatings; [www.coil.sherwin.com](http://www.coil.sherwin.com), in colour(s) selected by Consultant.
- 2.1.3. Slip Sheet: Rosin sized building paper; 1.2 mm thick EPDM strips or modified bituminous sheet "Bituthene® 3000" by GCP Applied Technologies, Inc.; [www.gcpat.com](http://www.gcpat.com), "Blueskin® WP200" by Henry Company; [www.henry.com](http://www.henry.com) or "MEL-ROL® Rolled, Self-Adhering Waterproofing Membrane" by W.R. Meadows of Canada; [www.wrmeadows.com](http://www.wrmeadows.com).
- 2.1.4. Dielectric Separator: Provide best grade, quick drying non-staining alkali resistant bituminous paint or epoxy resin solution or membrane type.
- 2.1.5. Bedding Compound: Rubber-asphalt type.
- 2.1.6. Plastic Cement: As recommended by installer and reviewed by Consultant.
- 2.1.7. Sealant: Supply 1 part polysulfide sealant conforming to ASTM C920, Type S, Grade NS.
- 2.1.8. Starter Strips: Of same material as flashing used, 1.214 mm (18 ga), minimum 38 mm (1-1/2") wide, interlocked with metal flashing.
- 2.1.9. Flashing Cleats, Starter Strips, Skirts, Clips and Backup Plates: Same as specified sheet metal, unless indicated otherwise, make cleats at best 50 mm (2") wide and interlocked with metal flashing.
- 2.1.10. Flashing Fasteners: Nails, screws, bolts and other fastening devices and fasteners finished to match metal being fastened where exposed to view. Size and type to suit applicable conditions. Use stainless steel where connecting directly to concrete.

- 2.1.11. Fabrication:
- 2.1.11.1. Fabricate copings, parapet vertical flashings, flashings, curb counter flashing starter clips, strips and miscellaneous flashings in accordance with CRCA recommendations and to detail indicated.
- 2.1.11.2. Form sections true to shape, accurate in size, square, and free from distortion or defects. Equally space joints in any 1 run of flashing to suit building module or window spacing and in all cases locate in consultation with Consultant before installation commences. Make dedicated flashings meeting the Project requirements for roof mounted equipment to details shown.
- 2.1.11.3. Fabricate cleats and starter strips of same material as sheet, minimum 50 mm (2") wide, interlockable with sheet.
- 2.1.11.4. Form pieces in longest practical lengths. Make joints to permit thermal movement. Make flashing surfaces free from building, warp, wave, dents, oil canning or other defects.
- 2.1.11.5. Hem exposed edges on underside 13 mm (1/2"); mitre and seam corners.
- 2.1.11.6. Form material with standing seam.
- 2.1.11.7. Fabricate corners from 1 piece with minimum 450 mm (18") long legs; seam for rigidity, seal with sealant. Make corners square and surfaces straight and in true planes.
- 2.1.11.8. Fabricate vertical faces with bottom edge formed outward 6 mm (1/4") and hemmed to form drip.
- 2.1.11.9. Fabricate flashings to allow toe to extend 50 mm (2") over roofing gravel and paver. Return and brake edges. Form sheet metal pans 150 mm (6") nominal size, with 75 mm (3") upstand and 100 mm (4") flanges. Fill pans watertight with plastic cement.
- 2.1.12. Finishes:
- 2.1.12.1. Shop prepare and prime exposed ferrous metal surfaces.
- 2.1.12.2. Concealed metal surfaces to receive 1 coat of bituminous paint, 0.4 mm (1/64") thickness.
- 2.1.12.3. Metal finishes designated on Drawings.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions:
  - 3.1.1.1. Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
  - 3.1.1.2. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.
  - 3.1.1.3. Verify membrane termination and base flashings are in place, sealed and secure.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. PREPARATION**

- 3.2.1. Field measure site conditions prior to fabricating work.

#### **3.3. INSTALLATION**

- 3.3.1. Conform to drawing details included in CRCA manuals.
- 3.3.2. Install copings, curb coverings, starter strips, (back-up plates), pipe collars and other flashings to details shown on Drawings.
- 3.3.3. Exposed fastenings will not be permitted in the Work.

- 3.3.4. Install starter strips where indicated or required to present a true, non-waving, leading edge. Anchor to back-up to provide rigid, secure installation.
- 3.3.5. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- 3.3.6. Insert flashings into reglets to form tight fit. Secure in place with plastic wedges. Seal flashings into reglets with sealant.
- 3.3.7. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations directed by Consultant.
- 3.3.8. Apply plastic cement compound between metal flashings and felt flashings.
- 3.3.9. Fit flashings tight in place. Make corners square, surfaces true and straight in planes and lines accurate to profiles.
- 3.3.10. Provide and maintain continuity of high temperature resistant air/vapour barrier to adjacent dissimilar materials. Seal to form weathertight seal between flashing and adjoining surfaces and between flashing and other work.
- 3.3.11. Sheet Steel Flashings: Ensure end joints where adjacent lengths of metal flashing meet are made using an "S-lock" joint as detailed on Drawings. Execute by inserting the end of 1 coping length in a 25 mm (1") deep "S" lock formed in the end of the adjacent length. Extend concealed portion of the "S" lock 25 mm (1") outwards and nail to substrate. Face nailing of joints will not be permitted.
- 3.3.12. Caulking: Caulk where required to form weathertight seal between flashing and adjoining surfaces and between flashing and other work of this Section. Caulking work consists of bedding between members where possible and with neatly formed caulking bead where exposed.

**3.4. SITE QUALITY CONTROL**

- 3.4.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.5. PROTECTION**

- 3.5.1. Protect work of this Section from damage.
- 3.5.2. Protect reglets from ice formation during freezing weather.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide firestopping and smoke seals including but not limited to following:
  - 1.2.1.1. firestopping and smoke seals in accordance with Code requirements, at openings and around penetrations, at un-penetrated openings, at projecting and recessed items and at openings and joints within fire separations and assemblies having fire resistance rating, excluding those inside sealed mechanical and electrical assemblies (e.g. inside ducts, dampers, bus ducts, etc.).
  - 1.2.1.2. firestopping and smoke seals in accordance with Code requirements, at openings and spaces at perimeter edge conditions, excluding those inside sealed mechanical and electrical assemblies (e.g. inside ducts, dampers, bus ducts, etc.).
  - 1.2.1.3. firestopping and smoke seals between back of curtain wall and edge of slab.
  - 1.2.1.4. seals to form draft tight barriers to retard passage of flame and smoke and where specifically designated, passage of liquids while passing hose stream test.
  - 1.2.1.5. ensure seal provides and maintains a fire-resistance rating as determined by OBC for adjacent floor, wall or other fire separation assembly to requirements of and as acceptable to authorities having jurisdiction and to Consultant.
  - 1.2.1.6. firestopping and smoke seals in and around fire separations, including spaces around mechanical and electrical penetrations, at tops of fire walls, between slab edges and other gaps and penetrations at fire assemblies.
  - 1.2.1.7. ensure Divisions 21, 22, 23, 26, 27 and 28 respectively are responsible for firestopping and smoke seals within mechanical (i.e. inside ducts, dampers) and electrical assemblies (i.e. inside electrical bus ducts). Ensure firestopping and smoke seals around outside of such mechanical and electrical assemblies where they penetrate fire-rated separations are part of work of this Section.
  - 1.2.1.8. systems and specified Products are only a guide and may not address all firestopping conditions pertaining to situations which may be present in the Work. Provide firestopping and smoke seal required for the Work. These Products and systems are not presented to restrict other tested and approved listed assemblies of other manufacturers designing assemblies conforming to Code and resolving firestopping required for the Work.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Poured concrete slabs and walls: Section 03 30 00, Cast-in-Place Concrete.
  - 1.2.2.2. Masonry partitions including mortaring in of fire dampers: Section 04 20 00, Masonry Units.
  - 1.2.2.3. Temporary sheet steel covers: Section 05 50 00, Metal Fabrications.
  - 1.2.2.4. Sealants and caulking: Section 07 92 00, Joint Sealants.
  - 1.2.2.5. Coordination with curtain wall system: Section 08 44 13, Glazed Aluminum Curtain Wall.
  - 1.2.2.6. Gypsum board partitions: Section 09 21 16, Gypsum Board Assemblies.
  - 1.2.2.7. Firestopping and smoke seals inside mechanical assemblies: Division 21, Fire Suppression, Division 22, Plumbing and Division 23, Heating Ventilating and Air Conditioning.
  - 1.2.2.8. Firestopping and smoke seals inside electrical assemblies: Division 26, Electrical, Division 27, Communications and Division 28, Electronic Safety and Security.

### **1.3. REFERENCES**

#### **1.3.1. Abbreviations and Acronyms:**

- 1.3.1.1. IFC: International Firestop Council; [www.firestop.org](http://www.firestop.org).
- 1.3.1.2. OBC: Ontario Building Code.
- 1.3.1.3. UL: Underwriters Laboratories Inc.; [www.ul.com](http://www.ul.com).
- 1.3.1.4. ULC: Underwriters Laboratories of Canada; [www.canada.ul.com](http://www.canada.ul.com).

#### **1.3.2. Definitions:**

##### **1.3.2.1. Firestop System Types:**

- 1.3.2.1.1. Head of Wall Joint Firestop Systems (HW): Systems intended for installation in vertical separations between wall and floor or roof structures. Ensure these systems do not incorporate penetrating items such as pipes or cables.
- 1.3.2.1.2. Joint Firestop Systems (JF): Systems intended for installation in openings such as construction joints, gaps and spaces in floors or walls or at floor and wall intersections in accordance with approved systems. Ensure these systems do not incorporate penetrating items such as pipes or cables.
- 1.3.2.1.3. Perimeter Joint Firestop Systems (PJ): Perimeter joint firestop system rating are governed by lowest of fire resistance ratings of individual components (i.e. wall, floor or joint system). These systems consist of floor with fire endurance rating, exterior wall with or without fire endurance rating and perimeter joint system. Ensure these perimeter joint firestop systems do not incorporate penetrating items such as pipes or cables.
- 1.3.2.1.4. Service Penetration Firestop Systems (SP): Systems intended for installation in openings of limited dimensions and shape in floor or wall assemblies in accordance with approved systems. Ensure penetrating pipes, cable trays and similar items are in exact accordance with approved systems.
- 1.3.2.1.5. Service Penetration for Combustible Systems (SPC): Systems intended for installation in openings of limited dimensions and shape in floor or wall assemblies in accordance with approved systems. Ensure penetrating pipes are in exact accordance with approved systems. These systems are tested with a minimum differential pressure of 50 Pa between exposed and unexposed surfaces of assembly to meet Code requirements for Combustible Pipes for Use in Drain, Waste and Vent Piping.
- 1.3.2.2. Ratings: Rating of firestop system applies to its use in specific assembly of materials, penetration and floor or walls in which it is tested as follows:
  - 1.3.2.2.1. F Rating: When system remains in opening during fire test for rating period without permitting passage of flame through openings or occurrence of flaming on any element of unexposed side of assembly.
  - 1.3.2.2.2. FT Rating: When system remains in opening during fire test in accordance with F Rating requirement and additionally, transmission of heat through firestop system during rating period shall not have been such as to raise temperature of any thermocouple on unexposed surface of system more than 163 deg C (325 deg F) above initial temperature.
  - 1.3.2.2.3. FH Rating: When system remains in opening during fire and hose test in accordance with F Rating requirement and additionally, during hose stream test firestop system shall not develop any opening that would permit a projection of water from stream beyond unexposed side.
  - 1.3.2.2.4. FTH Rating: When system remains in opening during fire test and hose stream test within limitations described for F, FT and FH ratings.

- 1.3.2.2.5. L Rating: Based on volume of air flowing, per unit of time through opening around test sample under specified pressure difference applied across surface of system. L Ratings are intended to determine acceptability of firestop systems with reference to control of air movement through assembly. Rating is expressed in litres per second (ℓ/s) per linear metre of opening for joint systems.
- 1.3.3. Reference Standards:
- 1.3.3.1. ASTM E2307-20 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus
- 1.3.3.2. ASTM G21 -15 - Standard practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- 1.3.3.3. CAN/ULC-S101-14 - Standard Methods of Fire Endurance Tests of Building Construction and Materials
- 1.3.3.4. CAN/ULC-S102-18 - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
- 1.3.3.5. CAN/ULC-S115-18 - Standard Method of Fire Tests of Firestop Systems
- 1.3.3.6. UL Product iQ; [www.ulprospector.com](http://www.ulprospector.com)

#### **1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Preinstallation Meetings:
- 1.4.1.1. Arrange preinstallation meeting 1 week before commencing work with all parties associated with trade as designated in Contract Documents or as requested by Consultant. Presided over by Construction Manager, include Consultant who may attend, Trade Contractor performing work of this trade, Owner's representative, testing company's representative and consultants of applicable discipline. Review Contract Documents for work included under this trade and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of work of this Section.
- 1.4.1.2. Ensure a manufacturer's direct representative (not distributor or agent) is on-site during initial installation of firestop systems to train appropriate Trade Contractor personnel in proper selection and installation procedures. Ensure this is done per manufacturer's written recommendations published in their literature and drawing details.

#### **1.5. SUBMITTALS**

- 1.5.1. Product Data: Submit manufacturers' specifications and technical data for each material including compositions, limitations, documentation conforming ULC and/or cUL firestop system proposed for this Project and manufacturers' installation instructions.
- 1.5.2. Shop Drawings:
- 1.5.2.1. Submit Shop Drawings in accordance with Section 01 30 00. Submit complete and detailed Shop Drawings for each condition encountered on site. Indicate following:
- 1.5.2.1.1. ULC and/or cUL assembly number certification and material safety data sheets.
- 1.5.2.1.2. required temperature rise and flame rating.
- 1.5.2.1.3. hose stream rating (where applicable).
- 1.5.2.1.4. thickness.
- 1.5.2.1.5. proposed installation methods.

- 1.5.2.1.6. material of firestopping and smoke seals, primers, reinforcements, support and securement methods, damming materials, reinforcements and anchorages /fastenings.
- 1.5.2.1.7. size of opening.
- 1.5.2.1.8. adjacent materials.
- 1.5.2.1.9. number of penetrations.
- 1.5.2.2. Designate on Shop Drawings fixed penetrants, relative positions, number of penetrations, expansion and control joints in rated slabs and walls, firestopping details at receptacles and similar poke-through devices and surrounding permanent materials. Identify re-entry locations.
- 1.5.2.3. Submit fireproofing manufacturer's written verification that manufacturers have identified where firestopping is required, have selected correct firestop system and applicators have been trained by system manufacturers. Products, systems and assemblies have been installed in accordance with manufacturer's requirements.
- 1.5.3. Samples: Submit only as requested and in accordance with Section 01 30 00, various types of firestopping and smoke seal material.
- 1.5.4. Certificates:
  - 1.5.4.1. Submit manufacturer's verification that installed firestopping and smoke seal materials comply with specified requirements.
  - 1.5.4.2. Submit copies of ULC, Warnock Hersey and/or cUL Listing cards for review.

**1.6. CLOSEOUT SUBMITTALS**

- 1.6.1. Operational and Maintenance Data: Provide maintenance data for materials and prefabricated devices, providing descriptions sufficient for identification on site in accordance with requirements of Section 01 70 00.

**1.7. QUALITY ASSURANCE**

- 1.7.1. Qualifications:
  - 1.7.1.1. Installers: Provide work of this Section executed by competent installers experienced, trained, licensed and approved, by material or system manufacturer for application of materials and systems being used having minimum 5 years experience in application of Products, systems and assemblies specified. Ensure firestopping systems conform to requirements of CAN/ULC-S115 tested assemblies that provide fire rating as shown.
- 1.7.2. Mock-Ups: Construct minimum 5 mock-up samples of various firestopping systems at Project locations designated by Consultant for review by Consultant, Building Official and/or authority having jurisdiction. Once reviewed with no objections recorded, samples remain part of finished work and used as a quality reference standard for balance of Project.

**1.8. DELIVERY, STORAGE AND HANDLING**

- 1.8.1. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's sealed and labelled containers. Materials are subject to Consultant's inspection.
- 1.8.2. Storage and Handling Requirements:
  - 1.8.2.1. Store materials inside building for 24 hours prior to use; store in area designated by Consultant. Protect from damage and environmental conditions detrimental to material.
  - 1.8.2.2. Comply with manufacturer's temperature, relative humidity and substrate moisture content for storage, mixing, application and curing of Products.

**1.9. SITE CONDITIONS**

- 1.9.1. Ambient Conditions:
- 1.9.1.1. Comply with manufacturer's recommended requirements for temperature, relative humidity, moisture content and presence of any sealer or release agents on substrate during application and curing of materials. Ensure surfaces are dry and frost free.
- 1.9.1.2. Maintain minimum temperature of 5 deg C (40 deg F) for minimum period of 1 week before application, during application and until application is fully cured.
- 1.9.1.3. Ventilate areas in which firestopping is being applied. Protect water-soluble material from wetting until fully cured.

**1.10. WARRANTY**

- 1.10.1. Manufacturer Warranty: Warrant work of this Section against defects and deficiencies for period of 5 years in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no additional expense to Owner. Defects include but are not limited to cracking, breakdown of bond, failure to stay in place or bleeding.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer Lists: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
- 2.1.1.1. 3M Canada; [www.3m.ca](http://www.3m.ca)
- 2.1.1.2. Hilti (Canada) Corporation; [www.hilti.ca](http://www.hilti.ca)
- 2.1.1.3. Tremco Canada; [www.tremcosealants.com](http://www.tremcosealants.com)
- 2.1.2. Substitution Limitations: This Specification is based on Hilti (Canada) Corporation's Products. Comparable Products from manufacturers listed herein may be reviewed provided they meet requirements of this Specification. No further substitutions will be permitted.

**2.2. MATERIALS**

- 2.2.1. Performance/Design Criteria:
- 2.2.1.1. Ensure firestop systems intended for installation in fire separations have assigned fire ratings as defined herein when tested in accordance with CAN/ULC-S115. Ensure firestop systems intended for use in fire resistive wall and/or floor assemblies are evaluated in accordance with CAN/ULC-S101 (Refer to "UL Product iQ").
- 2.2.1.2. For "L Rating" systems, ensure results do not exceed 5.0 cfm/sq ft of penetration opening at both ambient and elevated temperatures.
- 2.2.1.3. Mould Resistance: Provide penetration firestopping with mould and mildew resistance rating of 0 or 1 in accordance with ASTM G21.
- 2.2.1.4. Supply materials and systems capable of effectively impeding passage of fire, smoke, gasses and where specifically indicated passage of liquids. Use only firestop systems that have been ULC and/or cUL tested for specific fire rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements and fire rating involved for each separate instance.
- 2.2.1.5. Ensure firestopping system provides fire-resistance rating, flame and temperature not less than fire resistance rating of surrounding floor, wall or assembly, in accordance with requirements of OBC.



- 2.2.1.6. Firestop System Rating: Where applicable, comply with F Rating based on number of hours system can resist flames and gases; T Rating based on maximum temperature rise of 163 deg C (325 deg F) above ambient for any thermocouple in addition to flame, gas and stream performance and H Rating based on capacity to withstand hose stream after burn. Design combined and/or built-up site systems in accordance with approved restrictions and technical evaluations permitted by Consultant and authorities having jurisdiction.
- 2.2.1.7. Ensure systems provide fire and temperature rating in accordance with those outlined in OBC and effectively impeding passage of flame, smoke and gasses.
- 2.2.1.8. Firestopping seals except for wall joints in visible areas must be of easily identifiable colour, such as red or yellow to be clearly distinguished from other building materials.
- 2.2.1.9. Ensure service penetration components and assemblies, including back-up materials and supports are certified in accordance with CAN/ULC-S115 or CAN/ULC-S101 and be ULC listed by a certified authority recognized by building Code officials in locality in which Building is situated.
- 2.2.1.10. Ensure suitability of Products for application and compatibility of materials with surfaces to which it will be applied.
- 2.2.1.11. Ensure site system assembly is in accordance with CAN/ULC-S115 labeled and listed system design limitations, unless proposed assembly is approved by authorities having jurisdiction and meets Consultant's review. Design combined and/or built-up site systems in accordance with approved restrictions and technical evaluations acceptable to authorities having jurisdiction as reviewed by Consultant. Engineering Judgements from firestopping manufacturers reviewed by Consultant and authorities having jurisdiction may be used for conditions where a ULC and/or cUL firestopping system is not available. Ensure Engineering Judgements are performed in accordance with IFC's "Recommended IFC Guidelines for Evaluating Firestop Systems in Engineering Judgments (EJs)"
- 2.2.1.12. Ensure sealants and putty for overhead and vertical joints are non-sagging; seals for floors, self-levelling. Ensure flexible fire stop sealant provides movement capability in fire rated joint applications. Ensure sealants are compatible with base materials such as without limitations masonry, concrete, metal, gypsum board and other similar items.
- 2.2.1.13. Ensure Products have a compressive strength capable of providing self support at a penetrating item and shall maintain their integrity as tested in a ULC vertical application.
- 2.2.1.14. Ensure Products are compatible with abutting dissimilar architectural coatings and finishes at floors, walls, ceilings, waterproofing membranes and the like. Check with Room Finish Schedule and manufacturer of selected materials being installed.
- 2.2.1.15. Integral Pipe Sleeves/Firestopping Components: Other Sections within Divisions 21, 22 and 23 may specify fire-rated pipe sleeves, cast-in pipe/sleeve assemblies and integral firestopped penetration devices and accessories listed by authorized testing and certification authorities. These systems may eliminate need for separate firestopping applications at certain designated locations and it is responsibility of this Section to determine any and all locations where such devices will be utilized on Project.
- 2.2.1.16. Do not provide Products containing asbestos.
- 2.2.1.17. Firestopping System 1 (JF and/or PJ Systems):
  - 2.2.1.17.1. This Firestopping System is primarily an expansion, control and perimeter seal without smoke resistance and be non-combustible, semi-rigid, felt fire protection. Certified assembly of 1 of listed manufacturers and permitted by Consultant.
  - 2.2.1.17.2. Ensure firestop systems are from "Manufacturer List" specified herein and listed in UL (XHEZ7 and XHBN7) Fire Resistance Directory provided they conform to construction type and fire resistance rating involved in each separate instance.

- 2.2.1.17.3. Where required by listing, ensure impaling clips are heavy gauge galvanized wire or 25 mm (1") wide x 0.607 mm (24 ga) galvanized steel, Z formed with horizontal bottom and dimensions conforming to location of firestopping and width of void to be filled. Ensure compression of joint do not damage clips.
- 2.2.1.18. Firestopping System 2: Same materials as in System 1, but without use of impaling clips and with smoke and fluid seal with hose stream resistance. Certified assembly of 1 of listed manufacturers and permitted by Consultant.
- 2.2.1.19. Firestopping System 3: Fire, gas, fluid and hose stream resistant elastomeric sealant with movement capabilities, ULC labeled assembly of 1 of listed manufacturers and permitted by Consultant. Ensure materials have elastic characteristics where used at openings subject to movement. Intumescent pads may form part of this system, at Contractor's [Construction Manager's] option.
- 2.2.1.20. Firestopping System 4: Ensure firestopping, gas, fluid and hose stream resistant seals at openings intended for ease of re-entry such as cables be an elastomeric seal or proprietary assembly of following types; a cementitious or rigid seal at such locations is not permitted. Certified assembly of 1 of listed manufacturers and permitted by Consultant.
- 2.2.1.21. Firestopping System 4-A: Where openings are considered large such as at cable trays and bus ducts. Certified assembly of 1 of listed manufacturers and permitted by Consultant.
- 2.2.2. Primers: To manufacturer's recommendations for specific material, substrate and end use.
- 2.2.3. Damming and Backup Materials, Supports and Anchoring Devices: Non-combustible, to manufacturer's recommendations in accordance with tested assembly being installed and as acceptable to authorities having jurisdiction. Ensure sheet steel covers over temporarily unused sleeves in tenant and similar spaces are minimum 0.912 mm (20 ga) thick galvanized sheet steel formed to a tight fit over opening with specified firestopping materials installed beneath. Combustible materials are permitted only if they are approved under ULC or cUL systems, otherwise they should be removed after permanent firestop materials have cured.
- 2.2.4. Pre-Installed Firestop Devices: For use with non-combustible and combustible pipes (closed and open systems), conduit and/or cable bundles penetrating concrete floors, provide 1 of following Products:
  - 2.2.4.1. "Cast-In Firestop Device (CP 680-P)" by Hilti (Canada) Corporation.
  - 2.2.4.2. "Cast-In Firestop Device (CP 680-PX)" by Hilti (Canada) Corporation for use with XFR pipe.
  - 2.2.4.3. "Cast-In Firestop Device (CP 680-M)" by Hilti (Canada) Corporation for use with non-combustible penetrants.
  - 2.2.4.4. "Cast-In Firestop Device (CFS-CID MD P/M)" by Hilti (Canada) Corporation.
  - 2.2.4.5. "Firestop Drop-In Device (CFS-DID)" by Hilti (Canada) Corporation for use with non-combustible and combustible penetrants.
- 2.2.5. Pre-Formed Materials: For use with standard head-joint top tracks and slip-type head joints in fire-rated construction at top of partition in concrete construction, provide following Product:
  - 2.2.5.1. "Firestop Top Track Seal (CFS-TTS)" by Hilti (Canada) Corporation.
  - 2.2.5.2. "Firestop Top Track Seal (CFS-TTS MD)" by Hilti (Canada) Corporation.
- 2.2.6. Re-Penetrable, Round Cable Management Devices:
  - 2.2.6.1. For use with new cable bundles penetrating gypsum board or masonry walls, provide following Product:
    - 2.2.6.1.1. "Speed Sleeve (CP 653)" by Hilti (Canada) Corporation with integrated smoke seal fabric membrane.

- 2.2.7. Single or Cable Bundles up to 25 mm (1") Diameter: Penetrating gypsum board, masonry, concrete walls or wood floor assemblies, provide following Product:
  - 2.2.7.1. "Firestop Cable Disc (CFS-D 1")" by Hilti (Canada) Corporation.
- 2.2.8. Pipe and Duct Insulation and Wrappings Compatible with Firestopping Systems: "TREMstop WS" by Tremco Canada or "3M™ Fire Barrier Duct Wrap 615" by 3M Canada.
- 2.2.9. Intumescent Pads: "Firestop Block (CFS-BL)" by Hilti (Canada) Corporation.
- 2.2.10. Firestop Collar or Wrap Devices: Devices attached to assemble around combustible plastic pipe (closed and open piping systems) tested to 50 Pa pressure differential, following Products are permitted:
  - 2.2.10.1. "Firestop Collar (CP 643N)" by Hilti (Canada) Corporation.
  - 2.2.10.2. "Firestop Wrap Strip (CP 648-S/648-E)" by Hilti (Canada) Corporation.
- 2.2.11. Wall Opening Protective Devices: Wall opening protective materials for use with cUL/ULC listed metallic and specified nonmetallic outlet boxes, following Products are permitted:
  - 2.2.11.1. "Firestop CP 617 Putty Pad" by Hilti (Canada) Corporation.
  - 2.2.11.2. "Firestop Putty Stick CP 618" by Hilti (Canada) Corporation.
  - 2.2.11.3. "Firestop Box Insert" by Hilti (Canada) Corporation.
- 2.2.12. Preformed, Spray or Sealant Materials for Use with Fire-Rated Construction at Perimeter Slab Joints: Provide 1 of following Products tested in accordance with ASTM E2307 and/or CAN/ULC-S115:
  - 2.2.12.1. "CFS-EOS QuickSeal Preformed Firestop System" with "CFS-EOS WS Edge of Slab Waterstop" used at brackets and butt joints by Hilti (Canada) Corporation.
  - 2.2.12.2. "CFS-SP WB Firestop Joint Spray" by Hilti (Canada) Corporation.
  - 2.2.12.3. "CFS-SP SIL Firestop Silicone Joint Spray" by Hilti (Canada) Corporation.
  - 2.2.12.4. "CFS-S SIL SL Firestop Silicone Sealant, Self-Leveling" by Hilti (Canada) Corporation.
- 2.2.13. Spray or Sealant Materials for Use with Fire-Rated Construction Joints: Provide 1 of following:
  - 2.2.13.1. "CFS-SP WB Firestop Joint Spray" by Hilti (Canada) Corporation.
  - 2.2.13.2. "CFS-SP SIL Firestop Silicone Joint Spray" by Hilti (Canada) Corporation.
  - 2.2.13.3. "CP 606 Flexible Firestop Sealant" by Hilti (Canada) Corporation.
  - 2.2.13.4. "CFS-S SIL GG Firestop Silicone Sealant, Gun-Grade" by Hilti (Canada) Corporation.
  - 2.2.13.5. "CFS-S SIL SL Firestop Silicone Sealant, Self-Leveling" by Hilti (Canada) Corporation.
- 2.2.14. Sealant Materials for Use with Fire-Rated Construction Penetrations: Provide 1 of following:
  - 2.2.14.1. "FS ONE MAX Firestop Intumescent Sealant" by Hilti (Canada) Corporation.
  - 2.2.14.2. "CFS-S SIL GG Firestop Silicone Sealant, Gun-Grade" by Hilti (Canada) Corporation.
  - 2.2.14.3. "CFS-S SIL SL Firestop Silicone Sealant, Self-Leveling" by Hilti (Canada) Corporation.
  - 2.2.14.4. "CP 606 Flexible Firestop Sealant" by Hilti (Canada) Corporation.
- 2.2.15. Spray or Sealant Materials for Use with Non-Fire-Rated Construction Joints and Other Gaps: Provide 1 of following:
  - 2.2.15.1. "Lightweight Smoke and Acoustic Sealant CS-S SA Light" by Hilti (Canada) Corporation.
  - 2.2.15.2. "CP 572 Smoke and Acoustic Spray" by Hilti (Canada) Corporation.

- 2.2.16. Pre-Formed Materials: For use with standard head-joint top tracks and bottom-joint tracks and slip type head joints in non-fire-rated construction at top or bottom of partition in flat concrete construction, provide following Product:
- 2.2.16.1. “CS-TTS SA Smoke and Acoustic Track Seal” by Hilti (Canada) Corporation.
- 2.2.17. Mixes:
- 2.2.17.1. Mix materials at correct temperature and in accordance with manufacturer's directions.
- 2.2.17.2. Cleaning Materials: As recommended by firestop manufacturer.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions:
  - 3.1.1.1. Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
  - 3.1.1.2. Verify openings, dimensions and surfaces conform to fire and smoke seal assembly.
  - 3.1.1.3. Examine sizes of penetrating service, percentage fill and sleeve or opening sizes with exact annular space calculations, anticipated movement and conditions necessary to establish correct type, thickness and installation of back-up materials and seals.
  - 3.1.1.4. Since firestop systems do not re-establish structural integrity of load bearing partitions/assemblies, or support live loads and traffic, consult structural engineer prior to penetrating any load bearing assembly.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. PREPARATION**

- 3.2.1. Surface Preparation:
  - 3.2.1.1. Provide primer or surface conditioner if required by Product manufacturer. Prime surfaces in accordance with manufacturer's directions.
  - 3.2.1.2. Remove combustible material and loose material detrimental to bond from edges of penetration. Clean, prime or otherwise prepare substrate material to manufacturer's recommendation.
  - 3.2.1.3. Remove insulation from insulated pipe and duct where such pipes or ducts penetrate a fire separation unless ULC certified assembly permits such insulation to remain within assembly, or where mechanical trades have installed special fire rated insulated sleeves. Ensure continuity of thermal and vapour barriers where such are removed, altered or replaced, to satisfaction of Divisions 21, 23 and 23 and Consultant.
  - 3.2.1.4. Alternatively, ensure pipe and duct insulation and wrappings occurring within openings to receive firestopping and smoke seals under this Section are installed prior to work of this Section and insulation and wrappings within fire seals are ULC listed components of system to be installed under this Section, unless ULC certified assembly permits such other insulation and wrappings to remain within assembly. Coordinate work of this Section with Divisions 21, 22 and 23.
  - 3.2.1.5. Clean bonding surfaces to remove deleterious substances including dust, paint, rust, oil, grease, moisture, frost and other foreign matter which may otherwise impair effective bonding.

#### **3.3. INSTALLATION**

- 3.3.1. Do not apply firestop material to surfaces previously painted or treated with sealer, curing compound, water repellent to other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

- 3.3.2. Provide temporary forming, packing and bracing materials necessary to contain firestopping. Upon completion, remove forming and damming materials not required to remain as part of system.
- 3.3.3. Install damming and firestopping materials as per manufacturer's instructions.
- 3.3.4. Mix and apply firestopping and smoke seals in accordance with manufacturer's instructions and tested designs to provide required fire (temperature and flame) rated seal, to prevent passage of smoke and where specifically designated, passage of fluids.
- 3.3.5. Provide temporary forming and packing as required. Apply materials with sufficient pressure to properly fill and consolidate mass to seal openings.
- 3.3.6. Tool or trowel exposed surfaces. Allow materials to cure by not covering up materials until full curing has taken place.
- 3.3.7. Where a designated system described hereinafter does not meet Code requirements for particular service condition, substitute with next higher system meeting required rating.
- 3.3.8. Notify Consultant when completed installations are ready for inspection and prior to concealing or enclosing firestopping and smoke seals.
- 3.3.9. System 1:
  - 3.3.9.1. Install fire rated joint firestopping by compressing material minimum of 25% to ensure complete sealing and to follow irregularities of concrete slabs at perimeter of building where junction occurs with back of cladding system. Apply firestopping sealant of spray over compressed mineral wool.
  - 3.3.9.2. Butt succeeding sections of firestopping material tightly up against preceding. Leave no voids.
  - 3.3.9.3. Provide firestopping between exterior wall cladding and concrete floor slab. Secure and support to suit design requirements.
  - 3.3.9.4. Use this System for joint seals through fire-resistance rated floor slabs, ceilings and roofs unless otherwise stipulated.
- 3.3.10. System 2:
  - 3.3.10.1. At fire-rated masonry walls and gypsum board partitions which extend nominally to within 19 mm (3/4") of underside of deck above, insert fire rated joint assembly firestopping material in 25% compression in accordance with ULC test requirements and manufacturer's instructions. Provide adequate depth of material to fill gap flush with face of wall, except as otherwise specified. Apply firestopping sealant of spray over compressed mineral wool.
  - 3.3.10.2. Insert at intersection of fire-resistance rated masonry and gypsum board partitions.
  - 3.3.10.3. Insert at both sides of control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
  - 3.3.10.4. Where wall/slab junction is exposed in finished work, keep fibre back 9 mm (3/8") from face of block and apply fire-resistant sealant to gap, tooling to a concave joint.
  - 3.3.10.5. At perimeter slab locations where this system would otherwise be exposed in finished work and where smoke seal is required, provide cover spray material of thickness as recommended by manufacturer of System 3 material set flush with top of slab and tooled smooth. Minimum cover spray thickness 3 mm (1/8"). Where anticipated movement in joint width is inevitable, select sealant with elastic capabilities.
- 3.3.11. System 3:
  - 3.3.11.1. This System establishes fire rated firestopping for service penetrations throughout the Project. Seal gaps and holes in fire-rated walls and slabs and composite construction through which conduit, wire, cables, ductwork, piping and other protrusions pass as a result of work using fire-resistant penetration sealant. Include opening which have been formed, sleeved and cored.

- 3.3.11.2. Apply at unpenetrated openings and sleeves installed for future use through fire-resistance rated assemblies.
- 3.3.11.3. Apply this System between spaces having different air pressures. (See Mechanical Drawings for pressurized areas and locations of moving penetrants.)
- 3.3.11.4. Apply at "wet" rooms supported by suspended slabs at locations over Electrical and Equipment Rooms or similar areas containing power devices in which future re-entry is not required.
- 3.3.11.5. Apply at Mechanical Rooms and similar rooms having systems containing liquids, including piping runs, unless such rooms are located over slab-on-grade.
- 3.3.11.6. Install System 3 materials at elevator shafts, duct shafts and other similar locations over occupied spaces.
- 3.3.11.7. Install 6 mm to 9 mm (1/4" to 3/8") bead of firestop caulking at interface of retaining angles around fire dampers, where angles meet fire-rated assembly and between retaining angles and fire damper, both sides of penetration. At floor locations, sealant bead at top of assembly is adequate.
- 3.3.11.8. Where necessary, remove insulation from insulated pipe and duct where such services penetrate a fire separation unless certified assembly permits such insulation to remain within assembly. Apply wrapping materials as listed herein.
- 3.3.11.9. Install System 3 materials at open wall joints, including expansion joints between fire rated enclosures and assemblies.
- 3.3.12. Systems 4 and 4A: Install at following locations:
  - 3.3.12.1. At Electrical, Electrical Switchgear, Electrical Transformer Rooms and at Telephone Equipment Rooms requiring re-entry for additional services.
  - 3.3.12.2. Install at communications and computer cable penetration points throughout.
- 3.3.13. Accessories: At hollow fire-rated walls, apply intumescent pads to back surfaces and cable entry points of electrical boxes, panels and other service penetration points, ensuring close coordination with electrical, mechanical and drywall trades. Where greater dimension of panel exceeds 500 mm (20"), gypsum board trades construct fire-rated enclosure around recessed panels.
- 3.3.14. Penetration Sizing: Ensure following regulates sizing of service penetrations to be firestopped, other than for fire dampered openings:
  - 3.3.14.1. Ensure single, circular penetration is sleeved by work of Divisions 21, 22, 23, 26, 27 and 28.
  - 3.3.14.2. Multiple penetrations of circular elements are defined as more than 1 circular penetration having a maximum space of 100 mm (4") between closest faces of such penetrating elements. Forming of such multiple penetrations is responsibility of respective trades whose service penetrates rated assembly and such formed opening shall be square or rectangular frame around group of penetrations in which maximum clearance between outer penetration element and face of opening shall be 25 mm (1").
  - 3.3.14.3. Create single and multiple rectangular penetrations in same manner as specified above, but edge clearance may be increased to a maximum of 50 mm (2").
  - 3.3.14.4. Exception; at fire dampers, clearances are governed by testing authorities' requirements.
  - 3.3.14.5. For purposes of this Specification, a moving penetrant is defined as a penetrating device having an anticipated movement of greater than 9 mm (3/8") when measured at right angles to face of rated assembly.

3.3.15. Cable Tray Penetrations:

- 3.3.15.1. Seal (firestop) cable tray penetrations with re-enterable/re-penetrable matrices/devices with applicable ratings determined in accordance with CAN/ULC-S115 having a minimum L Rating not exceeding 5.0 cfm/sq ft of penetration opening at both ambient and elevated temperatures. For penetrations through a fire wall or horizontal fire separation provide a firestop system with a FT Rating as determined by ULC or cUL which is equal to fire resistance rating of construction being penetrated.
- 3.3.15.2. Ensure ULC or cUL tested listings for cable tray and cable penetrations conform to annular space requirements, (construction assembly type, penetrating item type and fire rating) for each separate instance per manufacturer's listings.

**3.4. SITE QUALITY CONTROL**

- 3.4.1. Ensure firestopping systems do not affect structural integrity of load bearing walls and assemblies. Coordinate with Consultant prior to penetrating any load bearing assembly. For unusual firestop application for which no tested system is available, ensure manufacturers submit their proposal to local authorities having jurisdiction for their review and approval prior to installation.
- 3.4.2. Ensure work of this Section is by 1 Trade Contractor responsible for firestopping materials and systems for all work except as specified herein.
- 3.4.3. Conform to both temperature and flame ratings of standards listed hereinafter and other requirements of authorities having jurisdiction.
- 3.4.4. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.
- 3.4.5. Manufacturer Services: Consult with Product manufacturer's technical representative about following items:
- 3.4.5.1. fire stopping system for fire separation required.
- 3.4.5.2. curing characteristics of materials specified.
- 3.4.5.3. joint characteristics as built.
- 3.4.5.4. to be on-site during initial installation of firestop systems to train appropriate Trade Contractor personnel in proper selection and installation procedures. Ensure this is done per manufacturer's written recommendations published in their literature and drawing details.

**3.5. CLEANING**

- 3.5.1. Remove excess materials and debris and clean adjacent surfaces immediately after application to satisfaction of Consultant. Remove and or correct staining and discolouring of adjacent surfaces as directed.
- 3.5.2. Remove temporary dams after initial set of firestopping and smoke seal materials where such materials are left exposed in finished areas and flame spread rating of such materials exceed a value of 25, in accordance with CAN/ULC-S102.

**3.6. PROTECTION**

- 3.6.1. Fully protect walls, windows, floors and other surfaces around areas to be firestopped from marring or damage. Mask where necessary to avoid spillage on to adjoining surfaces. Mask areas adjacent to openings, where necessary to prevent contamination or marring of adjacent surface materials. Remove masking after seal has been completed and an initial set has been achieved. Remove stains on adjacent surfaces as required.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide joints sealants including but not limited to following:
  - 1.2.1.1. Exterior:
    - 1.2.1.1.1. control and expansion joints in cast-in-place concrete.
    - 1.2.1.1.2. joints between metal panels.
    - 1.2.1.1.3. perimeter joints between materials listed above and frames of doors and windows.
    - 1.2.1.1.4. control and expansion joints in soffits and overhead surfaces.
    - 1.2.1.1.5. joints between different materials listed above.
    - 1.2.1.1.6. other joints as indicated.
  - 1.2.1.2. Interior:
    - 1.2.1.2.1. control and expansion joints on exposed interior surfaces of exterior walls.
    - 1.2.1.2.2. perimeter joints of exterior openings where indicated.
    - 1.2.1.2.3. tile control and expansion joints.
    - 1.2.1.2.4. joints on underside of precast beams and planks.
    - 1.2.1.2.5. perimeter joints between interior wall surfaces and frames for interior doors and windows [and elevator entrances].
    - 1.2.1.2.6. joints between plumbing fixtures and adjoining walls, floors and counters.
    - 1.2.1.2.7. joints between different materials listed above.
    - 1.2.1.2.8. other joints as indicated.
  - 1.2.1.3. mildew resistant sealants.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Filling and sealing of sawcut joints in concrete slab: Section 03 30 00, Cast-In-Place Concrete.
  - 1.2.2.2. Masonry control and expansion joint fillers and gaskets: Section 04 20 00, Masonry Units.
  - 1.2.2.3. Sealing and sealants in conjunction with inverted roofing system: Section 07 55 56, Fluid-Applied Protected Membrane Roofing.
  - 1.2.2.4. Firestopping and smoke seals: Section 07 84 00, Firestopping and Smoke Seals.
  - 1.2.2.5. Sealing and sealants between aluminum curtain wall members and between aluminum curtain wall and adjacent construction: Section 08 44 13, Glazed Aluminum Curtain Wall.
  - 1.2.2.6. Sealing and sealants between aluminum window wall members and between aluminum window wall and adjacent construction: Section 08 51 66, Aluminum Window Wall.



- 1.2.2.7. Sealing of joints around sound attenuating gypsum board partitions: Section 09 21 16, Gypsum Board Assemblies.
- 1.2.2.8. Read other Sections of Specifications for extent of sealing specified in those Sections. Do other sealing indicated, specified or required.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
- 1.3.1.1. IPA: Isopropyl Alcohol (99.9% pure).
- 1.3.1.2. MEK: Methyl-ethyl-ketone.
- 1.3.1.3. SWRI: Sealant, Waterproofing, & Restoration Institute; [www.swrionline.org](http://www.swrionline.org).
- 1.3.2. Reference Standards:
- 1.3.2.1. ASTM C661-15(22) - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
- 1.3.2.2. ASTM C719-22 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
- 1.3.2.3. ASTM C834-17 - Standard Specification for Latex Sealants
- 1.3.2.4. ASTM C920-18 - Standard Specification for Elastomeric Joint Sealants
- 1.3.2.5. ASTM C1021-08(19) - Standard Practice for Laboratories Engaged in Testing of Building Sealants
- 1.3.2.6. ASTM C1248-18 - Standard Test Method for Staining of Porous Substrate by Joint Sealants

**1.4. ADMINSTRATIVE REQUIREMENTS**

- 1.4.1. Preinstallation Meeting:
- 1.4.1.1. Prior to start of work, arrange for Project site meeting of parties associated with work of this Section. Presided over by Construction Manager, include Consultant who may attend, Trade Contractor performing work of this trade, Testing Company's Representative, Construction Manager's consultants of applicable discipline and manufacturer's representative.
- 1.4.1.2. Review Specification for work included under this Section and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of this Section. Discuss also following items:
- 1.4.1.2.1. verify with sealant manufacturer that specified sealants are compatible with and will satisfactorily adhere to substrates.
- 1.4.1.2.2. weather conditions under which work will be done.
- 1.4.1.2.3. anticipated frequency and extent of joint movement.
- 1.4.1.2.4. joint design.
- 1.4.1.2.5. suitability of durometer hardness and other properties of material to be used.
- 1.4.1.2.6. recommendations of manufacturer for mixing of multi-component sealants.
- 1.4.1.2.7. number of beads to be used in sealing operation and priming operation if required.

**1.5. SUBMITTALS**

- 1.5.1. Product Data: Submit Product information from sealant manufacturer prior to commencement of work of this Section verifying:
  - 1.5.1.1. selected sealant materials are from those specified.
  - 1.5.1.2. composition and physical characteristics.
  - 1.5.1.3. surface preparation requirements.
  - 1.5.1.4. priming and application procedures.
  - 1.5.1.5. suitability of sealants for purposes intended and joint design.
  - 1.5.1.6. test report on adhesion, compatibility and staining effect on samples of adjacent materials used on Project.
  - 1.5.1.7. suitability of sealants for temperature and humidity conditions at time of application.
- 1.5.2. Test and Evaluation Reports:
  - 1.5.2.1. Compatibility Testing Report: Submit in accordance with Section 01 30 00. Prior to supply or installation, test exterior sealant materials for compatibility with joint substrates. Test for staining and adhesion including substrates treated with sealers, curing compounds and water repellants, etc. Submit a written report of test results to Consultant.
  - 1.5.2.2. Colour: Submit colours for review in accordance with following general colour hierarchy i.e. Between 2 dissimilar materials, colour the sealant to match the material with the higher relative position on the colour hierarchy scale (highest is at ".1"):
    - 1.5.2.2.1. concrete.
    - 1.5.2.2.2. masonry.
    - 1.5.2.2.3. metal extrusions.
    - 1.5.2.2.4. metal (formed).
- 1.5.3. Samples: Submit samples in accordance with Section 01 30 00. Provide cured, colour samples of manufacturer's standard range of colours in each type of sealant and caulking compound for colour selection by Consultant. Submit samples of primer, bond breaker tape and joint backing material, if requested.

**1.6. QUALITY ASSURANCE**

- 1.6.1. Qualifications:
  - 1.6.1.1. Installers: Provide work of this Section executed by competent installers who have a membership in good standing with SWRI and have minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of Product manufacturers.
  - 1.6.1.2. Testing Agencies: An independent testing agency qualified according to ASTM C1021 to conduct testing indicated. Ensure Products are verified by SWRI in accordance with ASTM C719 and ASTM C661.
- 1.6.2. Preconstruction Testing:
  - 1.6.2.1. Test for compatibility of sealant and accessory Products with joint substrates. Provide test results and written recommendations for primers and substrate preparation required for proper adhesion. For materials failing tests, obtain joint sealant manufacturer's written instructions for corrective measures, including use of specialty formulated primers.
  - 1.6.2.2. Test elastomeric joint sealants for compliance with requirements of ASTM C920 and where applicable, to other standard test methods.
  - 1.6.2.3. Test elastomeric joint sealants for compliance with requirements of ASTM C719 for adhesion and cohesion under cyclic movement, adhesion-in peel and indentation hardness.

- 1.6.2.4. Test other joint sealants for compliance with requirements indicated by referencing standard Specifications and test methods.
- 1.6.3. Mock-Ups: Conform to requirements of Section 01 40 00. At site, in area(s) designated by Consultant, erect sample panels 1 m (39") long for each type of sealant joint design, showing location, size, shape and depth of joint complete with backup materials, primer, caulking and sealant, bond, colour and quality of installation work. If requested conduct field test for joints designated. Construct additional samples if required to obtain no objections. Do no sealant work until samples have been reviewed with no objections recorded. Samples become standard of comparison for sealant and caulking work on site and may become part of Work.

**1.7. DELIVERY, STORAGE AND HANDLING**

- 1.7.1. Delivery and Acceptance Requirements: Deliver caulking and sealant materials to site in original, unopened containers with manufacturers' labels and seals intact. Labels to identify manufacturer's name, brand name of Product, grade and type, application directions and shelf life or expiry date of Product.
- 1.7.2. Storage and Handling Requirements:
- 1.7.2.1. Handle and store materials in accordance with manufacturer's printed directions. Store flammable materials in safe, approved containers to eliminate fire hazards.
- 1.7.2.2. Do not use caulking and sealant materials that have been stored for period of time exceeding maximum recommended shelf life of materials.

**1.8. SITE CONDITIONS**

- 1.8.1. Ambient Conditions:
- 1.8.1.1. Do not apply any sealant under adverse weather conditions, when joints to be sealed are damp, wet or frozen or when at ambient temperatures below 5 deg C (40 deg F). Maintain minimum temperature of application during application and for 8 hours after application. Consult manufacturer for specific instructions before proceeding and obtain Consultant's review.
- 1.8.1.2. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated and until contaminants capable of interfering with adhesion are removed from joint substrates.

**1.9. WARRANTY**

- 1.9.1. Manufacturer Warranty: Warrant work of this Section for period of 10 years for silicone type sealants and 5 years for other sealants against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to; cracking, crumbling, melting, shrinkage, sag, failure of adhesion, cohesion or reversion, air and moisture leakage, marbling or streaking due to improper mixing, discolouration due to dirt pick-up during curing and staining of adjacent materials.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
- 2.1.1.1. BASF; [www.master-builders-solutions.basf.com](http://www.master-builders-solutions.basf.com)
- 2.1.1.2. CPD Construction Products; [www.cpd.com](http://www.cpd.com)
- 2.1.1.3. The Dow Chemical Company; [www.consumer.dow.com](http://www.consumer.dow.com)
- 2.1.1.4. Euclid Chemical Canada Ltd.; [www.euclidchemical.com](http://www.euclidchemical.com)

- 2.1.1.5. Momentive Performance Materials; [www.momentive.com](http://www.momentive.com)
- 2.1.1.6. Pecora Corporation; [www.pecora.com](http://www.pecora.com)
- 2.1.1.7. Sika Canada Inc.; [www.sika.ca](http://www.sika.ca)
- 2.1.1.8. Tremco Canada; [www.tremcosealants.com](http://www.tremcosealants.com)
- 2.1.1.9. W.R. Meadows of Canada; [www.wrmeadows.com](http://www.wrmeadows.com)

**2.2. MATERIALS**

- 2.2.1. Performance/Design Criteria: Provide exterior and interior elastomeric joint sealants establishing and maintaining water tight, water resistant and air tight continuous joint seals without staining or deteriorating joint substrates.
- 2.2.2. General: Ensure elastomeric sealants comply with Standards specified herein for type, grade, class and uses.
- 2.2.3. Provide Products with capability, when tested for adhesion and cohesion under maximum cyclic movement in accordance with ASTM C719, to withstand required percentage change in joint width existing at time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated.
- 2.2.4. Where non-staining elastomeric sealants are applied to porous substrates, provide Products that have undergone testing according to ASTM C1248 and have not stained porous joint substrates indicated for Project.
- 2.2.5. Type A Sealant: Provide 1 of following:
  - 2.2.5.1. Non-sag type, 1 component ultra low-modulus, pre-pigmented, elastomeric silicone sealant conforming to ASTM C920, Type S, Grade NS, Class 100/50, Use NT, G, M, A and O. Supply in standard colours as selected. Supply 1 of following:
    - 2.2.5.1.1. "DOWSIL™ 790 Silicone Building Sealant" by The Dow Chemical Company.
    - 2.2.5.1.2. "GE SCS2700 SilPruf\* LM" by Momentive Performance Materials.
    - 2.2.5.1.3. "Pecora 890NST" by Pecora Corporation.
    - 2.2.5.1.4. "Sikasil® WS-290" by Sika Canada Inc.
    - 2.2.5.1.5. "Spectrem® 1" by Tremco Canada.
  - 2.2.6. Type B Sealant: Non-sag type, 1 component, mildew resistant silicone containing non-toxic fungicidal agents sealant conforming to ASTM C920, Type S, Grade NS, Class 25, Use NT. Supply in clear or white as selected. Supply 1 of following:
    - 2.2.6.1. "DOWSIL™ 786" by The Dow Chemical Company.
    - 2.2.6.2. "DOWSIL™ Tub, Tile & Ceramic Silicone Sealant" by The Dow Chemical Company.
    - 2.2.6.3. "GE Sanitary SCS1701 or SCS1702" by Momentive Performance Materials.
    - 2.2.6.4. "Sikasil®-GP" by Sika Canada Inc.
    - 2.2.6.5. "Tremsil® 200" by Tremco Canada.
- 2.2.7. Type C Sealant: Provide 1 of following:
  - 2.2.7.1. Non-sag type, 1 component, acrylic latex sealant conforming to ASTM C834, Type OP, Grade - 18°C. Supply in standard colours as selected. Supply 1 of following:
    - 2.2.7.1.1. "GE RCS20" by Momentive Performance Materials.
    - 2.2.7.1.2. "AC-20® +Silicone" by Pecora Corporation.
    - 2.2.7.1.3. "Tremflex® 834" by Tremco Canada.

- 2.2.7.2. Non-sag type, multi-component polyurethane sealant conforming to ASTM C920, Type M, Grade NS, Class 50, Use T, I, M, A and O. Supply in standard colours as selected. Supply 1 of following:
  - 2.2.7.2.1. "MasterSeal® NP 2™" by BASF.
  - 2.2.7.2.2. "Sikaflex® 2c NS" by Sika Canada Inc.
  - 2.2.7.2.3. "Dymeric® 240FC" by Tremco Canada.
- 2.2.7.3. Non-sag type, 1 component polyurethane sealant conforming to ASTM C920, Type S, Grade NS, Class 25, Use NT, M, A and O. Supply in standard colours as selected. Supply 1 of following:
  - 2.2.7.3.1. "MasterSeal® NP 1™" by BASF.
  - 2.2.7.3.2. "Eucolastic 1NS" by Euclid Chemical Canada Ltd.
  - 2.2.7.3.3. "Sikaflex® 1a" by Sika Canada Inc.
  - 2.2.7.3.4. "Dymonic® FC" or "Dymonic® 100" or "Vulkem 116" by Tremco Canada.
- 2.2.8. Type D Sealant: Provide 1 of following:
  - 2.2.8.1. Pour grade, 1 component polyurethane sealant conforming to ASTM C920, Type S, Grade P, Class 25, Use T, M, A, I and O. Supply in standard colours as selected. Supply 1 of following:
    - 2.2.8.1.1. "MasterSeal® SL 1™" by BASF.
    - 2.2.8.1.2. "Eucolastic 1SL" by Euclid Chemical Canada Ltd.
    - 2.2.8.1.3. "Sikaflex® Self-Leveling Sealant" by Sika Canada Inc.
    - 2.2.8.1.4. "Vulkem® 45SSL" by Tremco Canada.
  - 2.2.8.2. Pour grade, multi-component, polyurethane sealant conforming to ASTM C920, Type M, Grade P, Class 25, Use T, M, A, I and O. Supply 1 of following:
    - 2.2.8.2.1. "MasterSeal® SL 2™" by BASF.
    - 2.2.8.2.2. "Sikaflex® 2c SL" by Sika Canada Inc.
    - 2.2.8.2.3. "THC-901 or Vulkem® 245" by Tremco Canada.
- 2.2.9. Joint Primer: Non-staining, suitable for substrate surfaces, compatible with joint forming materials and as recommended by sealant manufacturer for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- 2.2.10. Joint Backing: Preformed, compressible, resilient, non-waxing, non-extruding, non-staining strips of closed cell polyethylene or urethane foam, compatible with joint substrates and are approved by sealant manufacturer based on field experience and laboratory test. Sizes and shapes to suit various conditions, diameter 25% greater than joint width. Ensure backing is compatible with sealant, primer and substrate.
- 2.2.11. Bond Breaker Tape: As recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.
- 2.2.12. Masking Tape: Provide non-staining, non-absorbent tapes and sheets which effectively mask substrate without leaving an adhesive residue compatible with joint sealants and surfaces adjacent to joints.
- 2.2.13. Cleaning Material: Non-corrosive, non-staining, solvent type, xylol, MEK, toluol, IPA or as recommended by sealant manufacturer and acceptable to material or finish manufacturers for surfaces adjacent to sealed areas free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way and formulated to promote optimum adhesion of sealants with joint substrates.

---

**PART 3 - EXECUTION**

**3.1. EXAMINATION**

- 3.1.1. Verification of Conditions:
  - 3.1.1.1. Examine joints for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealant performance. Ensure joints are suitable to accept and receive sealants.
  - 3.1.1.2. Verify joint surfaces are clean, sound, free of defects and dimensions are within sealant manufacturer's size requirements.
  - 3.1.1.3. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 3.1.1.4. Do not apply sealant to masonry until mortar has cured.
- 3.1.2. Preinstallation Testing: Before any sealing work is commenced, test materials for indications of staining or poor adhesion.
- 3.1.3. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.2. PREPARATION**

- 3.2.1. Protection of In-Place Conditions: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.
- 3.2.2. Surface Preparation:
  - 3.2.2.1. Clean joints and spaces which are to be sealed and ensure they are dry and free of dust, loose mortar, oil, grease, oxidation, coatings, form release agents, sealers and other foreign material.
  - 3.2.2.2. Clean porous surfaces such as concrete, masonry or stone by wire brushing, grinding or blast cleaning, mechanical abrading or combination of these methods as required to obtain clean and sound surfaces.
  - 3.2.2.3. Remove laitance by grinding or mechanical abrading.
  - 3.2.2.4. Remove oils by sandblast cleaning.
  - 3.2.2.5. Remove loose particles present or resulting from grinding, abrading or sandblast cleaning by thorough brushing.
  - 3.2.2.6. Clean ferrous metals of rust, mill scale and foreign materials by wire brushing, grinding or sanding.
  - 3.2.2.7. Wipe non-porous surfaces such as metal and glass to be sealed, except pre-coated metals, with cellulose sponges or clean rags soaked with ethyl alcohol, ketone solvent, xylol or toluol and wipe dry with clean cloth. Where joints are to be sealed with silicone based sealants clean joint with MEK or xylol. Do not allow solvent to air-dry without wiping. Clean pre-coated metals with solutions or compounds which will not injure finish and which are compatible with joint primer and sealant. Check ferrous metal surfaces are painted before applying sealant.
  - 3.2.2.8. Examine joint sizes and where depth of joint exceed required depth of sealant correct to achieve proper following width/depth ratio:
    - 3.2.2.8.1. Maintain 2:1 Width/Depth Ratio: Ensure maximum sealant depth is 13 mm (1/2") and minimum contact width with each substrate is 6 mm (1/4"). Confirm width/depth ratios with sealant manufacturers.
  - 3.2.2.9. Install joint backing material to achieve correct, uniform joint profile and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

- 3.2.2.10. Do not leave gap between ends of sealant backing; do not stretch, twist, puncture, or tear sealant backings; remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- 3.2.2.11. Confirm with sealant manufacturer selected bond breaker material works with chosen sealant.
- 3.2.2.12. Where joint design or depth of joint prevents use of joint backing material, apply bond breaker tape at back of joint to prevent 3-sided adhesion.
- 3.2.2.13. Do not stretch, twist, puncture or tear joint backing. Butt joint backing at intersections. Install bond breaker tape at back of joint where joint backing is not required or cannot be installed.
- 3.2.2.14. On horizontal traffic surfaces, support joint filler against vertical movement which might result from traffic loads, including foot traffic.
- 3.2.2.15. Where surfaces adjacent to joints are likely to become coated with sealant during application, mask them prior to priming and sealing.
- 3.2.2.16. Do not exceed shelf life and pot life of materials and installation times, as stated by manufacturer.
- 3.2.2.17. Be familiar with work life of sealant to be used. Do not mix multiple component materials until required for use.
- 3.2.2.18. Use materials as received from manufacturer, without additions, deletions and adulterations of materials.
- 3.2.2.19. Mix multiple component sealants and bulks sealants using mechanical mixer capable of mixing without mixing air into material, in accordance with manufacturer's directions and recommendations. Continue mixing until material is homogeneously blended, uniform in colour and free from streaks of unmixed material. Install compound prior to start of hardening or curing cycle.
- 3.2.2.20. Prior to painting, seal joints in surfaces to be painted. Where surfaces to be sealed are prime painted in shop before sealing ensure prime paint is compatible with primer and sealant. If they are incompatible, inform Consultant and change primer and sealant to compatible types reviewed by Consultant.
- 3.2.2.21. Where irregular surface or sensitive joint border exists, apply masking tape at edge of joint to ensure joint neatness and protection.
- 3.2.2.22. Prime exterior horizontal joints. Prime sides of joints for type of surface being sealed prior to application of joint backing, bond breaker or sealant as recommended by sealant manufacturer.

### **3.3. APPLICATION**

- 3.3.1. Apply in accordance with manufacturer's directions and recommendations unless more stringent requirements apply.
- 3.3.2. Apply sealant by proven techniques using hand operated guns or pressure equipment fitted with suitable nozzle size and equipment approved by sealant manufacturer.
- 3.3.3. Force sealant into joint and against sides of joints to obtain uniform adhesion. Use sufficient pressure to completely fill voids in joint regardless of variation in joint widths and to proper joint depth as prepared. Ensure full firm contact with interfaces of joint. Superficial pointing with skin bead is not permitted.
- 3.3.4. Finish face of compound to form smooth, uniform beads. At recesses in angular surfaces, finish compound with flat face, flush with face of materials at each side. At recesses in flush surfaces, finish compound with concave face flush with face of materials at each side.
- 3.3.5. Compound may be tooled, provided such tooling does not damage seal or tear compound. Avoid pulling of sealant from sides.
- 3.3.6. Tool surfaces as soon as possible after sealant application or before any skin formation has occurred, particularly when using silicone sealants.

- 3.3.7. Ensure joint surfaces are straight, neatly finished, free from ridges, wrinkles, sags, dirt, stains, air pockets and embedded foreign matter or other defacement and be uniform in colour, free from marbling and/or colour streaking due to improper mixing or use of out of shelf life Products.
- 3.3.8. Do not use solvent curing sealants indoors.
- 3.3.9. Joint designation in "SEALANT LOCATION SCHEDULE" specified herein and the fact that Drawings do not show all locations to be sealed does not limit responsibility of this Section to seal all locations except those indicated in other Sections of work, required to create and ensure continuous enclosure.
- 3.3.10. Firestopping and Smoke Seal: Sealants part of firestopping systems and smoke seals provided within fire rated assemblies are part of work of Section 07 84 00 and carried out under supervision of this Section.

### **3.4. SITE QUALITY CONTROL**

- 3.4.1. Site Tests and Inspections:
  - 3.4.1.1. Independent inspection and testing company may be appointed and paid for by Owner to carry out inspection and testing as directed by Consultant. Refer to Section 01 40 00.
  - 3.4.1.2. Inspect joints for complete fill, for absence of voids and for joint configuration complying with specified requirements. Record results in a manner permitted by Consultant.
  - 3.4.1.3. Tests may include sampling of installed Product where adhesion, cohesion or reversion failure is suspected.
  - 3.4.1.4. Where work or materials fail to meet requirements as indicated by test results, pay costs of additional inspection and testing required for new replacement work or materials.
- 3.4.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.
- 3.4.3. Manufacturer Services: Prior to commencement of sealing, arrange for sealant manufacturer's technical representative to visit the Place of the Work and inspect surfaces and joints to be sealed.

### **3.5. CLEANING**

- 3.5.1. Immediately clean adjacent surfaces which have been soiled and leave work in neat, clean condition. Remove excess materials, compounds smears or other soiling resulting from application of sealants. Use recommended cleaners and solvents. Leave finished work in neat, clean condition with no evidence of spillovers onto adjacent surfaces.

### **3.6. PROTECTION**

- 3.6.1. Provide permitted, non-staining means of protection for completed joint sealant installations where required to protect work from mechanical, thermal, chemical and other damage by construction operations and traffic.
- 3.6.2. Maintain protection securely in place until completion of Work. Remove protection when so directed by Consultant.



**3.7. ATTACHMENTS**

**3.7.1. SEALANT LOCATION SCHEDULE**

- 3.7.1.1. Use 1 of sealants specified for each type in following locations. Ensure sealant chosen (from several specified under each type under "MATERIALS") for each location is recommended by manufacturer for use for conditions encountered:
- 3.7.1.1.1. Type A: Typically used in joints between metal frames and adjacent masonry and/or concrete construction in exterior walls, exterior and interior sides; control and expansion joints in exterior and interior surfaces of poured-in-place concrete walls and unit masonry walls; and other locations where sealant is required or noted on Drawings except in locations designated for Type B, C and D and except where sealant is specified in other Sections.
- 3.7.1.1.2. Type B: Typically used in joints between urinals and walls, around washrooms accessories, at corners of walls, between splash backs and walls, in shower, damp or wet areas, at ceramic tiles where mildew resistant sealant is required.
- 3.7.1.1.3. Type C: Typically used in joints between interior metal and/or wood frames and adjacent construction in interior partitions.
- 3.7.1.1.4. Type D (traffic bearing): Typically used in joints with movement in horizontal surfaces between concrete slabs, pavers and precast concrete panels.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide glazing schedule including but not limited to following:
  - 1.2.1.1. vision glass types (VG).
  - 1.2.1.2. spandrel glass types (SG).
  - 1.2.1.3. miscellaneous glass types (GL).
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Installation of glazing units: Section 05 73 13, Glazed Decorative Metal Railings.
  - 1.2.2.2. Installation of glazing units: Section 08 11 13, Hollow Metal Doors and Frames.
  - 1.2.2.3. Installation of glazing units: Section 08 14 00, Wood Doors.
  - 1.2.2.4. Installation of glazing units: Section 08 44 13, Glazed Aluminum Curtain Wall.
  - 1.2.2.5. Installation of glazing units: Section 08 51 66, Aluminum Window Wall.
  - 1.2.2.6. Installation of glazing units: Section 08 80 00, Glass and Glazing.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. CGL: Clear Float Glass.
  - 1.3.1.2. FGIA: Fenestration & Glazing Industry Alliance; [www.fgiaonline.org](http://www.fgiaonline.org).
  - 1.3.1.3. HSGL: Heat-Strengthened Glass.
  - 1.3.1.4. LGL: Laminated Glass.
  - 1.3.1.5. PVB: Polyvinyl Butyral.
  - 1.3.1.6. TGL: Tempered Glass.
- 1.3.2. Reference Standards:
  - 1.3.2.1. CAN/CGSB-12.8-97 - Insulating Glass Units
  - 1.3.2.2. CAN/CGSB-12.9-M87 - Spandrel Glass

**1.4. SUBMITTALS**

- 1.4.1. Samples:
  - 1.4.1.1. Submit samples of materials in accordance with Section 01 30 00 identifying quality and type of glass before commencing work. Ensure samples are clearly labelled with manufacturer's name and type.

- 1.4.1.2. Submit following samples:
- 1.4.1.2.1. 300 mm x 300 mm (12" x 12") tempered glass.
- 1.4.1.2.2. 300 mm x 300 mm (12" x 12") laminated glass.
- 1.4.1.2.3. Vision Glass (VG): 300 mm x 300 mm (12" x 12") of each VG glass unit type complete with specified glass pane types and thicknesses, Low 'E' coating, ceramic frit as required, spacer, primary and secondary seals in colour indicated.
- 1.4.1.2.4. Spandrel Glass (SG): 300 mm x 300 mm (12" x 12") of each SG glass unit type complete with specified glass pane types and thicknesses, Low 'E' coating, water-based silicone coating, spacer, primary and secondary seals in colour indicated.

## **1.5. WARRANTY**

- 1.5.1. Manufacturer Warranty: Warrant factory sealed insulating units against defects for a period of 10 years. Warrant factory sealed insulating units free from condensation, fogging of material, obstruction of vision as result of dust or film formation on internal glass surfaces by any cause, under normal conditions anticipated under this Project, other extrinsic glass breakage, but including breakage due to thermal shock and temperature differential due to inherent glass or glazing fault.

## **PART 2 - PRODUCTS**

### **2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List for Insulated Glass Units: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
  - 2.1.1.1. Oldcastle Building Envelope; [www.obe.com](http://www.obe.com)
  - 2.1.1.2. Prelco; [www.prelco.ca](http://www.prelco.ca)
  - 2.1.1.3. Saand Inc.; [www.saand.ca](http://www.saand.ca)
  - 2.1.1.4. Trulite Glass & Aluminum Solutions, LLC; [www.trulite.com](http://www.trulite.com)
  - 2.1.1.5. Viracon; [www.viracon.com](http://www.viracon.com)

### **2.2. MATERIALS**

- 2.2.1. Glazing Materials:
  - 2.2.1.1. For glass material types, refer to "Related Sections" specified herein.
  - 2.2.1.2. Primary Seal: Provide a polyisobutylene based sealant exhibiting excellent long-term stability remaining permanently flexible, even at low temperatures, "ADOTHERM™ PIB Series" by ADCO; [www.adcocorp.com](http://www.adcocorp.com). Provide in black or grey colour as selected by Consultant.
  - 2.2.1.3. Secondary Seal: Provide 1 of following:
    - 2.2.1.3.1. 2 component high-modulus elastomeric silicone sealant. Provide in colour specified herein.
    - 2.2.1.3.2. 1 component high-modulus, moisture cure elastomeric silicone sealant. Provide in colour specified herein.
  - 2.2.1.4. Low Emissivity Glass Coating (Low 'E'): To glass units specified herein, as applicable and unless otherwise designated apply Low 'E' coating to No. 2 surface of a sealed insulating glass unit to meet criteria specified herein. Permitted manufacturers and applicators of Low 'E' coatings are AGC Glass Company North America; [www.agc-yourglass.com](http://www.agc-yourglass.com), Cardinal Glass Industries; [www.cardinalcorp.com](http://www.cardinalcorp.com), Guardian Industries Corp.; [www.guardianglass.com](http://www.guardianglass.com), Pilkington Building Products; [www.pilkington.com](http://www.pilkington.com), Viracon; [www.viracon.com](http://www.viracon.com) and Vitro Architectural Glass; [www.vitro.com](http://www.vitro.com). Uniformly apply Low 'E' coating to glass. Edge delete Low 'E' coating where silicone sealant is in contact with glass.

- 2.2.1.5. Factory sealed insulating glass units to requirements of CAN/CGSB-12.8 using dual seal. Maintain separation of panes with non-corrosive desiccant filled spacer core. Dehydrate air space and hermetically seal inner and outer panes at periphery with flexible sealer. Ensure thermal resistance of glazing system edge seals are minimum 0.06 m<sup>2</sup>•°C/W for units having service conditions of interior building relative humidity of greater than 35% and minimum 0.035 m<sup>2</sup>•°C/W for other areas.
- 2.2.1.6. Spandrel Glass with Opacifier: Conforming to CAN/CGSB-12.9-M, Type 2, Class A, Style 3 Organic Coated, Form M, monolithic heat strengthened with water-based coloured silicone coating with a minimum dry film thickness of 0.165 mm (6.5 mils), "OPACI-COAT-300®", Silicone Coating" by ICD High Performance Coatings; [www.icdcoatings.com](http://www.icdcoatings.com).
- 2.2.2. Fabrication: Manufacture factory sealed insulating glass units in accordance with FGIA's "IGMAC Certification Program Manual".

### **PART 3 - EXECUTION**

#### **3.1. GLAZING SCHEDULE**

- 3.1.1. Vision Glass Types (VG):
- 3.1.1.1. Type VG-1: Factory sealed insulating glass unit assembly consisting of:
- 3.1.1.1.1. Outboard Pane: minimum 8 mm (5/16") thick heat-strengthened glass (HSGL).
- 3.1.1.1.2. Low 'E' Coating: "SunGuard® SuperNeutral SNR 50" by Guardian Industries on surface #2.
- 3.1.1.1.3. Air Space: 12.7 mm (1/2") thick 90% Argon filled.
- 3.1.1.1.4. Spacer: Black stainless steel.
- 3.1.1.1.5. Secondary Sealant Colour: Black.
- 3.1.1.1.6. Inboard Pane: minimum 6 mm (1/4") thick clear float glass (CGL).
- 3.1.1.2. Type VG-2: Factory sealed insulating glass unit assembly consisting of:
- 3.1.1.2.1. Outboard Pane: minimum 8 mm (5/16") thick heat-strengthened glass (HSGL).
- 3.1.1.2.2. Low 'E' Coating: "SunGuard® SuperNeutral SNR 50" by Guardian Industries on surface #2.
- 3.1.1.2.3. Air Space: 12.7 mm (1/2") thick 90% Argon filled.
- 3.1.1.2.4. Spacer: Black stainless steel.
- 3.1.1.2.5. Secondary Sealant Colour: Black.
- 3.1.1.2.6. Ceramic Frit: pattern to meet bird friendly guidelines on surface #3.
- 3.1.1.2.7. Inboard Pane: minimum 6 mm (1/4") thick clear float glass (CGL).
- 3.1.1.3. Type VG-3: Factory sealed insulating glass unit assembly consisting of:
- 3.1.1.3.1. Outboard Pane: minimum 8 mm (5/16") thick heat-strengthened glass (HSGL).
- 3.1.1.3.2. Low 'E' Coating: "SunGuard® Neutral 78/65" by Guardian Industries on surface #2.
- 3.1.1.3.3. Air Space: 12.7 mm (1/2") thick 90% Argon filled.
- 3.1.1.3.4. Spacer: Black stainless steel.
- 3.1.1.3.5. Secondary Sealant Colour: Black.
- 3.1.1.3.6. Ceramic Frit: pattern to meet bird friendly guidelines on surface #3.
- 3.1.1.3.7. Inboard Pane: minimum 6 mm (1/4") thick clear float glass (CGL).

- 3.1.2. Spandrel Glass Types (SG):
  - 3.1.2.1. Type SG-1: Factory sealed insulating glass unit assembly consisting of:
    - 3.1.2.1.1. Outboard Pane: minimum 8 mm (5/16") thick heat-strengthened glass (HSGL).
    - 3.1.2.1.2. Low 'E' Coating: "VRE-46" by Viracon on surface #2.
    - 3.1.2.1.3. Air Space: 12.7 mm (1/2") thick 90% Argon filled.
    - 3.1.2.1.4. Spacer: Stainless steel.
    - 3.1.2.1.5. Secondary Sealant Colour: Black.
    - 3.1.2.1.6. Coating: water-based silicone coating opacifier in colour selected later by Consultant.
    - 3.1.2.1.7. Inboard Pane: minimum 6 mm (1/4") thick tempered glass (TGL).
  - 3.1.3. Miscellaneous Glass Types (GL):
    - 3.1.3.1. Type GL-1: Single glass unit consisting of:
      - 3.1.3.1.1. Glass Type: clear tempered glass (TGL).
      - 3.1.3.1.2. Glass Thickness: 6 mm (1/4").
    - 3.1.3.2. Type GL-2: Single glass unit consisting of:
      - 3.1.3.2.1. Glass Type: clear tempered glass (TGL) with pattern to meet bird friendly guidelines.
      - 3.1.3.2.2. Glass Thickness: 6 mm (1/4").
    - 3.1.3.3. Type GL-3: Laminated glass (LGL) unit consisting of:
      - 3.1.3.3.1. Outboard Pane: 6 mm (1/4") thick clear heat-strengthened glass (HSGL).
      - 3.1.3.3.2. Interlayer: 1.6 mm (0.060") thick frosted PVB.
      - 3.1.3.3.3. Inboard Pane: 6 mm (1/4") thick clear heat-strengthened glass (HSGL).

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide hollow metal doors and frames including but not limited to following:
  - 1.2.1.1. supply of interior hollow metal doors.
  - 1.2.1.2. supply of exterior insulated hollow metal doors.
  - 1.2.1.3. supply of fire-rated hollow metal doors.
  - 1.2.1.4. supply of hollow metal door frames.
  - 1.2.1.5. preparation of hollow metal doors and frames for door hardware.
  - 1.2.1.6. glazing stops.
  - 1.2.1.7. preparation of hollow metal doors and frames for security system including CSA approved wiring, conduit and junction boxes for electronic hardware.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Building in hollow metal door frames in masonry walls: Section 04 20 00, Masonry Units.
  - 1.2.2.2. Setting in place hollow metal door frames in masonry: Section 06 90 00, General Installations.
  - 1.2.2.3. Hanging of doors and installation of door hardware: Section 06 90 00, General Installations.
  - 1.2.2.4. Caulking and/or sealing door frames: Section 07 92 00, Joint Sealants.
  - 1.2.2.5. Provision of glazing schedule: Section 08 06 80, Glazing Schedule.
  - 1.2.2.6. Supply of door hardware: Section 08 71 00, Door Hardware.
  - 1.2.2.7. Provision of glass: Section 08 80 00, Glass and Glazing.
  - 1.2.2.8. Installation of snap-in clips and frames in gypsum board partitions: Section 09 21 16, Gypsum Board Assemblies.
  - 1.2.2.9. Finish painting doors and frames: Section 09 91 00, Painting.
  - 1.2.2.10. Wiring and conduit for electronic hardware in frame: Division 26, Electrical.
  - 1.2.2.11. Provision of security system: Division 28, Electronic Safety and Security.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. CSDMA: Canadian Steel Door Manufacturers Association; [www.csdma.org](http://www.csdma.org).
  - 1.3.1.2. HMMA: Hollow Metal Manufacturers Association; [www.naamm.org/hmma/](http://www.naamm.org/hmma/).
  - 1.3.1.3. NAAMM: National Association of Architectural Metal Manufacturers; [www.naamm.org](http://www.naamm.org).
  - 1.3.1.4. OBC: Ontario Building Code.

- 1.3.1.5. RRPC: Resin Reinforced Polychloroprene.
- 1.3.1.6. TRR: Temperature Rise Rated.
- 1.3.1.7. ULC: Underwriters Laboratories of Canada; [www.canada.ul.com](http://www.canada.ul.com).
- 1.3.2. Reference Standards:
  - 1.3.2.1. ANSI/SDI A250.4-18 - Test Procedure and Acceptance Criteria for - Physical Endurance for Steel Doors, Frames and Frame Anchors
  - 1.3.2.2. ANSI/SDI A250.10-20 - Test Procedure and Acceptance Criteria for - Prime Painted Steel Surfaces for Steel Doors and Frames
  - 1.3.2.3. ASTM A568/A568M-19a - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
  - 1.3.2.4. ASTM A653/A653M-22 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - 1.3.2.5. ASTM C177-19 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
  - 1.3.2.6. ASTM C518-17 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
  - 1.3.2.7. ASTM C578-19 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
  - 1.3.2.8. CSA W59-18 - Welded Steel Construction (Metal Arc Welding)
  - 1.3.2.9. NAAMM-HMMA 840-16 - Guide Specification for Receipt, Storage and Installation of Hollow Metal Doors and Frames
  - 1.3.2.10. NAAMM-HMMA 860-13 - Guide Specifications for Hollow Metal Doors and Frames
  - 1.3.2.11. NFPA 80-22 - Standard for Fire Doors and Other Opening Protectives
  - 1.3.2.12. NFPA 252-22 - Standard Methods of Fire Tests of Door Assemblies
  - 1.3.2.13. CAN/ULC-S104-15 - Standard Method for Fire Tests of Door Assemblies
  - 1.3.2.14. CAN/ULC-S105-16 - Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104
  - 1.3.2.15. CAN/ULC-S702.1-21 - Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification

#### **1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Scheduling: Submit a schedule indicating each door and frame related to the Door Schedule.

#### **1.5. SUBMITTALS**

- 1.5.1. Shop Drawings:
  - 1.5.1.1. Submit Shop Drawings in accordance with Section 01 30 00. Show each type of frame, door, core, metal thicknesses and finishes, openings (glazing), fire ratings, location of exposed fasteners, cutouts, hardware blanking, reinforcing, tapping and drilling arrangements. Show large scale frame sections and anchoring details. Submit door and frame schedule identifying each unit. Ensure each unit bears legible identifying mark corresponding to that listed in Door Schedule.

- 1.5.1.2. For each door and frame scheduled for electrical hardware, show following items in addition to minimum requirements (coordinate with Division 26):
  - 1.5.1.2.1. location and size of junction boxes and conduit for electrical hardware and wiring (electrical junction back boxes by this Section).
  - 1.5.1.2.2. conduit cutouts (conduit and connectors by Division 26).
  - 1.5.1.2.3. other information related to electrical hardware or interrelated systems such as fire alarm and security systems/controls.
- 1.5.2. Samples: Submit samples in accordance with Section 01 30 00. Provide 1 cut-away corner sample minimum 300 mm (12") square for each type of door and frame to indicated following:
  - 1.5.2.1. Doors:
    - 1.5.2.1.1. core.
    - 1.5.2.1.2. reinforcing.
    - 1.5.2.1.3. facing.
    - 1.5.2.1.4. frame.
    - 1.5.2.1.5. insulation if applicable.
    - 1.5.2.1.6. glazing if applicable.
    - 1.5.2.1.7. factory applied finishes if applicable.
  - 1.5.2.2. Frames:
    - 1.5.2.2.1. frame profile.
    - 1.5.2.2.2. corner joints.
    - 1.5.2.2.3. floor and wall anchors.
    - 1.5.2.2.4. silencers.
- 1.5.3. Test and Evaluation Reports: Submit following test and evaluation reports in accordance with NAAMM/HMMA 860:
  - 1.5.3.1. Hollow metal door and frame assemblies supplied under this Section meet acceptance criteria of ANSI/SDI A250.4, Level A.
  - 1.5.3.2. Primer applied on hollow metal door and frame assemblies meet acceptance criteria of ANSI/SDI A250.10.
  - 1.5.3.3. Insulated doors supplied in exterior openings meet specified thermal resistance rating.
  - 1.5.3.4. Ensure reports include name of testing authority, date of test, location of test facility, description of test specimen, procedures used in testing and indicate compliance with specified acceptance criteria.
  - 1.5.3.5. Submit in addition to fire label, certificate to substantiate design and construction of fire-rated screen assemblies, if required by Consultant or authorities having jurisdiction.
- 1.6. QUALITY ASSURANCE**
  - 1.6.1. Qualifications:
    - 1.6.1.1. Manufacturers: Execute work of this Section by a manufacturer who is a member of CSDMA and/or HMMA ensuring Product quality meets standards set by these associations.



**1.7. DELIVERY, STORAGE AND HANDLING**

- 1.7.1. Delivery and Acceptance Requirements:
  - 1.7.1.1. Identify Products with a label indicating: manufacturer's name, Consultant's opening number, Product description and dimensions.
  - 1.7.1.2. Protect doors and frames during shipping.
  - 1.7.1.3. Inspect materials thoroughly upon receipt and report discrepancies, deficiencies and damage immediately in writing to Consultant. Note damages on carrier's Bill of Lading.
- 1.7.2. Storage and Handling:
  - 1.7.2.1. Store and protect doors and frames during storage in accordance with NAAMM-HMMA 840. Coordinate this requirement with Section 06 90 00 for installing doors.
  - 1.7.2.2. Remove wrappings or coverings from doors upon delivery at site. Store doors in vertical position, spaced by blocking at least 100 mm (4") off ground to permit air circulation between them.

**1.8. WARRANTY**

- 1.8.1. Manufacturer Warranty: Warrant work manufactured from ASTM A653/A653M, A40 galvanized steel, touched up only with zinc-rich rust inhibitive primer where coating was removed during its manufacture for period of 10 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to; rust perforation when stored, installed and finish painted in accordance with manufacturer's written instructions.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
  - 2.1.1.1. Artek Door Ltd.; [www.artekdoor.com](http://www.artekdoor.com)
  - 2.1.1.2. Baron Steel Doors & Frames; [www.baronmetal.com](http://www.baronmetal.com)
  - 2.1.1.3. Daybar Industries Limited; [www.daybar.com](http://www.daybar.com)
  - 2.1.1.4. Fleming Door Products Ltd.; [www.flemingdoor.com](http://www.flemingdoor.com)
  - 2.1.1.5. Gensteel Doors, Inc.; [www.gensteeldoors.com](http://www.gensteeldoors.com)
  - 2.1.1.6. Shanahan's Limited Partnership; [www.shanahans.com](http://www.shanahans.com)
- 2.1.2. Provide doors and frames for work of this Section by a single source manufacturer.

**2.2. MATERIALS**

- 2.2.1. Performance/Design Criteria:
  - 2.2.1.1. Ensure Product is manufactured by a firm experienced in design and production of standard and custom commercial metal door and frame assemblies, integration of builders' or electronic hardware and glazing assemblies and other items affecting work.
  - 2.2.1.2. Cycle Test Acceptance Criteria: Ensure door and frame assembly is testing in accordance with ANSI/SDI A250.4 for "High Usage" and is certified as Level "A" (1,000,000 cycles).
  - 2.2.1.3. Twist Test Acceptance Criteria: Maximum permanent deflection not to exceed 3 mm (1/8") under a maximum 136 kg (300 lb) load, total deflection not to exceed 32 mm (1-1/4") when tested in accordance with ANSI/SDI A250.4. Ensure tests are conducted by an independent nationally recognized accredited laboratory.

- 2.2.1.4. Test fire rated doors, frames, transom frames and sidelight assemblies in accordance with requirements of CAN/ULC-S104 and NFPA 252. Ensure Products are listed by a nationally recognized testing agency acceptable to authorities having jurisdiction and reviewed by Consultant having factory inspection services.
- 2.2.1.5. Ensure core materials for exterior doors attain a thermal resistance of RSI = 1.23 (R = 7) when tested in accordance with ASTM C177 or ASTM C518.
- 2.2.2. Sheet Steel:
  - 2.2.2.1. Interior Doors and Frames: Commercial grade steel to ASTM A568/A568M, Class 1, hot-dip galvanized to ASTM A653/A653M, ZF120 (A40), known commercially as "Galvanneal". Steel sheet thicknesses specified are base metal thicknesses prior to galvanizing.
  - 2.2.2.2. Exterior Doors and Frames: Commercial grade steel to ASTM A568/A568M, Class 1, hot-dip galvanized to ASTM A653/A653M, Z275 (G90). Steel sheet thicknesses specified are base metal thicknesses prior to galvanizing.
- 2.2.3. Door Cores:
  - 2.2.3.1. Steel Stiffened: Continuous vertically formed steel sections, full thickness of interior space between door faces. Stiffeners 0.66 mm minimum thickness, spaced 150 mm (6") apart and securely fastened to both face sheets by industrial glue for moderate duty doors or laser welds for heavy duty doors spaced a maximum of 125 mm (5") oc vertically.
  - 2.2.3.2. Insulation: Mineral wool insulation, density 24 kg/m<sup>3</sup> (1.5 pcf) minimum consisting of durable fibrous material processed from rock, slag or glass, bound with deterioration resistant binders, CAN/ULC-S702.1, Type 1.
  - 2.2.3.3. TRR Core: Core composition to limit temperature rise on unexposed side of door to 250 deg C (450 deg F) at 30 or 60 minutes, as determined by OBC requirements. Test core as part of complete door assembly in accordance with CAN/ULC-S104 or NFPA 252 and listed by nationally recognized testing agency having factory inspection service.
  - 2.2.3.4. Polystyrene: Type 1, fire retardant, open cell board conforming to ASTM C578 rigid, extruded, closed cell board, 15 kg/m<sup>3</sup> (0.90 lb/cu ft) density minimum, conforming to ASTM C578, Type 1 and a minimum RSI = 1.23 (R = 7) conforming to ASTM C518.
- 2.2.4. Adhesives:
  - 2.2.4.1. Steel Components: Heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
  - 2.2.4.2. Polystyrene Cores: Heat resistant, epoxy resin based, low viscosity, contact cement.
  - 2.2.4.3. Lock-Seam Doors: Fire resistant, RRPC, fire resistant, high viscosity sealant/adhesive.
- 2.2.5. Primer: Rust inhibitive touch-up only.
- 2.2.6. Door Silencers (Bumpers): Single stud rubber/neoprene type.
- 2.2.7. Fasteners for Stops: Cadmium plated steel, counter sunk flat or oval head sheet metal Phillips screws.
- 2.2.8. Mortar Guard Boxes: Minimum 0.66 mm thick steel.
- 2.2.9. Frame Anchors:
  - 2.2.9.1. Floor Anchors: Minimum 3 mm (1/8") thick adjustable floor anchors with 2 holes for bolting to floor.
  - 2.2.9.2. Wall Anchors:
    - 2.2.9.2.1. Masonry T-strap Type Wall Anchors: Minimum 1.06 mm thick steel.
    - 2.2.9.2.2. Masonry Stirrup-strap Type 50 mm x 250 mm (2" x 10"): Minimum 1.34 mm thick steel.
    - 2.2.9.2.3. Steel/Wood Stud Type: Minimum 0.81 mm thick steel.

- 2.2.9.2.4. Steel/Wood Stud Tension and Associated Wall Type: Minimum 0.81 mm thick steel.
- 2.2.10. Fire Rated Door and Frame Assemblies: Conform to CAN/ULC-S104, CAN/ULC-S105, NFPA 80 and NFPA 252.
- 2.2.11. Fabrication:
  - 2.2.11.1. Welding: Carry out welding in accordance with CSA W59.
  - 2.2.11.2. Grind exposed welds smooth and flush. Fill open joints, seams and depressions with filler or by continuous brazing or welding. Grind smooth to true sharp arises and profiles and sand down to smooth, true, uniform finish.
  - 2.2.11.3. Hardware Requirements: Blank, mortise, reinforce, drill and tap doors and frames to receive mortised templated hardware. Check hardware list for requirements.
  - 2.2.11.4. Frames - General:
    - 2.2.11.4.1. Fabricate frames for doors to profiles indicated.
    - 2.2.11.4.2. Ensure exterior frames are welded type construction. Ensure interior frames are welded type construction.
    - 2.2.11.4.3. Reinforce frame as required for surface mounted hardware. For door frames wider than 1500 mm (5'), reinforce door frame head and jamb and mullions at junction of head.
    - 2.2.11.4.4. Protect mortise cut outs with mortar guard boxes. Omit for gypsum board applications.
    - 2.2.11.4.5. Where frames occur in masonry provide strip strap, T-strap or wire type anchors. Where frames occur in gypsum board provide stud type anchors.
    - 2.2.11.4.6. Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb. Provide 2 anchors for rebate opening heights up to and including 1500 mm (5') and 1 additional anchor for each additional 760 mm (30") of height or fraction thereof, except as indicated below. For frames in previously placed concrete, masonry or structural steel provide anchors located not more than 150 mm (6") from top and bottom of each jamb and intermediate anchors at 660 mm (26") on centre maximum.
    - 2.2.11.4.7. Where floor finishes allow, fabricate frames to extend 38 mm (1-1/2") below finished floor level. Where frames are to terminate at finished floor level, provide plates for anchorage to slabs.
    - 2.2.11.4.8. Prepare each door opening for single stud door silencers: 3 for single door openings placed opposite hinges: 2 for double door openings approximately 150 mm (6") each side of centreline of head stop.
    - 2.2.11.4.9. Supply removable portion of stop and frame where required for overhead concealed door closers and properly connect to frame and prepare for attachment to closer prior to shipment.
    - 2.2.11.4.10. Provide 0.81 mm thick steel snap-in or welded-in "Z" type stud anchors for door frames installed in steel stud gypsum board partitions. Ensure snap-in clips are supplied to Section 09 21 16.
    - 2.2.11.4.11. Factory apply touch-up primer to areas where zinc coating has been removed during fabrication.
    - 2.2.11.4.12. Construct door frames of labelled fire doors as detailed in Follow-up Service Procedures/ Factory Inspection Manuals issued by nationally recognized listing agency to individual manufacturers and tested in conformance with CAN/ULC-S104. Ensure ratings for frames match doors as minimum requirement. Locate label on frame jamb on hinge side, so it is concealed when door is closed.
  - 2.2.11.5. Hollow Metal Door Frames:
    - 2.2.11.5.1. Steel:
      - 2.2.11.5.1.1. Interior: Minimum 1.34 mm thick steel.
      - 2.2.11.5.1.2. Exterior: Minimum 1.70 mm thick steel.

- 2.2.11.5.2. Reinforcements:
  - 2.2.11.5.2.1. Lock and Strike Reinforcements: Minimum 1.34 mm thick steel.
  - 2.2.11.5.2.2. Hinge Reinforcements: Minimum 3.12 mm thick steel.
  - 2.2.11.5.2.3. Flush Bolt Reinforcement: Minimum 1.34 mm thick steel.
  - 2.2.11.5.2.4. Reinforcement for Surface Applied Hardware: Minimum 1.06 mm thick steel.
  - 2.2.11.5.2.5. Concealed Door Closer or Holder Reinforcements: Minimum 2.36 mm thick steel.
  - 2.2.11.5.2.6. Top and Bottom End Channels: Minimum 1.06 mm thick steel.
- 2.2.11.5.3. Jamb Shipping Bars: Minimum 0.81 mm thick steel.
- 2.2.11.6. Welded Type Frames:
  - 2.2.11.6.1. Punch mitre corners of frames. Punch mitres accurately with slots and tabs and weld continuously on inside of frame faces.
  - 2.2.11.6.2. When required due to site access or due to shipping limitations, fabricate frame Product for large openings in sections, with splice joints for field assembly. Provide alignment plates or angles at each joint, fabricated of same metal thickness as frame. Indicate joints for field assembly on Shop Drawings.
  - 2.2.11.6.3. Accurately cope and securely weld butt joints of mullions, transom bars, centre rails and sills. Grind welded joints to a smooth, uniform finish.
  - 2.2.11.6.4. Securely attach floor anchors to inside of each jamb profile.
  - 2.2.11.6.5. Weld in 2 temporary jamb shipping bars at each frame to maintain alignment during shipment.
  - 2.2.11.6.6. Use formed channel glazing stops, minimum 16 mm (5/8") in height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
- 2.2.11.7. Doors - General:
  - 2.2.11.7.1. Fabricate doors to be swing type flush with 1 continuous face free from joints, tool markings and abrasions and with provisions for glass and/or louvre openings as indicated on Door Schedule and Drawings.
  - 2.2.11.7.2. Fabricate exterior doors using insulated steel stiffened construction. Fabricate interior doors using steel stiffened construction.
  - 2.2.11.7.3. For exterior hollow metal doors, ensure longitudinal edges have continuously welded seams, filled and sanded flush full height of door.
  - 2.2.11.7.4. Fabricate doors with top and bottom inverted recessed spot-welded channels.
  - 2.2.11.7.5. Reinforce, blank, drill and tap doors for mortised, templated hardware.
  - 2.2.11.7.6. Reinforce doors for surface mounted hardware.
  - 2.2.11.7.7. Undercut 19 mm (3/4") for air intake at washrooms and other doors indicated on Door Schedule.
  - 2.2.11.7.8. Factory prepare holes 13 mm (1/2") diameter and larger. Factory prepare holes less than 13 mm (1/2") when required for function of device for knob, lever, cylinder, turn pieces or when these holes overlap function holes.
  - 2.2.11.7.9. Fabricate fire rated door assemblies as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by nationally recognized listing agency to individual manufacturer and tested in conformance with CAN/ULC-S104. Provide labels for fire rated doors.
  - 2.2.11.7.10. Fabricate fire rated doors where indicated in Door Schedule or Drawings, to meet required maximum temperature rise on unexposed side of door in accordance with OBC and ULC requirements.

- 2.2.11.8. Interior Hollow Metal Doors:
  - 2.2.11.8.1. Face Sheets: 1.06 mm thick minimum galvanized steel sheet.
  - 2.2.11.8.2. Vertical Stiffeners: 0.81 mm thick minimum unprimed steel sheet.
  - 2.2.11.8.3. Glazing Stops: 0.81 mm thick minimum unprimed steel sheet, formed, drilled and countersunk for fastenings.
- 2.2.11.9. Interior Fire Rated Hollow Metal Doors:
  - 2.2.11.9.1. Face Sheets: 1.06 mm thick minimum galvanized steel sheet.
  - 2.2.11.9.2. Vertical Stiffeners: 0.81 mm thick minimum unprimed steel sheet.
- 2.2.11.10. Exterior Hollow Metal Doors:
  - 2.2.11.10.1. Face Sheets: 1.34 mm thick minimum galvanized steel sheet.
  - 2.2.11.10.2. Vertical Stiffeners: 0.81 mm thick minimum unprimed steel sheet.
  - 2.2.11.10.3. Glazing Stops: 1.34 mm thick minimum unprimed steel sheet, formed, drilled and countersunk for fastenings.
  - 2.2.11.10.4. End Channels:
    - 2.2.11.10.4.1. Top of Door: Close top of door with same material as face sheets. Steel flush channel, putty-filled seam and ground smooth, sealed, projection welded.
    - 2.2.11.10.4.2. Bottom of Door: Close bottom of door with same material as face sheets. Steel inverted channel.
    - 2.2.11.10.4.3. Provide weep-holes openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
- 2.2.11.11. Doors (Steel Stiffened Construction):
  - 2.2.11.11.1. Fabricate door faces with a single sheet of galvanized steel welded to steel stiffeners.
  - 2.2.11.11.2. Reinforce steel stiffened doors with 0.912 mm thick (20 ga) continuous interlocking vertical steel stiffeners spaced 150 mm (6") oc maximum, spot welded at 150 mm (6") oc maximum to face sheets. Fill voids with mineral wool insulation specified herein.
- 2.2.11.12. Fabrication Tolerances:
  - 2.2.11.12.1. Frames:
    - 2.2.11.12.1.1. Width and Height: +1.6 mm (+1/16"), -0.8 mm (-1/32").
    - 2.2.11.12.1.2. Face, Stop and Rabbet: +/-0.8 mm (+/-1/32").
    - 2.2.11.12.1.3. Jamb Depth: +/-1.6 mm (+/-1/16").
  - 2.2.11.12.2. Doors:
    - 2.2.11.12.2.1. Width and Height: +/-1.2 mm (+/-3/64").
    - 2.2.11.12.2.2. Thickness: +/-1.6 mm (+/-1/16").
    - 2.2.11.12.2.3. Edge Flatness: 1.6 mm (1/16") maximum.
    - 2.2.11.12.2.4. Surface Flatness: 3 mm (1/8") maximum.
    - 2.2.11.12.2.5. Door Twist: +/-1.6 mm (+/-1/16").
  - 2.2.11.12.3. Hardware:
    - 2.2.11.12.3.1. Cutouts: Template dimension +0.38 mm (+0.015"), -0 mm (-0").
    - 2.2.11.12.3.2. Location: +/-0.8 mm (+/-1/32").
    - 2.2.11.12.3.3. Between Hinge Centrelines: +/-0.4 mm (+/-1/64").

- 2.2.11.13. Prime Painting: Apply factory touch up primer at areas where zinc coating has been damaged during fabrication.

**2.3. SOURCE QUALITY CONTROL**

- 2.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**PART 3 - EXECUTION**

**3.1. INSTALLATION**

- 3.1.1. Supply hollow metal doors and frames to Section 06 90 00 for installation.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide wood doors including but not limited to following:
  - 1.2.1.1. wood veneer faced particle core doors.
  - 1.2.1.2. fire rated wood doors.
  - 1.2.1.3. glass stops.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Setting steel door frames in masonry: Section 04 20 00, Masonry Units.
  - 1.2.2.2. Setting steel door frames in place: Section 06 90 00, General Installations.
  - 1.2.2.3. Installation of wood doors and door hardware: Section 06 90 00, General Installations.
  - 1.2.2.4. Provision of glazing types: Section 08 06 80, Glazing Schedule.
  - 1.2.2.5. Supply steel door frames: Section 08 11 13, Hollow Doors and Frames.
  - 1.2.2.6. Supply of door hardware: Section 08 71 00, Door Hardware.
  - 1.2.2.7. Supply of glass: Section 08 80 00, Glass and Glazing.
  - 1.2.2.8. Setting steel door frames in gypsum board partitions: Section 09 21 16, Gypsum Board Assemblies.
  - 1.2.2.9. Site painting of doors: Section 09 91 00, Painting.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. AWMAC/WI: Architectural Woodwork Manufacturers Association of Canada/Woodwork Institute; [www.awmac.com](http://www.awmac.com).
  - 1.3.1.2. HVAC: Heating, Ventilating and Air Conditioning.
  - 1.3.1.3. ITS: (Warnock Hersey) - Certification Listings for Fire Doors.
  - 1.3.1.4. NAAWS: North American Architectural Woodwork Standards – 4.0, 2021, as amended.
  - 1.3.1.5. OBC: Ontario Building Code.
- 1.3.2. Reference Standards:
  - 1.3.2.1. ANSI/WDMA I.S. 1A-13 - Industry Standard for Interior Architectural Flush Wood Doors
  - 1.3.2.2. NFPA 80-22 - Standard for Fire Doors and Other Opening Protectives
  - 1.3.2.3. NFPA 252-22 - Standard Methods of Fire Tests of Door Assemblies

- 1.3.2.4. CAN/ULC-S104-15 - Standard Method for Fire Tests of Door Assemblies
- 1.3.2.5. CAN/ULC-S105-16 - Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104
- 1.3.2.6. CAN/ULC-S113-16 - Standard Specification for Wood Core Doors Meeting the Performance Required by CAN4-S104 for Twenty Minute Fire Rated Closure Assemblies
- 1.3.2.7. UL 10B - Underwriters Laboratories Fire Tests for Door Assemblies

#### **1.4. SUBMITTALS**

- 1.4.1. Product Data: Submit Product data indicating door core materials and construction and face type wood veneer.
- 1.4.2. Shop Drawings:
  - 1.4.2.1. Submit Shop Drawings in accordance with Section 01 30 00.
  - 1.4.2.2. Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special bevelling, special blocking for hardware, identify cut outs for glazing and other openings.
- 1.4.3. Samples: Submit 1 cut away corner sample minimum 300 mm (12") square to clearly indicate construction and finish characteristics of each type of door assembly.

#### **1.5. QUALITY ASSURANCE**

- 1.5.1. Qualifications:
  - 1.5.1.1. Provide work of this Section in accordance with Section 09 of NAAWS produced by AWMAC/WI, except as specified otherwise herein and by reference are hereby made a part of this Section. Ensure any reference to grades and terminology in this Section is as defined in NAAWS.
  - 1.5.1.2. Requirements of this Section govern and modify NAAWS.
  - 1.5.1.3. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and be a member of AWMAC/WI.

#### **1.6. DELIVERY, STORAGE AND HANDLING**

- 1.6.1. Delivery and Acceptance Requirements:
  - 1.6.1.1. Do not subject interior wood doors to extremes in either heat or humidity. Do not receive delivery to site until HVAC systems are operational and balanced, providing temperature range of 10 deg C to 32 deg C (50 deg F to 90 deg F) and 25% to 55% relative humidity.
  - 1.6.1.2. Receive doors at site in manufacturer's standard packaging.
- 1.6.2. Storage and Handling Requirements: Store and protect wood doors in accordance with manufacturer's recommendations and ANSI/WDMA I.S. 1A's Appendix Section "Care and Installation at Job Site". Ensure Trade Contractor responsible for receiving and storing wood doors has a copy of ANSI/WDMA I.S. 1A.

#### **1.7. WARRANTY**

- 1.7.1. Manufacturer Warranty: Warrant work of this Section against defects and deficiencies for a period of 3 years. Promptly correct defects and deficiencies which become apparent during warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include, but are not limited to, bubbling, delamination of faces, or edges, warp, twist bow exceeding 6 mm (1/4") and telegraphing of core. "Correct" referred to herein includes labour and materials for removal, repair, refinishing and replacement of Products provided as part of work of this Section, installing hardware, finishing, hanging and fitting.



**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Door Schedule and Specifications:
- 2.1.1.1. Baillargeon; [www.masonitearchitectural.ca](http://www.masonitearchitectural.ca)
  - 2.1.1.2. Lambton Doors; [www.lambtondoors.com](http://www.lambtondoors.com)
  - 2.1.1.3. Masonite Architectural; [www.masonitearchitectural.com](http://www.masonitearchitectural.com)
  - 2.1.1.4. RK Doors Inc.; [www.rkdoors.ca](http://www.rkdoors.ca)
  - 2.1.1.5. VT Industries, Inc.; [www.vtindustries.com](http://www.vtindustries.com)

**2.2. MATERIALS**

- 2.2.1. Description:
- 2.2.1.1. Regulatory Requirements:
    - 2.2.1.1.1. Ensure wood doors comply with NAAWS, Section 09 or ANSI/WDMA I.S. 1A.
    - 2.2.1.1.2. Submit certification that fire-rated door has been tested in conformance to CAN/ULC-S104, CAN/ULC-S105 or UL 10B, NFPA 80 and NFPA 252 as indicated on Drawings and Schedule.
    - 2.2.1.1.3. Ensure wood doors requiring fire-rating carry either ULC or ITS (Warnock Hersey) label.
  - 2.2.2. Supply wood doors from same manufacturer.
  - 2.2.3. Interior Solid Particleboard Core Wood Flush Doors:
    - 2.2.3.1. Construction: 5 ply.
    - 2.2.3.2. Fire Rating: 20 minutes for 5 ply construction.
    - 2.2.3.3. Core: Solid mat-formed wood particleboard core. Minimum 513 kg/m<sup>3</sup> (32 pcf) density.
    - 2.2.3.4. Stiles: 2 ply, minimum 30 mm (1-3/16") laminated with 22 mm (7/8") hardwood edge.
    - 2.2.3.5. Bottom Rail: Minimum 30 mm (1-3/16") hardwood or oriented strand board (manufacturer's option).
    - 2.2.3.6. Top Rail: Minimum 30 mm (1-3/16") hardwood or oriented strand board (manufacturer's option) for 5 ply construction.
  - 2.2.4. Interior Solid Mineral Core Wood Flush Doors:
    - 2.2.4.1. Construction: 5 ply.
    - 2.2.4.2. Fire Rating: As required.
    - 2.2.4.3. Core: Fire rated incombustible mineral core with top, bottom and intermediate blocking.
    - 2.2.4.4. Crossband: Composite 3.2 mm (1/8") thick fire retardant treated.
    - 2.2.4.5. Stiles: 19 mm (3/4") minimum.
    - 2.2.4.6. Top Rail: Minimum 35 mm (1-3/8") hardwood or mineral firestop for all ratings.
    - 2.2.4.7. Bottom Rail: Minimum 35 mm (1-3/8") hardwood or mineral firestop for all ratings.
  - 2.2.5. Door Facing:
    - 2.2.5.1. Veneer Exterior Flush: AWMAC/WI or ANSI/WDMA I.S. 1A Custom grade, 0.8 mm (1/32") thick mechanically spliced, for paint and/or transparent finish.
    - 2.2.5.2. Veneer Interior Flush: AWMAC/WI or ANSI/WDMA I.S. 1A Custom grade, 0.8 mm (1/32") thick mechanically spliced, for paint and/or transparent finish.

- 2.2.5.3. Exposed Vertical Edges: Veneer minimum 13 mm (1/2") thick. Hardwood for transparent and/or paint finish.
- 2.2.6. Adhesive: Provide in accordance with Section 04, 04.5.5.2 and "Adhesive Usage Guide" in "Appendix" of NAAWS.
- 2.2.7. Vision Frames for Fire Doors: Solid wood with intumescent incorporated, veneer wrapped steel, of same species as facing or rolled painted steel with mitre corners; prepared for countersink style tamperproof screws.
- 2.2.8. Vision Frames for Unrated Doors: Wood, of same species as door facing; channel shape; mitre corners; prepared for countersink style tamper proof screws.
- 2.2.9. Glass Units (GL): For single glass unit types, refer to Section 08 06 80.
- 2.2.10. Fabrication:
  - 2.2.10.1. Fabricate flush doors in accordance with NAAWS, Section 09 or ANSI/WDMA I.S. 1A and CAN/ULC-S113, except as specified herein.
  - 2.2.10.2. Size doors for 3 mm (1/8") clearance of heads and jambs and maximum 19 mm (3/4") at bottom.
  - 2.2.10.3. Undercut 19 mm (3/4") for air intake at washrooms and other doors as indicated on Door Schedule.
  - 2.2.10.4. Bevel vertical edges of single acting doors 3 mm in 50 mm (1/8" in 2") on lock and hinge sides.
  - 2.2.10.5. Radius vertical edges of double acting doors to 60 mm (2-3/8") radius.
  - 2.2.10.6. Seal wood edges and edges of cut outs before units are placed in unheated storage areas at plant or shipped to site.
  - 2.2.10.7. Flush Doors:
    - 2.2.10.7.1. Fabricate solid core doors using hot or cold press construction technology. Bond stiles and rails to core using Type I or II adhesive. Sand for uniform thickness. Laminate door facing, crossbanding and assembled core in hot or cold press.
    - 2.2.10.7.2. Astragal for Fire-Rated Pairs of Doors: Steel T shaped astragal, overlapping and recessed at face edge specifically for pairs of doors.
    - 2.2.10.7.3. Factory sand assembled door leaf.
    - 2.2.10.7.4. Factory machine doors for door hardware in accordance with hardware requirements and dimensions.
    - 2.2.10.7.5. Factory cut glass light openings. Ensure openings are square with internal corners slightly rounded. Ensure portion between cutout and door edge is not less than 125 mm (5") wide at any point. Ensure cut out area is not greater than 40% of area of door face. Ensure cut out does not exceed half height of door.
    - 2.2.10.7.6. Provide hardwood glass stops, finished to match face veneer, for vision panels in un-rated doors.
    - 2.2.10.7.7. Provide metal glass stops for vision panels in fire-rated labelled doors. Ensure glass size conforms to OBC requirements.
    - 2.2.10.7.8. Factory fit doors for frame opening dimensions identified on Shop Drawings.
    - 2.2.10.7.9. Provide inner blocks at lock edge, top of door closer and bottom for hardware reinforcement.
- 2.3. SOURCE QUALITY CONTROL**
  - 2.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**PART 3 - EXECUTION**

**3.1. INSTALLATION**

3.1.1. Installation of wood doors and door hardware forms part of the work of Section 06 90 00.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide access doors and frames including but not limited to following:
  - 1.2.1.1. access doors and frames.
  - 1.2.1.2. fire-rated access doors and frames.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. SSPC: The Society for Protective Coatings (formerly known as Steel Structures Painting Council); [www.sspc.org](http://www.sspc.org).
  - 1.3.1.2. ULC: Underwriters Laboratories of Canada; [www.canada.ul.com](http://www.canada.ul.com).
  - 1.3.1.3. WHI: Warnock Hersey (Intertek); [www.intertek-eltsemko.com](http://www.intertek-eltsemko.com).
- 1.3.2. Reference Standards:
  - 1.3.2.1. ANSI/UL 10B-08 - Fire Tests of Door Assemblies
  - 1.3.2.2. ANSI/UL 263-14 - Fire Tests of Building Construction and Materials
  - 1.3.2.3. ASTM A123/A123M-17 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - 1.3.2.4. ASTM A153/A153M-16a - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - 1.3.2.5. ASTM A653/A653M-22 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - 1.3.2.6. ASTM E119-22 - Standard Test Methods for Fire Tests of Building Construction and Materials
  - 1.3.2.7. CSA G40.20-13(18) - General Requirements for Rolled or Welded Structural Quality Steel
  - 1.3.2.8. CSA G40.21-13(18) - Structural Quality Steel
  - 1.3.2.9. NFPA 80-22 - Standard for Fire Doors and Other opening Protectives
  - 1.3.2.10. NFPA 252-22 - Standard Methods of Fire Tests of Door Assemblies
  - 1.3.2.11. SSPC-Paint 20 - Zinc-Rich Coating Type I – Inorganic and Type II – Organic
  - 1.3.2.12. SSPC-Paint 25 - Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel Type I and Type II

**1.4. SUBMITTALS**

- 1.4.1. Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Section 01 30 00. In addition to the minimum requirements indicate following:
  - 1.4.1.1. face or ceiling placement.
  - 1.4.1.2. tolerances and clearances.
  - 1.4.1.3. finishes.
  - 1.4.1.4. hardware.
- 1.4.2. Samples: Submit samples in accordance with Section 01 30 00. Provide 1 cut-away corner sample minimum 300 mm (12") square for each type of access door to indicated following:
  - 1.4.2.1. core.
  - 1.4.2.2. facing.
  - 1.4.2.3. frame.
- 1.4.3. Certificates: Submit in addition to fire label, certificate to substantiate design and construction of fire-rated access doors and frames, if required by Consultant or authorities having jurisdiction.
- 1.4.4. Test and Evaluation Reports: Submit following test and evaluation reports:
  - 1.4.4.1. Ensure reports include name of testing authority, date of test, location of test facility, descriptions of test specimens, procedures used in testing and indicate compliance with acceptance criteria of the test.

**1.5. QUALITY ASSURANCE**

- 1.5.1. Qualifications:
  - 1.5.1.1. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
  - 2.1.1.1. Acudor Products, Inc.; [www.acudor.com](http://www.acudor.com)
  - 2.1.1.2. Bar-Co, Inc. by Alfab, Inc.; [www.alfabinc.com](http://www.alfabinc.com)
  - 2.1.1.3. Bauco Access Panel Solutions Inc.; [www.accesspanelsolutions.com](http://www.accesspanelsolutions.com)
  - 2.1.1.4. Cendrex Inc.; [www.cendrex.com](http://www.cendrex.com)
  - 2.1.1.5. Cesco Products; [www.cescoproducts.com](http://www.cescoproducts.com)
  - 2.1.1.6. Jensen Industries; [www.jensen-ind.com](http://www.jensen-ind.com)
  - 2.1.1.7. Karp Associates, Inc.; [www.karpinc.com](http://www.karpinc.com)
  - 2.1.1.8. Larsen's Manufacturing Company; [www.larsensmfg.com](http://www.larsensmfg.com)
  - 2.1.1.9. Nystrom Building Products Co.; [www.nystrom.com](http://www.nystrom.com)
  - 2.1.1.10. Williams Brothers Corporation of America; [www.wbdoors.com](http://www.wbdoors.com)

**2.2. MATERIALS**

- 2.2.1. Performance/Design Criteria:
  - 2.2.1.1. Fire-Rated Access Doors and Frames: Ensure units comply with NFPA 80 and are labeled and listed by ULC, WHI or another testing and inspecting agency acceptable to authorities having jurisdiction per test method indicated:
    - 2.2.1.1.1. Vertical Access Doors: NFPA 252, ANSI/UL 10B or ULC.
    - 2.2.1.1.2. Horizontal Access Doors and Frames: ASTM E119, ANSI/UL 263 or ULC.
  - 2.2.2. Steel Plates, Shapes and Bars: New material conforming to CSA G40.20 and CSA G40.21, Grade 300W.
  - 2.2.3. Hot-Dip Galvanized Steel: Coat to comply with ASTM A123/A123M for steel and iron products and ASTM A153/A153M for steel and iron hardware.
  - 2.2.4. Steel Sheet:
    - 2.2.4.1. Metallic Coated: ASTM A653/A653M, Commercial Steel (CS), Type B, with A60 zinc-iron-alloy (galvannealed) coating or G60 mill-phosphatized zinc coating; stretcher-leveled standard of flatness.
  - 2.2.5. Drywall Beads: Edge trim formed from 0.759 mm (22 ga) zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum panels indicated.

**2.3. MANUFACTURED UNITS**

- 2.3.1. Flush, Insulated, Fire-Rated Access Doors and Trimless Frames:
  - 2.3.1.1. Material: Metallic-coated steel sheet.
  - 2.3.1.2. Surface Type: Gypsum board.
  - 2.3.1.3. Locations: Walls and ceilings.
  - 2.3.1.4. Fire-Resistance Rating: As required.
  - 2.3.1.5. Temperature-Rise Rating: 250 deg F at the end of 30 minutes.
  - 2.3.1.6. Door: Flush panel with core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.912 mm (20 ga).
  - 2.3.1.7. Frame: Minimum 1.519 mm (16 ga) thick sheet metal with drywall bead.
  - 2.3.1.8. Hinges: Concealed pin type.
  - 2.3.1.9. Automatic Closer: Spring type.
  - 2.3.1.10. Latch: Self-latching bolt operated by knurled knob with interior release.
- 2.3.2. Flush Access Doors and Trimless Frames:
  - 2.3.2.1. Material: Metallic-coated steel sheet.
  - 2.3.2.2. Surface Type: Gypsum board.
  - 2.3.2.3. Locations: Walls and ceilings.
  - 2.3.2.4. Door: Minimum 1.519 mm (16 ga) thick sheet metal, set flush with surrounding finish surfaces.
  - 2.3.2.5. Frame: Minimum 1.519 mm (16 ga) thick sheet metal with bead for type of surface indicated.
  - 2.3.2.6. Hinges: Spring-loaded concealed pin type.
  - 2.3.2.7. Latch: Screwdriver-operated cam latch.
- 2.3.3. Recessed Access Doors and Trimless Frames:
  - 2.3.3.1. Material: Metallic-coated steel sheet.

- 2.3.3.2. Surface Type: Gypsum board.
- 2.3.3.3. Locations: Walls.
- 2.3.3.4. Door: Minimum 1.519 mm (16 ga) thick sheet metal in the form of a pan recessed 16 mm (5/8") for infill of finish matching surface type indicated.
- 2.3.3.5. Reinforce panel as required to prevent buckling.
- 2.3.3.6. Frame: Minimum 1.519 mm (16 ga) thick sheet metal with bead or edge for surface type indicated.
- 2.3.3.7. Hinges: Spring-loaded concealed pin type.
- 2.3.3.8. Latch: Screwdriver-operated cam latch with plastic grommet for access through pan recess.
- 2.3.4. Acoustic Access Panels for Gypsum Board Ceilings:
  - 2.3.4.1. Material: Aluminum.
  - 2.3.4.2. Surface Type: Gypsum board.
  - 2.3.4.3. Locations: Ceilings.
  - 2.3.4.4. Door: Aluminum in the form of a pan recessed 16 mm (5/8") for infill of finish matching surface type indicated. Door can be lifted out and have safety cables.
  - 2.3.4.5. Frame: Aluminum with continuous EPDM gasket
  - 2.3.4.6. Hinges: Concealed pivoting rod hinge.
  - 2.3.4.7. Latch: Concealed touch latch.
  - 2.3.4.8. Options:
    - 2.3.4.8.1. Barymat 5 - barium loaded rubber matt attached to gypsum board in access panel.
    - 2.3.4.8.2. 2nd layer of gypsum board laminated to back of access door.
  - 2.3.4.9. Permitted Product: "Bauco-Plus II" by Bauco Access panel Solutions Inc.
- 2.3.5. Finishes:
  - 2.3.5.1. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in SSPC-Paint 25; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated and capability to provide sound foundation for field-applied topcoats despite prolonged exposure.
  - 2.3.5.2. Shop Primer for Metallic-Coated Steel: Organic zinc-rich primer complying with SSPC-Paint 20 and compatible with topcoat.
  - 2.3.5.3. Galvanizing Repair Paint: High-zinc-dust-content paint for reglvanizing welds in steel, complying with SSPC-Paint 20.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions:
  - 3.1.1.1. Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
  - 3.1.1.2. Size and Location Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment and indicate on schedule.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.2. INSTALLATION**

- 3.2.1. Advise installers of other work about specific requirements relating to access door and floor door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts and anchoring devices.
- 3.2.2. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- 3.2.3. Install access doors flush with adjacent finish surfaces or recessed to receive finish material.

**3.3. SITE QUALITY CONTROL**

- 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.4. ADJUSTING**

- 3.4.1. Adjust doors and hardware after installation for proper operation.

**END OF SECTION**



**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide sectional overhead doors including but not limited to following:
  - 1.2.1.1. electrically operated insulated sectional overhead doors.
  - 1.2.1.2. door guides, tracks and accessories.
  - 1.2.1.3. counterweight and counterweight enclosures.
  - 1.2.1.4. fender guards for overhead door tracks.
  - 1.2.1.5. supplementary steel supports required for installation.
  - 1.2.1.6. operators, motors, control panels, photo-electric devices, etc. and electrical work as specified.
  - 1.2.1.7. shop priming.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Head and jamb door framing: Section 05 50 00, Metal Fabrications.
  - 1.2.2.2. Finish painting of sectional overhead doors: Section 09 91 00, Painting.
  - 1.2.2.3. Wiring from power source to line side of main disconnect switch in door control panels: Division 26, Electrical.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. CSA: Canadian Standards Association; [www.csagroup.org](http://www.csagroup.org).
  - 1.3.1.2. EEMAC: Electrical Equipment Manufacturers Association of Canada; [www.eemac.ca](http://www.eemac.ca).
  - 1.3.1.3. EMT: Electro Metallic Tubing.
  - 1.3.1.4. ULC: Underwriters Laboratories of Canada; [www.canada.ul.com](http://www.canada.ul.com).
- 1.3.2. Reference Standards:
  - 1.3.2.1. CSA S136-16 - North American Specification for the Design of Cold-Formed Steel Structural Members

**1.4. SUBMITTALS**

- 1.4.1. Shop Drawings:
  - 1.4.1.1. Submit Shop Drawings for the work of this Section in accordance with Section 01 30 00.

- 1.4.1.2. Clearly show and describe in detail, detailed door assemblies and adjacent construction, including elevations, sections and details of door, track, hardware and operating components, dimensions, gauges, finishes and of relationship of door, frames, track, hardware and operating components to adjacent construction. Submission includes detailed descriptions and catalog cuts of specified door controls.
- 1.4.1.3. Submit complete electrical schematics with Shop Drawings.
- 1.4.1.4. Submit complete engineering design data for doors to confirm doors have been designed to meet design requirements specified.
- 1.4.1.5. Ensure a licensed engineer specified herein is responsible for:
  - 1.4.1.5.1. production and review of Shop Drawings.
  - 1.4.1.5.2. sealing and signing each Shop Drawing and any associated calculations performed.

**1.5. CLOSEOUT SUBMITTALS**

- 1.5.1. Operation and Maintenance Data: Submit printed operation instructions and maintenance data for doors, as follows:
  - 1.5.1.1. Wiring Diagrams: "As built" straight line wiring diagrams showing electrical connections and control circuitry.
  - 1.5.1.2. Instructions explaining operation.
  - 1.5.1.3. Lubrication chart indicating lubrication points and type of lubricant recommended for equipment.

**1.6. QUALITY ASSURANCE**

- 1.6.1. Qualifications:
  - 1.6.1.1. Installers: Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of Product manufacturers.
  - 1.6.1.2. Licensed Professionals: Employ a licensed engineer carrying minimum \$2,000,000.00 professional liability insurance and is registered in the Province of Ontario.

**1.7. DELIVERY, STORAGE AND HANDLING**

- 1.7.1. Delivery and Acceptance Requirements: Deliver materials in sequence to meet the installation schedule and arrange ahead for off-the-ground, undercover storage locations.
- 1.7.2. Storage and Handling Requirements: Handle components with care. Protect against damage, dirt, disfigurement and weather.

**1.8. WARRANTY**

- 1.8.1. Manufacturer Warranty: Warrant work of this Section for a period of 3 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to; buckling, opening of seams, bond failure and extensive colour fading.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
  - 2.1.1.1. "595 Series Thermacore" by Overhead Door Corporation of Toronto; [www.overheaddoor.com](http://www.overheaddoor.com)
  - 2.1.1.2. "Thermatite T175-20" by Richards-Wilcox Canada; [www.rwdoors.com](http://www.rwdoors.com)

- 2.1.1.3. "Therm-O-Dor TD-134" by Steel-Craft Door Products Ltd.; [www.steel-craft.ca](http://www.steel-craft.ca)
- 2.1.1.4. "Thermalex ®2000, Polyurethane Insulated Steel Door" by Upwardor Corp.; [www.upwardor.com](http://www.upwardor.com)
- 2.2. MATERIALS**
- 2.2.1. Performance/Design Criteria:
  - 2.2.1.1. Design exterior doors to withstand horizontal wind loads in closed position of 0.95 kN/m<sup>2</sup> (20 psf) positive, 0.57 kN/m<sup>2</sup> (12 psf) negative, with operators to function against 0.383 kPa (8 psf) wind load. Ensure maximum deflection under full design load is L/240 of the span.
  - 2.2.1.2. Calculate properties of steel sections and allowable stresses used in determination of structural performance in accordance with CSA S136.
  - 2.2.1.3. Structural Design: Employ a licensed engineer specified herein to:
    - 2.2.1.3.1. design components for work of this Section requiring structural performance.
    - 2.2.1.3.2. be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations.
- 2.2.2. Steel Supports: Design, fabricate and install following to carry overhead doors and tracks:
  - 2.2.2.1. Galvanized steel jamb and head supports.
  - 2.2.2.2. Miscellaneous framing, not shown on structural Drawings, to support operators and tracks e.g. centre spring mount and motor anchorage plates.
- 2.2.3. Overhead Sectional Doors:
  - 2.2.3.1. Insulated Sections Description:
    - 2.2.3.2. Core: R-14 polyurethane.
    - 2.2.3.3. Outer Face Sheet:
      - 2.2.3.3.1. Embossed and pebble textured, Z275 (G90) galvanized sheet steel or Galvalume.
      - 2.2.3.3.2. Finish: 1 prime coat and 1 white finish coat.
    - 2.2.3.4. Inner Face Sheet:
      - 2.2.3.4.1. Finish: White primer.
      - 2.2.3.4.2. Weight: 2.25 lbs/sq ft +40 lbs for track.
    - 2.2.3.5. Provide air and weather seals in following locations:
      - 2.2.3.5.1. between door sections.
      - 2.2.3.5.2. at jambs and head.
      - 2.2.3.5.3. on bottom sections.
    - 2.2.3.6. Door Sections:
      - 2.2.3.6.1. Panels: Insulated 610 mm (24").
  - 2.2.4. Track Description:
    - 2.2.4.1. Material: Roll formed galvanized steel.
    - 2.2.4.2. Depth: 75 mm (3").
    - 2.2.4.3. Curve Radius: Minimum 400 mm (16").
    - 2.2.4.4. Thickness: 3 mm (1/8") core minimum.
    - 2.2.4.5. Overlap jambs and head minimum 25 mm (1").

- 2.2.4.6. Steel Framing, Supports, Hangers, Stiffeners and Bracing: Z275 (G90) galvanized steel minimized spangle.
- 2.2.4.7. Verify track design and clearances and provide suitable standard or low headroom track if necessary.
- 2.2.4.8. Provide sub-framing to support track hangers between bottom chords of roof trusses.
- 2.2.4.9. Provide diagonal and sufficient stiffeners to prevent distortion and sagging.
- 2.2.4.10. Provide continuous track mounting angles along tracks.
- 2.2.4.11. Provide double bar latch cylinder locks with electrical interlock.
- 2.2.5. Rollers:
  - 2.2.5.1. Bearings: Full floating, hardened steel
  - 2.2.5.2. Provide industrial grade galvanized steel roller brackets and hinges.
- 2.2.6. Lifting Cables: Galvanized multi-strand aircraft type, with an 8:1 safety factor.
- 2.2.7. Electrical Components:
  - 2.2.7.1. Provide CSA and ULC approved electrical components
  - 2.2.7.2. Provide time delay timers adjustable from 0.5 to 180 seconds.
- 2.2.8. Safety Edge System:
  - 2.2.8.1. Provide a door bottom safety edge to stop downward travel of door when it comes into contact with an obstruction.
  - 2.2.8.2. Provide a reversing time delay on the safety edge system operation.
- 2.2.9. Manual Chain Hoist Operator: Provide a manual chain hoist operator with reduction unit as backup in case of electrical system failure.
- 2.2.10. Electric Operators (Drawbar):
  - 2.2.10.1. 1/2 hp suitable for 208V / 3 phase/60-cycle power.
  - 2.2.10.2. Provide drawbar arm so it is in the vertical position when the door is fully closed.
  - 2.2.10.3. Provide operators complete with magnetic brake, instant reversing motors and thermal overload.
  - 2.2.10.4. Provide 1 to 2 second delay timers in the reversing circuit and 1 to 5 minute timers in the close circuit.
  - 2.2.10.5. 100,000 cycle oil tempered torsion springs counter balancing mechanism mounted on a 25 mm (1") keyed solid steel shaft.
- 2.2.11. Photo Switch Controls:
  - 2.2.11.1. Provide a "photo-switch" Series 5000, Model 42 MRL/MRR photocell 110V, mounted 500 mm (20") off finished floor, to suspend door closing until opening is clear, to reset door at full open position and to reset timer.
  - 2.2.11.2. Provide a separate switch to deactivate the photo switch controls and associated timer.
- 2.2.12. Radio Controls: Provide each door with individual radio controls (separate frequency for each door). Provide 2 controls for each door.
- 2.2.13. Exterior Weatherproof Key Switch: Provide an exterior weatherproof key switch to be located by Consultant.

**PART 3 - EXECUTION**

**3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.2. INSTALLATION**

- 3.2.1. Employ manufacturer's qualified representatives to install overhead doors in accordance with manufacturer's printed installation instructions.
- 3.2.2. Provide wiring and EMT conduit from the disconnect switch at each jamb to the operators and controls.
- 3.2.3. Provide watertight operators, push buttons and wiring on the interior.
- 3.2.4. Provide and connect photo cell units.
- 3.2.5. On completion, adjust and lubricate moving parts in accordance with manufacturer's recommendations, check controls and demonstrate operation and controls of doors to Owner.
- 3.2.6. Controls:
  - 3.2.6.1. Provide 1 set of following for each door:
    - 3.2.6.1.1. Controls.
    - 3.2.6.1.2. Adjustable timer.
    - 3.2.6.1.3. Automatic/Back-up switch.
  - 3.2.6.2. Provide following entrance controls:
    - 3.2.6.2.1. Automatic Activator: Buried loop [radio control] [push button] [key switch] opens door and sets timer.
    - 3.2.6.2.2. Safety Control: Photo switch at opening verifies opening is clear and resets timer.
    - 3.2.6.2.3. Back-Up Control (Non-Timed): Push buttons located at the door jamb or alternatively the emergency chain operator.
  - 3.2.6.3. Provide following exit controls:
    - 3.2.6.3.1. Automatic Activator: Photo switch 900 mm (36") before door radio control; in each case timer is set.
    - 3.2.6.3.2. Safety Control: Photo switch at opening verifies opening is clear and resets timer.
    - 3.2.6.3.3. Back-Up Control (Timer Deactivated): Push buttons located at door jamb or alternatively the emergency chain operator.

**3.3. SITE QUALITY CONTROL**

- 3.3.1. Site Tests and Inspections:
  - 3.3.1.1. Structural Inspection: Ensure a licensed engineer specified herein inspects work of this Section during erection/installation and submits sealed and signed Field Review Report within 5 Days of site visit.
- 3.3.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.4. ADJUSTING**

3.4.1. Lubrication:

3.4.1.1. Upon completion of erection of units and operating equipment, lubricate moving parts before operation.

3.4.1.2. Grease sprockets, bearings, cables, link chains and guides. Use lubricant recommended by manufacturer.

**3.5. CLOSEOUT ACTIVITIES**

3.5.1. Demonstration: Test operate new doors and demonstrate operation of same to satisfaction of Consultant at time of review of completed work.

**3.6. PROTECTION**

3.6.1. Protect other work resulting from work of this Section.

**END OF SECTION**



**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide aluminum window wall including but not limited to following:
  - 1.2.1.1. unitized or stick built double glazed pre-finished aluminum window wall cladding system(s) including prefinished metal flashings as required to complete window wall system and/or specified herein and indicated on Drawings.
  - 1.2.1.2. operable awning/casement vents, horizontal sliding aluminum doors including standard hardware.
  - 1.2.1.3. out-of-sequence infill areas.
  - 1.2.1.4. mullion reinforcement and bracing to floors.
  - 1.2.1.5. pre-finished aluminum formed components at termination and closure points as indicated and required to meet design requirements. Include extruded aluminum sills, clips and supports for sills.
  - 1.2.1.6. pre-finished louvres within window wall system including insulated blank-off panels and framing.
  - 1.2.1.7. parapets including related flashing related to window wall with necessary anchors and clips.
  - 1.2.1.8. separation of dissimilar metals with dielectric separator.
  - 1.2.1.9. membrane tie-ins to adjacent envelope assemblies ensuring full compatibility and insulation continuity.
  - 1.2.1.10. sealing joints within work of this Section, at abutting joints of this work and interface work of adjacent trades.
  - 1.2.1.11. coordination with electrical, security and pneumatic trades for installation of their respective work within work of this Section.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of glazing types: Section 08 06 80, Glazing Schedule.
  - 1.2.2.2. Provision of curtain walls: Section 08 44 13, Glazed Aluminum Curtain Wall.
  - 1.2.2.3. Provision of lock cylinders: Section 08 71 00, Door Hardware.
  - 1.2.2.4. Pre-finished louvres not part of window wall assembly: Section 08 91 00, Louvres.
  - 1.2.2.5. Provision of gypsum board finish on interior side of window wall: Section 09 21 16, Gypsum Board Assemblies.
  - 1.2.2.6. Provision of exterior building maintenance and window washing equipment: Section 11 81 29, Facility Fall Protection.
  - 1.2.2.7. Provision of door contacts: Division 28, Electronic Safety and Security.



**1.3. REFERENCES**

1.3.1. Abbreviations and Acronyms:

1.3.1.1. AAMA: American Architectural Manufacturers Association; [www.fgiaonline.org](http://www.fgiaonline.org).

1.3.1.2. ASHRAE: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; [www.ashrae.org](http://www.ashrae.org).

1.3.1.3. EPDM: Ethylene Propylene Diene Monomer.

1.3.1.4. FGIA: Fenestration & Glazing Industry Alliance; [www.fgiaonline.org](http://www.fgiaonline.org).

1.3.1.5. GANA: Glass Association of North America; [www.glass.org](http://www.glass.org).

1.3.1.6. OBC: Ontario Building Code.

1.3.1.7. PVC: Polyvinyl Chloride.

1.3.1.8. PVDF: Polyvinylidene Fluoride.

1.3.1.9. SWRI: Sealant Waterproofing & Restoration Institute; [www.swrionline.org](http://www.swrionline.org).

1.3.2. Definitions:

1.3.2.1. Air/Vapour Barrier: A continuous membrane including joints of membrane to adjacent construction which seals or prevents rate of penetration of moisture laden air and diffusion of water vapour through it at air infiltration/exfiltration rates given.

1.3.2.2. Glass Terminology: Conform to ASTM C162 for glossary of terms and definitions of glazing terminology.

1.3.2.3. Independent Consultant: A consultant retained directly by Owner for exclusive purpose of reviewing, testing and approving Work of this Section.

1.3.2.4. Rain Screen Principle: A theory governing the design of a building enclosure in such a way as to prevent water penetration due to rain; in other words, a scientific approach to eliminating water leakage.

1.3.3. Reference Standards:

1.3.3.1. AAMA 2603-22 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusion and Panels (with Coil Coating Appendix)

1.3.3.2. AAMA 2605-22 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusion and Panels (with Coil Coating Appendix)

1.3.3.3. AAMA/WDMA/CSA 101/I.S.2/A440-17 - North American Fenestration Standard/Specification for windows, doors, and skylights

1.3.3.4. AMCA 500-L-12(15) - Laboratory Methods of Testing Louvers for Rating

1.3.3.5. AMCA 511-13 - Certified Ratings Program Product Rating Manual for Air Control Devices

1.3.3.6. ANSI/IES/ASHRAE 90.1-20 - Energy Code for Commercial and High-Rise Residential Buildings

1.3.3.7. ASTM A653/A653M-22 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

1.3.3.8. ASTM B117-19 - Standard Practice for Operating Salt Spray (Fog) Apparatus

1.3.3.9.	ASTM B209/B209M-21	- Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
1.3.3.10.	ASTM B221M-21	- Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
1.3.3.11.	ASTM B244-09(14)	- Standard Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments
1.3.3.12.	ASTM C162-05(15)	- Standard Terminology of Glass and Glass Products
1.3.3.13.	ASTM C165-07(17)	- Standard Test Method for Measuring Compressive Properties of Thermal Insulations
1.3.3.14.	ASTM C542-05(17)	- Standard Specification for Lock-Strip Gaskets
1.3.3.15.	ASTM C661-15	- Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
1.3.3.16.	ASTM C719-14(19)	- Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
1.3.3.17.	ASTM C794-18	- Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants
1.3.3.18.	ASTM C920-18	- Standard Specification for Elastomeric Joint Sealants
1.3.3.19.	ASTM C1036-16	- Standard Specification for Flat Glass
1.3.3.20.	ASTM C1048-18	- Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
1.3.3.21.	ASTM D523-14(18)	- Standard Test Method for Specular Gloss
1.3.3.22.	ASTM D714-02(17)	- Standard Test Method for Evaluating Degree of Blistering of Paints
1.3.3.23.	ASTM D968-17	- Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
1.3.3.24.	ASTM D2244-16	- Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
1.3.3.25.	ASTM D2247-15(20)	- Standard Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity
1.3.3.26.	ASTM D3363-20	- Standard Test Method for Film Hardness by Pencil Test
1.3.3.27.	ASTM D4214-07(15)	- Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
1.3.3.28.	ASTM E283/E283M-19	- Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
1.3.3.29.	ASTM E330-E330M-14	- Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
1.3.3.30.	ASTM E331-00(16)	- Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

1.3.3.31.	ASTM E547-00(16)	- Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Cyclic Static Air Pressure Difference
1.3.3.32.	ASTM E1300-16	- Standard Practice for Determining Load Resistance of Glass in Buildings
1.3.3.33.	ASTM F588-17	- Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact
1.3.3.34.	CAN/CGSB-12.1-17	- Safety glazing
1.3.3.35.	CAN/CGSB-12.20-M89	- Structural Design of Glass for Buildings
1.3.3.36.	CAN/CGSB-79.1-M91	- Insect Screens
1.3.3.37.	CSA A440S1-17	- Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/ A440-11, NAFS - North American Fenestration Standard / Specification for windows, doors, and skylights
1.3.3.38.	CSA G40.21-13(18)	- Structural Quality Steels
1.3.3.39.	CSA S16-14(19)	- Design of Steel Structures
1.3.3.40.	CSA S136-16	- North American Specification for the Design of Cold-Formed Steel Structural Members
1.3.3.41.	CSA S157-17	- Strength design in aluminum
1.3.3.42.	CSA W47.1-19	- Certification of Companies for Fusion Welding of Steel
1.3.3.43.	CSA W47.2-11(15)	- Certification of Companies for Fusion Welding of Aluminum
1.3.3.44.	CSA W59-18	- Welded Steel Construction (Metal Arc Welding)
1.3.3.45.	CAN/ULC-S702.1-21	- Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification
1.3.3.46.	GANAL 01-0300	- Glass Information Bulletin – Proper Procedures for Cleaning Architectural Glass Products

#### **1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Coordination:
- 1.4.1.1. Notify concerned trades of items required to be incorporated into work of separate Sections. Certain components specified under this Section includes items which are closely integrated with air/vapour barrier transitions, entrances, glazing components, flashing pieces and architectural metalwork specified under separate Sections and consequently requires close coordination with such allied trades. Perform total coordination required to ensure correct installation procedures and results.
- 1.4.1.2. Coordinate and cooperate with metal panel system trades by installing panel system closures and trim supplied by such trades and installed directly into window wall system.

- 1.4.2. Preinstallation Meetings:
  - 1.4.2.1. Arrange preinstallation meeting 1 week prior to commencing work with parties associated with this trade as designated in Contract Documents or as requested by Consultant. Presided over by Construction Manager, include Consultant who may attend, Trade Contractor performing work of this trade, testing company's representative and consultants of applicable discipline. Review Contract Documents for work included under this trade and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of work of this Section.
  - 1.4.2.2. Review installation methods, procedures, time schedule and conditions under which work shall proceed including manufacturer's written instructions and coordination required with related work.
  - 1.4.2.3. Review and finalize construction schedule, verify availability of materials, experienced installer, equipment and facilities needed to make progress and avoid delays.
- 1.5. SUBMITTALS**
  - 1.5.1. Shop Drawings:
    - 1.5.1.1. Submit Shop Drawings for work of this Section in accordance with Section 01 30 00 for Consultant's review before any work is fabricated. In addition to minimum requirements indicate following:
      - 1.5.1.1.1. Indicate with plans, sections, elevations and sufficient full size details to indicate components and methods of assembly, materials, finishes, colour and their characteristics relative to their purpose and other fabrication information.
      - 1.5.1.1.2. Identify and describe material types and components being supplied, their manufacturers, wall thicknesses of extrusions and shapes including connections and grades, attachments, reinforcing, anchorage and locations of fastenings.
      - 1.5.1.1.3. allowances for thermal and structural movement between components and thermal isolation materials.
      - 1.5.1.1.4. line of airseal, water drainage, venting and water shed continuous, clearly shown and defined, including continuity of air seal and membrane flashing with adjacent trades.
    - 1.5.1.2. Include description of materials, metal finishing specifications and other pertinent information.
    - 1.5.1.3. Ensure a licensed engineer specified herein is responsible for:
      - 1.5.1.3.1. production and review of Shop Drawings.
      - 1.5.1.3.2. sealing and signing each Shop Drawing and any associated calculations performed.
  - 1.5.2. Samples: Submit samples in accordance with Section 01 30 00. Submit following samples in the sizes indicated:
    - 1.5.2.1. 300 mm (12") long or square samples of 4-way panel-to-panel intersections at window wall sill, head and mullions at various intersections, mullion at typical vertical glazing intersection with spandrel panels, parapet cap detail (at corner) and sill profiles.
    - 1.5.2.2. 3 samples, minimum 300 mm (12") square of each window wall and aluminum panel type, with each specified glass type or metal panel colour and edge seals.
    - 1.5.2.3. Samples of colour and finish prepared as specified on respective aluminum components for both extrusion and sheet. Indicate range within which colour and sheen and metallic disbursement of fluopolymer on building shall adhere. Submit samples as many times as required to obtain review with no objections recorded of range. Mark direction of metal grain and rolling and paint application on back of control samples.

- 1.5.3. Test and Evaluation Reports:
  - 1.5.3.1. Submit in accordance with Section 01 30 00.
  - 1.5.3.2. Submit all test and evaluation reports as well as calculations to Independent Consultant and Consultant for review.
  - 1.5.3.3. Prior to fabrication of window wall, submit certified test data performed by an independent Standards Council of Canada approved laboratory displaying results of testing program carried out on typical window wall systems proposed for this Project.
  - 1.5.3.4. Provide test report on adhesion to production samples of metal and glass testing in accordance with ASTM C794.
  - 1.5.3.5. Ensure test results show compliance with standards specified under this Section.
- 1.5.3.6. Glazing Thermal Stress Analysis:
  - 1.5.3.6.1. Submit results of a thermal stress analysis for glazing, including any stresses developing from solar radiation or other causes - prior to or during installation of glass - and allow for protection or method of handling and storage of glass to avoid such stresses and conform to safety requirements for glass application in accordance with ASTM C1036.
  - 1.5.3.6.2. Identify glazing which can be expected to fail under service conditions and submit recommendations for resolution of problem to avoid glazing failure.
- 1.5.3.7. Thermal performance calculations per ANSI/IES/ASHRAE 90.1.

**1.6. CLOSEOUT SUBMITTALS**

- 1.6.1. Operation and Maintenance Data: Submit maintenance instructions in accordance with Section 01 70 00. Include in Maintenance Manual; printed copies of maintenance instructions for window walls, proper care and maintenance of window walls and hardware, recommended inspection schedule, copy of each duly reviewed Shop Drawing in its most recent amended form, complete explanation of operation principles and sequences, complete parts and materials list with numbers and glass sizes, method statement of re-glazing and replacement of component parts of installation, instructions for proper cleaning and routine maintenance of window walls including recommended frequency.

**1.7. QUALITY ASSURANCE**

- 1.7.1. Qualifications:
  - 1.7.1.1. Insulating Glass Unit Fabricators: Ensure insulating glass unit fabricators have membership and certification in FGIA. Ensure FGIA members participate in certification program and successfully pass a Compliance Audit within last 6 months.
  - 1.7.1.2. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.
  - 1.7.1.3. Licensed Professionals: Employ a licensed engineer carrying minimum \$2,000,000.00 professional liability insurance and is registered in the Province of Ontario.
- 1.7.1.4. Sealant Certification:
  - 1.7.1.4.1. Submit written certification from sealant manufacturer that sealant applications in specified systems have been reviewed and approved as completely appropriate for its intended uses in systems as shown and detailed on Shop Drawings, designating drawing number, date and revision, with regard to design criteria and other requirements of the Contract Documents and compatibility with components and adjacent materials together with life expectancy of sealant materials detailed and specified. Ensure specific reference is made to compatibility of glass edge seal with adjacent materials, together with life expectancy of sealant materials detailed and specified.

- 1.7.1.4.2. Submit Product information on the sealant to be used, complete with recommendations and installation instructions.
- 1.7.1.4.3. Ensure weather seal sealants are verified by SWRI in accordance with ASTM C719 and ASTM C661.
- 1.7.1.4.4. Provide to sealant manufacturer, Shop Drawings showing size of lites, design loads and sealant dimensions for evaluation and statement on stress.
- 1.7.1.5. Sealed Glazed Units:
  - 1.7.1.5.1. Submit to Consultant a written certification from sealed unit manufacturer that sealed units of window wall assemblies have been reviewed as completely appropriate for their intended use in system shown. They are to be detailed on Shop Drawings, designating drawing number, date and requirements of the Contract Documents, compatibility with components and adjacent materials and thermal safety of glass constructions together with life expectancy of glazing materials detailed and specified in the glazing system.
  - 1.7.1.5.2. Take into account any stresses developing from solar radiation or other causes (prior to or during installation of glass) and allow for protection or methods of handling and storage of glass to avoid such stresses and conform to safety requirements for glass application as set out in ASTM C1036.
  - 1.7.1.5.3. Ensure sealed units are capable of being removed and replaced from exterior. Submit to Consultant detail drawing indicating procedure for removal and replacement of any damaged sealed unit of glass.
- 1.7.1.6. Corrosion Analysis:
  - 1.7.1.6.1. Engage a licensed Engineer who is an expert in corrosion, to conduct a component-by-component analysis of potential corrosion resulting from galvanic action between materials, for components of window wall and aluminum panels and provide report.
  - 1.7.1.6.2. Submit Engineering Report to Consultant, for review prior to submission of Shop Drawings. Ensure sample and test results are available upon request.
  - 1.7.1.6.3. Separate dissimilar metals to prevent electrolytic action. Provide letter of confirmation from Engineer specified herein that infill components, accompanying trims and flashings and attachments to adjacent construction are designed to eliminate potential for galvanic action between components.
- 1.7.2. Visual Mock-Ups:
  - 1.7.2.1. Erect mock-up at designated location for Independent Consultant's and Consultant's review. Provide mock-up for 1 complete occupancy unit minimum. Ensure mock-up is complete, including but not necessarily limited to, framing members, correct glass types, spandrel glass panels, doors, louvres, slab edge covers, insulated metal air/vapour barrier, connections, sealants, air seal gaskets, anchorage systems and transitions to adjacent and adjoining assemblies and materials as applicable.
  - 1.7.2.2. Mock-up will be tested by an independent inspection and testing company for meeting minimum for air and water infiltration and environmental separation performance requirements in accordance with recognized industry standards as determined, reviewed and approved by Independent Consultant.
  - 1.7.2.3. Adjust mock-up at no extra cost to Owner as required to obtain no objections recorded of Independent Consultant and Consultant.
  - 1.7.2.4. Mock-up when reviewed with no objections recorded, acts as minimum standard for balance of Work.
  - 1.7.2.5. Mock-up may become part of permanent Work.

**1.8. DELIVERY, STORAGE AND HANDLING**

- 1.8.1. Delivery and Acceptance Requirements: Transport materials to site storage in a manner to prevent in-transit damage. These measures include, but are not limited to, crating, polyethylene wrapping system, etc.
- 1.8.2. Storage and Handling Requirements:
- 1.8.2.1. Store in a dry, protected area on site, in original undamaged containers with manufacturer's labels and seals intact.
- 1.8.2.2. Brace frames to maintain squareness and rigidity during shipment and installation.
- 1.8.2.3. Provide glass units with interlayer protection between lites. Keep glass and interleaving dry and store cases in clean, cool, dry areas with temperatures above dewpoint. Circulation of cool, dry air in storage areas is essential. Open cases and inspect units periodically for moisture accumulation. Do not store glass in direct sunlight without an opaque protective covering over same.
- 1.8.2.4. Remove damaged or unsatisfactory materials from site and replace with new materials to satisfaction of Consultant at no cost to Owner.
- 1.8.2.5. Provide at factory, strippable coatings on exposed surfaces of aluminum. Ensure coating and protective wrappings remain on surfaces through period other trades' works proceed on building and remove by this trade on completion of building.
- 1.8.2.6. Comply with unpacking procedures as recommended by framing and glass manufacturers.

**1.9. WARRANTY**

- 1.9.1. Manufacturer Warranty:
- 1.9.1.1. Warrant work of this Section for a period of 5 years against labour and material defects and/or deficiencies in accordance with General Conditions of Contract. Promptly correct any defects or deficiencies which become apparent within warranty period (labour and materials required to repair or replace window wall system should air leakage or water ingress occur during warranty period), to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to air leakage and water ingress of window wall, structurally sound and free from distortion, deflection, misalignment, continuity of air/vapour barrier, insulating glass units are free from condensation, fogging of material, obstruction of vision, loosening of glazing and anchorage buckling, water penetration beyond air/vapour seal, fading, discolouration of finish, failure of glazing, joint sealant against staining, adhesion and cohesion, bond failure and extensive colour fading.
- 1.9.1.2. Warrant factory sealed insulating units against defects for a period of 10 years. Warrant factory sealed insulating units free from material obstruction of vision as result of dust or film formation on internal glass surfaces by any cause, under normal conditions anticipated under this Project, other extrinsic glass breakage, but including breakage due to thermal shock and temperature differential due to inherent glass or glazing fault.
- 1.9.1.3. Warrant water based silicone opacifier for a period of 10 years against defects and/or deficiencies in accordance with General Conditions of Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
- 2.1.1.1. BVGlazing Systems; [www.bvglazing.com](http://www.bvglazing.com)

- 2.1.1.2. Newmar Window Manufacturing Inc.; [www.newmar.com](http://www.newmar.com)
- 2.1.1.3. State Window Corporation; [www.statewindowcorp.com](http://www.statewindowcorp.com)
- 2.1.2. Manufacturer List for Insulated Glass Units: Refer to Section 08 06 80.

## **2.2. MATERIALS**

- 2.2.1. Performance/Design Criteria:

- 2.2.1.1. Drawings and details are diagrammatic and are intended to show design concept, configuration, components and arrangements; they are not intended to identify nor solve completely problems of thermal, deflection and structural movements, air pressure equalization, air/vapour barriers, assembly framing, fixings and anchorages, moisture disposal, water penetration and problems at the glass line associated with glazing installation, movements, pressure fracture or thermal shock and weather seal. Final engineering design of window wall is responsibility of this trade. Material types, sizes and/or thicknesses shown on Drawings are diagrammatic and must be engineered to suit intended sizes and profiles.
- 2.2.1.2. Include cladding, glazing, insulation, air/vapour barriers, system components, metal trims, expansion joints, thermal breaks, closures, fascias, parapet fins, flashings, vents, anchorage, fixings, reinforcing and related items of work to provide a complete window wall system to meet design criteria.
- 2.2.1.3. Comply with requirements of OBC and regulations of authorities having jurisdiction, which shall be minimum, except where more stringent requirements are specified herein.
- 2.2.1.4. Design glazing systems and framing to prevent thermal shock and pressure fracture damage to glass.
- 2.2.1.5. Design aluminum work as shown to provide free and noiseless movement of components of assembly due to structural erection or dead loads, without buckling, oil canning of any component and/or transmitting of stresses to any members.
- 2.2.1.6. Coordinate maximum allowable reaction loads with Structural Drawings.
- 2.2.1.7. Ensure metal faces of panels, flashings, caps, bases and soffits are visually flat under all lighting conditions. Ensure finish on aluminum is uniform and consistent within each component and from component to component.
- 2.2.1.8. Locate sealants, gaskets, air/vapour seals, thermal separations, drainage slots and holes as shown or specified in this Section, as required to obtain design requirements. Ensure components and assemblies exterior to air barrier drain to building exterior.
- 2.2.1.9. Design, assemble and secure Work in a manner that will keep any stresses on sealants within sealant manufacturer's recommended working range within factors of safety specified.
- 2.2.1.10. Extrude pressure plates to dimensions of glass panes. Design pressure plates and glass retainers to place uniform pressure on glass, to prevent distortion of glass. Jointing of pressure plates need not necessarily follow snap-on cap jointing locations.
- 2.2.1.11. Ensure grain and extruding direction or rolling direction of horizontal mullion caps, trims, flashings, bases and sills are horizontal and in same direction. Where applicable apply paint finish in same direction as grain and extruding direction of metal.
- 2.2.1.12. Ensure grain and extruding or rolling direction of vertical mullion caps and trims are in "up" direction. Where applicable apply paint finish in same direction as grain and extruding direction of metal and vertical grain direction.
- 2.2.1.13. Accurately shape members at intersecting joints to obtain hairline joints, just wide enough to permit thermal expansion and contraction.
- 2.2.1.14. Design and assemble window wall and aluminum panels to permit re-glazing without removal of structural mullion sections.



- 2.2.1.15. Conceal securement devices unless otherwise specified.
- 2.2.1.16. Design attachments that permit replacement of individual units during construction or in subsequent usage of building without dismantling or disturbance to adjoining components or units. In addition, accomplish such replacement without use of extra fasteners, splices, covers and like that alter original design features.
- 2.2.1.17. Provide accessories, closures and trims required and necessary to complete work.
- 2.2.1.18. Design window wall assembly so that movements specified herein are accommodated without any audible noise being generated.
- 2.2.1.19. Design and detail vented air space and controlled drainage path using rainscreen principle to actively discharge water and condensation which enter into or forms within window wall system to exterior and prevent accumulation or storage of water within window wall. Prevent water ingress to interior in accordance with ASTM E331.
- 2.2.1.20. Overall system shall meet Class AW requirements.
- 2.2.1.21. Structural Building Movement and Tolerances:
  - 2.2.1.21.1. Dead and Live Loads: Design window wall system and fixing to accommodate differential structural movements; 9 mm (3/8") typical live load deflection, 1.6 mm (1/16") subsidence of columns, creep and thermal movement of the structure and other elements. Coordinate final calculations.
  - 2.2.1.21.2. Allow for a differential deflection of floor slabs, beams and wall framing after window wall and aluminum panel installation for anticipated primary structural deflections, as required by structural design.
  - 2.2.1.21.3. Design window wall system so failure of any 1 element (eg. bolt, anchor or embed) will not result in progressive failure of the wall.
  - 2.2.1.21.4. Ensure design of window wall and aluminum framing and panels, with fixing devices to structure, accommodates building construction tolerances in accordance with those specified on Structural Drawings.
  - 2.2.1.21.5. Be responsible for agreeing to tolerances of other trades that may affect work of this Section prior to start of Shop Drawings.
- 2.2.1.22. Structural Design Requirements:
  - 2.2.1.22.1. Design work to withstand within permitted deflection limitations, its own weight, forces applied by movements of building structure and attached adjacent components and maximum design loads due to pressure and suction of wind, snow, ice, rain and hail.
  - 2.2.1.22.2. Design window wall and aluminum panels to accept 150% of design loads without failure or permanent deformation in excess of L/1000.
  - 2.2.1.22.3. Design work to accommodate within its components, expansion and contraction due to cyclic temperature changes, shrinkage, moisture changes, creep in component materials, movement due to differential hoisting, distortions, misalignment, joint seal failures, noise, undue stress on securement devices and components and any other damage.
  - 2.2.1.22.4. Design work to accommodate expansion and contraction between this work, work of other Sections and building structure due to cyclic temperature changes, to prevent damages, twisting, distortion, misalignment, buckling, noise, undue stress on components and securement devices to work of this Section, work of other Sections and building structure.
  - 2.2.1.22.5. Ensure work accommodates, by means of expansion/contraction provisions, any movements within building structure and adjacent construction caused by short and long term structural movements, creep, column shortening, deflection, torsion, sway and racking.

- 2.2.1.22.6. Expansion/contraction provisions shall ensure no damages, distortion, misalignment of work of this Section, building structure, adjacent construction and connections occur and shall ensure thermal, vapour barrier, air infiltration/exfiltration and water and weathertightness requirements are maintained.
- 2.2.1.22.7. Design window wall connections to building structure and to adjacent construction to take into account peculiarities as may be found on this Project; to ensure no possibility of weakening, loosening or fracturing occurring due to vibrations from any source.
- 2.2.1.22.8. Design light gauge steel structural members in accordance with CSA S136.
- 2.2.1.22.9. Design light gauge aluminum structural members in accordance with CSA S157.
- 2.2.1.22.10. Design window wall and glazing systems (including accessories) to resist minimum wind pressure as required to meet design criteria and designated in OBC for this specific location of Project.
- 2.2.1.22.11. Ensure deflection limitations for span distributions as directly related to exterior wall system and related cladding whether positive or negative (pressure or suction) comply with following:
  - 2.2.1.22.11.1. In all cases, limit deflection of any member, in direction parallel to wall plane, when member carries its full design load, not to exceed 75% of design clearance dimension between that member and panel, glass, or other part immediately below it.
  - 2.2.1.22.11.2. Deflection of any framing member in a direction normal or perpendicular to the plane of the wall when subjected to a uniform and/or concentrated load deflection test in accordance with ASTM E330/E330M, loads shall not:
    - 2.2.1.22.11.2.1. exceed  $L/240$  of its clear span or 19 mm (3/4") whichever is less.
    - 2.2.1.22.11.2.2. exceed  $L/175$  of its cantilevered length or 19 mm (3/4") whichever is less.
  - 2.2.1.22.11.3. For horizontal mullions and members, deflection measured parallel to face of glass; a maximum of greater of  $L/175$  or an amount which allows reduction of glass bite to not exceed 3 mm (1/8") at mid-height of any glass light due to member deflection.
  - 2.2.1.22.11.4. Ensure aluminum panels, when carrying a full design load do not deflect more than  $L/60$  of its clear span of the short dimension.
  - 2.2.1.22.11.5. For horizontal and vertical members retaining glass panels; deflection limits shall be such that integrity of glass and air seals are maintained at design loading. Permanent deformation of members due to applied loads is not permitted.
- 2.2.1.22.12. Ensure sheet metal air/vapour barriers do not deflect more than 6 mm (1/4") under design loads or sufficient to cause noise, breaking joint seals or to cause them to touch other components of Work of this Section and building structure. Design, fabricate and erect supplementary framing as required to support air vapour barriers such that completed installation meets specified design requirements.
- 2.2.1.22.13. Design anchors, fasteners, bracing and framing fastened directly to structure, structurally adequate in accordance with requirements of CSA S16 using Limit States Design. Where extra bracing and/or supports are required to stabilize window wall assembly, provide such structural members whether shown on Drawings or not. Provide reinforcement in mullions as required, without increasing sight lines of aluminum members.
- 2.2.1.22.14. Utilize Limit States Design in sizing of glass and employ a safety factor for glass to statistical probability of failure of 8 glass lites per 1000. Comply with requirements of CAN/CGSB-12.20-M for design of glass. Replace broken or damaged sealed units prior to application of Substantial Performance of the Work.
- 2.2.1.22.15. In addition, ensure design of glazing takes into consideration characteristics of mullions and effects of connections and sealants at frame junctions. Ensure glass is heat strengthened or tempered as required in order to meet wind load, failure probability specified and accommodate thermal stresses as required to meet building codes and/or standards.

- 2.2.1.22.16. Design work to accommodate tolerance requirements permitted of building structure and thermal, seismic and live load movements of building structure as stipulated in Contract Documents.
- 2.2.1.23. Seismic Loads: In accordance with OBC.
- 2.2.1.24. Water and Moisture Design Requirements: In designing and engineering the Work, use following principles:
  - 2.2.1.24.1. Design window wall system to rain screen principle. Make provision to drain to exterior face of assembly at every floor level to create horizontal compartmentalization and provide vertical compartmentalization at each vertical mullion to control any water, air and condensation occurring within window wall construction while maintaining air seal between interior and exterior. Ensure drain holes are adequate to drain water.
  - 2.2.1.24.2. Design, fabricate and install assembly to be watertight under design conditions in combination with movements occurring due to loads imposed.
  - 2.2.1.24.3. Ensure frames provide pressure equalization to glazing pockets at vision and spandrel panels and reveal base and sill panels, column covers to have pressure equalization provided to spaces behind and not fully depend upon sealants and gaskets to achieve watertight and air/vapour barrier seals. Ensure window wall system is self-draining with framing components to window wall assembly profiled to drain off any moisture to exterior. Screen drainage ports to exterior.
- 2.2.1.25. Air/Vapour Design Requirements:
  - 2.2.1.25.1. Ensure a vapour barrier consistent with rain screen principle is continuously installed at inner frame perimeter as an integral part of window wall system design to provide a complete and impervious air/vapour barrier. No detectable drafts are permitted.
  - 2.2.1.25.2. It is Trade Contractor's responsibility to design and provide air/vapour seal between window wall, aluminum panels, trim and expansion joints at roof, base structure, masonry and other components of building.
  - 2.2.1.25.3. Ensure maximum water vapour transmission including joints is 20 Imperial perms.
  - 2.2.1.25.4. Design and reinforce rigid air/vapour barriers to withstand permitted load deflection limitations, their own weight, insulation weight and design loads.
- 2.2.1.26. Operable Windows Performance:
  - 2.2.1.26.1. Ensure windows meet following AAMA/NWWDA/CSA 101/I.S.2/A440 and CSA A440S1 window classification ratings provided, however, ensure thickness of extruded aluminum components are not less than 1.6 mm (0.062").
  - 2.2.1.26.2. Air Tightness: Window rating A3, 0.55 (m<sup>3</sup>/h) m, Fixed, 0.25 (m<sup>3</sup>/h) m, (maximum air leakage rate) when tested in accordance with ASTM E283/E283M.
  - 2.2.1.26.3. Water Tightness: Zero leakage at B3, 400 Pa (test pressure differential) when tested in accordance with ASTM E547.
  - 2.2.1.26.4. Load Resistance: C3, deflection at sash, not more than L/125 when tested at 1200 Pa (test pressure) and deflection of mullions, not more than L/175 when tested at 2000 Pa (test pressure).
  - 2.2.1.26.5. Resistance to Forced Entry: Comply with F20 for Ground Floor units with access from terrace levels and F10 requirements specified in AAMA/NWWDA/CSA 101/I.S.2/A440 and CSA A440S1 when tested according to ASTM F588 for other units.
- 2.2.1.27. Louvres:
  - 2.2.1.27.1. Wind Driven Rain Performance: When tested in accordance with AMCA 500L and AMCA 511 for a 1220 mm x 1220 mm (48" x 48") sized decorative or storm class louvre, following results apply:
    - 2.2.1.27.1.1. Static Air Pressure Drop Performance: Maximum 0.15" – 0.20" water gauge pressure loss at 1000 FPM.
  - 2.2.1.27.2. Minimum 45% Free Area.

- 2.2.1.27.3. AMCA certified Class A for wind speed of 29.1 mph and rainfall rate of 3"/hour.
- 2.2.1.27.4. AMCA certified Class A for wind speed of 50 mph and rainfall rate of 8"/hour.
- 2.2.1.27.5. Thermal Movement: Design louvres to accommodate expansion and contraction of components due to temperature changes.
- 2.2.2. Aluminum Sections: ASTM B221M, sized accurately formed as shown on Drawings, extruded aluminum alloy AA-6063-T5 for aluminum except surfaces receiving anodizing which shall be AA-6061-T6. Ensure surfaces are free from defects impairing appearance, strength and durability.
- 2.2.3. Aluminum Sheet: ASTM B209/B209M, minimum thickness 3 mm (1/8") of type and characteristics to match finished extrusions; ensure sheet which is not exposed is Utility Aluminum mill finished; for intricate forming with decorative finishes use AA-1100 and for siding and exposed panels use AA-3003 with specified finish.
- 2.2.4. Screws, Bolts and Fasteners: At exterior to air seal and/or penetrating air seal, use Type 304 Series stainless steel or hardened aluminum. At interior of air seal, use cadmium plated or Series 400 stainless steel.
- 2.2.5. Internal Frame Sealant: Non-sag type, either 1 or 2 component ultra low-modulus, pre-pigmented, neutral cure elastomeric silicone sealant conforming to ASTM C920, Type S or M, Grade NS, Class 50, Use NT, G, M, A and O. Supply in standard colours as selected. Supply 1 of following:
  - 2.2.5.1. "DOWSIL™ 983 Structural Glazing Sealant" by The Dow Chemical Company; [www.consumer.dow.com](http://www.consumer.dow.com).
  - 2.2.5.2. "GE UltraGlaze SSG4400" by Momentive Performance Materials; [www.momentive.com](http://www.momentive.com).
  - 2.2.5.3. "Sikasil SG-500CN" by Sika Canada Inc.; [www.sika.ca](http://www.sika.ca).
- 2.2.6. Backpan Sealant: Non-sag type, 2 component. Supply in standard colours as selected. Supply 1 of following:
  - 2.2.6.1. "DOWSIL™ 983 Structural Glazing Sealant" by The Dow Chemical Company.
  - 2.2.6.2. "Sikasil SG-500CN" by Sika Canada Inc.
- 2.2.7. Thermal Break Component: Glassfibre impregnated nylon, "Polymide" by Ensinger Ltd.; [www.ensinger.ltd.uk](http://www.ensinger.ltd.uk).
- 2.2.8. Light Gauge Sheet Metal: Commercial quality galvanized sheet steel to ASTM A653/A653M, Designation Z275 (G90) unless otherwise specified.
- 2.2.9. Miscellaneous and Sub-Frame Steel: CSA G40.21, Grade 300W, prime painted.
- 2.2.10. Shims: Alcan Utility sheet when not in contact with concrete; stainless steel when in contact with concrete or cementitious substances of thicknesses required, or galvanized steel.
- 2.2.11. Stools, Sills and Cover Plates: Extruded aluminum and sheet stock minimum 1.55 mm nominal thickness formed or brake shaped to profiles shown on Drawings.
- 2.2.12. Window Hardware: Manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close and securely lock aluminum windows and sized to accommodate sash or ventilator weight and dimensions. Cadmium-plated hardware not permitted. Do not use aluminum in frictional contact with other metals. Where exposed, provide nonmagnetic stainless steel.
- 2.2.13. Screen for Operating Units:
  - 2.2.13.1. Design windows and hardware to accommodate screens in tight fitting, removable arrangement with minimum of exposed fasteners and latches.
  - 2.2.13.2. Aluminum coated wire fabric or glass fibre fabric mesh of PVC coated woven into 14 x 18 or 16 x 18 mesh screen cloth, CAN/CGSB-79.1-M.

- 2.2.14. Insulation for Spandrels: Stone wool, rigid or semi-rigid board insulation, "ROCKWOOL™ CURTAINROCK®" by ROCKWOOL™ International A/S. Ensure insulation has a thermal resistance value of not less than RSI=0.704 per 25 mm (R=4 per inch) thickness at a mean temperature of 24 deg C (75 deg F) and a minimum nominal density of 64 kg/m<sup>3</sup> (4 pcf). Ensure deformation of insulation does not exceed 10% when tested at 1.2 kPa (25 psf) in accordance with CAN/ULC-S702.1, Type 1 and ASTM C165. Thickness as indicated.
- 2.2.15. Dielectric Separator: Provide best grade, quick drying non-staining alkali resistant bituminous paint or epoxy resin solution or membrane type.
- 2.2.16. Adhesive for Insulation: Compatible, permanent type recommended by insulation manufacturer and suitable when fully coated to hold metal back-up panels and insulation totally bonded for life of building.
- 2.2.17. Metal Air/Vapour Barriers: Galvanized sheet metal for metal air/vapour barriers, backpans and air seals minimum 0.912 mm (20 ga) thick, sheet steel galvanized to requirements specified herein and Designation Z275 (G90).
- 2.2.18. Insulation Retainers: Aluminum bars spaced no greater than 400 mm (16") oc.
- 2.2.19. Gun Welded Pins: Alternative at Trade Contractor's option to stick clips, 3 mm (1/8") dia. galvanized steel pins with cup heads of length to suit insulation thickness and suitable for gun shot welding to metal air/vapour barriers.
- 2.2.20. Stick Clips: Consisting of 25 mm (1") diameter perforated disc base with integral 3 mm (1/8") square sharpened pin of moulded polyvinyl chloride. Ensure pin lengths suit insulation thickness and clips have 25 mm x 25 mm (1" x 1") galvanized sheet steel retainers punched to lock on pins. Adhere with structural silicone sealant.
- 2.2.21. Adhesive for Stick Clips: High-strength, resilient adhesive having a drying time of 1 to 30 minutes (rapid initial set) and 24 hour final set. Ensure adhesive is compatible with specified insulation adhesive, insulation, galvanized steel and polyvinyl chloride.
- 2.2.22. Primer for Adhesives: As recommended by adhesive manufacturer for particular materials to be adhered.
- 2.2.23. Seal Closure/Spandrel Back Panel: 0.912 mm (20 ga) nominal core thickness steel sheet.
- 2.2.24. Coping and Parapet Counter Flashing: Provide 2.5 mm (3/32") thick stainless steel, reinforced as required.
- 2.2.25. Touch-Up Paint: As recommended by aluminum finish manufacturer. Touch-up paint for welded galvanized areas; "Zinc Clad® 5 Organic Zinc-Rich Primer" by The Sherwin-Williams Company; [www.sherwin-williams.com](http://www.sherwin-williams.com) in accordance with manufacturer's printed directions.
- 2.2.26. Air/Vapour Transition Membrane System:
- 2.2.26.1. Flexible Membrane: SBS modified bitumen or rubberized asphalt membrane, minimum 0.56 mm (22 mils) thick with polyethylene or polypropylene film membrane on 1 side and siliconized release paper on the other, cut to suit design and lap requirements, "Perm-A-Barrier Wall Membrane" by GCP Applied Technologies, Inc., "Blueskin SA/Blueskin SA LT" by Henry Company, "IKO AquaBarrier AVB" by IKO Industries Ltd., "Air Shield" by W. R. Meadows of Canada, "ExoAir 110/110AT Self-Adhered" by Tremco Canada or "SOPRASEAL STICK 1100T" by Soprema Inc. Primer as recommended by membrane manufacturer.
- 2.2.27. Glazing Materials:
- 2.2.27.1. Ensure selected glazing accessories for each condition are fully compatible with contact surfaces of frames, other accessories used in glazing system and contact surfaces of compounds used on insulated glass units. Wood or other organic materials are not permitted for use in glazing systems, including spacer blocks.
- 2.2.27.2. Edge Blocking for Glass: 60 - 70 Durometer neoprene, silicone or EPDM, channel shaped, 100 mm - 150 mm (4" - 6") long.

- 2.2.27.3. Spacers: Black anodized aluminum alloy of adequate rigidity, continuous with bent corners and welded joints. Design spacer to accommodate seals and desiccant.
- 2.2.27.4. Setting Blocks, Void Filler Blocks Under Pressure Bars, Anti-Walk Blocks: Neoprene ASTM C542, or silicone or EPDM, having 80 to 90 Durometer Shore 'A' hardness.
- 2.2.27.5. Glazing Tape: Preformed, 100% solids polyisobutylene butyl, paper release, reinforced centre. Permitted Products: "Polyshim 2" by Tremco Canada or equivalent by Protective Treatments Incorporated. Test to ensure compatibility with edge-seal.
- 2.2.27.6. Neoprene Gaskets: Black, closed cell neoprene of approximately 5 to 15 Durometer Shore 'A' hardness suitable for 50% compression when installed.
- 2.2.27.7. Glazing Gaskets for Window Wall: Composite system consisting of EPDM rubber lock-on upper gasket with a precision extruded sealant portion for either interior or exterior application to custom designed aluminum frame or glass stop with integral nib designed to accept profile of strip. Permitted Product; "Visionstrip" by Tremco Canada.
- 2.2.27.8. Silicone Compatible Rubber Extrusions: Gaskets and accessories such as wedges, pre-set spacers and shims for use in glazing applications and other building joint applications. "SCR-900 Rubber Extrusions" by Tremco Canada for standard design or profile size and configuration to suit design requirements.
- 2.2.27.9. Preshim Glazing Tape: Preformed, ribbon-shaped, non-skinning, 100% solids, non-oxidizing polyisobutylene: butyl, paper release, EPDM Shim with continuous synthetic rubber spacer rod of 60 Durometer hardness. Permitted Products: "Polyshim II Tape" by Tremco Canada, or "PTI-606" by Protective Treatments Inc. Ensure tape is sufficiently wide and thick to completely cover bite area of glazing unit when unit is pushed into place.
- 2.2.27.10. Sealant for Heel Bead Airseal: One component, medium modulus silicone sealant conforming to ASTM C920, Type S, Grade NS. Permitted Products: "DOWSIL™ 795 Silicone Building Sealant" by The Dow Chemical Company or "Sikasil WS-295" by Sika Canada Inc. in accordance with Section 07 92 00. Ensure compatibility with edge seal of glazing unit.
- 2.2.28. Glass:
- 2.2.28.1. Glass thicknesses given in this Section are minima. Validate glass thicknesses specified in Section 08 06 80 in accordance with ASTM E1300.
- 2.2.28.2. Ensure glass (particularly heat-strengthened, tempered and laminated) bears manufacturer's labels on bottom inner right hand corner indicating quality.
- 2.2.28.3. Ensure heat-strengthened and tempered glass meets following roller wave distortion criteria:
- 2.2.28.3.1. maximum peak to valley measurement of 0.076 mm (0.003") for every 300 mm (12") in any direction.
- 2.2.28.3.2. roller distortion and/or ripples runs in same direction for entire Project.
- 2.2.28.3.3. unless precluded by manufacturing process, orient roller-wave in the horizontal direction. Ensure glass is heat-treated through the horizontal tempering process.
- 2.2.28.4. Ensure glass coatings do not have pinholes greater than 1.6 mm (1/16") in diameter, nor have pinholes clustered together. Ensure scratches on coatings only occur within 75 mm (3") of glass edge and does not exceed 75 mm (3") in length.
- 2.2.28.5. Float Glass (CGL): Clear transparent float glass conforming to ASTM C1036, Type I, Class 1, Quality-Q3.
- 2.2.28.6. Tempered Glass (TGL):
- 2.2.28.6.1. Clear transparent tempered glass conforming to ASTM C1048, Kind FT and meeting requirements of CAN/CGSB-12.1. Ensure surface compression is equal to or greater than 68.9 MPa (10 000 psi). Ensure tempered glass is heat-soaked in accordance with BS EN 14179-1.

- 2.2.28.6.2. Ensure heat soaking records are kept in accordance with Section 01 70 00 and glass remains traceable.
- 2.2.28.6.3. Retest heat soak batches with breakage greater than 1 in 100 units. Batches with additional breakages will be rejected and not used on this Project.
- 2.2.28.6.4. "Statistical Heat Soak", "Partial Batch" and "On-Line" heat soaking are not permitted.
- 2.2.28.6.5. Tempered glass at a height greater than 3 m (10') above a trafficable walkway and has 1 or more unframed edges or is point-fixed will be treated as inclined glazing with requirements for secondary retention in case of breakage.
- 2.2.28.7. Heat-Strengthened Glass (HSGL): Clear transparent heat-strengthened glass conforming to ASTM C1048, Kind HS. Perform heat-strengthening using horizontal tong free method and ensure surface compression is between 27.6 MPa (4000 psi) and 48.3 MPa (7000 psi).
- 2.2.29. Spandrel Glass Units (SG): For spandrel glass unit types, refer to Section 08 06 80.
- 2.2.30. Factory Sealed Insulating Vision Glass Units (VG): For factory sealed insulating vision glass unit types, refer to Section 08 06 80.
- 2.2.31. Temporary Strips and Safety Markings: Supply 25 mm (1") wide, light reflecting, easily removable, pressure sensitive tape applied over glass lites in windows. Ensure windows have corner to corner cross stripes from aluminum frames.
- 2.2.32. Fabrication:
  - 2.2.32.1. Window Wall:
    - 2.2.32.1.1. Drawing details of window wall are based on design performance requirements and criteria specified herein, frame depth and back section, cap depths and configuration as shown.
    - 2.2.32.1.2. Ensure extrusion thickness is adequate to satisfy loading and deflection, as required and indicated.
    - 2.2.32.1.3. Form accurate extrusions with clean, straight, sharply defined profiles free from any defects.
    - 2.2.32.1.4. Insofar as practical, execute fitting and assembly of unitized components in shop with various parts or assemblies ready for erection on site.
    - 2.2.32.1.5. Take field measurements and levels required to verify or supplement those shown for proper layout and installation of Work. Coordinate dimensional tolerances in adjacent building elements and confirm prior to commencement of Work. Commencement of installation floor by floor implies acceptance of building conditions. Ensure window wall does not deviate from tolerances specified.
    - 2.2.32.1.6. Maintain dimensional tolerances from vertical and horizontal planes with closest possible accuracy.
    - 2.2.32.1.7. Where window wall occurs in curved plane, machine butt joints of horizontal members to accurately follow a segmented line along curve of building wall.
    - 2.2.32.1.8. Ensure means of anchoring window wall has sufficient adjustment to permit correct and accurate alignment. After adjustment, positively lock anchorage devices in manner to preclude movement, once alignment is achieved.
    - 2.2.32.1.9. Isolate aluminum bearing contact with dissimilar materials. Ensure method of isolation is reviewed by Consultant.
    - 2.2.32.1.10. Make allowances for deflection of structure above when making connection thereto and ensure no structural load is transmitted to aluminum window wall.
    - 2.2.32.1.11. Ensure grain of sheet and direction of finish for flashings and panels on building are in the same direction. Make panels free of machine marks.

- 2.2.32.1.12. Conceal nuts, bolts, screws, clips and other means of fastening in finished Work, except where shown or specified. Countersink and conceal fixing screws. Ensure screws are oval head, Phillips or Robertson head, set flush with adjacent surfaces.
- 2.2.32.1.13. Weld aluminum where required with inert metal arc equipment by methods recommended by manufacturer. Ensure welders qualify according to CSA W47.2. Make exposed welds continuous and flush with adjacent surface. Do not mar surface finishes with welds in back of exposed aluminum. Do not deform exposed metal and finish in any way by welding.
- 2.2.32.1.14. Weld steel, where required, in accordance with CSA W59. Ensure welded joints are of adequate strength and durability with jointing tight and flush. Ensure welder is fully approved by Canadian Welding Bureau and fabricator certified to CSA W47.1, Division 3. Where it is necessary to weld components already galvanized, remove galvanizing for 50 mm (2") around weld and paint over welds where galvanizing is removed as specified hereinafter.
- 2.2.32.1.15. Insert concealed galvanized and zinc chromate coated steel reinforcement into frame members and any other units as required, sized to adequately withstand snow and wind pressure requirements of OBC.
- 2.2.32.1.16. Window wall closures thickness for exposed or concealed locations: Minimum 3 mm (1/8").
- 2.2.32.1.17. At junction of mullions and adjoining structure, notch extrusion stem at head and/or sill as required too allow for correct, uninterrupted installation of flashings and air seals integrated into system as indicated.
- 2.2.32.1.18. Include thermal barriers and miscellaneous EPDM pads, shims and washers.
- 2.2.32.1.19. Glass Rabbet: Ensure rabbet depth is no less than 25 mm (1") deep to allow adequate engagement of variables such as temperature, manufacturing tolerances and site installation.
- 2.2.32.1.20. Provide weepholes in glazing cavity to drain water leakage to exterior. Provide drainage tubes as necessary to conduct water safely through isolated insulated areas to direct exterior discharge. Seal around tubes.
- 2.2.32.1.21. Fabricate frame systems complete with mullions, head and sill frames, spigots and plugs for horizontals, spline gaskets, thermal break pressure plates, filler pieces, snap-on caps, and other necessary components. Where horizontal and/or vertical mullions terminate or are interrupted and would otherwise expose an open end of tube, provide plug consisting of colour matching aluminum finished to fit with hair-line joint and either welded or mechanically fixed in position with totally concealed stainless steel fasteners.
- 2.2.32.2. Insulating Glass Units: Manufacture factory sealed insulating glass units in accordance with FGIA's "IGMAC Certification Program Manual".
- 2.2.32.3. Spandrel Panel Assembly:
  - 2.2.32.3.1. Ensure spandrel panel assembly consists of minimum 0.759 mm (22 ga) galvanized steel back pan with full depth insulation, minimum RSI2.64 (R15) thermal value and 19 mm (3/4") air space between insulation and second surface of spandrel glass. Include cold rolled framing, furring, brackets, clips, hangers and incidental components as required for secure fastening and provide weathertight installation including non-corrosive fasteners. At contact edges of back pans in glazing channels, provide internal 90 Durometer EPDM spacer blocks subject to clamping pressure of torqued bars. Seal joints in back pan and at perimeter of back pan to create an air seal.
  - 2.2.32.3.2. Secure insulation boards to back pans with silicone adhesively applied stick clips or mechanically fastened gun welded clips at maximum 1 clip per 3 sq ft and no greater than 100 mm (4") from panel edge when placed at 610 mm (24") oc around perimeter of panels. Gun welded pins are not permitted unless both sides of back pan are cleaned and spot primed at weld points using zinc-rich primer.



- 2.2.32.3.3. Provide openings at interior gasket to allow for air ventilation and drainage of cavity. Provide for condensation and inner wall drainage at sill members and other shapes which would otherwise tend to trap water.
- 2.2.32.4. Metal Air/Vapour Barriers:
  - 2.2.32.4.1. Brake form barriers from sheet metal to permit assembly using self-tapping screws and attachment using powder-activated or pneumatic fixings or other means of secure fastening.
  - 2.2.32.4.2. Make provision in barrier design to accommodate movement resulting from thermal change and from structural deflection. Where largest dimension of back-pan exceeds 500 mm (18"), internally reinforce pans to maintain deflection limitations.
  - 2.2.32.4.3. Form edges in contact with building substrate to 45° to permit peripheral and joint sealing. Form edges making contact with aluminum framing sections similarly to flanged and stepped back pans.
  - 2.2.32.4.4. Cut, fit and form metal air/vapour barriers as required to accommodate conflicting framing connections, mechanical and electrical appurtenances and other obstructions.
  - 2.2.32.4.5. Supply metal furring and reinforcing as required to support radiant heating equipment shown. Fastener penetrations are not permitted through air barrier; weld all such Work.
  - 2.2.32.4.6. Where air/vapour barrier is mechanically connected to aluminum window wall framing, ensure fasteners used are specially designed to be non-corrosive and to maintain air tightness throughout life of building.
  - 2.2.32.4.7. As part of work of this Section, include where required custom formed metal back pans integrated at head of window wall. Make sealed connections to back-up steel framing and to rebate line on window wall head member, separating dissimilar metals. Make allowances in aluminum framing to receive sealed cap flashing between metal wall panels and window wall furnished under separate Section.
- 2.2.32.5. Flashing and Trim:
  - 2.2.32.5.1. Supply metal flashing members, trim and accessories in contact with framing members under this Section. Fabricate exposed, concealed or semi-concealed flashing and closure sections from finish-matching 2.5 mm (3/32") thick aluminum from stock as previously specified.
  - 2.2.32.5.2. Be responsible for accurate cutting, drilling and fitting of dissimilar and aluminum components which penetrate this work.
  - 2.2.32.5.3. Provide matching custom formed or brake shape trim sections at capped peak, sill section to overlap separate counter flashing and end rafter edge trim to interface with metal cladding.
- 2.2.32.6. Doors:
  - 2.2.32.6.1. Ensure aluminum doors have bevelled glazing beads designed for neoprene glazing system; except at exterior doors with insulating lites, use glazing system compatible with secondary sealant of the glass unit.
  - 2.2.32.6.2. Equip doors with full weatherstripping at perimeter. Install weatherstripping throughout the full length and width of the doors at jambs and heads.
  - 2.2.32.6.3. Fabricate doors and frames complete with necessary internal reinforcements, cutouts, recesses, mortising or milling operations required for a rigid assembly and to accommodate door hardware. Ensure connections have adequate strength.
  - 2.2.32.6.4. Fabricate frames with joints accurately fitted and securely joined together in a manner to ensure tightly fitting joints. Internally caulk and seal corners of frames and joints exposed to water penetration using a material compatible to resist flow at the high surface summer temperatures to be experienced by the metal.

2.2.33. Finishes: Provide 1 of following systems:

2.2.33.1. Exterior Superior Performance Coating Finish Process: (3 Coat Wet System (primer/colour coat/clear coat)) including thermal setting application of 70% fluoropolymer resin minimum, PVDF with added colour pigment finish exceeding or meeting AAMA 2605 requirements. Ensure fluoropolymer baked resins form a continuous physically locked finish during manufacturing process. Apply fluoropolymer finish after multistage chemical treatment cleaning providing corrosion resistance surface ready to receive primer. During baking process apply primer in accordance with manufacturer's recommendations followed by a flash process whereby evaporating solvent and then fluoropolymer finish sprayed on to aluminum; apply another flash procedure and then bake for approximately 10 minutes when aluminum surface reaches a temperature of 232 deg C (450 deg F). Permitted Product: "Duranar XL" by PPG Industries; [www.ppgideascape.com](http://www.ppgideascape.com) or "Fluoropon® Classic" by Sherwin-Williams Coil Coatings; [www.coil.sherwin.com](http://www.coil.sherwin.com) with following characteristics:

	<b>Description</b>	<b>Performance Characteristics</b>
2.2.33.1.1.	Coating Thickness:	0.0063 mm +/-0.0013 mm (0.25 +/-0.05 mils) primer 0.025 mm (1.0 mil) min barrier coat (if applicable) 0.025 mm (1.0 mil) min colour coat 0.015 mm +/-0.0005 mm (0.6 +/-0.02 mil) clear top coat
2.2.33.1.2.	Pre-Treatment:	Multi-Stage Cleaning with Chemical Conversion Coating
2.2.33.1.3.	Gloss (ASTM D523 @ 60°):	Medium gloss
2.2.33.1.4.	Pencil Hardness (ASTM D3363):	F minimum
2.2.33.1.5.	Abrasion Resistance Falling Sand (ASTM D968):	50 t/ml
2.2.33.1.6.	Acid Resistance 10% Muriatic Acid Spot Test:	15 minutes - no attack
2.2.33.1.7.	Alkali Resistance-Mortar Pat Test 100% R.H. @ 100°F:	24 hours - no attack
2.2.33.1.8.	Colour Retention 10 yrs, 45° South Florida (ASTM D2244):	ΔE <5.0
2.2.33.1.9.	Humidity Resistance: ASTM D714, ASTM D2247, 4000 hrs, 100% R.H. @ 100°F:	Few #8 blisters maximum
2.2.33.1.10.	Salt Spray Resistance: ASTM B117, 4000 hrs 5% NaCl @ 100°F:	1/16" maximum undercutting
2.2.33.1.11.	Chalking Resistance 10 yrs, 45° South Florida (ASTM D4214):	No more than #8 (#6 for Whites)
2.2.33.1.12.	Erosion Resistance: 10 yrs, 45° South Florida (ASTM B244):	Maximum 5%

2.2.33.2. Exterior Superior Performance Coating Finish Process: (1 Coat Dry System) meeting or exceeding AAMA 2605 with minimum 100% fluoropolymer resin. Permitted Product: "Interpon D3000 Fluoromax Powder Coating" by Akzo Nobel Coatings, Inc.; [www.akzonobel.com](http://www.akzonobel.com) with following characteristics:

	Description	Performance Characteristics
2.2.33.2.1.	Coating Thickness:	0.060 mm to 0.115 mm (2.4 mils to 4.5 mils) with no reading less than 0.045 mm (1.8 mils)
2.2.33.2.2.	Pre-Treatment:	Multi-Stage Cleaning with Chemical Conversion Coating
2.2.33.2.3.	Gloss (ASTM D523 @ 60°):	20% - 40%
2.2.33.2.4.	Pencil Hardness (ASTM D3363):	F minimum
2.2.33.2.5.	Abrasion Resistance Falling Sand (ASTM D968):	40 t/ml
2.2.33.2.6.	Colour Retention 10 yrs, 45° South Florida (ASTM D2244):	ΔE <5.0
2.2.33.2.7.	Humidity Resistance ASTM D714, ASTM D2247, 4000 hrs, 100% R.H. @ 100°F: Few #8 blisters maximum	
2.2.33.2.8.	Salt Spray Resistance ASTM B117, 4000 hrs 5% NaCl @ 100°F:	1/16" maximum undercutting

2.2.33.3. Interior Pigmented Organic Thermal Setting Finish Process: (1 Coat Wet System) meeting or exceeding AAMA 2603. Permitted Product: "Duracron" by PPG Industries; [www.ppgideascape.com](http://www.ppgideascape.com) or "Acryliccoat™" by Sherwin-Williams Coil Coatings; [www.coil.sherwin.com](http://www.coil.sherwin.com) with following characteristics:

	Description	Performance Characteristics
2.2.33.3.1.	Colours Available:	White, Black and full range of colours including metallics and pearlescents
2.2.33.3.2.	Dry Film Thickness:	0.025 mm +/-0.005 mm (1.0 mil +/-0.2 mils) - 0.02 mm (0.8 mil) minimum
2.2.33.3.3.	Pre-Treatment:	Multi-Stage Cleaning with Chemical Conversion Coating
2.2.33.3.4.	Gloss (ASTM D523 @ 60°):	Colours: Low, medium and high gloss Polychromatics: Low and medium gloss
2.2.33.3.5.	Pencil Hardness (ASTM D3363):	H minimum
2.2.33.3.6.	Acid Resistance 10% Muriatic Acid Spot Test:	15 minutes - no attack
2.2.33.3.7.	Alkali Resistance-Mortar Pat Test 100% R.H. @ 100°F:	24 hours - no attack
2.2.33.3.8.	Detergent Resistance (3%) immersion @ 100°F:	72 hours - no attack
2.2.33.3.9.	Humidity Resistance ASTM D714, ASTM D2247, 1500 hrs, 100% R.H. @ 100°F: Few #8 blisters maximum	

- 2.2.33.3.10. Salt Spray Resistance  
ASTM B117, 1500 hrs  
5% NaCl @ 100°F: 1/16" maximum undercutting
- 2.2.33.3.11. Exterior Exposure  
1 yr @ 45° South Florida: No loss of adhesion, maximum 8 fade and maximum 6 chalk
- 2.2.33.4. Interior Pigmented Thermal Setting Coating Finish Process: (1 Coat Dry System) meeting or exceeding AAMA 2603. Permitted Product: "Interpon D1010 Powder Coating" by Akzo Nobel Coatings, Inc.; [www.akzonobel.com](http://www.akzonobel.com) with following characteristics:
- | Description   | Performance Characteristics                             |
|---|---|
| 2.2.33.4.1. Coating Thickness:  | 0.051 mm to 0.080 mm (2.0 mils to 3.2 mils)             |
| 2.2.33.4.2. Pre-Treatment:  | Multi-Stage Cleaning with Chemical Conversion Coating   |
| 2.2.33.4.3. Gloss (ASTM D523 @ 60°):  | 10% - 90%   |
| 2.2.33.4.4. Pencil Hardness (ASTM D3363):   | H minimum   |
| 2.2.33.4.5. Acid Resistance<br>10% Muriatic Acid Spot Test:                               | 15 minutes - no attack                                  |
| 2.2.33.4.6. Alkali Resistance-Mortar<br>Pat Test 100% R.H. @ 100°F:                       | 24 hours - no attack                                    |
| 2.2.33.4.7. Detergent Resistance<br>(3%) immersion @ 100°F:                               | 72 hours - no attack                                    |
| 2.2.33.4.8. Humidity Resistance<br>ASTM D714, ASTM D2247,<br>1500 hrs, 100% R.H. @ 100°F: | Few #8 blisters maximum                                 |
| 2.2.33.4.9. Salt Spray Resistance<br>ASTM B117, 1500 hrs<br>5% NaCl @ 100°F:              | 1/16" maximum undercutting                              |
| 2.2.33.4.10. Exterior Exposure<br>1 yr @ 45° South Florida:                               | No loss of adhesion, maximum 8 fade and maximum 6 chalk |
- 2.2.33.5. Colours and Sheens: To be selected by Consultant. Include for texture and specialty finishes.
- 2.2.33.6. Painting:
- 2.2.33.6.1. Prime steel at building interior and not exposed to view or to exterior environmental conditions with oil alkyd primer.
- 2.2.33.6.2. Provide a dielectric separator to concealed surfaces of aluminum and galvanized steel which would otherwise come in direct contact with structural steel, concrete and masonry.
- 2.2.33.6.3. Paint welded, galvanized items where galvanizing has been removed for welding. Make Good corrosion protection using 2 coats of touch-up primer for galvanized steel. Make Good protection on steel primed with oil alkyd primer using same primer.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions:
- 3.1.1.1. Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.1.2. Ensure openings and recesses to receive work of this Section are within permitted tolerances.

- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.2. INSTALLATION**

- 3.2.1. Perform work of this Section in accordance with "GANA Glazing Manual, 50th Anniversary Edition".
- 3.2.2. Erect work plumb and true and in proper alignment and relationship to established lines and grades.
- 3.2.3. Erection Tolerances: Maintain following tolerances:
- 3.2.3.1. maximum variation from plane or location shown on Shop Drawings: 1.6 mm (1/16") in 4420 mm (14' – 6") of length.
- 3.2.3.2. maximum offset from true alignment between 2 identical members abutting end-to-end in line: 0.8 mm (1/32").
- 3.2.3.3. racking of face: 3 mm (1/8") maximum.
- 3.2.3.4. racking in elevation: nil.
- 3.2.3.5. Deviation from true plumb over full height of building: maximum 6 mm (1/4").
- 3.2.3.6. Deviation from true straightness in plane over full length of each building face; maximum 6 mm (1/4").
- 3.2.3.7. Maximum variation in any column-to-column space or 6 m (20' - 0") run: 3 mm (1/8").
- 3.2.3.8. Ensure tolerances of relationship of individual components are as follows:
- 3.2.3.8.1. member to member, maximum 0.4 mm (1/64").
- 3.2.3.8.2. out of plane between faces of 2 halves of split mullions, 0.8 mm (1/32").
- 3.2.3.9. Joint width, mullion snap-on cap to mullion snap-on cap; maximum 1.6 mm (1/16"). Ensure each joint is of uniform width.
- 3.2.3.10. Joint width between soffits and base and sill panels; maximum 3 mm (1/8") and of uniform width. Do not apply sealants to joints between panels; use only "dry" gasket system of sealing.
- 3.2.3.11. Keep panel joints to a minimum and as shown. Ensure panel sizes are uniform and to direction of Consultant.
- 3.2.3.12. Tolerances are not cumulative.
- 3.2.3.13. Flatness of Panels Defined:
- 3.2.3.13.1. Ensure exposed metal panels including exposed flashing components have a visual flatness permitted and in such manner that slope of any surface at any point does not exceed 0.5% from nominal plane of surface when measured in any direction at 25 mm (1") intervals when ambient temperature is at 22 deg C (72 deg F) and under any combination of performance conditions. This requirement is also applicable to conditions and jointing of components in same plane and to transition from 1 component to another or similar component in same plane.
- 3.2.3.13.2. Short length distortion ripples, edge distortions, "oil canning", "telegraphing of fasteners" and like will not be permitted. Make provisions to allow for differential thermal expansion between stiffeners, recessed slots and exposed metal of window wall system to take place without noise and without buckling of surface.
- 3.2.3.14. Dimensional tolerances of outer dimensions of panels: +/-0.8 mm in 1220 mm (+/-1/32" in 4' - 0") measured at any point.

- 3.2.4. Ensure devices for anchoring frame assemblies have sufficient adjustment to permit correct and accurate alignment. After alignment, positively secure anchorage devices to prevent movement other than those designed for expansion and contraction. Take into consideration climatic conditions prevailing at time of installation.
- 3.2.5. Ensure site located fixings are subject to Consultant's review. Perform welding and drilling of steel and drilling of concrete as required to install fixings. Repair concrete chipped by drilling or fixing operations.
- 3.2.6. Installed adjacent to each other, group components with shop applied finishes which relate most closely to 1 another, with regard to colour and appearance.
- 3.2.7. Coordinate work of this Section with and provide connection for compartmentalization of air spaces provided under other Sections.
- 3.2.8. Provide thermal insulation and air/vapour barriers compatible and continuous with adjacent thermal and air/vapour barrier systems.
- 3.2.9. Ensure a uniform, continuous thermal and vapour barrier effect. Where adjacent insulation and vapour barriers are to be provided under other Sections, coordinate work such that thermal and vapour barrier continuity is achieved.
- 3.2.10. Locate vapour barrier on warm-in-winter side of insulation.
- 3.2.11. Isolate metal air/vapour barriers with thermal breaks and spacers.
- 3.2.12. Gun-apply a continuous bead of sealant to joints and air/vapour barrier junctions with adjacent construction. Liberally butter screw fastenings with sealant.
- 3.2.13. Supply and install flexible, continuous membrane and gasket air/vapour barrier seals between work of this Section and adjacent construction and at deflection and expansion connections, where required. Apply membrane to concrete and masonry with adhesive and retain with continuous aluminum or galvanized steel plates or bars and non-corrosive mechanical fasteners. Vulcanize or overlap joints to ensure a continuous seal.
- 3.2.14. Provide air tight seals at penetrations in air/vapour barriers.
- 3.2.15. Apply insulation to cold-in-winter side of air/vapour barriers.
- 3.2.16. Adhere stick clips for insulation to metal air/vapour barriers at 300 mm (12") oc both ways. As an alternative, gun weld apply pins to metal substrates in lieu of stick clips, provided clips do not easily break off and weld burn-through does not occur. Ensure other methods of retaining insulation tight to metal air/barrier are subject to Consultant's review.
- 3.2.17. Support adhesive-applied clips in place until adhesive has set.
- 3.2.18. Cut insulation as required and fit snugly to penetrations, obstructions, openings and corners. Butt insulation boards tightly. Cut out back of board insulation as required to accommodate substrate irregularities and build up over cut out areas on other side as required to ensure thermal barrier uniformity unless otherwise indicated or permitted.
- 3.2.19. Install insulation to thicknesses shown on Drawings.
- 3.2.20. Press insulation boards firmly and tightly to barrier or substrate impaling them on clips without bending clips. Butt insulation boards tightly at joints. Install retainers to clips.
- 3.2.21. Fill irregular shaped voids within assemblies with fibrous packing insulation to maintain continuity of thermal barrier.
- 3.2.22. Protect exterior finished surfaces by installing snap-on caps only when building is closed in and when possibility of damage due to construction has been minimized, to Consultant's review.
- 3.2.23. Provide structural steel framing and supports required to support work of this Section unless indicated to be provided under other Sections.
- 3.2.24. Supply and install galvanized formed steel coping supports.

- 3.2.25. Supply and install flexible sheet waterproofing membrane at copings and parapets. Lap, adhere and seal joints in membrane in accordance with recommendations of membrane manufacturer to provide a watertight, continuous membrane.
- 3.2.26. Glazing:
- 3.2.26.1. Clean rabbets, stops and glass edges of dust, dirt, moisture, oil and other foreign matter detrimental to glazing material adhesion. Ensure drainage holes are not blocked.
- 3.2.26.2. Mask surfaces subject to staining and wherever necessary to ensure neat appearance of glazing bead. Remove masking as work progresses.
- 3.2.26.3. Accurately size glass to fit openings allowing clearances following trade practices. Cut glass cleanly and carefully; nicks and/or damaged edge conditions are not permitted. Replace glass which has nicked or otherwise damaged edges.
- 3.2.26.4. Replace defective materials and materials damaged due to faulty installation, careless handling or other causes resulting from work of this Section.
- 3.2.26.5. Remove glazing stops and replace in original locations, using original fasteners, securely set and accurately aligned.
- 3.2.26.6. Use shims, spacers and setting blocks of proper size to support and hold glass in position independent of glazing tape and gaskets. Place 2 setting blocks under each unit at quarter points. Place spacers located directly opposite each other on both sides of glass, at maximum 610 mm (24") centres and maximum 300 mm (12") from corners and uniformly spaced. Arrange shims, spacers, setting blocks and shims so as to avoid blocking water transfer inside frames.
- 3.2.26.7. Install preformed tapes to ensure complete contact on surface of glass, pressure plates and stops. Make joints only at corners of sash or frame. Fit tape accurately with tight joints, free from tension, without gaps and cracks.
- 3.2.26.8. Install glazing gaskets in continuous lengths between corners, not stretched and seal joints at corners to prevent entry of water and air movement.
- 3.2.26.9. At top of sealed glass units, at mid point of rebate, supply and install 50 mm (2") wide finger compressible closed cell foam pad to prevent convection currents occurring within glazing rebate.
- 3.2.26.10. Set glass properly centred with uniform bite and face and edge clearance, free from twist, warp or other distortion likely to develop stress. Ensure bite is minimum 19 mm (3/4").
- 3.2.26.11. Handle and install glass in accordance with manufacturer's directions. Prevent nicks, abrasion and other damage likely to develop stress on edges.
- 3.2.26.12. Install glazing materials to obtain complete adhesion over full bite area of unit and to be free from gaps, air bubbles and embedded foreign matter. Use primer for elastomeric compounds. Use sufficient bedding compound so that when glass is pressed into place excess compound is forced well out around entire margin.
- 3.2.26.13. Ensure a weathertight and rattle-free seal for glass cushioning.
- 3.2.26.14. Ensure a continuous seal between glazed element and frame flush with sight line.
- 3.2.27. Louvres:
- 3.2.27.1. Secure support frames to openings. Install louvres plumb or true to slope and at correct location in openings, with bird screens on inside. Use concealed method of attachment.
- 3.2.27.2. Provide dielectric separator between dissimilar metals, where required.
- 3.2.27.3. Ensure louvres are provided with shop cut-outs and flanges for duct connections. Coordinate locations of ductwork and ensure ducts are able to drain through louvres and to outside.
- 3.2.27.4. At sides of louvered sections, return insulated sandwich panels (complete with framing) to outside wall and seal weather tight.

- 3.2.27.5. Include removable sections in sandwich panel assembly, to provide access above and below spandrel beam to plenum between louvres.
- 3.2.27.6. Provide thru-wall continuous flashing around louvres for waterproofing and drainage to exterior at the sill.
- 3.2.27.7. Use 300 series stainless steel fasteners and aluminum clips to anchor louvres.
- 3.2.28. Doors:
- 3.2.28.1. Install doors plumb, square, level, free from warp, twist and superimposed loads.
- 3.2.28.2. Secure work adequately and accurately to structure in the required position, in a manner not restricting thermal movement.
- 3.2.28.3. Provide compressible filler over aluminum work at locations shown on Drawings.
- 3.2.28.4. Install doors complete with door hardware supplied by hardware Supplier, in accordance with templates supplied by same.
- 3.2.28.5. After installation of hardware, have hardware Supplier check operation of hardware. Do readjustments as required.
- 3.2.28.6. Use aluminum or stainless steel screws, nuts, bolts, washers, rivets and other fastening devices, colour to match doors and frames where exposed to view.
- 3.2.29. Sealants: Seal joints between frame assemblies and adjacent construction except where specified to be done under other Sections and within glazed assemblies where required to maintain weathertightness and integrity of air/vapour barrier. Seal junctions in sheet metal air/vapour barriers and between air/vapour barriers and adjacent construction. Conform to requirements of Section 07 92 00.

### **3.3. SITE QUALITY CONTROL**

- 3.3.1. Site Tests and Inspections:
- 3.3.1.1. Field Review:
- 3.3.1.1.1. Independent Consultant will carry out inspection and testing work of this Section. Field review will include but not limited to:
  - 3.3.1.1.1.1. in situ testing of completed installation for water ingress and air infiltration.
  - 3.3.1.1.1.2. verification of materials including insulation, sealants, vapour retarder and air barrier.
  - 3.3.1.1.1.3. review of installation.
  - 3.3.1.1.1.4. check of interface and termination seals against other elements.
  - 3.3.1.1.1.5. review of panel to panel air seals and roof/wall interface.
  - 3.3.1.1.1.6. review of panel fastening.
  - 3.3.1.1.1.7. check of air and vapour seals/barriers for continuity, penetrations and correct orientation.
  - 3.3.1.1.1.8. check for continuity of insulation plane.
  - 3.3.1.1.1.9. verification of flashing placement, continuity and seal.
  - 3.3.1.1.1.10. confirmation of fastener size, type and material.
  - 3.3.1.1.1.11. review of drainage paths to confirm clear.
  - 3.3.1.1.1.12. verification of glass type and position.
- 3.3.1.1.2. Be responsible for remedying defects and/or deficiencies found with inspection and testing reports. Be responsible for additional testing to confirm remedied Work is in conformance with Contract Documents.



3.3.1.2. Structural Inspection: Ensure a licensed engineer specified herein inspects work of this Section during erection/installation and submits sealed and signed Field Review Report within 5 Days of site visit.

3.3.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.4. CLEANING**

3.4.1. Clean work of this Section in accordance with "Cleaning Procedure" as recommended by Aluminum Company of Canada in publication D.I. 650, 1962 "Care During Construction" and as recommended by finish applicator.

3.4.2. Clean and polish glass in accordance with GANA 01-0300 including removal of markings indicating presence of glass.

**3.5. PROTECTION**

3.5.1. Protect finishes with strippable coating that will not mar, nor deface finish on removal, or a similar method designed to afford an equivalent amount of protection. Leave protected coating intact until damage risk is past or immediately prior to final cleaning.

3.5.2. In addition to foregoing, ensure finish surfaces are protected by adequate covering to ensure no detrimental effect on any and contaminants or other effects or elements.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Supply door hardware including but not limited to following:
  - 1.2.1.1. hollow metal doors.
  - 1.2.1.2. hollow metal frames.
  - 1.2.1.3. wood doors.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Installation of door hardware: Section 06 90 00, General Installations.
  - 1.2.2.2. Supply of hollow metal doors and frames: Section 08 11 13, Hollow Metal Doors and Frames.
  - 1.2.2.3. Supply of wood doors: Section 08 14 00, Wood Doors.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. AODA: Accessibility for Ontarians with Disabilities Act; [www.aoda.ca](http://www.aoda.ca).
  - 1.3.1.2. AHC: Architectural Hardware Consultant.
  - 1.3.1.3. BHMA: Builders Hardware Manufacturers Association; [www.buildershardware.com](http://www.buildershardware.com).
  - 1.3.1.4. CSA: Canadian Standards Association; [www.csagroup.org](http://www.csagroup.org).
  - 1.3.1.5. DHI: Door and Hardware Institute Canada; [www.dhicanada.ca](http://www.dhicanada.ca).
  - 1.3.1.6. NFPA: National Fire Protection Association; [www.nfpa.org](http://www.nfpa.org).
  - 1.3.1.7. UL: Underwriters Laboratories Inc.; [www.ul.com](http://www.ul.com).
  - 1.3.1.8. ULC: Underwriters Laboratories of Canada; [www.canada.ul.com](http://www.canada.ul.com).
- 1.3.2. Reference Standards:
  - 1.3.2.1. NFPA 80-22 - Standard for Fire Doors and Other Opening Protectives
  - 1.3.2.2. CAN/ULC-S104-15 - Standard Method for Fire Tests of Door Assemblies
  - 1.3.2.3. CAN/ULC-S105-16 - Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104

**1.4. SUBMITTALS**

- 1.4.1. Shop Drawings:
  - 1.4.1.1. Submit Shop Drawings for hardware installation in accordance with Section 01 30 00.

- 1.4.1.2. Submit Shop Drawings in schedule form, prepared by an AHC, indicating manufacturers' names, Product descriptions, makes, models, materials, finishes, functions, location of each item, complete keying schedule and other pertinent information. Repeat hardware item numbers used in Door Hardware Schedule. Include list of abbreviations and finish symbols and their meaning. Include manufacturer's cut sheets for each hardware item.
- 1.4.2. Samples:
  - 1.4.2.1. Submit samples in accordance with Section 01 30 00.
  - 1.4.2.2. Do not order hardware from manufacturer until samples have been reviewed by Consultant. Hardware and finishes supplied shall be identical to reviewed samples.
  - 1.4.2.3. Supply 1 of each item of hardware with specified finishes to Consultant. Label each sample as to manufacturer, type, finishes, size and location for use proposed. Reviewed samples will be retained for comparison and returned upon completion of the Work.
  - 1.4.2.4. Do not submit substitutions to accepted alternates.

**1.5. CLOSEOUT SUBMITTALS**

- 1.5.1. Operational and Maintenance Data:
  - 1.5.1.1. Instruct Owner's designated representative in proper care and preventative maintenance of hardware to assure longevity of operation.
  - 1.5.1.2. Provide 3 copies of descriptive information, operating, adjustment and maintenance instructions and "As-Built" record of location of each hardware group and other pertinent information.
  - 1.5.1.3. Provide maintenance data, parts list and manufacturer's instructions for each type of door closer, lockset, fire exit hardware and door holder. Provide manufacturer's instructions for proper care of hardware, including lubrication, for incorporation into operation and maintenance instruction manual.
  - 1.5.1.4. Provide this information in 3-ring binders suitably identified in accordance with requirements of Section 01 70 00.

**1.6. MAINTENANCE MATERIAL SUBMITTALS**

- 1.6.1. Tools: Prior to date of Substantial Performance, supply a complete set of specialized tools as needed for Owner's continued adjustment, maintenance and removal and replacement of builders hardware.

**1.7. QUALITY ASSURANCE**

- 1.7.1. Qualifications:
  - 1.7.1.1. Suppliers: A recognized architectural door hardware supplier for exit devices, cylinders, power supply, magnetic holders and similar items that has a record of successful in-service performance for supplying door hardware similar in quantity, type and quality to that indicated for this Project and employs an experienced AHC who is available to Owner, Consultant and Trade Contractor at reasonable times during course of the work for consultation.

**1.8. DELIVERY, STORAGE AND HANDLING**

- 1.8.1. Delivery and Acceptance Requirements: Supply scheduled hardware to the Place of the Work.
- 1.8.2. Storage and Handling Requirements:
  - 1.8.2.1. Pack hardware in suitable wrappings and containers to protect from damage during shipping and storage. Enclose accessories, fastening devices and other loose items with each item. Pack screws, bolts and fastenings necessary for proper installation in same package. Mark packages for easy identification legibly indicating manufacturer's numbers, types, sizes. Markings must include floor, item number and door number.

- 1.8.2.2. Provide assistance in counting hardware on major shipments to confirm hardware is shown as shipped. Provide inventory list with Door Hardware Schedule. Obtain assistance from hardware supplier to confirm hardware has been delivered to site correctly for all major shipments. Be responsible to unload hardware, to check hardware shipments and to set up shelving and organize hardware room.
- 1.8.2.3. Provide templates, template information, installation instructions and details necessary for preparation and installation of hardware.
- 1.8.2.4. Provide 3 copies of installation instructions for hardware supplied.

**1.9. WARRANTY**

- 1.9.1. Manufacturer Warranty: Warrant work of this Section for period of 2 years for general, 10 years for closers and lifetime for butt hinges against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period including making good any work damaged by this work, to satisfaction of Consultant and at no expense to Owner.

**PART 2 - PRODUCTS**

**2.1. MATERIALS**

- 2.1.1. Door Hardware:
  - 2.1.1.1. Provide door closers, locksets and latchsets meeting ANSI/BHMA Qualified Products List. Provide door hardware in accordance with Door Hardware Schedule appended to Section 00 01 20. No substitutions are allowed without review by Consultant.
  - 2.1.1.2. Supply door hardware for work of Sections 08 11 13 and 08 14 00 for installation as part of the work of Section 06 90 00.
  - 2.1.1.3. Fire Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA 80. Provide only hardware which has been tested and listed by ULC for the types and sizes of doors required and complies with requirements of door and door frame labels.
- 2.1.2. Fastenings:
  - 2.1.2.1. Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
  - 2.1.2.2. Where pull is scheduled on 1 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. Prepare holes or cutouts for cylinders or deadlocks in pushplates where applicable.
  - 2.1.2.3. Use fasteners with material through which they pass.
  - 2.1.2.4. Only "3M" brand double sided tape for kickplates, armour plates and pushplates is permitted, where specified.
- 2.1.3. Keying:
  - 2.1.3.1. Key locks to Owner's requirements (construction master keyed, grand master keyed, sub-master keyed, as directed).
  - 2.1.3.2. Provide interchangeable cores to Owner's grand master key system. Number of keys to be determined by Owner. Provide a minimum of 2 cut keys per cylinder, but coordinate "maximum" quantity per key group with Owner before ordering final amounts.
  - 2.1.3.3. Provide operational brass construction cores for locks and cylinders. Cores will be returned to manufacturer when permanent cores are provided.
  - 2.1.3.4. Include and provide for cost of permanent cores.

**PART 3 - EXECUTION**

**3.1. EXAMINATION**

- 3.1.1. Verification of Conditions:
  - 3.1.1.1. Before supplying any hardware and installation instructions, carefully check Drawings for work requiring hardware, verify door swings, door and frame materials and operating conditions and assure hardware will fit work to be attached.
  - 3.1.1.2. Check Shop Drawings and frame and door lists affecting hardware type and installation, and verify to correctness thereof, or advise of required revisions. Ensure doors, frames and panels requiring additional support are reinforced.
  - 3.1.1.3. Point out special requirements to installer and ensure final adjustment of hardware, in particular closer arms, valves and locksets has all been done properly.
  - 3.1.1.4. Be responsible to check and confirm dimensions for hardware for this Project, including door protection, overhead stop sizes, exit devices, power door operators and other related hardware items that may require coordination for sizing.
  - 3.1.1.5. Be responsible to coordinate and confirm electric hardware requirements with related trades and Consultants.
  - 3.1.1.6. Electric Hardware Responsibilities: Hardware supplier is responsible for following:
    - 3.1.1.6.1. Coordinate and confirm block diagrams with related trades and Consultants for electrical hardware applications, including but not limited to, electric latch retraction exit devices, power transfers, electric strikes, power door operators and associated accessories, maglocks, electrically operated door equipment, power supplies and key switches for operators.
    - 3.1.1.6.2. Performing low voltage connections for equipment listed herein and ensuring equipment functions in intended manner. Commission equipment supplied in this Section and test each item. Coordinate to ensure related trades have performed their work in order for equipment provided in this Section to function correctly.
    - 3.1.1.6.3. Ensure installation trades have installed equipment supplied in this Section correctly. Report any incorrect installation. Do not wire or commission equipment that has been incorrectly installed.
    - 3.1.1.6.4. Install, adjust and test mechanical operations of electric hardware. For example, electric strikes shall be adjusted to allow locks or exit devices to latch correctly taking into account seals, wind pressures, or any other issues affecting normal operation of door and hardware while electric hardware is not activated.
    - 3.1.1.6.5. Ensure electric action of electric hardware supplied under this Section performs correctly.
    - 3.1.1.6.6. Where applicable, arrange to either remove item in order to make wire connections, or make connections during initial installation. Do not inhibit other trades from performing their work as a result of electrical connections.
    - 3.1.1.6.7. Maglock installation shall be by hardware installer, or if necessary, by security system provider. Ensure mechanical operation of door and hardware is not impeded by maglock installation.
    - 3.1.1.6.8. Be responsible to ensure related trades with respect to electric hardware is provided. Consult Owner to ensure proper coordination and commissioning of electric hardware.
    - 3.1.1.6.9. Apply for and obtain applicable maglock permits.
    - 3.1.1.6.10. Conduit, junction boxes, 120V connections and wire, including low voltage wire, shall be provided by Division 26. Coordinate and confirm Division 26 has applicable information from this Section in order to perform their work correctly.

- 3.1.1.6.11. Provide low voltage connections for push button actuators, motion detectors, presence sensors and key switches related to power door operators. Coordinate fire alarm, 120VAC connections, security system connections and any other related connections for power door operators with related trades. After connections are made, commission equipment, test and adjust to suit requirements of hardware and operator applications.
- 3.1.1.7. Provide ULC or UL approved hardware where labelled doors are specified. Provide CSA approved electrical devices where required.

**3.2. INSTALLATION**

- 3.2.1. Supply door hardware to Section 06 90 00 for installation.

**3.3. SITE QUALITY CONTROL**

- 3.3.1. Site Tests and Inspections: After installation, have hardware inspected by manufacturer's representative, an experienced AHC who is a member of DHI, who shall certify in writing with a copy to Consultant, items and their installation are in accordance with Specification requirements and are functioning properly and notify Consultant of any cases where it has not been properly installed, is defective or is not as specified. Replace or re-install defective or improperly installed hardware at no cost to Owner.
- 3.3.2. Supervision: Provide following Project services relative to Project co-ordination, supervision and inspection:
- 3.3.2.1. Provide services of AHC familiar with type of work being performed, with type of Project, for preparation of hardware Shop Drawings (schedule), keying, coordination with other trades, consultation with Owner and Consultant and for performing on-site inspections.
- 3.3.2.2. Verify hardware listed in the Schedule is of proper selection for its apparent function and required fire rating or submit alternative proposals. Ensure hardware for fire-rated openings complies with requirements of authorities having jurisdiction, with door and frame manufacturer's tested and labelled assemblies and that hardware items bear certification labels.
- 3.3.2.3. Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada. Ensure door and hardware are tested as an assembly to maintain labelling requirements. Hardware for fire rated door and frame assemblies shall conform to CAN/CSA-S104, CAN/CSA-S105 and NFPA 80. Electronic hardware such as magnetic locks, power supplies, key switches and alarm panic bolts shall be ULC labelled.
- 3.3.2.4. Ensure mortise locks, exit devices and door closers conform to both BHMA certified ANSI/BHMA A156 Series Grade I classifications and to AODA standards.
- 3.3.2.5. Inspect to verify hardware has been properly installed and is functioning satisfactorily.
- 3.3.2.6. Recommend adjustments.
- 3.3.2.7. Replace defective hardware.
- 3.3.2.8. Check door closers after installation to ensure adjustment such as backchecking degree has been properly made and if not, make such adjustments or instruct those installing hardware to make these adjustments.
- 3.3.2.9. Submit 6 copies of finalized schedule to Consultant for review. Provide additional copies as required for Project and office use.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide glass and glazing including but not limited to following:
  - 1.2.1.1. glazing hollow metal doors.
  - 1.2.1.2. glazing borrowed lights and screens.
  - 1.2.1.3. glazing borrowed lights and screens with fire-rated ceramic glass.
  - 1.2.1.4. glazing wood doors.
  - 1.2.1.5. back painted glass.
  - 1.2.1.6. mirrors.
  - 1.2.1.7. window film.
  - 1.2.1.8. miscellaneous specialty glass, gaskets, tapes and glazing materials.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of glazing types: Section 08 06 80, Glazing Schedule.
  - 1.2.2.2. Supply of hollow steel doors and frames: Section 08 11 13, Hollow Metal Doors and Frames.
  - 1.2.2.3. Supply of wood doors and frames: Section 08 14 00, Wood Doors.
  - 1.2.2.4. Provision of glass and glazing in curtain walls: Section 08 44 13, Glazed Aluminum Curtain Wall.
  - 1.2.2.5. Provision of glass and glazing in structurally glazed curtain walls: Section 08 44 26, Structural Glass Curtain Wall.
  - 1.2.2.6. Provision of glass and glazing in window walls: Section 08 51 66, Aluminum Window Wall.
  - 1.2.2.7. Provision of unit mirrors: Section 10 28 00, Washroom Accessories.
  - 1.2.2.8. Glazed hose cabinets and valve directory: Division 21, Fire Suppression.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. EPDM: Ethylene Propylene Diene Monomer.
  - 1.3.1.2. GANA: Glass Association of North America; [www.glass.org](http://www.glass.org).
  - 1.3.1.3. OBC: Ontario Building Code.
  - 1.3.1.4. PVB: Polyvinyl Butyral.
  - 1.3.1.5. ULC: Underwriters Laboratories of Canada; [www.canada.ul.com](http://www.canada.ul.com).

1.3.2. Definitions:

1.3.2.1. Glass Terminology: Conform to ASTM C162 for glossary of terms and definitions of glazing terminology.

1.3.2.2. United Inches: Total of 1 width and 1 height of a lite of glass in inches.

1.3.3. Reference Standards:

- |           |                      |  |
|-----------|----------------------|--|
| 1.3.3.1.  | ANSI/ASME B18.6.3-13 | - Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series)                            |
| 1.3.3.2.  | ASTM C162-05(15)     | - Standard Terminology of Glass and Glass Products   |
| 1.3.3.3.  | ASTM C509-06(15)     | - Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material              |
| 1.3.3.4.  | ASTM C864-05(15)     | - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers |
| 1.3.3.5.  | ASTM C920-18         | - Standard Specification for Elastomeric Joint Sealants  |
| 1.3.3.6.  | ASTM C1036-16        | - Standard Specification for Flat Glass  |
| 1.3.3.7.  | ASTM C1048-18        | - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass                         |
| 1.3.3.8.  | ASTM C1115-17        | - Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories               |
| 1.3.3.9.  | ASTM C1172-14        | - Standard Specification for Laminated Architectural Flat Glass                                      |
| 1.3.3.10. | ASTM C1503-18        | - Standard Specification for Silvered Flat Glass Mirror  |
| 1.3.3.11. | ASTM E1300-16        | - Standard Practice for Determining Load Resistance of Glass in Buildings                            |
| 1.3.3.12. | CAN/CGSB-12.1-17     | - Safety glazing   |
| 1.3.3.13. | CAN/CGSB-12.20-M89   | - Structural Design of Glass for Buildings   |
| 1.3.3.14. | CAN/ULC-S104-15      | - Standard Method for Fire Tests of Door Assemblies  |
| 1.3.3.15. | CAN4-S106-M80(85)    | - Standard Method for Fire Tests of Window and Glass Block Assemblies                                |
| 1.3.3.16. | GAN 01-0300          | - Glass Information Bulletin – Proper Procedures for Cleaning Architectural Glass Products           |
| 1.3.3.17. | NFPA 80-22           | - Standard for Fire Doors and Other Opening Protectives  |

**1.4. ADMINISTRATIVE REQUIREMENTS**

1.4.1. Preinstallation Meetings:

1.4.1.1. Arrange pre-installation meeting 1 week prior to commencing work with all parties associated with trade as designated in Contract Documents or as requested by Consultant. Presided over by Construction Manager, include Consultant who may attend, Trade Contractor performing work of this trade, testing company's representative and consultants of applicable discipline. Review Contract Documents for work included under this trade and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of work of this Section.

1.4.1.2. Review installation methods, procedures, time schedule and conditions under which work shall proceed including manufacturer's written instructions and coordination required with related work.



- 1.4.1.3. Review and finalize construction schedule, verify availability of materials, experienced installer, equipment and facilities needed to make progress and avoid delays.

**1.5. SUBMITTALS**

- 1.5.1. Samples:
- 1.5.1.1. Submit samples of materials in accordance with Section 01 30 00 identifying quality and type of glass if required by Consultant before commencing work. Ensure samples are clearly labelled with manufacturer's name and type.
- 1.5.1.2. Submit following samples:
- 1.5.1.2.1. mirrors.
- 1.5.1.2.2. fire-rated ceramic glass.
- 1.5.1.2.3. back painted glass.
- 1.5.1.2.4. window film.

**1.6. CLOSEOUT SUBMITTALS**

- 1.6.1. Operational and Maintenance Data: Provide maintenance data in accordance with Section 01 70 00 indicating cleaning instructions for inclusion into Maintenance Manual.

**1.7. QUALITY ASSURANCE**

- 1.7.1. Qualifications:
- 1.7.1.1. Installers: Provide experienced installer who is trained and experienced in glass and glazing requirements of this Section including familiarization with standards specified herein and capable to instruct installation requirements of this Section.

**1.8. DELIVERY, STORAGE AND HANDLING**

- 1.8.1. Delivery and Acceptance Requirements: Deliver glass and associated materials to site in original crates and containers with manufacturer's name and brand distinctly marked thereon and with glass labelled as to types. Do not remove labels on glass until after work is reviewed by Consultant.
- 1.8.2. Storage and Handling Requirements: Store materials within the building, in a clean, dry location, reviewed by Consultant. Fully protect materials from damage of any kind until ready for use.

**1.9. SITE CONDITIONS**

- 1.9.1. Ambient Conditions: Do not perform glazing when temperature is less than 7 deg C (44 deg F) or sash or frames are wet, damp or frosted.

**1.10. WARRANTY**

- 1.10.1. Manufacturer Warranty: Warrant mirrors for period of 10 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to deterioration of silvering on mirrors.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
- 2.1.1.1. AGC Glass Company North America; [www.yourglass.com](http://www.yourglass.com)
- 2.1.1.2. Cardinal Glass Industries; [www.cardinalcorp.com](http://www.cardinalcorp.com)

- 2.1.1.3. The Dow Chemical Company; [www.consumer.dow.com](http://www.consumer.dow.com)
- 2.1.1.4. Guardian Industries Corp.; [www.guardian.com](http://www.guardian.com)
- 2.1.1.5. Momentive Performance Materials; [www.momentive.com](http://www.momentive.com)
- 2.1.1.6. Pilkington Special Glass Limited; [www.pilkington.com](http://www.pilkington.com)
- 2.1.1.7. TGP Technical Glass Products; [www.fireglass.com](http://www.fireglass.com)
- 2.1.1.8. Tremco Canada; [www.tremcosealants.com](http://www.tremcosealants.com)
- 2.1.1.9. Vetrotech USA; [www.vetrotechusa.com](http://www.vetrotechusa.com)
- 2.1.1.10. Vitro Architectural Glass; [www.vitro.com](http://www.vitro.com)
- 2.1.2. Single Source Responsibility for Sealants, Gaskets and Other Glazing Accessories: Ensure consistent quality of performance by providing glazing sealant and seals from single manufacturer.

## **2.2. MATERIALS**

- 2.2.1. Performance/Design Criteria:
  - 2.2.1.1. Design glass and glazing to CAN/CGSB-12.20-M complying to OBC design and fire rating requirements and regulations of authorities having jurisdiction, being the minimum, except where more stringent requirements are specified herein. In case of conflict of requirements comply with most stringent requirements.
  - 2.2.1.2. Validate glass thicknesses specified in Section 08 06 80 in accordance with ASTM E1300.
  - 2.2.1.3. Provide accessories, closures and trims required and necessary to complete work.
  - 2.2.1.4. Deflection: Limit glass deflection to flexural limit of glass with full recovery of glazing materials.
- 2.2.2. Glass:
  - 2.2.2.1. Free from bubbles, waves, discolouration and other defects. Ensure glass (particularly heat-strengthened, tempered and laminated) bears manufacturer's labels on bottom inner right hand corner indicating quality.
  - 2.2.2.2. Float Glass (CGL): Clear transparent float glass conforming to ASTM C1036, Type I, Class 1, Quality-Q3.
  - 2.2.2.3. Tempered Glass (TGL): Clear transparent tempered glass conforming to ASTM C1048, Kind FT and meeting requirements of CAN/CGSB-12.1. Ensure surface compression is equal to or greater than 69 MPa (10 000 psi).
  - 2.2.2.4. Laminated Glass (LGL): Clear transparent laminated float glass (CGL) conforming to ASTM C1172, Type I and meeting requirements of CAN/CGSB-12.1 with clear PVB interlayer. Ensure mismatch of glass lites after laminating process is +3.2 mm (1/8"), -1.6 mm (1/16") maximum for exposed edges after installation. Provide edge seal protection at exposed edges of glass.
  - 2.2.2.5. Heat-Strengthened Glass (HSGL): Clear transparent heat-strengthened glass conforming to ASTM C1048, Kind HS. Perform heat-strengthening using horizontal tong free method; surface compression less than 52 MPa (7500 psi).
  - 2.2.2.6. Wired Glass (WGL): Clear transparent wired glass conforming to ASTM C1036, Type II, Class 1, Quality Q5, Form 1, Mesh 2(M2).
  - 2.2.2.7. Glass Units (GL): For single glass unit types, refer to Section 08 06 80.
  - 2.2.2.8. Fire-Rated Ceramic Glass (FRCGL):
    - 2.2.2.8.1. Fire-rated ceramic glass clear and wireless glazing materials installed as transoms, borrowed lights and screens in fire-rated frames.

- 2.2.2.8.2. Impact and safety rating conforming to CAN/CGSB-12.1; thickness to suit design, fire-rating requirements and in accordance with manufacturer's recommendations conforming to testing agencies acceptable to authorities having jurisdiction for respective performance criteria.
- 2.2.2.8.3. Test fire-rating in accordance with CAN/ULC-S104 and CAN/ULC-S106 as applicable and acceptable to authorities having jurisdiction for specific application.
- 2.2.2.8.4. 5 mm (3/16") thick, (20 minute to 3 hour fire-rating), non-impact safety fire-rated ceramic glass; "FireLite® Premium", "PYRAN® Platinum" by TGP Technical Glass Products or "Keralite® Select Standard" by Vetrotech USA respectively.
- 2.2.2.8.5. 5 mm (3/16") thick, (20 minute to 3 hour fire-rating), impact safety fire-rated ceramic glass with an approved surface-applied safety film; "FireLite® Premium NT" or "PYRAN® Platinum F" by TGP Technical Glass Products or "Keralite® Select Filmed" by Vetrotech USA.
- 2.2.2.8.6. 8 mm (5/16") total thickness, (20 minute to 3 hour fire-rating), impact safety laminated fire-rated ceramic glass; "FireLite Plus®" or "PYRAN® Platinum L" by TGP Technical Glass Products or "Keralite® Select Laminated" by Vetrotech USA.
- 2.2.2.8.7. Provide glazing tapes and setting blocks in accordance with applicable ULC Listing for approved fire-rated glazing Product. Butyl tapes and setting blocks are not permitted.
- 2.2.2.9. Back Painted Glass: Provide "OPACI-COAT-300®" opacifying coating with minimum thickness of 4-5 mils dry (0.10mm to 0.127 mm). For fallout protection a minimum thickness of 6.50 mils dry (0.17 mm) is required. Colours to be selected by Consultant at later date from full range of colours including specialty, metallic and custom colours.
- 2.2.2.10. Mirrors: Size(s) as shown on Drawings, 6 mm (1/4") thick conforming to ASTM C1503 float glass with process deposit of 5 silver coats, 3 copper coats and final protective seal, warranted for 10 years against deterioration of silvering.
- 2.2.2.11. Surveillance Mirrors: Institutional surveillance mirrors by Richelieu, [www.richelieu.com](http://www.richelieu.com), Security Mirror Industries Limited; [www.securitymirror.com](http://www.securitymirror.com). Provide 1 of following:
  - 2.2.2.11.1. Hemispheric Safety Mirrors: Plexiglass with moulded acrylic film (0.125") thick 360° Central areas, 180° Wall to Ceiling and 90° Corners, sizes as shown on Drawings.
  - 2.2.2.11.2. Indoor or Outdoor Convex Mirror: 300 mm (12") diameter convex acrylic mirror complete with frame and bracket for exterior and interior locations.
- 2.2.3. Mirror Adhesive: Compatible with silver coatings, copper coatings and protective seal applied to mirrors, recommended by manufacturer to hold mirrors permanently in position without visible signs of mirror deterioration thorough out warranty period. "Mirror-Mastic Bond" by Palmer Corporation.
- 2.2.4. Security Screws: Complying with ANSI/ASME B18.6.3; provide only tamper-resistant Torx-Plus® or break off type screws as specified and noted on Drawings. Provide flathead security screws where Torx-Plus® or breakoff is indicated to be counter sunk otherwise provide only trusshead or buttonhead for Torx-Plus® and only roundhead for breakoff type. Torx-Plus® Tamper resistant screws with heads having a deep hex-lobular recess with a solid post formed in the centre requiring a special metal driver to install or remove screw. Ensure fasteners and tools are of type produced by licensed manufacturer. Break-Off head security screws with drive heads having an additional hexagonal shaped head designed to break off after installation at a predetermined torque level. Grind remaining portion of neck smooth after hex-head is broken off. Permitted Manufacturers: Tamperproof Screw Co., Inc.; [www.tamperproof.com](http://www.tamperproof.com) or Sentry Security Fasteners Inc.; [www.sentrysf.com](http://www.sentrysf.com).
- 2.2.5. Window Film: Provide "3M Scotchcal ElectroCut Special Effects Film" by 3M; [www.3m.com](http://www.3m.com) in colour selected later by Consultant, translucent opacity, transparent synthetic liner, clear pressure sensitive adhesive. Ensure film cutouts suit design and are located on glass doors and other areas as indicated on Drawings.

- 2.2.6. Glazing, Sealing Compounds and Accessories:
- 2.2.6.1. Ensure glazing, sealing compounds and accessories are compatible with contact surfaces of frames, other accessories used in glazing system and contact surfaces of compounds used on insulated glass units. Wood or other organic materials are not permitted for use in glazing systems including spacer blocks.
- 2.2.6.2. Glazing Compound: Non-hardening modified oil type. Colour to match adjacent surfaces unless indicated otherwise.
- 2.2.6.3. Sealant Compound: One component type, elastomeric chemical curing, ASTM C920, Type S, Grade NS. Colour to match adjacent surfaces unless indicated otherwise.
- 2.2.6.4. Sealant Compound: ASTM C920, multi-component chemical curing, Type M, Grade NS. Colour to match adjacent surfaces.
- 2.2.6.5. Sealant Compound: One component, silicone base chemical curing. Colour to match adjacent surfaces.
- 2.2.6.6. Sealant for Interior Glass-to-Glass Butt Glazing Installation: Translucent 1 part silicone sealant conforming to ASTM C920, Type S, Grade NS, "Tremsil® 200 General Construction Grade Silicone Sealant" by Tremco Canada or "DOWSIL™ 999-A Building and Glazing Sealant" by The Dow Chemical Company or "GE Contractors SCS1000 Silicone Sealant" by Momentive Performance Materials.
- 2.2.6.7. Cellular Gaskets for Compression Glazing: ASTM C509 cellular, elastomeric, preformed, black. Closed cell neoprene or EPDM extrusions including molded corners where applicable by Cellular Rubber Extrusions, Tremco Canada.
- 2.2.6.8. Dense Gaskets for Compression Glazing: ASTM C864, Option II or ASTM C1115, Type C, dense neoprene or EPDM extrusions, 60 and 70 Durometer density including molded corners where applicable by Poly-Wej Gaskets, Tremco Canada.
- 2.2.6.9. Glazing Splines: Neoprene or EPDM manufacturer's standard dry glazing splines to suit aluminum extrusions. Colour to match adjacent surfaces unless indicated otherwise.
- 2.2.6.10. Glazing Points and Wire Spring Clips: Corrosion resistant, manufacturer's standards.
- 2.2.6.11. Edge Blocking, Setting Blocks, Lateral Shims, Gaskets and Tapes:
- 2.2.6.11.1. Edge Blocking for Glass: 60 - 70 Durometer neoprene, silicone or EPDM, channel shaped, 100 mm - 150 mm (4" - 6") long.
- 2.2.6.11.2. Setting Blocks: 7 mm x 100 mm (5/16 x 4") EPDM or extruded 80 - 90 Durometer neoprene; at insulating glass, use EPDM only. At fire-rated glazed doors and partitions, use similar sized fire-rated silicone GE "Gel 516" or asbestos cement blocks. Width; 1.6 mm to 3 mm (1/16" to 1/8") less than design glazing pocket width. For 4 sided structural glazing, use silicone compatible rubber or silicone.
- 2.2.6.11.3. Lateral Shims: Neoprene, silicone or EPDM, 40 - 60 Durometer, 100 mm (4") long or as required.
- 2.2.6.11.4. Non-Compression Glazing Tape for Interior Aluminum Screen Glazing: Preformed, 100% solids, cross linked butyl rubber, polyisobutylene, hardness 65 Durometer, unaffected by UV through glass. Permitted Product: "Tremco 440 Tape" by Tremco Canada. Ensure tape is sufficiently wide and thick enough to completely cover bite area of glazing unit when unit is pushed into place.
- 2.2.6.11.5. Compression Glazing Gaskets for Interior Aluminum Screen Glazing: EPDM, neoprene, thermoplastic or other permitted material with Shore A Durometer of 35, +/-5. Dual Durometer gaskets of a specific permitted type are also permitted. Ensure material has sufficient thickness or be of a configuration to allow 25% compression when installed, have a minimum 2000 psi (1500 psi for silicone) tensile strength, resistance to permanent set of 30% maximum, minimum elongation at break of 300% (700% for silicone) and resistance to ozone showing no cracks; "VISIONstrip®" by Tremco Canada. Other permitted manufacturers are Armet, The Dow Chemical Company and PTI.

- 2.2.6.11.6. Compression Glazing Tape: Preformed, ribbon-shaped, non-skinning, 100% solids, non-oxidizing polyisobutylene: butyl, paper release, EPDM shim with continuous synthetic rubber spacer rod of 60 Durometer hardness. Permitted Product: "Polyshim II Tape" by Tremco Canada. Ensure tape is sufficiently wide and thick to completely cover bite area of glazing unit when unit is pushed into place.
- 2.2.7. Primer Sealers and Cleaners: To glass and plastic glazing manufacturer's standards.
- 2.2.8. Fabrication:
  - 2.2.8.1. Label each light of glass with registered name of Product and weight and quality of glass.
  - 2.2.8.2. Check dimensions on job site before cutting materials.
  - 2.2.8.3. Grind and chamfer edges of unframed glass and mirrors. Grind and chamfer edges of glass shelves and sliding doors.
  - 2.2.8.4. Ensure minimum bite or lap of glass on stops and rabbets as recommended by glass manufacturer.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions:
  - 3.1.1.1. Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
  - 3.1.1.2. Ensure glass is not more than 4 mm (3/16") less than the rebate size in either dimension, with allowance for edge spacers, shims and setting blocks as required.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. PREPARATION**

- 3.2.1. Surface Preparation:
  - 3.2.1.1. Thoroughly clean glass rebates and glass of dust, dirt, mortar and other foreign materials prior to glazing. Remove oils and grease with non-staining solvents such as Xycol or Methyl Ethyl Ketone solutions.
  - 3.2.1.2. Properly prime, before glazing, glazing rebates in wood doors.

#### **3.3. INSTALLATION**

- 3.3.1. Perform work of this Section in accordance with "GANA Glazing Manual, 50th Anniversary Edition" and "GANA Laminated Glazing Reference Manual, 2009" for laminated glazing installation methods.
- 3.3.2. If required, thoroughly mix glazing compound as recommended by manufacturer. Thinning of glazing compound will not be permitted.
- 3.3.3. Carefully remove glazing stops and replace after glazing. Take care to prevent damage to stops.
- 3.3.4. Doors, Screens, Sidelites and Interior Windows:
  - 3.3.4.1. Place setting blocks on sill at 1/4 points from each corner unless otherwise directed by glazing manufacturer.
  - 3.3.4.2. Place continuous glazing gaskets on edges of glass.
  - 3.3.4.3. Centre and space each piece of glass with spacers located and installed according to manufacturer's directions.
  - 3.3.4.4. Place glass so no voids occur between glass and glazing material and glazing stops.

- 3.3.4.5. Secure glass in place with stops, secured in place with screws.
- 3.3.5. Glazing Sealant:
  - 3.3.5.1. Apply glazing sealant to clean, dry, grease and oil free surfaces. Provide exposed glazing sealant smooth, free from ridges, wrinkles, air pockets and embedded foreign materials.
  - 3.3.5.2. Prime surfaces if required by glazing sealant manufacturer.
  - 3.3.5.3. Trim glazing sealant flush with tops of stops and glazing channels.
  - 3.3.5.4. Remove excess glazing sealant or droppings which would set up or become difficult to remove from finished surfaces. Do not use chemicals, scrapers, or other tools which would affect finished surfaces.
- 3.3.6. Interior Glazing:
  - 3.3.6.1. Fire Rated Hollow Metal Doors and Screens: Set glass in fire rated metals doors and screens on continuous setting block with 3 mm (1/8") gap between glazing stop glass and embed in glazing compound in accordance with NFPA 80 and OBC requirements. Strike and point exposed joints between metal and glass or install glass in accordance to ULC tested proprietary methods of installation.
  - 3.3.6.2. Tape/Tape Method:
    - 3.3.6.2.1. Cut glazing tape to proper length and install against permanent stop projecting 1.6 mm (1/16") above sightline.
    - 3.3.6.2.2. Place glazing tape on free perimeter of glass projecting 1.6 mm (1/16") above sightline.
    - 3.3.6.2.3. Trim off excess tape to sightline.
  - 3.3.6.3. Combination Method-Tape/Sealant:
    - 3.3.6.3.1. Cut glazing tape to proper length and install against permanent stop projecting 1.6 mm (1/16") above sightline.
    - 3.3.6.3.2. Fill gap between glass and applied stop with sealant to depth equal to bite of frame on glass to uniform and level line.
    - 3.3.6.3.3. Trim off excess tape to sightline.
  - 3.3.6.4. Dry Method (Gaskets):
    - 3.3.6.4.1. Place gasket against permanent stop and position glass sheet.
    - 3.3.6.4.2. Apply removable stops. Install gaskets in frame channels.
  - 3.3.6.5. Window Film:
    - 3.3.6.5.1. Install window film in accordance with manufacturer's printed instructions by experienced film applicators as recommended by glass film manufacturer.
    - 3.3.6.5.2. Ensure glass surfaces are clean and ambient temperature is between 16 deg C and 38 deg C (61 deg F and 100 deg F).
    - 3.3.6.5.3. Whenever 2 or more pieces of same colour translucent film are seamed together as a continuous band of colour, they must match to ensure uniform reflected daytime colour and transmitted night appearance.
- 3.3.7. Mirrors:
  - 3.3.7.1. Install mirrors where indicated on Drawings.
  - 3.3.7.2. Mount plumb and level and accurately in position and secure rigidly in position.
  - 3.3.7.3. Ensure back-up wall surface is thoroughly dry, smooth and firm and is primed or painted.
  - 3.3.7.4. Provide space for air circulation and elimination of condensation between back of mirror and wall.

- 3.3.7.5. Install tamper proof mirrors according to manufacturer's directions.
- 3.3.7.6. Install frameless mirrors with mirror edges ground and polished.
- 3.3.7.7. Locate joints in mirrors to Consultant's direction. Generally joints are permitted only for locations where mirrors are longer than 2440 mm (8' - 0"). Provide butt joints with ground and polished edges. Apply 6 mm (1/4") wide clear silicone bead at butt joints.
- 3.3.7.8. Secure wall and ceiling mirrors in place over special adhesive, temporarily fixing in place until adhesive sets.
- 3.3.7.9. Install mirrors with frames according to manufacturer's direction. Use concealed tamper proof fasteners in addition to adhesive where required.

**3.4. SITE QUALITY CONTROL**

- 3.4.1. Site Tests and Inspections: Ensure framing to be glazed is plumb, secure and permanently fixed in position.
- 3.4.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.5. CLEANING**

- 3.5.1. Clean installed glass and metal frequently during construction. Avoid etching and staining glass and metal during construction.
- 3.5.2. Remove sealant and compound droppings from finished surface.
- 3.5.3. Clean and polish glass in accordance with GANA 01-0300 including removal of markings indicating presence of glass.

**3.6. PROTECTION**

- 3.6.1. Provide and maintain necessary protection of completed work against damage.
- 3.6.2. Do not mark or attach anything directly to exposed glass and framing surfaces.
- 3.6.3. If welding is to take place above or near completed glazing work, protect glass with plywood or other suitable means to reduce likelihood of weld spatter damaging glass surfaces.
- 3.6.4. Protect glass from other trades, workers, tools and other similar materials. Avoid storing materials adjacent to glass.
- 3.6.5. Replace cracked, broken, or defective glass at no additional cost to Owner.
- 3.6.6. Identification of Glazing: Mark glass lites with temporary, easily removable, large safety markings, immediately after glass installation. Maintain safety markings until final clean-up.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide louvres including but not limited to following:
  - 1.2.1.1. additional steel support framing.
  - 1.2.1.2. extruded aluminum prefinished wall louvres.
  - 1.2.1.3. bird screens.
  - 1.2.1.4. caulking.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of concrete walls: Section 03 30 00, Cast-In-Place Concrete.
  - 1.2.2.2. Provision of masonry walls: Section 04 20 00, Masonry Units.
  - 1.2.2.3. Provision of louvres within curtain wall system: Section 08 44 13, Glazed Aluminum Curtain Wall.
  - 1.2.2.4. Provision of louvres within window wall system: Section 08 51 66, Aluminum Window Wall.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. AMCA: Air Movement and Control Association International, Inc.; [www.amca.org](http://www.amca.org).
  - 1.3.1.2. PVDF: Polyvinylidene Fluoride.
  - 1.3.1.3. SSPC: The Society for Protective Coatings (formerly known as Steel Structures Painting Council); [www.sspc.org](http://www.sspc.org).
- 1.3.2. Reference Standards:
  - 1.3.2.1. AAMA 2605-22
    - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusion and Panels (with Coil Coating Appendix)
  - 1.3.2.2. AMCA 500-L-12(15)
    - Laboratory Methods of Testing Louvers for Rating
  - 1.3.2.3. AMCA 511-21
    - Certified Ratings Program – Product Rating Manual for Air Control Devices
  - 1.3.2.4. ASTM A653/A653M-22
    - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - 1.3.2.5. ASTM B117-19
    - Standard Practice for Operating Salt Spray (Fog) Apparatus
  - 1.3.2.6. ASTM B209/B209M-21
    - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
  - 1.3.2.7. ASTM B221M-21
    - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)



- |           |                   |  |
|-----------|-------------------|--|
| 1.3.2.8.  | ASTM B244-09(14)  | - Standard Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments |
| 1.3.2.9.  | ASTM C920-18      | - Standard Specification for Elastomeric Joint Sealants  |
| 1.3.2.10. | ASTM D523-14(18)  | - Standard Test Method for Specular Gloss  |
| 1.3.2.11. | ASTM D714-02(17)  | - Standard Test Method for Evaluating Degree of Blistering of Paints   |
| 1.3.2.12. | ASTM D968-17      | - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive  |
| 1.3.2.13. | ASTM D2244-16     | - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates   |
| 1.3.2.14. | ASTM D2247-15(20) | - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity   |
| 1.3.2.15. | ASTM D3363-20     | - Standard Test Method for Film Hardness by Pencil Test  |
| 1.3.2.16. | ASTM D4214-07(15) | - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films  |
| 1.3.2.17. | CISC/CPMA 2-75    | - A Quick-Drying Primer for Use on Structural Steel  |
| 1.3.2.18. | CSA G40.20-13(18) | - General Requirements for Rolled or Welded Structural Quality Steel   |
| 1.3.2.19. | SSPC-05           | - The Society for Protective Coatings, "Systems and Specifications, SSPC Painting Manual, Volume 2"  |

#### **1.4. SUBMITTALS**

- 1.4.1. Shop Drawings:
  - 1.4.1.1. Submit Shop Drawings for work of this Section in accordance with Section 01 30 00. In addition to minimum requirements indicate following:
    - 1.4.1.1.1. structural supports and framing provided as part of this Section.
    - 1.4.1.1.2. provision for structural and thermal movement between louvres and adjacent materials.
  - 1.4.1.2. Employ a licensed engineer specified herein is responsible for:
    - 1.4.1.2.1. production and review of Shop Drawings.
    - 1.4.1.2.2. sealing and signing each Shop Drawing and any associated calculations performed.
- 1.4.2. Samples: Submit samples in accordance with Section 01 30 00. Submit following samples in sizes indicated:
  - 1.4.2.1. louvres minimum 600 mm (24") square.
  - 1.4.2.2. louvre flashing minimum 300 mm (12") square.

#### **1.5. QUALITY ASSURANCE**

- 1.5.1. Qualifications:
  - 1.5.1.1. Installers: Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

- 1.5.1.2. Licensed Professionals: Employ a licensed engineer carrying a minimum \$2,000,000.00 professional liability insurance and is registered in the Province of Ontario.

**1.6. DELIVERY, STORAGE AND HANDLING**

- 1.6.1. Delivery and Acceptance Requirements: Coordinate deliveries to comply with construction schedule and arrange for strategic off-the-ground, undercover storage locations.
- 1.6.2. Storage and Handling Requirements:
- 1.6.2.1. Properly wrap louvres with protective coverings and put in suitable crates to prevent distortion and damage. Carefully unload, handle and store to prevent damage.
- 1.6.2.2. Protect work of this Section from damage. Protect other work from damage resulting from this Work. Repair or replace damaged work to satisfaction of Consultant at no cost to Owner.

**1.7. WARRANTY**

- 1.7.1. Manufacturer Warranty: Warrant work of this Section for period of 5 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to extensive colour fading.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
- 2.1.1.1. The Airolite Company, LLC; [www.airolite.com](http://www.airolite.com)
- 2.1.1.2. Construction Specialties Ltd.; [www.c-sgroup.com](http://www.c-sgroup.com)
- 2.1.1.3. Greenheck Fan Corporation; [www.greenheck.com](http://www.greenheck.com)
- 2.1.1.4. Ruskin Company; [www.ruskin.com](http://www.ruskin.com)
- 2.1.1.5. TenPlus Architectural Products Ltd.; [www.tenplus-online.com](http://www.tenplus-online.com)
- 2.1.1.6. Ventex Inc.; [www.ventexinc.com](http://www.ventexinc.com)
- 2.1.2. Substitution Limitations: Comparable Products from manufacturers listed herein may be reviewed provided they meet requirements of this Specification.

**2.2. MATERIALS**

- 2.2.1. Performance/Design Criteria:
- 2.2.1.1. Material thicknesses stated herein are a minimum. Be responsible for engineering calculations to ensure structural adequacy of wall louvres and louvred penthouses.
- 2.2.1.2. Structural Design:
- 2.2.1.2.1. Ensure louvre members deflect no more than L/180 of span between supports when subjected to wind load of 958 Pa (20 psf) applied horizontally to louvre face.
- 2.2.1.2.2. Employ a licensed engineer specified herein to:
- 2.2.1.2.2.1. design components for work of this Section requiring structural performance.
- 2.2.1.2.2.2. be responsible for determining sizes, joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations.
- 2.2.1.3. Vibration Control: Ensure louvre members do not vibrate when subjected to above wind loading. Provide integral bosses as required.

- 2.2.1.4. Wind Driven Rain Performance: When tested in accordance with AMCA 500-L and AMCA 511 for a 1220 mm x 1220 mm (48" x 48") sized decorative or storm class louvre, following result apply:
  - 2.2.1.4.1. Static Air Pressure Drop Performance: Maximum 0.15" x 0.20" water gauge pressure loss at 1000 fpm.
  - 2.2.1.4.2. Minimum 45% Free Area.
  - 2.2.1.4.3. AMCA certified Class A for wind speed of 47 kph (29.1 mph) and rainfall rate of 76 mm/hour (3"/hour).
  - 2.2.1.4.4. AMCA certified Class A for wind speed of 80 kph (50 mph) and rainfall rate of 200 mm/hour (8"/hour).
- 2.2.1.5. Thermal Movement: Design louvres to accommodate expansion and contraction of components due to temperature changes.
- 2.2.2. Aluminum Extrusions: ASTM B221M, size accurately formed as shown on Drawings, extruded aluminum alloy AA-6063-T5 for aluminum. Ensure surfaces are free from defects impairing appearance, strength and durability.
- 2.2.3. Aluminum Sheet: ASTM B209/B209M, type and characteristics to match finished extrusions; ensure sheet which is not exposed is Utility Aluminum mill finished; for intricate forming with decorative finishes use AA-1100 and for exposed panels use AA-3003 with specified finish.
- 2.2.4. Galvanized Steel Sheet: Supply commercial quality to ASTM A653/A653M with Z275 (G90) zinc coating, exposed surfaces prefinished as specified, "8000 Series" in colour later selected by Consultant.
- 2.2.5. Fasteners: Supply screws, bolts, nuts, washers, rivets and other fasteners incorporated into aluminum sections of tamperproof aluminum or ANSI Series 300 stainless steel.
- 2.2.6. Anchoring Devices: Aluminum, non-magnetic stainless steel or other non-corrosive metal compatible with aluminum. Steel anchors may be used provided they are zinc coated and insulated from aluminum.
- 2.2.7. Sealant for Precast Areas: Non-sag type, multi-component polyurethane sealant conforming to ASTM C920, Type M, Grade NS, Class 25, Use NT, G, M, A and O. Supply in standard colours as selected. Supply 1 of following:
  - 2.2.7.1. "MasterSeal® NP 2™" by BASF; [www.master-builders-solutions.basf.com](http://www.master-builders-solutions.basf.com).
  - 2.2.7.2. "Sikaflex -2c NS" by Sika Canada Inc.; [www.sika.ca](http://www.sika.ca).
  - 2.2.7.3. "DYmeric 240" by Tremco Canada; [www.tremcosealants.com](http://www.tremcosealants.com).
- 2.2.8. Sealant for Areas other than Precast: Non-sag type, 1 component ultra low-modulus, pre-pigmented, neutral cure elastomeric silicone sealant conforming to ASTM C920, Type S, Grade NS, Class 50, Use NT, G, M, A and O. Supply in standard colours as selected. Supply 1 of following:
  - 2.2.8.1. "DOWSIL™ 790 Silicone Building Sealant" by The Dow Chemical Company; [www.consumer.dow.com](http://www.consumer.dow.com).
  - 2.2.8.2. "GE SilPruf LM SCS2700" by Momentive Performance Materials; [www.momentive.com](http://www.momentive.com).
  - 2.2.8.3. "Spectrem 1" by Tremco Canada; [www.tremcosealants.com](http://www.tremcosealants.com).
- 2.2.9. Structural Steel Supports: Supply new material conforming to CSA G40.20, Grade 300W, cleaned to SSPC-SP 3 requirements and shop primed with primer conforming to CISC/CPMA 2-75.
- 2.2.10. Bituminous Coating: Supply "Bakor 810-07" by Henry Company; [www.henry.com](http://www.henry.com).
- 2.2.11. Blades, Heads, Jambs and Sills: Supply minimum 2.06 mm (0.08") thick; blades fixed type, stormproof profile.

- 2.2.12. Bird Screen: Supply 13 mm (1/2") square woven mesh of 1.6 mm (0.064") dia (16 B and S ga) aluminum wire in extruded aluminum frame, 2.5 mm (0.102") (10 B and S ga) thick.
- 2.2.13. Blank-Off Panels: Supply fixed insulated sheet steel sheet blank-off panels over back of louvres in lieu of bird screens. Ensure blank-off panel insulation R-values meet or exceed wall assembly R-value requirements.
- 2.2.14. Metal Sills: Supply 1 mm (0.040") (18 B and S ga) aluminum complete with cover plates at sill joints and drip deflectors at sill ends and at abutting vertical surfaces.

**2.3. MANUFACTURED UNITS**

- 2.3.1. Louvre Type: Supply aluminum construction, 150 mm (9") deep, step blade with 2.06 mm (0.081") blade and frame thickness. Provide "Model MW-9615" by C/S Construction Specialties Company.
- 2.3.2. Fabrication:
- 2.3.2.1. Form blades, mullions and frames to sizes and shapes indicated.
- 2.3.2.2. Provide louvre blades with extruded aluminum blade supports in section modulus and depth to resist loads anticipated and meet design requirements specified. Provide integral reinforcing ribs to prevent bowing and distortion.
- 2.3.2.3. Accurately cut and fit components to produce tight hairline junctures. Securely fasten frame members together with adequate concealed welds and seal with sealant to ensure watertight joints.
- 2.3.2.4. Fabricate bird screens using aluminum mesh securely locked into a heavy extruded aluminum channel frame. Install bird screens on the inside of louvres and screw fasten to frames to permit removal if required.
- 2.3.3. Finishes: Provide 1 of following systems:
- 2.3.3.1. Superior Performance Coating Finish Process: (3 Coat Wet System (primer/colour coat/clear coat)) including thermal setting application of 70% fluoropolymer resin minimum, PVDF with added colour pigment finish exceeding or meeting AAMA 2605 requirements. Ensure fluoropolymer baked resins form a continuous physically locked finish during manufacturing process. Apply fluoropolymer finish after multistage chemical treatment cleaning providing corrosion resistance surface ready to receive primer. During baking process apply primer in accordance with manufacturer's recommendations followed by a flash process whereby evaporating solvent and then fluoropolymer finish sprayed on to aluminum; apply another flash procedure and then bake for approximately 10 minutes when aluminum surface reaches a temperature of 232 deg C (450 deg F). Permitted Products: "Duronar XL" by PPG Industries; [www.ppgideascape.com](http://www.ppgideascape.com) or "Fluoropon® Classic" by Sherwin-Williams Coil Coatings; [www.coil.sherwin.com](http://www.coil.sherwin.com) with following characteristics:

	Description	Performance Characteristics
2.3.3.1.1.	Coating Thickness:	0.0063 mm +/-0.0013 mm (0.25 +/-0.05 mils) primer 0.025 mm (1.0 mil) min barrier coat (if applicable) 0.025 mm (1.0 mil) min colour coat 0.015 mm +/-0.0005 mm (0.6 +/-0.02 mil) clear top coat
2.3.3.1.2.	Pre-Treatment:	Multi-Stage Cleaning with Chemical Conversion Coating
2.3.3.1.3.	Gloss (ASTM D523 @ 60°):	Medium gloss
2.3.3.1.4.	Pencil Hardness (ASTM D3363):	F minimum
2.3.3.1.5.	Abrasion Resistance Falling Sand (ASTM D968):	50 t/ml

- |             |  |   |
|-------------|--|---|
| 2.3.3.1.6.  | Acid Resistance<br>10% Muriatic Acid<br>Spot Test:   | 15 minutes - no attack  |
| 2.3.3.1.7.  | Alkali Resistance-Mortar<br>Pat Test 100% R.H.<br>@ 100°F:   | 24 hours - no attack  |
| 2.3.3.1.8.  | Colour Retention<br>10 yrs, 45° South Florida<br>(ASTM D2244):   | $\Delta E < 5.0$  |
| 2.3.3.1.9.  | Humidity Resistance:<br>ASTM D714, ASTM D2247,<br>4000 hrs, 100% R.H. @ 100°F: Few #8 blisters maximum   |   |
| 2.3.3.1.10. | Salt Spray Resistance:<br>ASTM B117, 4000 hrs<br>5% NaCl @ 100°F:  | 1/16" maximum undercutting  |
| 2.3.3.1.11. | Chalking Resistance<br>10 yrs, 45° South Florida<br>(ASTM D4214):  | No more than #8 (#6 for Whites)   |
| 2.3.3.1.12. | Erosion Resistance:<br>10 yrs, 45° South Florida<br>(ASTM B244):   | Maximum 5%  |
| 2.3.3.2.    | Superior Performance Coating Finish Process: (1 Coat Dry System) meeting or exceeding AAMA 2605 with minimum 100% fluoropolymer resin. Permitted Product: "Interpon D3000 Fluoromax Powder Coating" by Akzo Nobel Coatings, Inc.; <a href="http://www.akzonobel.com">www.akzonobel.com</a> with following characteristics: |   |
|             | <b>Description</b>   | <b>Performance Characteristics</b>  |
| 2.3.3.2.1.  | Coating Thickness:   | 0.060 mm to 0.115 mm (2.4 mils to 4.5 mils) with no reading less than 0.045 mm (1.8 mils) |
| 2.3.3.2.2.  | Pre-Treatment:   | Multi-Stage Cleaning with Chemical Conversion Coating                                     |
| 2.3.3.2.3.  | Gloss (ASTM D523 @ 60°):   | 20% - 40%   |
| 2.3.3.2.4.  | Pencil Hardness<br>(ASTM D3363):   | F minimum   |
| 2.3.3.2.5.  | Abrasion Resistance<br>Falling Sand (ASTM D968):   | 40 t/ml   |
| 2.3.3.2.6.  | Colour Retention<br>10 yrs, 45° South Florida<br>(ASTM D2244):   | $\Delta E < 5.0$  |
| 2.3.3.2.7.  | Humidity Resistance<br>ASTM D714, ASTM D2247,<br>4000 hrs, 100% R.H. @ 100°F: Few #8 blisters maximum  |   |
| 2.3.3.2.8.  | Salt Spray Resistance<br>ASTM B117, 4000 hrs<br>5% NaCl @ 100°F:   | 1/16" maximum undercutting  |
| 2.3.3.3.    | Colours and Sheens: To be selected by Consultant. Include for texture and specialty finishes.  |   |

**2.4. SOURCE QUALITY CONTROL**

- 2.4.1. Tests and Inspections:

- 2.4.1.1. Structural Inspection: Ensure a licensed engineer specified herein inspects work of this Section during fabrication and submits sealed and signed Field Review Report within 5 Days of visit.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. INSTALLATION**

- 3.2.1. Secure support frames to openings. Install louvres plumb or true to slope and at correct location in openings, with bird screens on inside. Use concealed method for attachment.
- 3.2.2. Ensure louvres connected to ductwork, plenums, silencers, etc. are sealed weathertight.
- 3.2.3. Caulk perimeter of frames to adjacent materials or to supports using joint backing and sealant. Neatly tool and finish joints.

#### **3.3. SITE QUALITY CONTROL**

- 3.3.1. Site Tests and Inspections:
- 3.3.1.1. Structural Inspection: Ensure a licensed engineer specified herein inspects work of this Section during erection/installation and submits sealed and signed Field Review Report within 5 Days of site visit.
- 3.3.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.
- 3.3.3. Manufacturer Services: Arrange for Product manufacturer's technical representative to:
- 3.3.3.1. meet and discuss installation procedures and unique conditions at the Place of the Work.
- 3.3.3.2. inspect substrate surfaces and recommend solutions to accommodate adverse conditions.
- 3.3.3.3. periodically visit and inspect installation and report unsatisfactory conditions to Trade Contractor.
- 3.3.3.4. attend final inspection and to submit written certification that Products, systems and assemblies have been installed in accordance with manufacturer's requirements.

#### **3.4. CLEANING**

- 3.4.1. Maintain aluminum work in a clean condition throughout construction period, so it will be without deterioration or damage at time of review. Select methods of cleaning which will promote achievement of uniform appearance and stabilized colours and textures for materials that weather or age with exposure.
- 3.4.2. Immediately before time of Substantial Performance, clean aluminum work thoroughly, inside and out. Demonstrate proper cleaning methods to Owner during this final cleaning. Prepare a "Cleaning and Maintenance Manual" listing types of cleaning compounds and cleaning methods of the work and submit 2 copies to Consultant.

### **END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide gypsum board assemblies work including but not limited to following:
  - 1.2.1.1. supplementary steel supports for ceilings.
  - 1.2.1.2. reinforcement for suspension systems for lighting fixtures, access hatches, etc.
  - 1.2.1.3. steel studs and furring channels.
  - 1.2.1.4. concealed sheet steel reinforcing.
  - 1.2.1.5. ceiling, bulkhead and soffit suspension system.
  - 1.2.1.6. gypsum board ceilings, partitions, bulkheads and soffits.
  - 1.2.1.7. shaft wall.
  - 1.2.1.8. corner beads, casing beads, trim, control joints and corner reinforcement.
  - 1.2.1.9. taping and filling.
  - 1.2.1.10. acoustically insulated gypsum board partitions.
  - 1.2.1.11. acoustic caulking to acoustically insulated gypsum board partitions.
  - 1.2.1.12. fire rated wall assemblies.
  - 1.2.1.13. installation of access hatches, panels and doors supplied by other trades in gypsum board walls and ceilings as required.
  - 1.2.1.14. coordination of waterproofing membrane for installation under gypsum board for showers, etc.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of structural steel studs and exterior sheathing: Section 05 41 00, Structural Metal Stud Framing System.
  - 1.2.2.2. Miscellaneous steel sections and/or framing required to provide additional structural support to suit Project requirements: Section 05 50 00, Metal Fabrications.
  - 1.2.2.3. Grouting of door frames: Section 06 90 00, General Installations.
  - 1.2.2.4. Installation of hollow metal door and borrowed light frames and frame anchors in gypsum board partitions: Section 06 90 00, General Installations.
  - 1.2.2.5. Firestopping, smoke seals and penetration firestopping: Section 07 84 00, Firestopping and Smoke Seals.
  - 1.2.2.6. Provision of waterproofing membrane for showers: Section 09 30 00, Tiling.
  - 1.2.2.7. Finish painting of gypsum board: Section 09 91 00, Painting.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
- 1.3.1.1. OBC: Ontario Building Code.
- 1.3.1.2. STC: Sound Transmission Class.
- 1.3.1.3. ULC: Underwriters Laboratories of Canada; [www.canada.ul.com](http://www.canada.ul.com).
- 1.3.2. Definitions:
- 1.3.2.1. Drywall: Gypsum board.
- 1.3.3. Reference Standards:
- 1.3.3.1. ASTM A653/A653M-22 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- 1.3.3.2. ASTM A666-15 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
- 1.3.3.3. ASTM C475/C475M-17 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
- 1.3.3.4. ASTM C645-18 - Standard Specification for Nonstructural Steel Framing Members
- 1.3.3.5. ASTM C754-20 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
- 1.3.3.6. ASTM C840-20 - Standard Specification for Application and Finishing of Gypsum Board
- 1.3.3.7. ASTM C954-18 - 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
- 1.3.3.8. ASTM C1047-14a(19) - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
- 1.3.3.9. ASTM C1178/C1178M-18 - Standard Specification Coated Glass Mat Water-Resistant Gypsum Backing Panel
- 1.3.3.10. ASTM C1280-18 - Standard Specification for Application of Exterior Gypsum Panel Products for use as Sheathing
- 1.3.3.11. ASTM C1396/C1396M-17 - Standard Specification for Gypsum Board
- 1.3.3.12. ASTM C1658/C1658M-19e1 - Standard Specification for Glass Mat Gypsum Panels
- 1.3.3.13. ASTM D3273-16 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- 1.3.3.14. ASTM D4397-16 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
- 1.3.3.15. ASTM E90-09(16) - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements



- |           |                    |  |
|-----------|--------------------|--|
| 1.3.3.16. | ASTM E580/E580M-20 | - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions |
| 1.3.3.17. | CSA S136-16(21)    | - North American Specification for Design of Cold-Formed Steel Structural Members  |
| 1.3.3.18. | CAN/ULC-S101-14    | - Standard Methods of Fire Endurance Tests of Building Construction and Materials  |
| 1.3.3.19. | CAN/ULC-S102-18    | - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies   |
| 1.3.3.20. | CAN/ULC-S114-18    | - Standard Method of Test for Determination of Non-Combustibility in Building Materials  |
| 1.3.3.21. | CAN/ULC-S702.1-14  | - Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification  |

#### **1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Sequencing:
- 1.4.1.1. Coordinate installation and cooperate with mechanical and electrical trades to accommodate mechanical electrical items and any other work required to be incorporated into or coordinated with ceiling and soffit systems.
- 1.4.1.2. Cooperate and coordinate with Sections applying wet trades and trades installing mechanical and electrical services. Coordinate stud layout at partitions accommodating wall mounted fixtures by other trades.

#### **1.5. SUBMITTALS**

- 1.5.1. Shop Drawings:
- 1.5.1.1. Submit Shop Drawings in accordance with Section 01 30 00 showing design, construction, control joint layout, sound attenuating construction, adjacent construction, elevations, finishes and relevant details of furring, enclosures and partitions which require fire rating in accordance with ULC Design Numbers shown on Drawings.
- 1.5.1.2. Ensure a licensed engineer specified herein is responsible for:
- 1.5.1.2.1. production and review of Shop Drawings.
- 1.5.1.2.2. sealing and signing each Shop Drawing and any associated calculations performed.
- 1.5.2. Samples: Submit samples in accordance with Section 01 30 00. Submit following samples in sizes indicated:
- 1.5.2.1. each trim accessory minimum 300 mm (12") long.
- 1.5.3. Certificates:
- 1.5.3.1. Submit certification from licensed engineer registered in Province of Ontario, ensuring his/her seal and signature is affixed to certificate, stating that installed suspended ceiling system is capable of supporting its own weight and weight of lighting, grilles and other mechanical and electrical fixtures required by Mechanical and Electrical Divisions.
- 1.5.3.2. Obtain approval of electrical utility authorities having jurisdiction for support of light fixtures, by ceiling grid and supports, to satisfy requirements of electrical inspection department of Ontario Hydro. Adjust grid, fixing devices and support hangers as required to obtain approval.

**1.6. QUALITY ASSURANCE**

1.6.1. Qualifications:

1.6.1.1. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

1.6.1.2. Licensed Professionals: Employ a licensed engineer carrying minimum \$2,000,000.00 professional liability insurance and is registered in the Province of Ontario.

**1.7. DELIVERY, STORAGE AND HANDLING**

1.7.1. Delivery and Acceptance Requirements: Deliver materials to site with manufacturer's original labels intact. Do not remove wrappings until ready for use.

1.7.2. Storage and Handling Requirements:

1.7.2.1. No outside storage permitted. Store in clean, dry area, off ground. Provide adequate ventilation to avoid excess moisture, surface relative humidity and mould or fungal growth. Remove immediately any board showing signs of mould, mildew or fungal growth.

1.7.2.2. Stack gypsum board flat on level and dry surface without overhanging boards. Prevent sagging and damage to edges, ends and surfaces. Protect bagged Products from moisture or wetting.

**1.8. SITE CONDITIONS**

1.8.1. Ambient Conditions:

1.8.1.1. Do not install work of this Section in any area unless satisfied that work in place has dried out and that no further installation of materials requiring wetness, moisture or dampness is contemplated. Ensure relative humidity in area of work of this Section does not exceed 55% for duration of Project.

1.8.1.2. Ensure temperature of surrounding areas is min 13 deg C (55 deg F) and max 21 deg C (70 deg F) for 7 Days before and during application of gypsum board; maintain for 4 Days thereafter. Ensure heat is provided at appropriate time before work has started to bring surrounding and adjacent materials up to required temperature and maintained as specified. Avoid concentrated or irregular heating during drying by means of deflectors or protective screens.

1.8.1.3. Ensure ventilation is provided for proper drying of joint filler and adhesive and to prevent excessive humidity. Do not force dry adhesives and joint treatment.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:

2.1.1.1. Bailey Metal Products Ltd.; [www.bmp-group.com](http://www.bmp-group.com)

2.1.1.2. CertainTeed Corporation; [www.certainteed.com](http://www.certainteed.com)

2.1.1.3. CGC Inc; [www.cgcinc.com](http://www.cgcinc.com)

2.1.1.4. Dass Metal Studs; [www.dassmetal.com](http://www.dassmetal.com)

2.1.1.5. Fusion Building Products; [www.imperialgroup.ca](http://www.imperialgroup.ca)

2.1.1.6. Georgia-Pacific Canada LP; [www.gpgypsum.com](http://www.gpgypsum.com)

2.1.1.7. Imperial Manufacturing Group; [www.imperialgroup.ca](http://www.imperialgroup.ca)

2.1.1.8. Roll Formed Specialty; [www.rollformed.com](http://www.rollformed.com)

**2.2. MATERIALS**

2.2.1. Performance/Design Criteria:

- 2.2.1.1. Design ceiling suspension system in accordance with manufacturer's printed directions and conforming to ASTM C754 requirements. Do not suspend any items from structural steel deck. Do not support work of this Section from, nor make attachments to, ducts, pipes, conduits or support framing of other trades.
- 2.2.1.2. Design suspended ceiling system for adequate support of electrical fixtures as required by current bulletin of Electrical Inspection Department of Ontario Hydro.
- 2.2.1.3. Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.
- 2.2.1.4. Design suspension system to support weight of mechanical and electrical items such as air grilles, lighting fixtures and with adequate support to allow rotation/ relocation of light fixtures.
- 2.2.1.5. Design interior partitions and ceilings using a maximum deflection criteria of L/240 with a minimum lateral load of 0.239 kPa (5 psf) unless otherwise specified herein. Where tile is being applied or height is greater than 3 m (10') use L/360 with a minimum lateral load of 0.239 kPa (5psf).
- 2.2.1.6. Design sub-framing as necessary to accommodate and circumvent conflicts and interferences where ducts or other equipment prevent regular spacing of hangers.
- 2.2.1.7. Design steel stud reinforcements from hollow structural steel, stud, angle and steel plate sections, galvanized sheet steel minimum 43 mils designation thickness (1.087 mm (0.0428") minimum base steel thickness) (previously 18 ga) where required to support manufactured components without limitations items such as washroom accessories, expansion control covers and similar items. Design weld connections ensuring rigid and secure installation capable of offering resistance to minimum 227 kg (500 lb) pull force. Consider galvanized items in moist areas. Do not design using wood blocking for this purpose.
- 2.2.1.8. Design fire rated construction including ceiling, partition or fire protective membranes and furring to approved ULC design or other design acceptable to authorities having jurisdiction, to provide design fire rating indicated and/or required. Submit written evidence of permitted test design.
- 2.2.1.9. Provide sound rated construction having STC rating indicated and tested in accordance with ASTM E90.
- 2.2.1.10. Ensure partitions acting as guards, including walls around shafts or where floor elevation on 1 side of a wall is more than 600 mm (23-5/8") higher than elevation of floor or ground on other side complies with OBC, Division B, Part 4, Article 4.1.5.16. Provide Shop Drawings bearing seal of a licensed engineer registered in Province of Ontario confirming this requirement.
- 2.2.1.11. Structural Design: Employ a licensed engineer specified herein to:
  - 2.2.1.11.1. design components for work of this Section requiring structural performance.
  - 2.2.1.11.2. be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations.
- 2.2.2. Steel Studs: CSA S136 and ASTM C645, galvanized sheet steel, minimum 18 mils designation thickness (0.455 mm (0.0179") minimum base steel thickness) (previously 25 ga), minimum Z120 (G40) zinc coating, screw able with crimped web and returned flange, of depth shown in maximum continuous lengths possible. Provide thicker steel in accordance with Section 05 41 00 where required due to height.
- 2.2.3. Heavy Duty Steel Studs at Openings: CSA S136 and ASTM C645, galvanized sheet steel, minimum 54 mils designation thickness (1.367 mm (0.0538") minimum base steel thickness) (previously 16 ga), minimum Z120 (G40) zinc coating, screw able with crimped web and returned flange, of depth shown in maximum continuous lengths possible. Provide thicker steel where required due to height.

- 2.2.4. Provide knockout openings in web at 460 mm (18") oc to accommodate (if required) horizontal mechanical and electrical service lines and bracing.
- 2.2.5. Concealed Sheet Steel Reinforcing: Commercial quality galvanized sheet to ASTM A653/A653M, 1.214 mm (18 ga) thick minimum, Z275 (G90) zinc coated by hot-dip process or ASTM A666, Type 304 sheet stainless steel.
- 2.2.6. Floor and Ceiling Partition Track for Gypsum Board: CSA S136 and ASTM C645, galvanized sheet steel, minimum 18 mils designation thickness (0.455 mm (0.0179") minimum base steel thickness) (previously 25 ga), minimum Z120 (G40) zinc coating, with minimum 30 mm (1-1/4") legs, top track having longer legs where required to compensate for deflection of structure above. Width to suit steel studs.
- 2.2.7. Furring Channels: CSA S136 and ASTM C645, galvanized sheet steel, minimum 18 mils designation thickness (0.455 mm (0.0179") minimum base steel thickness) (previously 25 ga), minimum Z120 (G40) zinc coating, screw channels, 67 mm (2-5/8") wide x 22 mm (7/8") deep.
- 2.2.8. Premanufactured Grid Suspension System for Ceilings: ASTM C645, direct-hung system composed of commercial-quality, cold-rolled steel, main beams and cross-furring members that interlock with following characteristics:
  - 2.2.8.1. Main Tees: Fire-Rated Heavy Duty classification with integral reversible splice with knurled face.
  - 2.2.8.2. Cross Members: Fire-Rated members with knurled face.
  - 2.2.8.3. Cross Tees: Cross tee 38 mm (1-1/2") high x 1220 mm (48") long with 38 mm (1-1/2") wide face.
  - 2.2.8.4. Furring Channel: Furring channel 22 mm (7/8") high x 1220 mm (48") long with 38 mm (1-1/2") face.
  - 2.2.8.5. Accessory Cross Tees: Complete with knurled faces.
  - 2.2.8.6. Wall Mouldings: Single web with knurled face.
  - 2.2.8.7. Accessories: Transition clips, Splice clips, wall attachment clips, splice plates and dome hubs as recommended by manufacturer for specific applications.
  - 2.2.8.8. Finish: Hot-dipped galvanized.
  - 2.2.8.9. Permitted Products: "Drywall Grid Systems" by Armstrong World Industries Canada Ltd.; [www.armstrongceilings.com](http://www.armstrongceilings.com) or "Drywall Suspension System" by CGC Inc.
- 2.2.9. Resilient Channel Furring: CSA S136 and ASTM C645, "RC-1 Resilient Channel" by CGC Inc. or other permitted manufacturer.
- 2.2.10. Hangers: 4.8 mm (3/16") nominal diameter mild steel rod coated with rust inhibitive paint for elsewhere.
- 2.2.11. Inserts for Concrete Slabs: Tie wire anchors, "Red Head TW-1614" by ITW Canada Inc., "Parabolt Wire Hanger" distributed by Acrow-Richmond Ltd., "T-14 Eyebolt" by Ramset Ltd., "HHDCA" or "HLC-T" by Hilti (Canada) Corporation or "Tie Wire Drive TW-932" by Isometric Ltd.
- 2.2.12. Tie Wire: 1.519 mm (16 ga) nominal diameter galvanized, soft annealed steel.
- 2.2.13. Screws for Sheet Steel Members: ASTM C954, self-drilling, self-tapping gypsum board screws, 25 mm (1") long #6 for single layer application, 41 mm (1-5/8") long #7 for double layer application and as follows:
  - 2.2.13.1. For single layer application over steel framing; self-drilling, self-tapping, case hardened, No. 6 contoured Phillips head or Type S bugle head, sized for minimum 15.9 mm (5/8") penetration into steel framing. Ensure fasteners are corrosion resistant.
  - 2.2.13.2. For double layer application over gypsum backing board and existing gypsum board; 38 mm (1-1/2") Type G bugle head. For each additional layer of board, increase length of fasteners proportionally.

- 2.2.14. Gypsum Board (GB or GWB): Conforming to ASTM C1396/C1396M. Unless indicated otherwise use 1200 mm (4') wide standard facing board in maximum continuous lengths up to 3600 mm (12'), beveled and/or tapered edges to suit design requirements with butted square ends:
  - 2.2.14.1. Gypsum Board (Walls): Provide 12.7 mm (1/2") thick with tapered edges unless otherwise specified as follows:
    - 2.2.14.1.1. Provide 9.5 mm (3/8") thick gypsum board on curved walls.
  - 2.2.14.2. Gypsum Board (Ceiling): Provide 15.9 mm (5/8") thick with tapered edges unless otherwise specified as follows:
    - 2.2.14.2.1. Use anti sag sheets.
- 2.2.15. Moisture Resistant Gypsum Board (MRGB): ASTM C1658/C1658M, glass mat reinforced, silicone treated core gypsum board, ASTM D3273 with a rating of 10, no mould growth after 4 weeks exposure, 12.7 mm (1/2") or Type X, "DensArmor Plus® High Performance Interior Panel" by Georgia-Pacific Canada LP, "CGC Sheetrock® Brand Glass-Mat Panel Mold Tough®" by CGC Inc. or "M2TECH®" by CertainTeed Corporation.
- 2.2.16. Fire Rated Gypsum Board having Testing Agency Fire Rating Identification Stamp on Each Sheet: ASTM C1396/C1396M, Type X, 12.7 mm (1/2") and/or 15.9 mm (5/8") thick gypsum board 1200 mm (4') wide, maximum practical length and tapered edge as required by each fire resistance assembly. "Gyproc Fireguard Type X or Type C" by Georgia-Pacific Canada LP, "CGC Sheetrock Firecode or Firecode C" by CGC Inc. or "CERTAINTEED® Type X or Type C" by CertainTeed Corporation.
- 2.2.17. Gypsum Board Tile Backer Board: ASTM C1178/C1178M, glass mat reinforced, water-resistant gypsum core board, with a rating of 10 in accordance with ASTM D3273, no mould growth after 4 weeks exposure, 12.7 mm (1/2") thick plain or Type X; "DensShield® Tile Backer" by Georgia-Pacific Canada LP or "CGC Durock® Brand Glass-Mat Tile Backerboard" by CGC Inc. or "GlasRoc® Tile Backer" by CertainTeed Corporation.
- 2.2.18. Dust Barrier: Minimum 0.152 mm (6 mil) polyethylene in accordance with ASTM D4397.
- 2.2.19. Resilient Sponge Tape: Self-sticking adhesive on 1 side, closed cell neoprene sponge tape, "Rubatex®" by Rubatex Corp., "Foamflex # 1220" by Jacobs & Thompson Inc.; [www.foamparts.com](http://www.foamparts.com) or "Backerseal™ (Greyflex)™" by Emseal; [www.emseal.com](http://www.emseal.com).
- 2.2.20. Joint Tape: Conforming to ASTM C475/C475M, provide following:
  - 2.2.20.1. Regular Gypsum Board: Use either kraft paper joint tape with feathered edges and minute perforations 50 mm (2") wide.
  - 2.2.20.2. MRGB: Use glass fibre tape only, open weave, with pressure sensitive adhesive 1 side, "Durock Cement Board Tape" by CGC Inc.
- 2.2.21. Joint Fillers and Topping Compound: Either slow or fast setting, low shrinkage type free of asbestos fillers and as recommended by manufacturer. Use "Gyproc 90" by Georgia-Pacific Canada LP or "Durabond 90" by CGC Inc. at exterior soffits.
- 2.2.22. Sealant for Moisture Resistant Gypsum Board Edges: "Sheetrock Brand W/R Sealant" by CGC Inc., or similar type reviewed by Consultant.
- 2.2.23. Corner Bead: ASTM C1047, "Dur-A-Bead™ No. 103 Corner Bead" by CGC Inc. at corners, reveals, or similar. Provide custom shapes of similar materials and design as noted.
- 2.2.24. Metal Trim: CGC No.200-A or BMP D-4411 in lieu of "J" Mould. Do not provide "J" Mould (CGC No. 400-A) unless specifically noted on Drawings as 'Exposed "J" Mould'.
- 2.2.25. Flexible Casing Beads: 0.531 mm (25 ga) steel, wipe coated, angle shaped in size to fit over edge of gypsum board, to suit curved applications.
- 2.2.26. Control Joints: Prefabricated control joints prepared to suit site conditions; "No. 093" by CGC Inc. zinc alloy control joint.

- 2.2.27. Access Doors and Panels:
- 2.2.27.1. Supplied as part of Divisions 21, 22, 23, 26, 27 and 28 for installation as part of this Section.
- 2.2.27.2. Access Panels for Items Other Than Mechanical and Electrical: Refer to Section 08 31 13 as applicable.
- 2.2.28. Shaftwall:
- 2.2.28.1. Supply components from same manufacturer. Ensure components are compatible and tested by an independent testing facility acceptable to authorities having jurisdiction.
- 2.2.28.2. Ensure shaftwall framing, shaftliner, gypsum board and joint treatment materials provide 1, 2 or 3 hour fire resistance rating as noted on Drawings when tested in accordance with CAN/ULC-S101.
- 2.2.28.3. Shaftwall Framing including Galvanized Steel Studs and Runners: 64 mm (2-1/2"), minimum 18 mils designation thickness (0.455 mm (0.179") minimum base steel thickness) (previously 25 ga) thick galvanized steel, designed for use in shaftwall construction. C-T Studs, J-L Corner and J track and other associated components by Georgia-Pacific Canada, Inc. or C-H or C-T and E studs, J runners and other associated components, "Sheetrock® Brand Glass-Mat Liner Panels" by CGC Inc., "Dens Glass Ultra Shaftliner" by Georgia-Pacific Canada LP or "GlasRoc® Shaftliner Type X" by CertainTeed Corporation fabricated specially for gypsum shaftliner and facing boards in lengths up to 3600 mm (12'). Ensure shaftwall system for elevator shafts does not have pointed ends of screws penetrating into shaft.
- 2.2.28.4. Liner Panels: 25 mm (1") shaft wall liner panels with bevelled edges.
- 2.2.28.5. Face Boards: 13 mm (1/2") or 16 mm (5/8") thick fire rated gypsum boards.
- 2.2.29. Sound Control Materials:
- 2.2.29.1. Sound Attenuation Batts: CAN/ULC-S702.1, mineral (glass and stone wool) fibre, flame spread and smoke developed in conformance with OBC requirements and other authorities having jurisdiction in accordance with CAN/ULC-S102. Non-combustible in accordance with requirements of CAN/ULC-S114. Permitted Products: "EcoTouch™ QuietZone® PINK™ FIBERGLAS® Acoustic Insulation" by Owens Corning Canada LP; [www.insulation.owenscorning.ca](http://www.insulation.owenscorning.ca), "ROCKWOOL™ AFB - Acoustical Fire Batt Insulation" by ROCKWOOL™ International A/S; [www.rockwool.com](http://www.rockwool.com), "Sound-SHIELD® Formaldehyde-Free Fiber Glass Insulation" by Johns Manville Canada Inc.; [www.jm.com](http://www.jm.com), "NoiseReducer™ Sound Attenuation Batts" by CertainTeed Corporation or "Thermafiber® SAFB™ Mineral Wool Insulation" by Thermafiber, Inc. (Owens Corning Canada LP); [www.thermafiber.com](http://www.thermafiber.com), of sufficient thickness to meet required STC rating for sound-rated partitions and of width to suit metal framing spacing and other miscellaneous spacings.
- 2.2.29.2. Strip Impalement Clips: 25 mm (1") wide strip of "Insul-Hold" by Insul-Hold Co., Inc.; [www.insulhold.com](http://www.insulhold.com), fabricated from 0.531 mm (25 ga) galvanized sheet metal in 30 m (100') rolls with punch-out insulation securement arrows. Alternatively, use special studs with punch-out impalement strips.
- 2.2.29.3. Acoustic Sealant: Single component, non-hardening, non-skinning synthetic rubber sealant; "CP 506 Smoke and Acoustic Sealant" by Hilti (Canada) Corporation; [www.hilti.ca](http://www.hilti.ca) or "Tremco Acoustical Sealant" by Tremco Canada; [www.tremcosealants.com](http://www.tremcosealants.com).
- 2.2.29.4. Elastomeric Sealant: As recommended by manufacturer of fibre-reinforced gypsum sheathing board.
- 2.2.29.5. Gaskets: Closed cell neoprene, 3 mm (1/8") thick x 64 mm (2-1/2") wide.

**PART 3 - EXECUTION**

**3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.2. INSTALLATION**

- 3.2.1. Partition Types:
  - 3.2.1.1. Refer to Drawings for partition types.
  - 3.2.1.2. Provide partitions complete to underside of structure, unless otherwise indicated on Drawings.
- 3.2.2. Give minimum 48 hours notice for Consultant's inspection of internal wall insulation, vapour barriers and services prior to concealing with gypsum board.
- 3.2.3. Provide adequate ventilation to eliminate excessive moisture before commencing and during work to ensure proper drying of joint filler and adhesive. Do not force dry adhesive and joint treatment.
- 3.2.4. Carry out work using skilled tradesmen carefully supervised by competent foremen. Take measurements accurately.
- 3.2.5. Install framing, blocking and furring in accordance with ASTM C645, ASTM C1280 and ASTM C840.
- 3.2.6. Maintain wallboard panels minimum 6 mm (1/4") and maximum 13 mm (1/2") above floor to prevent moisture transfer. Unless otherwise shown, extend panels to minimum 100 mm (4") above finished ceiling and to underside of deck or structure where exposed and at fire rated and sound control partitions. Omit taping and filling of concealed surfaces above ceiling line, except at fire rated and sound control partitions and walls.
- 3.2.7. Erect plain wallboard vertically or horizontally, whichever results in fewer end joints. Keep end joints away from prominent locations and central portions of ceilings. Locate vertical joints at least 300 mm (12") from jamb lines of openings.
- 3.2.8. Do not secure gypsum board by installing screws into aluminum or steel window and door frames.
- 3.2.9. Install resilient sponge tape where gypsum board ceilings abut heads of door frames and where wallboard abuts heads or jambs of exterior door and window frames. Adhere tape to casing bead and compress during installation. Compressed thickness; 1.6 mm (1/16").
- 3.2.10. At partitions except shaft walls, apply 1 continuous 6 mm (1/4") bead of acoustical sealant to each side of partition where gypsum board meets dissimilar materials. Where 2 layers of gypsum board per face are required, apply bead of sealant at perimeter of base layer only.
- 3.2.11. Apply sealant beads at perimeter of other services and like objects which penetrate wallboard in accordance with manufacturer's directions.
- 3.2.12. Install access panels in locations to be determined by coordination with trades installing mechanical, electrical and other building services. Consultant reserves right to relocate access panels up to 3600 mm (12') from locations shown on Drawings due to site conditions, providing ample warning is given prior to installation.
- 3.2.13. Steel Framing for Partitions and Bulkheads:
  - 3.2.13.1. Comply with recommendations of CGC Drywall Steel-Framed Systems Folder 09250-SA 923 for steel stud partition, ceiling, column fireproofing and bulkhead detailing.

- 3.2.13.2. Provide partition tracks at floor and underside of ceiling or structure above. Align accurately. Lay out to partition layout.
- 3.2.13.3. Erect partial height and curved partitions as indicated.
- 3.2.13.4. Place studs vertically at 400 mm (16") oc unless otherwise specified and/or as required, not more than 50 mm (2") from abutting walls, and at each side of openings and corners. Position studs in tracks. Cross brace studs as required to provide rigid installation.
- 3.2.13.5. Provide heavy duty double boxed studs at each side of openings to extend in 1 piece from floor to underside of structure above.
- 3.2.13.6. Co-ordinate erection of studs and installation of service lines.
- 3.2.13.7. Do not secure studs to exterior window framing, or to ceiling grid members.
- 3.2.13.8. Provide continuous gasket between ceiling tracks and structure.
- 3.2.14. Provide continuous horizontal furring channels as backing to wall cabinets.
- 3.2.15. Metal Furring:
  - 3.2.15.1. Erect furring in accordance with manufacturer's directions and as specified herein.
  - 3.2.15.2. Provide furring rigid, secure, square, level or plumb, framed and erected to maintain finish dimensions and contours indicated. Allow for thermal movement.
  - 3.2.15.3. Furr around ducts, pipes and dropped beams occurring in finished areas and for vertical gypsum board breaks within or at termination of ceilings.
  - 3.2.15.4. Provide metal furring channels fastened to masonry or concrete surfaces in parallel rows at 400 mm (16") oc unless gypsum board is indicated to be adhered directly to masonry or concrete surfaces. Shim metal furring channels to provide a level surface.
- 3.2.16. Shaft Wall:
  - 3.2.16.1. Construct shaft wall assemblies to provide fire resistance ratings indicated, from both sides, and to maintain airtight seal.
  - 3.2.16.2. Install shaft wall studs at centres to meet design requirements in accordance with manufacturer's instructions or fire rated test design. Provide framing to enclose sides, tops and bottoms of shafts terminating at floor or in ceiling space, to maintain fire rating of shaft assembly.
  - 3.2.16.3. Install shaft wall liner in accordance with manufacturer's instructions at areas where specially designed studs require shaft wall liner panel application as required.
  - 3.2.16.4. Apply continuous sealant around partitions to ensure airtight shaft enclosures. Firestopping and smoke seals at penetrations specified under Section 07 84 00.
  - 3.2.16.5. Where shaft wall height exceeds maximum available panel height, ensure liner panel joints are positioned within upper and lower third points of wall and staggered to prevent continuous horizontal joint.
  - 3.2.16.6. Frame around duct openings through shaft walls with 'J' runners.
- 3.2.17. Gypsum Board Application:
  - 3.2.17.1. Provide gypsum board in accordance with manufacturer's written installation instructions and finish to requirements of ASTM C840. Install MRGB on any wall/partition with a paint finish containing a plumbing fixture (i.e. water closets, sinks, tubs, etc.). Install gypsum board tile backer board on any wall/partition requiring a tile finish.
  - 3.2.17.2. Provide metal trim casing bead at junctions with dissimilar materials. Provide reveals at junctions with dissimilar materials where indicated.



- 3.2.17.3. Provide curved uniform surfaces by wetting or dampening board or scoring back gypsum board and form to profiles indicated. Provide additional screws and framing members to maintain design curve. Apply joint compound and trowel smooth to provide continuous, smooth radius free from flat spots, facets and trowel marks. Allow gypsum boards to dry thoroughly before handling.
- 3.2.17.4. Provide finished work plumb, level and true, free from perceptible waves or ridges and square with adjoining work.
- 3.2.17.5. Cut and fit gypsum board to accommodate or fit around other parts of the Work. Provide work of this Section accurately and neatly.
- 3.2.17.6. Butt gypsum board sheets together in moderate contact. Do not force into place. Place tapered or wrapped edges next to 1 another.
- 3.2.17.7. Provide gypsum board perpendicular to framing and in lengths that will span ceilings and walls without creating end (butt) joints. If butt joints do occur stagger and locate them as far from centre of walls and ceilings as possible. Accurately fit exposed butt joints together and make edges smooth.
- 3.2.17.8. Support ends and edges on framing.
- 3.2.17.9. Fasten gypsum board to metal furring and steel studs with screws. Space screws at 200 mm (8") oc at board edges and 300 mm (12") oc on board field.
- 3.2.17.10. Gypsum Board - Single Layer:
  - 3.2.17.10.1. Ceilings: Apply gypsum board to metal furring with screws. Erect board with long dimension parallel to supports. Locate end joints over supporting members. Space screws at 200 mm (8") oc.
  - 3.2.17.10.2. Partitions: Apply gypsum board to steel studs with screws. Erect board with long dimension parallel to supports. Locate end joints over supporting members. Locate vertical joints at least 300 mm (12") from jamb lines of openings. Space screws at 200 mm (8") oc at board edges and 300 mm (12") oc on board field.
  - 3.2.17.10.3. Ceiling and Partition Fasteners: Ensure perimeter screws are not less than 9 mm (3/8") nor more than 13 mm (1/2") from edges and ends are opposite screws on adjacent boards. Drive screws with power screw-gun and set with countersunk head slightly below surface of board.
  - 3.2.17.10.4. Joints: Finish all joints unless specified otherwise.
- 3.2.17.11. Gypsum Board - Double Layer:
  - 3.2.17.11.1. Lay out work to minimize end joints on face layer; to offset parallel joints between face and base layers by at least 250 mm (10") and to apply face layer at right angles to base layer.
  - 3.2.17.11.2. Base Layer: Ensure base layer is same as face layer, or backing board, and applied at right angles to framing members. Secure base layer with screws spaced 300 mm (12") oc to each member. Ensure perimeter screws are not more than 13 mm (1/2") from edges and ends are opposite screws on adjacent boards. Ensure surface of erected base layer is straight, plumb or level and without protrusions before face layer is applied.
  - 3.2.17.11.3. Face Layer: Apply face layer at right angles to base layer with screws.
  - 3.2.17.11.4. Joints: Finish joints in face layers only, unless otherwise required to achieve fire resistant ratings indicated, as hereinafter specified. Ensure setting compound for fire rated construction conforms to requirements of authorities having jurisdiction to obtain fire rating shown on Drawings.
- 3.2.18. Interior Ceilings:
  - 3.2.18.1. Comply with recommendations of CGC Drywall Steel-Framed Systems Folder 09250-SA 923.
  - 3.2.18.2. Provide hanger wires spaced at maximum 1200 mm (4') oc along carrying channels and within 150 mm (6") of ends of carrying channel runs. Secure hanger wires to inserts in structure above.

- 3.2.18.3. Provide carrying channels maximum 1200 mm (4') oc and within 150 mm (6") of walls. Secure with hanger wire saddle-tied along channels. Provide 25 mm (1") clearance between runners and walls. Provide splicers behind joints. Level channels to a maximum tolerance of 3 mm (1/8") over 3600 mm (12').
- 3.2.18.4. Provide metal furring channels at right angles to carrying channels at maximum 600 mm (24") oc and within 150 mm (6") of walls. Provide 25 mm (1") clearance between furring ends and abutting walls. Attach furring channels to carrying channels with saddle-tie of double strand tie wire.
- 3.2.18.5. Provide additional cross-reinforcing at bulkheads and other openings.
- 3.2.18.6. Provide ceiling gypsum board, smooth and level. In areas with a high humidity content (ie. Washrooms, janitor closets, etc.) install MRGB.
- 3.2.18.7. Seismic Bracing: Sway-brace suspension systems with seismic connections, supports and lateral-force bracings conforming to requirements of ASTM E580/E580M and as follows:
  - 3.2.18.7.1. Install lateral-force bracing to ceilings where gypsum wallboard panels are attached by screws to metal suspension members and ceilings extend to walls.
  - 3.2.18.7.2. Install hanger wires splayed 90° from each other at an angle not exceeding 45° from horizontal plane of ceiling to satisfy force-bracing requirements.
  - 3.2.18.7.3. Attach wires to main runners and place within 50 mm (2") of intersection of cross tees. Ensure bracing points do not exceed 3660 mm (12') oc with first point of bracing within 1220 mm (4') of perimeter of suspended ceiling system.
  - 3.2.18.7.4. Fasten vertical uplift strut to and extend from main runner near bracing points to structural support members above. Ensure design and installation of uplift strut is determined for each ceiling system to suit design requirements.
  - 3.2.18.7.5. Partition Bracing: Brace non-bearing interior partitions to suspended ceilings by providing No. 12 gage galvanized, soft annealed mild steel suspension hanger wire laid at 45° maximum to horizontal plane of ceiling at 2440 mm (8') oc. Attach walls to metal suspension runners with a positive attachment designed by metal suspension system manufacturer.
  - 3.2.18.7.6. Provide wider wall moulding on all sides to support individual panels around perimeter. Minimum size: 50 mm (2").
- 3.2.18.8. Premanufactured Grid Suspension Systems: Install in accordance with manufacturer's instructions. Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- 3.2.19. Metal Trim and Accessories:
  - 3.2.19.1. Provide metal trim casing beads at reveals; at ceiling-wall intersections and partition perimeters; and at intersection of dissimilar constructions such as gypsum board to concrete.
  - 3.2.19.2. Provide metal trim casing beads where gypsum board abutts against a surface having no trim concealing junction.
  - 3.2.19.3. Provide a 13 mm (1/2") separation gasket between metal trim casing beads and window frames or other cold surfaces or provide sponge tape between gypsum board partition or furring framing, where such framing abuts exterior door or window frame, sponge tape between floor and gypsum board partition track. Ensure tape is either full width or 1 strip 9 mm (3/8") wide on each side of framing member.
  - 3.2.19.4. Provide casing bead and sponge tape where gypsum board abuts materials other than itself and acoustic tile ceilings including at exterior door and window frames, where juncture is not concealed with trim; or elsewhere where indicated on Drawings. Unless indicated otherwise, use tape 3 mm (1/8") narrower than casing bead to provide recess at exposed side. Compress tape by 25%.
  - 3.2.19.5. Provide metal trim casing beads where indicated on Drawings.

- 3.2.19.6. Provide pre-finished metal angle trim supports and provide light pockets and eggcrate grilles and/or louvres in accordance with manufacturer's instructions. Install light pockets and eggcrate grilles and/or louvre units square, straight and in 1 piece where possible or with inconspicuous joints at long runs.
- 3.2.20. Control Joints:
- 3.2.20.1. Provide either manufactured control joint devices or field fabricated control joints from suitable materials to suit site conditions in accordance with manufacturer's instructions and/or ASTM C840.
- 3.2.20.2. Set in gypsum facing board, supporting control joints with studs or furring channels on both sides of joint. Ensure double studs with discontinuous tracks and double suspended ceiling furring channels have been installed prior to commencing board and bead application at control joints. Provide control joints as required to prevent cracks following locations:
- 3.2.20.2.1. where a partition, wall or ceiling traverses a construction joint (expansion, seismic or building control element) in base building structure.
- 3.2.20.2.2. where a wall or partition runs in an uninterrupted straight plane exceeding 9.1 m (30') (Note: A full height door frame may be considered a control joint).
- 3.2.20.2.3. interior ceiling with perimeter relief: installed so linear dimensions between control joints do not exceed 15 m (15') and total area between control joints does not exceed 230 m<sup>2</sup> (2,500 sq ft).
- 3.2.20.2.4. interior ceiling without perimeter relief: installed so linear dimensions between control joints do not exceed 9.1 m (30') and total area between control joints does not exceed 84 m<sup>2</sup> (900 sq ft).
- 3.2.20.2.5. at stress points (ie corners of openings or changes in direction of surfaces).
- 3.2.20.3. Provide additional control joints at long and narrow surfaces.
- 3.2.20.4. Provide control joints full height floor to ceiling or door header to ceiling in partitions and furring runs.
- 3.2.20.5. Provide control joints from wall to wall in ceiling areas.
- 3.2.20.6. Provide continuous polyethylene dust barrier behind and across control joints.
- 3.2.20.7. Ensure Consultant reviews exact locations of control joints.
- 3.2.21. Sound Control:
- 3.2.21.1. Where indicated on Drawings, provide sound rated partitions and ceiling in locations indicated to meet required minimum STC rating. Apply gypsum board on both sides of sound-proofed partitions. Follow manufacturer's details and recommendations.
- 3.2.21.2. Provide sound attenuation insulation to completely fill height of stud cavities. Tightly butt ends and sides of blankets within cavities to ensure a 90% capacity, do not overfill cavities. Cut blankets to fit small spaces. Carefully fit blankets behind electrical outlets, bracing, fixture attachments and mechanical and electrical services.
- 3.2.21.3. Mechanically fasten blankets to back of gypsum board as recommended by gypsum board manufacturer.
- 3.2.21.4. At sound attenuating suspended ceiling and enclosures having spring isolator hangers, terminate ceiling or enclosure at adjacent construction by providing continuous isolator strip and sealed joint.
- 3.2.22. Joint Treatment - Gypsum Board:
- 3.2.22.1. Verify board is firm against framing members and screw heads are properly depressed.
- 3.2.22.2. Mix joint compound or ready-to-use compounds according to manufacturer's directions. Use pure, unadulterated, clean water for mixing. Permit mixed material to stand 30 minutes before using. Do not mix more material than can be used within 1 hour. Do not use set or hardened compound. Clean tools and equipment after mixing each batch.

- 3.2.22.3. Tape and fill joints and corners in accordance with gypsum board manufacturer's printed instructions. Fill either manually, using hand tools of trade, or by a mechanical taping and filling machine of proven efficiency.
  - 3.2.22.4. Remove plastic tape from control joints after finishing with joint compound.
  - 3.2.22.5. After final coats of filler have dried at least 24 hours, sand surface lightly with No. 00 sandpaper to leave it smooth, ready for decoration.
  - 3.2.22.6. Provide finished work smooth, seamless, plumb and true, flush and with square plumb neat corners.
  - 3.2.22.7. Levels of Finish: Provide following levels of finish in accordance with ASTM C840:
    - 3.2.22.7.1. Level 0: No taping, finishing or accessories required for temporary construction or areas where final decoration is not required.
    - 3.2.22.7.2. Level 1: Use this level in plenum areas above ceilings, attics, areas where assembly would generally be concealed or in building service corridors and other areas.
    - 3.2.22.7.3. Level 2: Use this level where water resistant gypsum backing board is used as substrate for tile; may be used in garages, warehouse storage, or other similar areas where surface appearance is not of primary concern.
    - 3.2.22.7.4. Level 3: Use this level in appearance areas which are to receive heavy or medium texture spray or hand applied finishes before final painting or where heavy grade wall coverings are to be applied as final decoration.
    - 3.2.22.7.5. Level 4: Use this level where flat paints, light textures or wall coverings are to be applied.
    - 3.2.22.7.6. Level 5: Use this level to provide a uniform surface and minimize possibility of joint photographing and of fasteners showing through final decoration.
    - 3.2.22.7.7. Exposed Moisture Resistant Gypsum Board Finish: Ensure joints and interior angles have tape embedded in joint compound and 2 separate coats of joint compound applied over all flat joints and 1 separate coat of joint compound applied over interior angles. Cover fasteners heads and accessories with 3 separate coats of joint compound. Ensure surface is smooth and free of tool marks and ridges.
  - 3.2.23. Fire Rated Partitions:
    - 3.2.23.1. Ensure materials for fire rated construction conform to requirements of authorities having jurisdiction to obtain fire rating shown on Drawings. Where dissimilar components are built into fire rated assemblies ensure continuity of fire separation by boxing in elements with gypsum board and framing to suit authorities having jurisdiction. Work in cooperation with Section providing firestopping work.
    - 3.2.23.2. Provide fire rated enclosures, separations and assemblies as indicated on Drawings conforming to requirements of authorities having jurisdiction.
    - 3.2.23.3. Where required, secure sound attenuation blanket insulation between studs as specified in Article on Sound Control Partitions.
  - 3.2.24. Cutting and Patching: Cooperate and coordinate with other Sections to obtain satisfactory gypsum board finish work. Do cutting, patching and Make Good as required by installation of work of other Sections.
- 3.3. SITE QUALITY CONTROL**
- 3.3.1. Site Tests and Inspections:
    - 3.3.1.1. Structural Inspection: Ensure a licensed engineer specified herein inspects work of this Section during erection/installation and submits sealed and signed Field Review Report within 5 Days of site visit.

- 3.3.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.4. CLEANING**

- 3.4.1. Clean off beads, casings, joint cement droppings and similar items and remove surplus materials and rubbish on completion and as directed.

**3.5. PROTECTION**

- 3.5.1. Provide protection of materials and work of this Section from damage by weather and other causes. Perform work in areas closed and protected from damage due to weather. Protect work of other trades from damage resulting from work of this Section. Make Good such damage immediately.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide tiling including but not limited to following:
  - 1.2.1.1. grouting control joints in floor slab under tile.
  - 1.2.1.2. waterproofing membrane.
  - 1.2.1.3. uncoupling membrane.
  - 1.2.1.4. CIM for floors.
  - 1.2.1.5. thin-set mortar bond coat.
  - 1.2.1.6. floor tile, base and fittings.
  - 1.2.1.7. wall tile.
  - 1.2.1.8. movement joints.
  - 1.2.1.9. grouting tile joints.
  - 1.2.1.10. caulking tile control joints.
  - 1.2.1.11. caulking penetrations through wall and floor tile.
- 1.2.2. Related Sections: Following description of work is included as reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of "Maintenance Material Form" for receiving extra/spare material for Owner's future use: Section 00 65 37, Maintenance Material Form (Specimen).
  - 1.2.2.2. Concrete floor slabs and finishing: Section 03 30 00, Cast-In-Place Concrete.
  - 1.2.2.3. Provision of gypsum board tile backer board walls: Section 09 21 16, Gypsum Board Assemblies.
  - 1.2.2.4. Provision of washroom accessories: Section 10 28 00, Washroom Accessories.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. CIM: Crack Isolation Membrane.
  - 1.3.1.2. DCOF: Dynamic Coefficient of Friction.
  - 1.3.1.3. EGP: Exterior Grade Plywood.
  - 1.3.1.4. SDS: Safety Data Sheets.
  - 1.3.1.5. TTMAC: Terrazzo, Tile & Marble Association of Canada; [www.ttmac.com](http://www.ttmac.com).
  - 1.3.1.6. VOC: Volatile Organic Compound.

1.3.2.	Reference Standards:	
1.3.2.1.	ANSI A108.02-19	- General Requirements: Materials, Environmental, and Workmanship
1.3.2.2.	ANSI A108.6-99(19)	- Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy
1.3.2.3.	ANSI A108.10-17	- Installation of Grout in Tilework
1.3.2.4.	ANSI A118.3-13	- American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive
1.3.2.5.	ANSI A118.4-19	- American National Standard Specifications for Modified Dry-Set Cement Mortar
1.3.2.6.	ANSI A118.10-14(19)	- American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation
1.3.2.7.	ANSI A118.11-17	- American National Standard Specifications for EGP (Exterior Glue Plywood) Modified Dry-set Mortar
1.3.2.8.	ANSI A118.12-14(19)	- American National Standard Specifications for Crack Isolation Membranes for Thin-set Ceramic Tile and Dimension Stone Installation
1.3.2.9.	ANSI A136.1-08(13)	- American National Standard Specifications for Organic Adhesives for Installation of Ceramic Tile
1.3.2.10.	ANSI A137.1-17	- American National Standard Specifications for Ceramic Tile
1.3.2.11.	ASTM C373-18	- Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products
1.3.2.12.	ASTM C627-18	- Standard Test Method for Evaluating Ceramic Floor Tile Systems Using the Robinson-Type Floor Tester
1.3.2.13.	ASTM C648-20	- Standard Test Method for Breaking Strength of Ceramic Tile
1.3.2.14.	ASTM C650-20	- Standard Test Method for Determination of Resistance to Chemical Substances
1.3.2.15.	ASTM F1869-16a	- Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
1.3.2.16.	ISO 10545-7:1996(21)	- International Standard - Ceramic Tiles – Part 7: Determination of resistance to surface abrasion for glazed tiles
1.3.2.17.	ISO 13006:2018	- International Standard – Ceramic Tiles - Definitions, classification, characteristics and marking
1.3.2.18.	ISO 13007-1:2010	- International Standard - Ceramic tiles - Grouts and adhesives – Part 1: Terms, definitions and specifications for adhesives

- 1.3.2.19. ISO 13007-3:2010 - International Standard - Ceramic tiles - Grouts and adhesives – Part 3: Terms, definitions and specifications for grouts

**1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Preinstallation Meetings: Arrange preinstallation meeting 1 week before commencing work with parties associated with trade as designated in Contract Documents or as requested by Consultant. Presided over by Construction Manager, include Consultant who may attend, Trade Contractor performing work of this trade, drywall trade, testing company's representative and consultants of applicable discipline. Review Contract Documents for work included under this trade and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of work of this Section.

**1.5. SUBMITTALS**

- 1.5.1. Product Data:
- 1.5.1.1. Submit manufacturer's technical data sheets, SDS and installation instructions for specified materials.
- 1.5.1.2. Where more than 1 manufacturer's Products are part of single tile assembly, arrange for each manufacturer to submit a written statement of compatibility with respect to other manufacturer's materials.
- 1.5.2. Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Section 01 30 00. In addition to minimum requirements indicate following:
- 1.5.2.1. details of construction.
- 1.5.2.2. movement joint layouts.
- 1.5.2.3. dimensions.
- 1.5.2.4. patterns.
- 1.5.3. Samples: Submit samples in accordance with Section 01 30 00. Submit individual sample panels of each colour of ceramic tile, set with adhesive, grouting and bonding method as specified, showing quality, colour and finish of material, grout and pattern of tiles. Ensure each panel is minimum 600 mm x 600 mm (24" x 24").

**1.6. CLOSEOUT SUBMITTALS**

- 1.6.1. Operational and Maintenance Data: Submit maintenance instructions in accordance with Section 01 70 00. Provide Owner with 3 copies of TTMAC's "2017-2019 Hardsurface Maintenance Guide". Include specific warnings of any maintenance practice or materials which may damage or disfigure tile work.

**1.7. MAINTENANCE MATERIAL SUBMITTALS**

- 1.7.1. Extra Stock Materials:
- 1.7.1.1. Supply in addition to quantities required for work, extra materials and Products to be stored by Owner as follows:
- 1.7.1.1.1. Provide 5% extra stock of each type of tile and special units.
- 1.7.1.2. Deliver extra stock to Owner as soon as permanent, locking storage facilities are available. Place extra stock in designated storage area where directed.
- 1.7.1.3. Execute Section 00 65 37.



**1.8. QUALITY ASSURANCE**

1.8.1. Qualifications:

1.8.1.1. Manufacturers: Provide Product of company specializing in manufacture of ceramic tile, porcelain tile, mosaics, pavers, trim units, thresholds, setting, grouting and installation Products with minimum experience of 5 years. Provide test reports if requested to substantiate that Products supplied on this Project will be of consistent quality in appearance and physical properties.

1.8.1.2. Installers: Execute work of this Section using a company who is a member in good standing with TTMAC and has minimum 5 years successful experience in application of Products, systems and assemblies specified. Perform tile work using skilled mechanics trained and experienced in work of this complexity. Install waterproofing system using an applicator approved by system manufacturer.

1.8.2. Mock-Ups:

1.8.2.1. Construct a minimum 10 m<sup>2</sup> (100 sq ft) mock-up complete with movement joint at Project location designated by Consultant for review. Ensure mock-up area is cleaned and properly prepared for tiling using specified setting and grouting materials in accordance with Specifications, Product instructions and discussions from preinstallation meeting. Ensure finish lighting scheme is replicated in area where mock-up is installed. During mock-up installation, ensure participants are present to observe substrate preparation, installation, grouting and cleaning procedures. Caution: When grouting with sanded grout, take special care and caution to prevent scratching, dulling or otherwise damaging tile natural surface appearance.

1.8.2.2. After mock-up has cured and been inspected, discuss pertinent remarks, observations and recommendations in the presence of participants.

1.8.2.3. Once reviewed, mock-up including recorded observations and recommendations remains part of finished work and used as a quality reference standard for balance of Project.

**1.9. DELIVERY, STORAGE AND HANDLING**

1.9.1. Delivery and Acceptance Requirements:

1.9.1.1. Coordinate deliveries to comply with construction progress schedule and arrange for above ground, under cover storage before materials are delivered to site.

1.9.1.2. Deliver tile in a manner to avoid chipping, breakage, staining and any other damage.

1.9.1.3. Deliver packaged materials in their original bags and containers clearly identified.

1.9.2. Storage and Handling Requirements:

1.9.2.1. Store and handle tile in a manner to avoid chipping, breakage, staining and any other damage.

1.9.2.2. Store packaged materials in their original bags and containers clearly identified. Keep containers sealed and labels intact unit time of use. Prevent damage or contamination to materials by water, moisture, freezing, excessive heat, foreign matter or other causes. If materials have frozen, do not stir liquids or mix materials until they are completely thawed.

1.9.2.3. Provide secure heated and dry storage facilities on site. Maintain temperatures in storage area between 15 deg C (59 deg F) and 30 deg C (86 deg F).

**1.10. SITE CONDITIONS**

1.10.1. Ambient Conditions:

1.10.1.1. Do not perform work of this Section at temperature below 12 deg C (54 deg F) when using portland cement mortars or dry set mortars, latex portland mortars or bond coat. Maintain temperature between 12 deg C (54 deg F) and 32 deg C (90 deg F).

1.10.1.2. Observe manufacturer's recommended working temperatures for installation of adhesives and grouts.

- 1.10.1.3. Close doors and windows and turn off direct forced ventilation systems and apparatus. Turn off radiant floor heating systems and protect work area from direct draft, sun and heat exposure during installation and for at least 72 hours after completion.
- 1.10.1.4. Do not perform work of this Section when either substrate and/or ambient temperatures are below 10 deg C (50 deg F) or above 35 deg C (95 deg F). Maintain temperature in tiled areas within these temperature limits during installation and for 7 Days after completion of the Work unless otherwise indicated in the Product instructions and/or in ANSI A108 Installation Standard Procedure requirements.

## **1.11. WARRANTY**

- 1.11.1. Manufacturer Warranty:
  - 1.11.1.1. Warrant work of this Section for a period of 3 years against defects, excessive wear and loss of adhesion including replacement of defective tiling, materials, labour costs for demolition of defective work, accessories and installation systems at Owner's convenience. Cracks arising from normal shrinkage and/or expansion of concrete are not considered as structural failure. Hairline cracks in grout joints which result from these causes are considered normal and warranty is not voided as a result of these minor defects.
  - 1.11.1.2. Warrant waterproofing work of this Section against defects of workmanship and materials and against any actual leakage, for a period of 5 years. Leakage due to structural failure of concrete is excepted.

## **PART 2 - PRODUCTS**

### **2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
  - 2.1.1.1. Ardex Canada, Inc.; [www.ardex.ca](http://www.ardex.ca)
  - 2.1.1.2. Custom Building Products; [www.custombuildingproducts.com](http://www.custombuildingproducts.com)
  - 2.1.1.3. Flextile Ltd.; [www.flextile.net](http://www.flextile.net)
  - 2.1.1.4. Laticrete International, Inc.; [www.laticrete.com](http://www.laticrete.com)
  - 2.1.1.5. MAPEI Inc.; [www.mapei.ca](http://www.mapei.ca)
  - 2.1.1.6. Olympia Tile International Inc.; [www.olympiatile.com](http://www.olympiatile.com)
  - 2.1.1.7. Schluter Systems (Canada) Inc.; [www.schluter.com](http://www.schluter.com)
- 2.1.2. Use proprietary Products in full compliance with manufacturer's recommendations. As far as possible obtain Product from single manufacturer ensuring compatibility with adjacent components while maintaining quality.

### **2.2. MATERIALS**

- 2.2.1. Crack Isolation Membrane: Provide 1 of following:
  - 2.2.1.1. Two part system made up of liquid rubber and reinforcing fabric to provide crack bridging capability over non-structural cracks, compatible with thin set mortar, supply "Ardex 8+9™ Rapid Waterproofing and Crack Isolation Compound" by Ardex Canada, Inc., "Custom® 9240 Waterproofing and Anti-Fracture Membrane" by Custom Building Products, "WP-980 Waterproof & Crack Isolation Membrane" by Flextile Ltd., "Laticrete Blue 92" by Laticrete International, Inc. or "Mapelastc™ 315" by MAPEI Inc.

- 2.2.1.2. Single component highly flexible load bearing peel and stick sheet membrane and primer compatible with tile/stone setting mortars, supply "Crack Buster® Pro Crack Prevention Mat Underlayment + Peel & Stick Primer" by Custom Building Products, "4000 Acrylic Latex Primer" and "1000 - Flexilastic Crack Isolation and Sound Reduction Membrane" by Flextile Ltd. or "Mapeguard™ Primer and Mapeguard™ SM" by MAPEI Inc.
- 2.2.2. Waterproofing Membrane: Provide 1 of following:
- 2.2.2.1. Extra heavy duty, seamless, load bearing conforming to ANSI A118.10, for installation of ceramic tile and quarry tile for areas such as bathrooms, plazas, showers, kitchens, fountains, swimming pools and balconies: "Ardex 8+9™ Rapid Waterproofing and Crack Isolation Compound with Mesh Tape" by Ardex Canada, Inc., "Custom® 9240 Waterproofing and Anti-Fracture Membrane" by Custom Building Products, "Flextile WP-980 Waterproof & Crack Isolation Membrane with Reinforcing Fabric" by Flextile Ltd., "KEMPEROL® 022 Membrane with KEMPEROL® 500 Fleece" by Kemper System Canada, Inc.; [www.kemper-system.com](http://www.kemper-system.com), "Laticrete 9235" waterproof membrane system with Laticrete's fiberglass cloth reinforcement by Laticrete International, Inc. or "Mapelastic™ 315" by MAPEI Inc.
- 2.2.2.2. A single component self-curing liquid rubber polymer that forms a flexible, seamless waterproofing membrane; provide "RedGard® Waterproofing and Crack Prevention Membrane" by Custom Building Products, "WP-900 Hydro-Bloc Waterproof & Crack Isolation Membrane" by Flextile Ltd., "Hydro Ban" by Laticrete International, Inc. or Mapelastic™ AquaDefense" by MAPEI Inc.
- 2.2.3. Uncoupling Membrane: Provide "Schluter®-DITRA" by Schluter Systems (Canada) Inc.; 3 mm (1/8") thick, orange, high-density polyethylene membrane with a grid structure of 12 mm x 12 mm (1/2" x 1/2") square cavities, each cut back in a dovetail configuration and a polypropylene anchoring fleece laminated to its underside, "RedGard® Uncoupling Membrane" by Custom Building Products, "FlexMat" by Flextile Ltd. or "Mapeguard® UM" by MAPEI Inc. Conforms to definition for uncoupling membranes in TTMAC's "2019-2021 Tile Installation Manual Specification Guide 09 30 00" and meets or exceeds requirements of ANSI A118.12.
- 2.2.4. Surface Preparation:
- 2.2.4.1. Sound Control Underlayment: Load bearing underlayment for reducing sound transmission through tile flooring surfaces, "Ardex DS 70™ Acoustic Mat" by Ardex Canada, Inc., "EasyMat® Tile & Stone Underlayment" by Custom Building Products, "2000SC - Flexilastic Sound Control and Crack Isolation Membrane" by Flextile Ltd., "Laticrete 18" by Laticrete International, Inc., "Mapesonic™ 2" by MAPEI Inc. or "Sonogrip" by Olympia.
- 2.2.5. Setting Bed and Thin-Set Adhesive:
- 2.2.5.1. Latex Mortar Bond Coat: ISO 13007-1 performance level (C2ES2P2); ANSI A118.4; ANSI A118.11; for improved (C2) cement adhesive with (E) extended open time (S2) high-deformability (>5 mm) and improved (P2) for adherence to EGP characteristics, conforming to ANSI A118.4 and ANSI A118.11 requirements, supply "ProLite® Premium Large Format tile Mortar" by Custom Building Products, "Laticrete 4237 with 211 Crete Filler Powder" by Laticrete International, Inc., "Kerabond/Keralastic" by MAPEI Inc. or "#51 Floor and Wall Mix Thin-Set Mortar" and "#44 High Solids Latex Thin-Set Mortar Additive" by Flextile Ltd.
- 2.2.5.2. Latex Cement Mortars:
- 2.2.5.2.1. ISO 13007-1 (C2) performance level for improved cement adhesive with specific additional characteristics according to specified basis of design Project requirements; ANSI A118.4 and ANSI A118.11.

- 2.2.5.2.2. Polymer-Modified Thin-Set Mortar Bond Coat for Vertical Application of Large Modular Tiling: (300 mm x 300 mm (12" x 12") and larger) ISO 13007-1 performance level (C2TES1) for improved cementitious (C2) for adhesive with (T) slip-resistant (E) extended open time (S1) deformable characteristics conforming to ANSI A118.4 for single component latex cement mortar: supply "Ardex X 77™ Microtec® Premium Microfiber Reinforced Polymer Modified Thin Set Mortar" by Ardex Canada, Inc., "VersaBond®-LFT Professional Large Format Tile Mortar" by Custom Building Products, "56SR Premium Polymer-Modified Sag-Resistant Mortar" by Flextile Ltd. or "Ultraflex™ LFT" by MAPEI Inc.
- 2.2.5.2.3. Polymer-Modified Thin-Set Mortar Bond Coat: ISO 13007-1 performance level (C2ES1P1) for improved (C2) for cementitious adhesive with (E) extended open time, (S1) deformable (2.5 mm to 4.9 mm) and normal (P1) for adherence to EGP characteristics, conforming to ANSI A118.4 (and/or ANSI A118.11 for EGP mortar installation over Plywood); supply "Ardex X 5™ Thin Set Mortar" by Ardex Canada, Inc., "VersaBond®-LFT Professional Large Format Tile Mortar" by Custom Building Products or "Ultraflex™ LFT" by MAPEI Inc.
- 2.2.5.3. Epoxy Mortar Bond Coat and Reactive Resin Polyurethane Adhesive: ANSI A118.3 chemical resistant, water cleanable tile-setting and grouting epoxy. Use 1 of following:
- 2.2.5.3.1. Epoxy Bond Coat: ISO 13007-1 (R2T) and ISO 13007-3 (RG 1) improved (R2) reactive resin adhesive with (T) slip characteristics and (RG1) reactive resin chemical resistant grout, ANSI A118.3 chemical resistant, water cleanable tile-setting and grouting epoxy, supply "Ardex WA™ High Performance, 100% Solids Epoxy Grout and Adhesive" by Ardex Canada, Inc., "CEG-Lite™ 100% Solids Commercial Epoxy Grout" by Custom Building Products or "KER 400 Kerapoxy®" by MAPEI Inc. to ISO 13007-1 (R2T) and ISO 13007-3 (RG1) performance standard with non-slip characteristics.
- 2.2.5.3.2. Epoxy Bond: ISO 13007-1 performance level (R2) improved reactive epoxy resin adhesive normally filled with silica sand and combined with hardener before application, supply "Ardex WA™ High Performance, 100% Solids Epoxy Grout and Adhesive" by Ardex Canada, Inc., "CEG-Lite™ 100% Solids Commercial Epoxy Grout" by Custom Building Products "KER 410 Kerapoxy®" by MAPEI Inc. to ISO 13007-1 (R2) performance standard.
- 2.2.5.3.3. 100% Solids Epoxy Adhesive: Supply "Ardex WA Easy to Use Epoxy Grout and Adhesive" by Ardex Canada, Inc. or "KER 410 Kerapoxy®" by MAPEI Inc. to ISO 13007-1(R2) performance standard; "CEG-Lite™ 100% Solids Commercial Epoxy Grout" by Custom Building Products or "KER 400 Kerapoxy®" by MAPEI Inc. to ISO 13007-1(R2T) and ISO 13007-3 (RG1) performance standards.
- 2.2.5.3.4. Polyurethane Reactive Resin Adhesive: ISO 13007-1 performance level (R2) Improved waterless, high bond strength, polyurethane-epoxy reactive resin adhesive system, supply "Planicrete W™" by MAPEI Inc.
- 2.2.6. Pre-Mixed Setting Bed and Dispersion Adhesive for Vertical Application of Tiles Less Than 300 mm x 300 mm (12" x 12"): Interior Use: ISO 13007-1 (D2T) performance level (D2) improved dispersion adhesive with (T) minimum slip characteristics (=0.5 mm) and ANSI A136.1 - Type 1 requirements. Supply Ardex D 14™ Type 1 Premixed Tile Adhesive" by Ardex Canada, Inc., "ReliaBond® Professional Tile Adhesive" by Custom Building Products or "Ultra/Mastic® ECO" by MAPEI Inc., Low VOC, solvent-free water-based (D2T) dispersion adhesive to ANSI A136.1-Type 1.
- 2.2.7. Tile:
- 2.2.7.1. Conforming to ANSI A137.1, ISO 13006. Provide bullnoses, copings, caps, cove base, nosings, corner pieces, and other special units as specified, indicated, and required. Colour as selected by Consultant from manufacturer's full ranges. Provide tile with minimum following characteristics:
- 2.2.7.1.1. Water Absorption: ASTM C373 - < 3.0%.
- 2.2.7.1.2. Breaking Strength: ASTM C648 - > 250 lbs.
- 2.2.7.1.3. Abrasion Resistance: ISO 10545-7 - Class Four Heavy Traffic.

- 2.2.7.1.4. Scratch Hardness: MOH's - 7.
- 2.2.7.1.5. Chemical Resistance: ASTM C650 - Resistant.
- 2.2.7.1.6. DCOF: > 0.42.
- 2.2.8. Grout:
- 2.2.8.1. Epoxy Grout: Conforming to ANSI A118.3 and ISO 13007-3 (RG) performance level for reactive resin grouts; 100% solids, 2 component water washable epoxy grout, "Ardex WA Easy to Use Epoxy Grout and Adhesive" by Ardex Canada, Inc., "CEG-Lite™ 100% Solids Commercial Epoxy Grout" by Custom Building Products, "100 Flex-Epoxy 100% Solids Epoxy Grout" by Flextile Ltd., "SpectraLOCK® PRO Premium Grout" by Laticrete International, Inc. or "Kerapoxy®" by MAPEI Inc.
- 2.2.8.2. Do not add water or other materials to dilute mortar or grout additives unless recommended by admixture manufacturer.
- 2.2.9. Movement Joint Profiles: To be selected later by Consultant from Schluter Systems (Canada) Inc.
- 2.2.10. Edge-Protection and Transition Profiles for Floors: Provide L-shaped profile with 3 mm (1/8") wide top section and vertical wall section that together form the visible surface, integrated trapezoid-perforated anchoring leg and integrated grout joint spacer. Material and Finish: To be selected later by Consultant. Height as required. Permitted Product: "Schluter®-SCHIENE" by Schluter Systems (Canada) Inc.
- 2.2.11. Finishing and Edge-Protection Profiles for Walls: Provide L-shaped profile with 3 mm (1/8") wide top section and vertical wall section that together form the visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer. Material and Finish: To be selected later by Consultant. Height as required. Permitted Product: "Schluter®-JOLLY" by Schluter Systems (Canada) Inc.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions:
  - 3.1.1.1. Verify existing conditions and finishes are ready to receive specified tile work. Ensure backings are structurally sound, level, and plumb within required tolerances. Notify Consultant in writing of unacceptable substrate conditions.
  - 3.1.1.2. Ensure compatibility of adhesives, waterproofing, reinforcing and fillers with adjacent substrate and component coming in contact with these Products.
  - 3.1.1.3. Ensure waterproofing and adhesive manufacturers; examine substrate conditions, verify conditions are suitable for installation prior to commencement and review application procedures. If requested submit written report.
- 3.1.2. Preinstallation Testing: Perform calcium chloride test in accordance with requirements of ASTM F1869 immediately prior to tiling for moisture on concrete floors around perimeter of areas, at columns and where moisture may be anticipated. Conduct 3 tests for first 93 m<sup>2</sup> (1000 sq ft) and 1 additional test for every 93 m<sup>2</sup> (1000 sq ft) of flooring. Ensure moisture emission from concrete floor does not exceed 1.36 kg/93 m<sup>2</sup> (3 lbs/1000 sq ft) in 24 hours unless otherwise stated in flooring Product instructions and limitations. Do not proceed with installation until moisture problem has been corrected. Provide results to Consultant prior to commencement of installation.
- 3.1.3. Evaluation and Assessment:
  - 3.1.3.1. Prior to installation, set aside for further inspection and replacement on a tile for tile basis by tile or dimension stone Supplier, sub-standard tiles, fractured tiles or tiles with chipped corners, pinholes or voids that are unusable for cuts. Ensure this Trade Contractor replaces at his own expense, sub-standard and/or pre-damaged tiles once installed.

- 3.1.3.2. Carefully select, set-aside and shade-mix tiles and/or dimension stones to a homogeneous blend throughout. During installation, provide supplementary lighting equipment if necessary to easily identify shade differences, which could normally be very slight and provide a standard even aesthetic blend effect. This is best achieved by using a strong floodlight or spotlight fitted to a movable pole stand immediately over Work area.
- 3.1.3.3. Before setting, examine tile backs for possible dust or other contaminants. If necessary, use a slightly damp towel and wipe tile backs to remove any such dust or contaminant residue.
- 3.1.3.4. Commencement of work implies acceptance of previously completed work.

### **3.2. PREPARATION**

- 3.2.1. Surface Preparation:
  - 3.2.1.1. Ensure substrates are structurally sound, solid, stable, level, plumb and true to a tolerance in plane of 3 mm in 3 m (1/4" in 10' - 0") in accordance with ANSI A108 specification requirements. Ensure substrates are clean and free of dust, oil, grease, paint, tar, wax, curing agent, primer, sealer, form release agent or any deleterious substance and debris which may prevent or reduce adhesion.
  - 3.2.1.2. Mechanically sand, shot blast or scarify substrate as required to completely remove paint, loosely bonded topping, loose particles and contaminants. Surface etching or contaminant removal by chemical means is not permitted. When sanding or scarifying surfaces that may contain silica sand, wear a permitted dust mask.
  - 3.2.1.3. Apply latex cementitious leveling coat to correct substrate irregularity up to 8 mm (5/16") thickness. Above 8 mm (5/16") correct irregularity by mortar bed method or fast-setting mortar bed method.
  - 3.2.1.4. Ensure substrates are dry.
  - 3.2.1.5. In all cases, structural design of substrate shall not allow a deflection greater than L/360 when tested to 136 kg (300 lb) concentrated loads in accordance with ASTM C627 test method. Deflection and curvature should be uniform over length of the span.
  - 3.2.1.6. Review setting out point with Consultant for each location, verify patterns and edge condition.
  - 3.2.1.7. Verify substrate expansion joints have been installed properly.

### **3.3. INSTALLATION**

- 3.3.1. Provide tiling in accordance with TTMAC's "2019-2021 Tile Installation Manual Specification Guide 09 30 00" unless specified otherwise.
- 3.3.2. Lay out tile so field or patterns are centered on wall and floor areas or conform architectural details, so no tile less than 1/2 size occurs. No cut tiles are allowed at finished ceiling level. Align joints in walls, bases and floors, where tile sizes accommodate. Provide uniform joint widths throughout.
- 3.3.3. Prior to installation ensure back of each tile is free of contaminants. Distribute production run variations evenly, maintaining continuity of appearance. When necessary, wipe the back face of stone or tile with a damp towel or cloth to remove dust and residual contaminants.
- 3.3.4. Arrange accessories in tile work so they are spaced evenly, centered with joints and set true with proper and adequate projection conforming to manufacturer's recommendations.
- 3.3.5. Make sure tile has adequate solid backing. Ensure corner and edges are fully supported by bonding material. Avoid slippage. Ensure tile installation has a minimum of 95% bond coverage by backbuttering or other permitted technique.
- 3.3.6. Fit tile units around corners, fittings, fixtures, drains and other built-in-objects to maintain uniform joint appearance. Cut, drill and set anchors, bolts for fastening fixtures and fittings in tile work. Make cut edges smooth, even and free from chipping. Do not split tile.

- 3.3.7. Grout to match colour of tile unless indicated otherwise. Fill joints.
- 3.3.8. Expansion and Control Joints:
  - 3.3.8.1. Carry existing movement joints all the way through from substrate surface layer including tiling surface. Ensure control and expansion joints are kept free of setting materials.
  - 3.3.8.2. Install control joints where tiling abuts restraining surfaces, around perimeter of work (and or panel) and at base of columns and curbs.
  - 3.3.8.3. Install and space expansion and control joints in accordance with following:
    - 3.3.8.3.1. interior: 4878 mm (16') to 6098 mm (20') in each direction with minimum joint width of 6 mm (1/4").
    - 3.3.8.3.2. interior exposed to direct sunlight or moisture: 2439 mm (8') to 3659 mm (12') in each direction with minimum joint width of 6 mm (1/4").
  - 3.3.8.4. Caution: Under no circumstances cut in control joints after tiling has been installed. Install tiling up to movement joint and stop. If required, cut tiling and resume setting from opposite side of the joint. Before continuing, rake joint clean.
  - 3.3.8.5. Install a permitted compressible bead and specified sealant to caulk expansion and control joints. Follow sealant manufacturer's installation instructions or install preformed proprietary brand control joint profiles as specified.
- 3.3.9. Waterproofing Membrane:
  - 3.3.9.1. Provide waterproofing membrane to following decks, floors, walls, steps and ramps:
    - 3.3.9.1.1. showers.
  - 3.3.9.2. Provide waterproofing membrane as follows:
    - 3.3.9.2.1. Apply membrane minimum 0.508 mm (20 mils) dry film. Apply fibreglass cloth reinforcement. Apply membrane minimum 0.508 mm (20 mils) dry film. Allow 24 hours cure time.
    - 3.3.9.2.2. Apply membrane liberally, minimum 0.508 mm (20 mils) dry film. Allow 5 Day cure time.
  - 3.3.9.3. Conduct hydrostatic water pressure test minimum 24 hours. No water loss allowed, except due to evaporation.
  - 3.3.9.4. Repair and retest if required.
- 3.3.10. Uncoupling Membrane:
  - 3.3.10.1. Apply a thin-set mortar suitable for substrate (mixed to a fairly fluid consistency, but still able to hold a notch) using uncoupling membrane manufacturer's recommended trowel.
  - 3.3.10.2. Apply uncoupling membrane to floor, fleece side down. Solidly embed uncoupling membrane into thin-set mortar using a float, screed trowel or manufacturer's recommended roller.
  - 3.3.10.3. When using a roller, place weight not to exceed 34 kg (75 lbs) on roller shelf. Slowly move roller from 1 end of uncoupling membrane to other, slightly overlapping successive passes.
  - 3.3.10.4. Lift up a corner of uncoupling membrane to check coverage. Proper installation results in full contact between fleece webbing and thin-set mortar. Simply abut end and side sections of adjacent sheets.
- 3.3.11. Tile:
  - 3.3.11.1. Provide setting bed in accordance with manufacturer's printed instructions and as specified herein.
  - 3.3.11.2. Prepare gypsum board and cement board surfaces, by applying a scratch coat of setting bed material.
  - 3.3.11.3. Provide setting compound in 1 layer with notched trowel to provide a continuous 3 mm to 6 mm (1/8" to 1/4") bed, in accordance with tile manufacturer's written instructions.

- 3.3.11.4. Place tiles to achieve uniform:
  - 3.3.11.4.1. shading.
  - 3.3.11.4.2. colouring.
  - 3.3.11.4.3. jointing.
- 3.3.11.5. Lay tiles in true lines, conforming to lines of building and arrange symmetrically in accordance with Drawing layouts. Review layout and slopes with Consultant prior to setting of tiles.
- 3.3.11.6. When tiles are laid by thin-set method on exterior surfaces, in wet areas or laying large size tiles, achieve minimum of 95% coverage. Ensure bonding is notched in horizontal straight lines. Lay tile on freshly notched thin-set mortar, slide tile back and forth at 90 degree to notches. Ensure tiles are set while bond coat is wet and in tacky stage without skin. Provide back buttering by applying thin troweled coat to back side of tile using flat side of trowel immediately before laying to achieve minimum 95% adhesion for exterior work, or large tile area or wet areas.
- 3.3.11.7. Tile Joints: Space tile with minimum 3 mm (1/8") width joints when grouting with epoxy grout. No butt joints are permitted.
- 3.3.11.8. Lippage: Conform to paragraph 4.3.7 of ANSI A108.02.
- 3.3.11.9. Lay out work to produce a symmetrical pattern with minimum amount of cutting. Ensure cut tile at room perimeter is not less than 1/2 full size.
- 3.3.11.10. Provide slopes to floor drains using levelling bed material.
- 3.3.11.11. Set wall tile in a true vertical plane with edges of tiles flush with each other.
- 3.3.11.12. Set floor tile flat and level, with uniform joints throughout, properly aligned. Provide uniform slopes to floor drains.
- 3.3.11.13. Neatly and closely fit tiles around pipes, accessories and other items occurring in floor and walls. Provide necessary cutting without marring tile.
- 3.3.11.14. Replace cracked, discoloured, chipped and damaged tile.
- 3.3.11.15. Align joints of floor, wall and base tiles.
- 3.3.12. Grouting:
  - 3.3.12.1. Where tiling or stone tiling is installed with normal setting thin-set mortar, grout no sooner than 24 hours after installation.
  - 3.3.12.2. Where tiling or stone tiling is installed with reactive epoxy mortars and adhesives, grout no sooner than 24 hours after installation.
  - 3.3.12.3. Install epoxy grouts in accordance with Product instructions, ANSI A108.6 and ANSI A108.10.

#### **3.4. SITE QUALITY CONTROL**

- 3.4.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.
- 3.4.2. Manufacturer Services: Have manufacturer's representative visit site at commencement of tile work to give proper direction and thereafter at regular interval to ensure proper workmanship.

#### **3.5. CLEANING**

- 3.5.1. Remove grout and mortar residue immediately while work progresses and before materials harden on tiling surface.
- 3.5.2. Clean tiling completely leaving no apparent cement laitance on the surface. Do not acid wash especially where pigmented grouts are specified.
- 3.5.3. Clean adjacent surfaces that have been soiled or otherwise marred, to completely remove evidence of materials causing same.



- 3.5.4. Upon completion, remove protective coverings and clean down finished work of this Section leaving it in a correct condition according to industry standards. Correct defective jointing and grouting and other non-conformities.

**3.6. PROTECTION**

- 3.6.1. Protect other parts of work from spatters, stains or damage.
- 3.6.2. Remove and replace with new materials, sections of work that have become stained, soiled, broken, chipped or otherwise damaged.
- 3.6.3. Protect finished work from weather, freezing and complete water immersion for periods of at least 72 hours to 14 Days after completion of the Work depending on setting and grouting materials used. Follow Product instructions for requirements.
- 3.6.4. Walls: Protect walls from impact, vibration and hammering on adjacent and opposite walls for periods of at least 24 hours to 7 Days after installation depending on setting and grouting materials used. Follow Product instructions for requirements.
- 3.6.5. Floors: Protect floors from foot traffic for at least 4 hours to 48 hours after installation depending on the setting and grouting materials used. In all cases prohibit heavy commercial and equipment traffic for at least 48 hours to 7 Days depending on setting and grouting materials used. Follow product instructions for requirements.
- 3.6.6. Since temperature and humidity conditions during and after installation affect final curing time of cement based and epoxy materials, allow for extended periods of cure and protection when ambient and/or substrate temperatures drop below 15 deg C (60 deg F) and/or when relative humidity is higher than 70%.
- 3.6.7. Protect finished work from damage by other trades and general abuse until Substantial Performance of the Work and.

**3.7. ATTACHMENTS**

- 3.7.1. Schedules:
- 3.7.1.1. Install tiles according to TTMAC's "2019-2021 Tile Installation Manual Specification Guide 09 30 00".
- 3.7.1.2. Expansion and Control Joints: Movement Joints for Tile Installations: TTMAC Detail 301MJ-2019-2021.
- 3.7.1.3. Wall Tile:
- 3.7.1.3.1. Tile Installed Over Masonry or Concrete Walls - Thin-Set Method: TTMAC Detail 303W-2019-2021; Interior/Exterior.
- 3.7.1.3.2. Tile Installed on Coated Glass Mat Backer Board: TTMAC Detail 305W-2019-2021 Detail B - Interior Wet/Dry Areas.
- 3.7.1.3.3. Tile Installed Over Coated Glass Mat Backer Board: TTMAC Detail 306W-2019-2021 Detail B - On Bath Tub/Walls - Thin-Set Method Interior Only.
- 3.7.1.3.4. Large Format Tile On Interior Walls: TTMAC Detail 330LFTW-2019-2021.
- 3.7.1.4. Floor Tile:
- 3.7.1.4.1. Tile Over Mortar Bed with Cleavage Membrane Interior Only: TTMAC Detail 309F-2019-2021.
- 3.7.1.4.2. Tile Bonded to Concrete Slab - Thin-Set Method, TTMAC Detail 311F-2019-2021; Detail A Interior/Exterior.
- 3.7.1.4.3. Tile Bonded to Concrete Slab - Thin-Set Method, TTMAC Detail 311F-2019-2021; Detail B - Epoxy Method Interior Only.

- 3.7.1.4.4. Tile Bonded to Concrete Slab - Thin-Set Method, TTMAC Detail 311F-2019-2021; Detail D - Uncoupling Over Green/Young Concrete.
- 3.7.1.4.5. Large Format Tile On Interior Floors: TTMAC Detail 329LFT-2019-2021.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide tactile warning surfacing including but not limited to following:
  - 1.2.1.1. cast-in-place tactile warning surfacing.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Filling and sealing of sawcut joints in concrete slab: Section 03 35 13, Concrete Floor Finishing.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. SDS: Safety Data Sheet.

**1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Preinstallation Meetings: Arrange preinstallation meeting 1 week before commencing work with all parties associated with trade as designated in Contract Documents or as requested by Consultant. Presided over by Construction Manager, include Consultant who may attend, Trade Contractor performing work of this trade, Owner's representative, testing company's representative and consultants of applicable discipline. Review Contract Documents for work included under this trade and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of work of this Section.

**1.5. SUBMITTALS**

- 1.5.1. Product Data: Submit Product data on tactile warning surfacing; clearly indicate specific items proposed for use if manufacturer's catalogues are submitted.
- 1.5.2. Samples: Submit samples in accordance with Section 01 30 00. Submit following samples in sizes indicated:
  - 1.5.2.1. cast-in-place tactile surfacing 300 mm (12") square.

**1.6. CLOSEOUT SUBMITTALS**

- 1.6.1. Operational and Maintenance Data: Submit 3 copies of Product maintenance manual to Consultant prior to completion of the Work. Ensure manual contains specific maintenance recommendations and gives specific warning of any maintenance practice or materials which may damage or disfigure tactile warning surfacing.

**1.7. MAINTENANCE MATERIAL SUBMITTALS**

- 1.7.1. Extra Stock Materials: Leave 2 extra tiles of each type of tactile warning surfacing specified for Owner's future maintenance use. Supply tactile warning surfacing from same production run as installed. Execute Section 00 65 37.

**1.8. QUALITY ASSURANCE**

- 1.8.1. Qualifications:
- 1.8.1.1. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.
- 1.8.2. Mock-Ups: Construct minimum 10 m<sup>2</sup> (100 sq ft) mock-up sample at Project location designated by Consultant for review. Once reviewed with no objection recorded, sample remains part of finished work and used as a quality reference standard for balance of Project.

**1.9. DELIVERY, STORAGE AND HANDLING**

- 1.9.1. Delivery and Acceptance Requirements:
- 1.9.1.1. Deliver materials in good condition to site in manufacturer's original unopened containers that bears name and brand of manufacturer, Project identification, shipping and handling instructions.
- 1.9.1.2. Deliver flooring material in a manner to avoid deterioration, staining or any other damage.
- 1.9.1.3. Deliver packaged floor preparation and adhesive materials in their original bags or containers clearly identified; keep containers sealed and labels intact until time of use. Prevent damage or contamination to materials by water, moisture, freezing, excessive heat, foreign matter or other causes.
- 1.9.1.4. Deliver materials on site at least 24 hours before work begins.
- 1.9.2. Storage and Handling Requirements:
- 1.9.2.1. Store and handle flooring material in a manner to avoid deterioration, staining or any other damage.
- 1.9.2.2. Store packaged floor preparation and adhesive materials in their original bags or containers clearly identified; keep containers sealed and labels intact until time of use. Prevent damage or contamination to materials by water, moisture, freezing, excessive heat, foreign matter or other causes. If materials are frozen, do not stir any such liquids or adhesives until they are completely thawed.
- 1.9.2.3. Provide secure heated and dry storage facilities on site. Maintain temperature in storage area between 18 deg C (65 deg F) and 38 deg C (100 deg F).
- 1.9.2.4. Store materials on site at least 24 hours before work begins.

**1.10. SITE CONDITIONS**

- 1.10.1. Ambient Conditions:
- 1.10.1.1. Maintain appropriate environmental conditions and protect work during and after installation. Comply with trade standards and manufacturer's Product instructions. Follow Product SDS and label instructions concerning safety, health and other related precautionary and environmental protection. Comply with applicable federal, provincial, local and statutory regulations.
- 1.10.1.2. Close doors and windows. Turn off radiant floor heating systems and protect work area from direct draft, sun and heat exposure during installation and for at least 72 hours after completion.
- 1.10.1.3. When necessary, build a temporary shelter and use indirect auxiliary heaters to maintain an adequate temperature level in work environment.

- 1.10.1.4. Exhaust temporary heaters to building exterior to prevent health hazards and damage to work from toxic fumes and emanations.
- 1.10.1.5. Maintain temperature of floor covering areas at not less than 18 deg C (65 deg F) or more than 38 deg C (100 deg F) 48 hours before, during installation and for 48 hours after application unless otherwise required in Product instructions.

**1.11. WARRANTY**

- 1.11.1. Manufacturer Warranty: Warrant work of this Section for period of 5 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to; buckling, opening of seams, bond failure and extensive colour fading.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
  - 2.1.1.1. AccessTile; [www.accesstile.com](http://www.accesstile.com)
  - 2.1.1.2. Engineered Plastics Inc.; [www.armor-tile.com](http://www.armor-tile.com)
  - 2.1.1.3. Kinesik Engineered Products Incorporated; [www.kinesik.ca](http://www.kinesik.ca)
- 2.1.2. Substitution Limitations: Comparable Products from other manufacturers not listed herein may be reviewed provided they meet requirements of this Specification.

**2.2. MATERIALS**

- 2.2.1. Cast-in-Place Tactile Warning Surfacing: Provide 1 of following:
  - 2.2.1.1. Polymer Type:
    - 2.2.1.1.1. Provide 5 mm thick polymer based tactile walking surface indicator with 5 mm high truncated domes in colour selected later by Consultant. Permitted Products: "Eon® Tile" by Kinesik Engineering Products Incorporated or "Intelligent Design™ Cast In Place Replacement" by AccessTile.
    - 2.2.1.1.2. Provide vitrified polymer composite based tactile walking surface indicator with raised truncated domes in colour selected later by Consultant. Permitted Product: "Armor-Tile™ Cast in Place" by Engineered Plastics Inc.
    - 2.2.1.1.3. Provide fire resistant vitrified polymer composite based tactile walking surface indicator with raised truncated domes in colour selected later by Consultant. Permitted Product: "Access Tile® FR Cast in Place" by Kinesik Engineered Products Incorporated.

**PART 3 - EXECUTION**

**3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.2. INSTALLATION**

- 3.2.1. Install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.
- 3.2.2. Place tactile warning surfacing units in dimensions and orientation indicated on Drawings.

**3.3. SITE QUALITY CONTROL**

- 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.4. CLEANING**

- 3.4.1. Remove protective plastic sheeting from detectable warning tiles within 24 hours of installation.
- 3.4.2. Clean tiles not more than 4 Days prior to date scheduled for inspection intended to establish Date of Substantial Performance in each area of the Project.

**3.5. PROTECTION**

- 3.5.1. Protect detectable warning tiles against damage during construction period to comply with tile manufacturer's specifications.
- 3.5.2. During and after detectable warning tile's installation and concrete curing stage, it is imperative no walking, leaning, or external forces are placed on tile to rock tile, causing a void between underside of tile and concrete substrate.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide painting including but not limited to following:
  - 1.2.1.1. surface preparation of substrate: abrasive blasting, cleaning and preparation of surfaces for application of paint systems.
  - 1.2.1.2. exterior priming and painting of:
    - 1.2.1.2.1. hollow metal doors and frames.
    - 1.2.1.2.2. overhead doors and frames.
    - 1.2.1.2.3. steel stair handrails, supports, ladders and cages.
    - 1.2.1.2.4. pipe bumpers.
    - 1.2.1.2.5. exposed surfaces in underground parking areas and components on walls and soffits.
    - 1.2.1.2.6. miscellaneous trims.
    - 1.2.1.2.7. miscellaneous mechanical, electrical and plumbing penetrations to exterior.
    - 1.2.1.2.8. shop primed materials of other Sections.
  - 1.2.1.3. interior priming and painting of:
    - 1.2.1.3.1. exposed building surfaces indicated on Room Finish Schedule or on Drawings.
    - 1.2.1.3.2. hollow metal doors and frames.
    - 1.2.1.3.3. overhead doors and frames, tracks, brackets, fenders and supplementary steel supports.
    - 1.2.1.3.4. wood doors including trim of lites in same doors.
    - 1.2.1.3.5. borrowed lite frames.
    - 1.2.1.3.6. exposed miscellaneous metal and steel items for work of other trades, including hangers, screws, supports, etc.
    - 1.2.1.3.7. steel stair railings.
    - 1.2.1.3.8. gypsum board walls, ceilings, bulkheads and other enclosures.
    - 1.2.1.3.9. telephone closet backboards.
    - 1.2.1.3.10. access panels and doors.
    - 1.2.1.3.11. wood fitments unless plastic laminated as noted.
    - 1.2.1.3.12. conduit, piping, ductwork, light panels, etc. exposed to view in areas listed in Room Finish Schedule or on Drawings.
    - 1.2.1.3.13. natural gas piping.
    - 1.2.1.3.14. finish painting of prime painted diffusers, registers and grilles in exposed locations.

- 1.2.1.3.15. shop primed materials of other Sections.
- 1.2.1.3.16. exposed surfaces of open ceilings including, structure, ducts, mechanical and electrical items, hangers, screws, miscellaneous metals, etc.
- 1.2.1.3.17. exposed surfaces behind mechanical louvres and grilles.
- 1.2.1.3.18. pipes, conduits, ducts and thermal insulation covers on ducts in rooms where walls and/or exposed ceilings are painted except mechanical/ electrical plant rooms.
- 1.2.1.4. provision of materials, labour and equipment required to complete painting work and ancillary work described and implied herein to full intent of Drawings and Schedules.
- 1.2.1.5. waste management and disposal of paint, stain and wood preservatives and other related hazardous materials.
- 1.2.2. Section Excludes: Painting of:
  - 1.2.2.1. pre-finished metal siding, fascia and soffit, coping cap flashing and similar components.
  - 1.2.2.2. chrome, stainless steel, vinyl, plastic laminate and aluminum surfaces throughout unless specified otherwise.
  - 1.2.2.3. primed and finish painted equipment supplied by manufacturer unless required to be field painted in 1 common corporate colour as identified in Room Finish Schedule or on Drawings.
  - 1.2.2.4. areas indicated as “unfinished” or “exposed” on Room Finish Schedule or on Drawings.
  - 1.2.2.5. special finishes for cast-in-place concrete.
  - 1.2.2.6. sealers over concrete.
  - 1.2.2.7. shop priming of steel including structural steel, joists and steel decking, metal fabrications and custom metal work.
  - 1.2.2.8. shop priming and finishing of finish woodwork.
  - 1.2.2.9. pre-finishing of wood doors and frames.
  - 1.2.2.10. electrostatic painting (powder coating).
  - 1.2.2.11. fluoropolymer thermal setting enamels or other organic coatings.
- 1.2.3. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.3.1. Surface preparation including cleaning, small crack repair, patching, caulking and Making Good surfaces and areas as required in cast-in-place concrete to be painted: Section 03 30 00, Cast-in-Place Concrete.
  - 1.2.3.2. Surface preparation and shop priming of miscellaneous metal work: Section 05 50 00, Metal Fabrications.
  - 1.2.3.3. Wood preservative or fire retardant treatment for rough carpentry: Section 06 10 00, Rough Carpentry.
  - 1.2.3.4. Priming and/or back painting of wood: Section 06 10 00, Rough Carpentry.
  - 1.2.3.5. Shop priming of steel doors, frames and screens: Section 08 11 13, Hollow Metal Doors and Frames.
  - 1.2.3.6. Shop priming of sectional overhead doors: Section 08 36 13, Sectional Overhead Doors.
  - 1.2.3.7. Back painting of glass or glass units: 08 80 00, Glass and Glazing.
  - 1.2.3.8. Instructions on painting, stenciling and banding of mechanical and electrical work: Division 22, Plumbing, Division 23, Heating, Ventilating and Air Conditioning and Division 26, Electrical.
  - 1.2.3.9. Factory assembled pre-finished roof mounted air handling and air conditioning equipment: Division 23, Heating, Ventilating and Air Conditioning.



- 1.2.3.10. Zone and traffic pavement markings: Section 32 17 23, Pavement Markings.
- 1.2.3.11. Prime and finish coats applied by other Sections. Read carefully other Sections of Specifications to determine extent thereof.

### **1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. DFT: Dry Film Thickness.
  - 1.3.1.2. MPI: The Master Painters Institute; [www.paintinfo.com](http://www.paintinfo.com).
  - 1.3.1.3. OPCA: Ontario Painting Contractors Association; [www.ontpca.org](http://www.ontpca.org).
  - 1.3.1.4. PDCA: Painting and Decorating Contractors of America; [www.pdca.org](http://www.pdca.org).
  - 1.3.1.5. SDS: Safety Data Sheets.
  - 1.3.1.6. SSPC: The Society for Protective Coatings (formerly known as Steel Structures Painting Council); [www.sspc.org](http://www.sspc.org).
  - 1.3.1.7. TSP: Tri-sodium Phosphate.
  - 1.3.1.8. VOC: Volatile Organic Compound.
- 1.3.2. Definitions:
  - 1.3.2.1. Exposed: Visible in completed work. In case of closets, cabinets and drawers, it includes their interiors. Exposed surfaces in underground parking areas are considered "Exterior" for purpose of this Specification. Exposed surfaces in aboveground parking areas are considered "Interior" for the purpose of this Specification.
  - 1.3.2.2. Gloss or Sheen: Capacity of a finish on a surface to reflect light at specific angles as tested in accordance with ASTM D523.
  - 1.3.2.3. Hazardous Waste: Construction and demolition materials that are regulated for disposal by local, city, county, province or federal authorities having jurisdiction.
  - 1.3.2.4. Painting: In this Section refers to application of various types of paint, stain, varnishes and lacquers, etc.
  - 1.3.2.5. Surface Preparation: Cleaning or treating of surface to be painted to ensure best possible bond between surface and painting to be applied to surface; remove surface contaminants that will affect performance of painting, without limitations such as oil, grease, salts, dust, dirt, rust, rust scale, mill scale and old coatings where applicable; remove surface imperfections without limitation including but not limited to such as weld spatter, sharp edges, burrs, slivers, laminations, pits, porosities and crevices; prepare surfaces to provide anchor profile or surface profile which improve mechanical bonding of coating to prepared surface by increasing surface area.
- 1.3.3. Reference Standards:
  - 1.3.3.1. ASTM D523-14(18) - Standard Test Method for Specular Gloss
  - 1.3.3.2. MPI Painting Manual-07 - The Master Painters Institute – Architectural Painting Specification Manual by PDCA
  - 1.3.3.3. MPI Approved – The Master Painters Institute – Approved Products List Products List (Includes United States, Canada and International Editions), January 2012
  - 1.3.3.4. SSPC-08 - Systems and Specifications - Steel Structures Painting Manual, Volume 1 & 2

**1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Preinstallation Meetings:
- 1.4.1.1. Review Drawings, details and Schedules, determine intent, extent, materials, types of surfaces, locations and be fully cognizant of intent of Work. Review Product literature, SDS, related safety data, proper disposal requirements and inform those involved in work of this Section.
- 1.4.1.2. Review Specifications and Drawings for work of other Sections regarding provisions for prime and finish coats and ensure compatibility with each other and substrate prior to application.
- 1.4.1.3. Prior to start of work, arrange for Project site meeting of parties associated with Work of this Section. Presided over by Construction Manager, include Consultant, Trade Contractor, manufacturer's representative, any sub-trades whose work will be painted (including Mechanical and Electrical trades) or whose work is adjacent to, or whose work or schedule may be affected by work of this Section.
- 1.4.1.4. Review Specification for work included under this Section and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas requiring painting and other matters affecting construction, to permit compliance with intent of this Section.
- 1.4.2. Scheduling: Schedule painting operations to prevent disruption of and by other trades. Ensure painting is completed for locations requiring application of finishes by other trades in a timely fashion to prevent delays.

**1.5. SUBMITTALS**

- 1.5.1. Product Data:
- 1.5.1.1. Submit Product data conforming to Section 01 70 00 and submit a Schedule of Finishes listing manufacturer's Product name, colour, textures, SDS and test reports requested for each paint system. Submit test reports for odourless, low or zero VOC Products when specified.
- 1.5.1.2. Painting Trade Contractor to receive written confirmation of specific surface preparation procedures and primers used for fabricated steel items from fabricator/supplier to ensure appropriate and manufacturer compatible finish coat materials prior to commencement of painting.
- 1.5.1.3. Submit Product data for concrete and concrete block primers.
- 1.5.2. Samples: Submit samples 30 Days before materials are required in accordance with Section 01 30 00. Submit following samples in sizes indicated:
- 1.5.2.1. 3 copies of brushouts minimum 200 mm x 250 mm (8" x 10") of each finish including colour, sheen and texture required at least 30 Days prior to commencement of application. Identify each sample with job, finish, colour name, number, sheen and gloss values, substrate to be applied to, date and name of Trade Contractor.

	<b>Substrate</b>	<b>Sample, Base Material</b>
1.5.2.1.1.	Masonry	Face of typical unit
1.5.2.1.2.	Gypsum Board	Face of typical unit
1.5.2.1.3.	Metal	Steel Plate
1.5.2.1.4.	Woodwork	Wood
1.5.3.	Certificates: Surface Preparation: Submit manufacturer's representative's written approval of surface preparation methods and any specific recommendations for alternative methods.	

- 1.5.4. Site Quality Control Submittals:
- 1.5.4.1. Submit site instruction reports in accordance with Section 01 30 00 containing information required by this Section.
- 1.5.4.2. Progress Reports: Submit in accordance with Section 01 30 00. Arrange to have paint manufacturer's representative inspect work of this Section on a regular basis and prepare weekly job progress reports. Submit copy of reports to Consultant.

**1.6. CLOSEOUT SUBMITTALS**

- 1.6.1. Operation and Maintenance Data: Upon completion of Project, submit a coating maintenance manual, such as Sherwin-Williams "Custodian Project Colour and Product Information" report or equal. Ensure manual includes an 'Area Summary' with finish schedule, 'Area Detail' designating where each Product/colour/finish was used, Product data pages, SDS, care and cleaning instructions, touch-up procedures and colour samples of each colour and finish used.

**1.7. MAINTENANCE MATERIAL SUBMITTALS**

- 1.7.1. Extra Stock Materials: Submit to Owner 3% but not less than 1 - 4 l (1 gal) can of each different type and colour and degree of gloss of paint used (batch mix) on this Project for touch-ups. Ensure paint is boxed and in sealed, unopened cans in undamaged condition, with name of manufacturer, contents, type and colour clearly indicated on a label securely adhered to can. Give to Consultant at time of final inspection.

**1.8. QUALITY ASSURANCE**

- 1.8.1. Qualifications:
  - 1.8.1.1. Applicators:
    - 1.8.1.1.1. Execute work of this Section by a firm which has adequate plant, equipment and skilled workers to perform work expeditiously and which is known to have been responsible, during immediate past 5 years, for installations similar to work contained herein. Ensure firm is fully conversant with applicable laws, bylaws, codes, fire, health and safety regulations and other regulations which govern.
    - 1.8.1.1.2. Provide work of this Section executed by competent applicators with membership in good standing in OPCA and/or PDCA and have a minimum of 5 years experience in application of Products, systems, coatings and assemblies specified and with approval and training of Product manufacturers.
    - 1.8.1.1.3. Ensure materials, preparation and workmanship conforms to requirements of MPI Painting Manual.
  - 1.8.2. Certifications: Ensure paint manufacturers and Products used are listed under Approved Product List section of MPI Painting Manual.
  - 1.8.3. Mock-Ups:
    - 1.8.3.1. Provide mock-up at location established by Consultant, complete with required lighting. Mock-up to establish standard of workmanship, texture, gloss and coverage.
    - 1.8.3.2. Apply minimum 300 mm x 300 mm (12" x 12"), or where required, full size mock-up of each finish on each type of surface to be coated with correct material, number of coats, colour, texture and degree of gloss required.
    - 1.8.3.3. Provide additional mock-ups of each finish in modified colour, texture or degree of gloss when required, to obtain no objections.
    - 1.8.3.4. Prepare surfaces and apply treatment to galvanized or other components as required for Consultant's review. Do no painting until mock-ups have been reviewed with no objections recorded.

- 1.8.3.5. Reviewed mock-up to become standard of comparison for painting work on site. Correct and refinish work which does not compare with reviewed finishes at no expense to Owner.
- 1.8.3.6. Reviewed full size mock-up may become integral part of finished work if permitted by Consultant.

**1.9. DELIVERY, STORAGE AND HANDLING**

- 1.9.1. Delivery and Acceptance Requirements:
  - 1.9.1.1. Deliver to site, materials manufacturer's original, sealed and labeled containers bearing manufacturer's name, brand name, type of paint or coating and colour designation, degree of gloss, batch number, standard compliance, materials content as well as mixing, reducing and application requirements.
  - 1.9.1.2. Manufacturer to certify, materials delivered to site conform to approved list.
- 1.9.2. Storage and Handling Requirements:
  - 1.9.2.1. Store on site, materials in manufacturer's sealed and labeled containers.
  - 1.9.2.2. Comply with applicable local fire and building code requirements during storage and application.
  - 1.9.2.3. Store containers of paint, thinner and other volatile materials in secure, well ventilated location, heated to minimum 10 deg C (50 deg F), where they will not be exposed to excessive heat or direct solar radiation. Keep tightly closed when not in actual use.
  - 1.9.2.4. Presence of any unauthorized materials or containers on site is sufficient cause for rejection of paint materials on site at that time.
  - 1.9.2.5. Protect floor and wall surfaces in storage areas from paint drips and splatters.
  - 1.9.2.6. Be totally responsible for prevention of fire or explosion caused by improper storage of paints, solvents, rags and similar items. Store fire hazardous materials in location and in manner approved by local fire authority. Post "No Smoking" signs in areas of storage and mixing and strictly enforce this requirement. Provide and maintain CO<sub>2</sub> fire extinguishers of minimum 9 kg (20 lb) capacity. Repair damage to storage area or surrounding area at no cost to Owner.
  - 1.9.2.7. Where toxic, volatile, explosive, flammable materials are used, provide adequate fireproof storage lockers and take necessary precautions and post adequate warnings (eg "No Smoking" signs) as required.

**1.10. SITE CONDITIONS**

- 1.10.1. Ambient Conditions:
  - 1.10.1.1. Paint and finish in clean, dust-free, properly ventilated and adequately lit areas minimum 323 Lx (30 ft candles) on surfaces to be painted or decorated.
  - 1.10.1.2. Provide each paint materials in accordance with manufacturer's recommended tolerances for:
    - 1.10.1.2.1. Substrate Moisture Content: Perform tests with a properly calibrated electronic moisture meter to ensure compliance with manufacturer's recommendations. Without limitation, maximum moisture content as follows:
      - 1.10.1.2.1.1. Concrete and Concrete Unit Masonry: Maximum 12 - 14% for solvent coatings and as recommended by manufacturer for each water based system.
      - 1.10.1.2.1.2. Gypsum Based Board: Maximum 12 - 14%.
      - 1.10.1.2.1.3. Wood: Maximum 15%.
    - 1.10.1.3. Temperature and Ventilation:
      - 1.10.1.3.1. Do not provide paint under ambient and surface temperatures less those required below in any instance for 24 hours before, during and 7 Days after installation.
      - 1.10.1.3.2. Provide ventilation to remove odours, evaporating solvents and moisture. Maintain adequate ventilation at all times to control excessive humidity.

- 1.10.1.3.3. Interior Paint:
- 1.10.1.3.3.1. Water Based Paints: Maintain minimum interior surface and ambient air temperature of between 18 deg C (65 deg F) and 32 deg C (90 deg F) during application and drying of paint and maintain until building occupancy occurs.
- 1.10.1.3.3.2. Solvent Based Paints: Maintain minimum interior surface and ambient air temperature of between 7 deg C (45 deg F) and 35 deg C (95 deg F) during application and drying of paint and maintain until building occupancy occurs.
- 1.10.1.3.3.3. Do not undertake interior painting on surfaces where condensation has or will form due to presence of high humidity and lack of proper ventilation.
- 1.10.1.3.4. Exterior Paint:
- 1.10.1.3.4.1. Do not undertake exterior painting if air and surface temperature are expected to fall below 10 deg C (50 deg F) before coating has dried. Avoid painting during winds, weather conditions which may affect paint application or following rain. Wait until frost, dew or condensation has evaporated. Avoid painting surfaces exposed directly to hot summer sun.
- 1.10.1.3.4.2. Do not apply paint in snow, rain, fog or mist or when relative humidity exceeds 85% or dew point is less then 3 deg C (5 deg F) difference between air and surface temperature, or damp or wet surfaces unless surface to be painted is enclosed and conditioned to required temperatures and ambient conditions required for application.
- 1.10.1.3.4.3. Where required, suitable weatherproof covering and sufficient heating facilities are to be provided which will enable required ambient and surface temperatures.

## **PART 2 - PRODUCTS**

### **2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
  - 2.1.1.1. Benjamin-Moore & Co., Limited; [www.benjaminmoore.com](http://www.benjaminmoore.com)
  - 2.1.1.2. Dulux Paints; [www.dulux.ca](http://www.dulux.ca)
  - 2.1.1.3. Para Paints; [www.para.com](http://www.para.com)
  - 2.1.1.4. Pittsburgh Paints; [www.pittsburghpaints.com](http://www.pittsburghpaints.com)
  - 2.1.1.5. The Sherwin-Williams Company; [www.sherwin-williams.com](http://www.sherwin-williams.com)
- 2.1.2. Substitution Limitations: Comparable Products from other manufacturers not listed herein may be reviewed provided they meet requirements of "MPI Approved Products List" and this Specification.
- 2.1.3. Source Limitations: Provide primers for each coating system from same manufacturer as finish coats.

### **2.2. MATERIALS**

- 2.2.1. Description:
  - 2.2.1.1. Regulatory Requirements:
    - 2.2.1.1.1. Conform to latest edition of Industrial Health and Safety Regulations issued by applicable authorities having jurisdiction in regard to site safety (ladders, scaffolding, ventilation, etc.).
    - 2.2.1.1.2. Comply with more stringent of applicable laws, bylaws, codes, fire regulations, health and safety regulations of authorities having jurisdiction or requirements of this Specification. Ensure standards used for work of this Section are considered a minimum.

- 2.2.1.1.3. Where required, ensure paints and coatings meet flame spread and smoke developed ratings designated by local code requirements and/or authorities having jurisdiction.
- 2.2.1.1.4. Comply with toxic trace limitations stipulated by authorities having jurisdiction.
- 2.2.1.1.5. Conform to requirements of local authorities having jurisdiction in regard to storage, mixing, application and disposal of paint and related waste materials.
- 2.2.2. Performance/Design Criteria:
  - 2.2.2.1. Provide best practices specified or recommended in MPI Painting Manual.
  - 2.2.2.2. Consultant reserves right to refuse any paint or finishing material if in its opinion it is not suitable or adequate for proposed use.
  - 2.2.2.3. Paint material containers not displaying manufacturer's Product identification will not be permitted. Ensure paint is not diluted.
  - 2.2.2.4. Use brand of paint chosen throughout work of this Section, except where specified otherwise. As far as practical, factory mix paint for immediate application without thinning or alteration at site.
  - 2.2.2.5. Provide primers in recommended DFT/coat.
  - 2.2.2.6. Only materials (primers, paints, coatings, varnishes, stains, lacquers, etc.) listed in MPI Approved Product List are permitted for use on this Project.
  - 2.2.2.7. Provide other materials such as linseed oil, shellac, thinners, solvents, etc. of highest quality Product of an MPI listed manufacturer and be compatible with paint materials being used as required.
  - 2.2.2.8. Ensure materials used are lead and mercury free and have low VOC content where possible.
  - 2.2.2.9. Provide paint materials with good flowing and brushing properties and dry or cure free of blemishes, sags, air entrapment, etc.
  - 2.2.2.10. Paint materials which from time to time will become hot, such as convector covers and similar item, a paint type approved by paint manufacturer for particular condition.
- 2.2.3. Finishes:
  - 2.2.3.1. Colours: To be selected by Consultant from manufacturer's full range of colours.
  - 2.2.3.2. Gloss Values:
    - 2.2.3.2.1. Walls: Satin (G4) or Semi-gloss (G5)
    - 2.2.3.2.2. Ceilings: Flat or Matte (G1)
    - 2.2.3.2.3. Trim and Doors: Semi-gloss (G5) or Gloss (G6)
    - 2.2.3.2.4. Signage: Flat or Matte (G1)

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions:
  - 3.1.1.1. Do work only when surfaces and conditions are satisfactory for production of quality work. Report to Consultant in writing any surfaces which are found to be unsatisfactory.
  - 3.1.1.2. Ensure temperature of surfaces to be finished are as required for application of finish. Refer to "Temperature and Ventilation" article specified herein. Ensure surfaces are dry and free of dirt, grease or other contaminants that may affect applied finish.
  - 3.1.1.3. Verify moisture content of surfaces with electronic moisture meter. Do not proceed without written directions if moisture reading is higher than as required for application. Refer to "Ambient Conditions" article specified herein for substrate moisture content requirements.

- 3.1.1.4. If substrate is steel, do not apply coatings over moisture or when surface temperature is within 3 deg C (5 deg F) of dew point.
- 3.1.1.5. If substrate is wood, do not stain or paint if moisture reading is higher than 15%. Inspect work to assure surfaces are smooth, free from machine marks and nail heads have been countersunk.
- 3.1.1.6. If substrate is cast-in-place concrete, allow to cure for 60 to 90 Days before proceeding with priming.
- 3.1.1.7. If substrate is masonry, allow to cure for 30 to 90 Days. Ensure moisture content is between 12% and 14% and test for alkalinity and neutralize (pH 6.5 - 7.5) before proceeding with priming.
- 3.1.1.8. If substrate is gypsum board, inspect to ensure joints are completely filled and sanded smooth. Inspect surfaces for "nail popping", screw heads not recessed and taped, breaks in surface or other imperfections and have repaired as required.
- 3.1.1.9. Verify each substrate is dry and not frozen and free from tool and sandpaper marks, dust, rust, insects, grease and other foreign matter liable to impair finished work.
- 3.1.2. Evaluation and Assessment:
  - 3.1.2.1. Prior to commencement of work of this Section, thoroughly examine (and test as required) conditions and surfaces scheduled to be painted and report in writing to Construction Manager and Consultant any conditions or surfaces that will adversely affect work of this Section.
  - 3.1.2.2. Do not commence painting work until adverse conditions and defects have been corrected and surfaces and conditions are acceptable to this Trade Contractor.
  - 3.1.2.3. Commencement of work does not imply acceptance of surfaces except as qualified herein. Surfaces such as concrete, masonry, structural steel and miscellaneous metal, wood, gypsum board and plaster, is not responsibility of this Trade Contractor. Commencement of work implies acceptance of previously completed work.

## **3.2. PREPARATION**

- 3.2.1. Protection of In-Place Conditions:
  - 3.2.1.1. Provide scaffolding, staging, platforms and ladders, as required for execution of work. Erect scaffolding to avoid interference with work of other trades. Comply with Occupational Health and Safety Act.
  - 3.2.1.2. During work of this Section, provide drop cloths, plastic, plywood or metal sheets to protect floors in areas assigned for storage and mixing of paints. Cover finished floors, walls, ceilings and other work in vicinity and protect from paint and damage.
  - 3.2.1.3. Protect work of other trades against paint splattering and Make Good at own expense any such damage.
  - 3.2.1.4. Protect exterior surfaces and areas, including landscaping, walks, drives, adjacent building surfaces (including glass, aluminum surfaces, etc.) and equipment and any door and frame labels and signage from painting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means and Make Good any damage caused by failure to provide such protection.
  - 3.2.1.5. Remove and securely store miscellaneous and finish hardware and surface fittings, electrical switch and outlet covers, receptacle plates, louvers, fittings and fastenings, to protect from paint splatter. Mask items not removable. Use sufficient drop cloths and protective coverings for full protection of floors, furnishings, mechanical, electrical and special equipment, other components of building which do not require painting or to be removed, from paint spotting and other soiling. Carefully clean and re-install items when paint is dry. Clean any components that are paint spotted or soiled. Do not use solvent or reactive cleaning agents on items that will mar or remove finishes (e.g. lacquer finishes).

- 3.2.1.6. Prohibit traffic, where possible, from areas where painting is being carried out and until paint is cured. Post "wet paint" or other warning signage during and on completion of work. Provide also warning signs at points of entry to areas where painting is applied and drying.
- 3.2.2. Surface Preparation:
  - 3.2.2.1. Prepare defective surfaces to obtain a satisfactory substrate and in accordance with paint manufacturer's instructions.
  - 3.2.2.2. Ensure exterior work is not performed during or immediately following rain, frost or dew.
  - 3.2.2.3. Prior to painting, sweep areas dust-free.
  - 3.2.2.4. Clean soiled surfaces to be painted.
  - 3.2.2.5. Remove efflorescence, chalk, dust, dirt, oil, grease, rust, form oil, release agents, loose mill scale and other extraneous matter from surfaces (except rust occurring on items specified to be primed under other Sections be removed and work re-primed under those Sections). Vacuum (fibre acoustic tile and) insulation covering surfaces. Vacuum clean floors before painting; wipe clean adjacent surfaces and surfaces to be painted before work is commenced to prevent dust and debris damage to wet paint.
  - 3.2.2.6. Remove mildew by scrubbing affected area with solution of 150 g (5.3 oz) TSP and 125 g (4.4 oz) bleach in 3.5 ℓ (0.92 gal) water. Rinse well with clean water and allow to dry. If condition is serious, source out finishes with extra mildew resistance.
  - 3.2.2.7. Be responsible for surface preparation to suit surface condition and conform to level of cleaning based on SSPC, recommended metal cleaning procedures most commonly used to suit site conditions.
- 3.2.2.8. Concrete and Masonry:
  - 3.2.2.8.1. Form Oil Removal: Remove with Xylol or TSP.
  - 3.2.2.8.2. Efflorescence Removal: Remove by dry brushing or washing with 1 part commercial muriatic acid to 20 parts water by volume and thoroughly rinse with clean water.
  - 3.2.2.8.3. Mildew Removal: Remove by scrubbing affected area with 1 part sodium hypochlorite to 3 parts water. Where dirt is also evident, add 1.36 kg (3 lbs) TSP to 6.8 ℓ (1.5 gal) of above solution.
  - 3.2.2.8.4. Concrete Vertical Surfaces: Use sand blasting, high pressure water blasting, high pressure water blasting with abrasives, vacuum blasting with abrasives or alternatively, needle guns or power grinders equipped with suitable grinding stone, to remove concrete, loose mortar, fins, projections and surface contaminants. Vacuum or blow down and remove dust and loose particles from surface. Fill large cracks and/or voids in consultation with design engineer using either polyester, epoxy or acrylic resin, block filler or cement sand mixture in accordance with design engineer's written instructions. Fill only flush to surface and allow to set.
  - 3.2.2.8.5. Concrete Block Masonry: Fill voids and cracks in masonry block wall to provide uniform surface for subsequent coats.
- 3.2.2.9. Metals:
  - 3.2.2.9.1. Ensure application of paint and coatings occurs within appropriate time frame after cleaning when environmental conditions encourage flash-rusting, rusting, contamination or manufacturer's paint specifications require earlier applications.
  - 3.2.2.9.2. Ferrous Metal: Clean to SSPC-SP 1/2/3, to suit site conditions. Remove loose rust and prime bare metal with rust inhibitive steel primer. Touch-up damaged shop applied primer using compatible Product. Provide full coat primer only if damage is extensive. Treat weld areas with phosphoric acid (5% solution).
  - 3.2.2.9.3. Structural Steel/Miscellaneous Steel (previously painted and exposed by alterations work): Remove oil, grease, dirt, rust scale, loose mill scale, loose paint or coating by abrasive blasting in accordance with SSPC-SP 6.



- 3.2.2.9.4. Hot Dipped Galvanized Steel (Unweathered): Allow to weather minimum of 26 weeks and Xylene clean to SSPC-SP 1 specified herein prior to coating to remove dust, dirt, grease, oxides and other foreign material. Remove silicates or similar surface treatments or any deposits of white rust by sanding or similar abrasive methods (bronze wool). Use of acetic acid to prepare galvanized surfaces is not permitted.
- 3.2.2.9.5. Galvanized Steel (Weathered): Remove dust, dirt, grease, oxides and other foreign material and clean to SSPC-SP 1 specified herein prior to coating.
- 3.2.2.9.6. Galvanized Steel (Pre-Treated) (Non-Crystal Appearance): Follow manufacturer's recommendations for preparation, priming and coating of pre-treated galvanized steel.
- 3.2.2.9.7. Light Zinc Coated or Satin Coated Products (ZF075) mostly found in environmentally controlled areas. Follow manufacturer's recommendations for preparation, priming and coating.
- 3.2.2.9.8. Heavy Coated Zinc Z275 (G90) for high humidity areas and as specified. Follow manufacturer's recommendations for preparation, priming and coating.
- 3.2.2.9.9. Metal Doors: Remove doors before painting to paint bottom and top edges and re-hang once dry. Do not paint stainless steel or bronze door butts. Paint or finish top and bottom edges of doors. Touch-up or refinish tops and edges after fitting. Exterior doors to have tops, bottoms and side edges finished same as exterior faces to these doors. Paint elevator doors and frames where supplied primed by elevator manufacturer.
- 3.2.2.10. Woodwork:
- 3.2.2.10.1. Verify and determine wood species, grain direction and structure, properties of finish, application method and exposure to elements. Check moisture content to avoid movement of wood caused by expansion and contraction due to changes in moisture content. Verify grain cut as it may interfere with adhesion of paint.
- 3.2.2.10.2. Apply wood finishing Product in following order and as needed for specific appearance and application specified herein. Sanding sealer to control penetration of subsequent coats to create more uniform finish. Stain to colour wood and highlight grain for final finish. Filler to fill pores of wood and control penetration of subsequent coats. Apply filler across grain forcing it into pores followed with rubbing and sanding when dried. For staining requirements mix stain with filler before applying for uniform finish. Finish coats to provide protection to wood.
- 3.2.2.10.3. Woodwork for Opaque Coating: Seal knots and sapwood in surfaces to receive paint with alcohol-based primer-sealer. Seal door edges. Sand smooth rough surfaces of woodwork to be finished using No. 150 grit paper followed by a second sanding using No. 220 grit paper. Sand in direction of grain. Clean surfaces free of dust before applying first coat using brush, compressed air or tack rags. Fill nail holes, splits and scratches with non-shrinking filler after first coat is dry.
- 3.2.2.10.4. Prepare plywood surface by removing dirt and debris. Fill screw and nail holes or minor imperfections with recommended filler and sand properly to receive finish coating. Ensure plywood requiring stained or painted finish is primed with top quality alkyd primer. Use only penetrating quality stain over plywood.
- 3.2.2.10.5. Woodwork for Clear Finish or Stain: Sand smooth woodwork to be finished using No. 150 grit paper followed by a second sanding using No. 220 grit paper and clean surfaces free of dust using brush, compressed air or tack rags before applying first coat. Abrade surfaces with stiff brush to remove loose fibres and splinters. Fill nail holes, splits and scratches with non-shrinking filler tinted to match local grain condition after first coat is dry. Sand lightly between coats with No. 220 grit sandpaper and remove dust.
- 3.2.2.10.6. Remove salt deposits that may appear on wood surfaces treated with fire retarder.
- 3.2.2.10.7. Obtain inspection of glue laminated beams by assigned painting inspector to ensure shop sealer has been applied. Where non-specified shop sealer has been applied to beams or columns, remove and refinish in accordance with manufacturer's written instructions.

- 3.2.2.10.8. Wood Doors: Remove doors before painting to paint bottom and top edges and re-hang once dry. Paint or finish top and bottom edges of doors to be painted or stained. Touch-up or refinish tops and edges after fitting.
- 3.2.2.11. Gypsum Board:
- 3.2.2.11.1. Examine and ensure gypsum board surfaces are without defects or deficiencies and suit able to receive painting applications. Commencement implies acceptance of gypsum board work. Examine surfaces after for imperfections showing through and fill small nicks or holes with patching compound and sand smooth. Examine surfaces after priming for imperfections showing through.
- 3.2.2.11.2. Clean surfaces dry, free of dust, dirt, powdery residue, grease, oil, wax or any other contaminants. Sand and dust as necessary prior to painting and between coats to provide an anchor for next coat and to remove defects visible from a distance up to 1 m (39").

### **3.3. APPLICATION**

- 3.3.1. Safety Precautions: When handling solvent coating materials, wear approved vapour/particulate respirator as protection from vapours. Dust respirators do not provide protection from vapours.
- 3.3.2. Material Compatibility: Provide primers and finish coat materials compatible with each other and substrate including fillers.
- 3.3.3. Mixing and Tinting:
- 3.3.3.1. Unless otherwise specified herein, paint to be ready and factory tinted. Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment and colour and gloss uniformity.
- 3.3.3.2. Mix and prepare paint materials including paste, powder or catalyzed paint mixes in accordance with manufacturer's directions for particular material and coat to be applied to produce a mixture of uniform density. If reducing is required, do so in accordance with recommendations of manufacturer for particular material and coat.
- 3.3.3.3. Where thinner is used, addition is not to exceed manufacturer's recommendations. Do not use kerosene or any such organic solvents to thin water-based paints.
- 3.3.3.4. Mix primer-sealer with a certain amount of colour coat in proportions recommended by manufacturer of material actually used. Tint undercoats and each finish coat with correct type colours, for identification of each succeeding coat.
- 3.3.3.5. Thoroughly mix materials before application. Apply materials evenly, under adequate illumination, free from sags, runs and other defects. Do cutting-in neatly.
- 3.3.4. Obtain colour chart giving colour schemes and gloss value for various areas from Consultant. Ensure colour chart gives final selection of colours and surface textures of finishes and whether finishes are transparent (natural) or opaque (paint).
- 3.3.5. Provide finish uniform in sheen, colour and texture, free from streaks, shiners and brush or roller marks or other defects.
- 3.3.6. Apply materials in accordance with manufacturer's directions and specifications paying particular attention to appropriate time frame after cleaning when environmental conditions encourage flash-rusting, rusting, contamination or manufacturer's paint specifications require earlier applications. Do not use adulterants. Do any reduction of coating's viscosity in accordance with manufacturer's directions.
- 3.3.7. Use up paints within period of shelf life recommended by paint manufacturer.
- 3.3.8. Ensure successive coatings are harmonious chemical compositions and materials of same manufacturer.
- 3.3.9. Sand and dust between each coat to provide an anchor for next coat and to remove defects visible from a distance up to 1 m (39").

- 3.3.10. Ensure each coat is dry and hard before a following coat is applied.
- 3.3.11. Continue through paint finish behind wall-mounted items (e.g. chalk and tack boards).
- 3.3.12. Finish listed surfaces indicated on Room Finish Schedule(s) and/or noted on Drawing(s) and as specified. Refer to Room Finish Schedule for type, location and extent of finishes required and include touch-ups and field painting necessary to complete work shown, scheduled or specified.
- 3.3.13. Finishes and number of coats specified herein are intended as minimum requirements guide only. Refer to manufacturer's recommendations for exact instructions for thickness of coating to obtain optimum coverage and appearance. Some materials and colours may require additional coats and deeper colours may require use of manufacturers' special tinted primers. Unless otherwise specified, provide Premium Grade finish as defined by MPI as minimum finish.
- 3.3.14. Paint entire plane of areas exhibiting incomplete or unsatisfactory coverage and of areas which have been cut and patched. Patching is not permitted. Vary each coat slightly in successively darker tones to permit supervision identity.
- 3.3.15. Do not paint baked paint surface, chrome plated, stainless steel, aluminum or other surfaces finished with final finish in factory. Finish paint primed surfaces.
- 3.3.16. Advise Consultant when each applied paint coat can be inspected. Do not recoat without inspection. Tint each coat slightly to differentiate between applied coats.
- 3.3.17. Apply additional paint coats, beyond number of coats specified for any surface, to completely cover and hide substrate and to produce a solid, uniform appearance.
- 3.3.18. Apply primer coat soon after surface preparation is completed to prevent contamination of substrate.
- 3.3.19. Primer/Sealers: Apply primer-sealer coats by brush or roller. Permit to dry in accordance with manufacturer's recommendations before applying succeeding coats. Touch up suction spots and sand between coats with No. 120 sandpaper.
- 3.3.20. Metals: Apply primer coat to unprimed ferrous metal surfaces. Where sandblast preparation is specified, apply specified primer immediately after blast cleaning.
- 3.3.21. Woodwork:
  - 3.3.21.1. Fill open grain woods with filler tinted to match wood and work well into grain. Wipe excess from surface before filler sets.
  - 3.3.21.2. Sand smooth paint and varnish undercoats prior to recoating.
  - 3.3.21.3. Prime woodwork designated for painting as soon as possible after delivery to site and before installation. Prime cut surfaces, whether exposed or not, i.e. 6 edges of wood doors, before installation. Prime cut surfaces of woodwork to receive transparent finish with 1 coat of transparent finish reduced 25% or as directed by manufacturer.
  - 3.3.21.4. Apply final coats on smooth surfaces by roller or brush. Hand brush wood trim surfaces.
- 3.3.22. Allow each coat of paint to cure and become dry and hard before application of succeeding coats (unless manufacturer's directions require otherwise).
- 3.3.23. Before finishing paint coats are applied, inspect and touch-up shop coats of primers previously applied by other trades or fabricators.
- 3.3.24. Provide paint coating thicknesses indicated, measured as minimum DFT.
- 3.3.25. Apply a minimum of 4 coats of paint where deep or bright colours are used to achieve satisfactory results.
- 3.3.26. Ledges: Finish projecting ledges, both above and below sight lines, as specified for adjacent surfaces.

**3.4. SITE QUALITY CONTROL**

**3.4.1. Site Tests and Inspections:**

3.4.1.1. Provide and coordinate site inspection service by manufacturer's representative in advance of work commencing and during progress of work to ensure correct use and application of each specified material. Manufacturer's representative to review and submit approval of surface preparation methods in Specifications or obtain specific recommendations for alternative methods. Report such conditions to Consultant.

3.4.1.2. As work progresses and upon completion of work, submit written reports and manufacturers' confirmation that materials and application methods conform to manufacturers' requirements.

3.4.1.3. Inspect surfaces, preparation and paint applications.

**3.4.2. Non-Conforming Work:**

3.4.2.1. Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction to Consultant at no cost to Owner. Touch up small affected areas, repaint large affected areas or areas without sufficient DFT of paint. Remove runs, sags of damaged paint by scraper or by sanding prior to application of paint.

3.4.2.2. Following are considered non-conforming qualities:

3.4.2.2.1. Lack of Uniformity:

3.4.2.2.1.1. brush/roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas and foreign materials in paint coatings.

3.4.2.2.1.2. evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.

3.4.2.2.1.3. damage due to touching before paint is sufficiently dry or any other contributory cause.

3.4.2.2.1.4. damage due to application on moist surfaces or caused by inadequate protection from weather.

3.4.2.2.1.5. damage and/or contamination of paint due to blown contaminants (dust, spray paint, etc.).

3.4.2.2.2. Aesthetic Problems: If following are evident under natural lighting source for exterior surfaces and final lighting source (including daylight) for interior surfaces:

3.4.2.2.2.1. visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 1 m (39").

3.4.2.2.2.2. visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 1 m (39").

3.4.2.2.2.3. visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.

3.4.2.2.2.4. when final coat on any surface exhibits a lack of uniformity of colour, sheen, texture and hiding across full surface area.

3.4.3. Manufacturer Services: Arrange for manufacturer's representative to visit site at intervals during surface preparation and paint coating application to ensure proper specified surface preparation is being performed, specified Product are being used, appropriate number of coats are being applied and specified finishing procedures are being carried out.

**3.5. CLEANING**

3.5.1. Keep waste rags in covered metal drums containing water and remove from building at end of each Day. Remove other combustible rubbish materials and empty paint cans each Day from site and safely dispose of same in accordance with requirements of authorities having jurisdiction.

3.5.2. Clean equipment and dispose of wash water/solvents as well as other cleaning and protective materials (e.g. rags, drop cloths, masking papers, etc.), paints, thinners, paint removers/strippers in accordance with safety requirements of authorities having jurisdiction.

- 3.5.3. Clean containers used for storage, mixing and application of materials free of foreign materials and residue.
- 3.5.4. Keep work area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.
- 3.5.5. Clean adjacent surfaces which have been painted, soiled or otherwise marred. Remove spilled, splashed, splattered or sprayed paint as work progresses using means and materials that are not detrimental to affected surfaces.
- 3.5.6. Remove masking and other protection provided under this Section.
- 3.5.7. Remove temporary protective wrappings provided by others for protection of work after completion of painting operations unless instructed otherwise.
- 3.5.8. Painting work will not be considered complete until spatters, drippings, smears and overspray have been cleaned and removed to satisfaction of Consultant.
- 3.5.9. Make Good any damage to structure building surfaces or furnishings resulting from painting operations at no cost to Owner.
- 3.5.10. Waste Management:
  - 3.5.10.1. Dispose paint waste in accordance with local regulations.
  - 3.5.10.2. Set aside and protect surplus and uncontaminated finish materials not required by Owner and deliver or arrange collection for verifiable re-use or re-manufacturing.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide washroom accessories including but not limited to following:
  - 1.2.1.1. concealed sheet steel reinforcing.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Rough-in for recessed or built-in fixtures in masonry: Section 04 20 00, Masonry Units.
  - 1.2.2.2. Provision of frameless and custom sized mirrors: Section 08 80 00, Glass and Glazing.
  - 1.2.2.3. Rough-in for recessed or built-in fixtures and reinforcing requirements for wall mounted accessories in gypsum board: Section 09 21 16, Gypsum Board Assemblies.

**1.3. REFERENCES**

- 1.3.1. Reference Standards:
  - 1.3.1.1. ASTM A653/A653M-22
    - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - 1.3.1.2. ASTM A666-15
    - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
  - 1.3.1.3. CSA W59-18
    - Welded Steel Construction (Metal Arc Welding)

**1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Coordination: Coordinate location of washroom accessories with other work to prevent interference with clearances required for access, proper installation, adjustment, operation, cleaning and servicing of washroom accessories.

**1.5. SUBMITTALS**

- 1.5.1. Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Section 01 30 00. Ensure Shop Drawings are in the form of catalogue cuts and fully illustrate specified materials with description of components, surface finishes, hardware and securement devices.
- 1.5.2. Samples: Submit complete samples of each accessory and modular unit to Consultant for review of construction quality, materials and finish prior to delivery of required quantities of items. Submit sample of each colour where applicable. Remove trademark and/or labels on exposed finishes prior to review.

**1.6. CLOSEOUT SUBMITTALS**

- 1.6.1. Operational and Maintenance Data: Submit maintenance instructions in accordance with Section 01 70 00. Submit an accessories schedule, keys and parts manual as part of Project closeout documents. Submit 2 sets of following items of manufacturer's literature:
- 1.6.1.1. Technical Data Sheets of each item used for the Project.
- 1.6.1.2. Service and Parts Manuals.
- 1.6.1.3. Name of local representative to be contacted in the event of need of field service of consultation.

**1.7. DELIVERY, STORAGE AND HANDLING**

- 1.7.1. Delivery and Acceptance Requirements: Deliver materials in sealed cartons and containers with manufacturer's name and Product description clearly marked thereon.

**PART 2 - PRODUCTS**

**2.1. MATERIALS**

- 2.1.1. Ensure washroom accessories are stainless steel, Type 304 or Type 302, of 1 type throughout, ANSI No. 4 mechanical brushed finish, of contemporary design, with minimum material thicknesses of components as specified herein. Arrange stainless steel sheet so grain of brushed finish runs vertically in finished installation.
- 2.1.1.1. Minimum thickness, any location or component: 0.607 mm (24 ga)
- 2.1.1.2. Hygienic accessory - exposed double pan doors and panels: 0.607 mm (24 ga)
- 2.1.1.3. Hygienic accessory - exposed single pan doors: 1.214 mm (18 ga)
- 2.1.1.4. Reinforcement: 1.214 mm (18 ga)
- 2.1.2. Concealed Sheet Steel Reinforcing: Commercial quality cold rolled galvanized sheet steel to ASTM A653/A653M with zinc coating designation of Z275 (G90) in minimum thickness of 0.912 mm (20 ga); or ASTM A666, Type 304 sheet stainless steel.
- 2.1.3. Provide washroom accessories as specified with options indicated. Model numbers may not reflect all options required.
- 2.1.4. Provide stainless steel collars to accommodate semi-recessed mounting of units whose depth exceeds wall cavity depth.

**2.2. MANUFACTURED UNITS**

- 2.2.1. Washroom Accessories: Refer to Interior Design.
- 2.2.2. Fabrication:
- 2.2.2.1. Fabricate accessories true, square, rigid, free from distortion and from defects detrimental to appearance and performance. Assemble sheet metal accessories by welding in accordance with CSA W59. Conceal welds, or grind smooth such as to be undetectable in finished work. Unless approved by Owner, ensure assembly fastenings, hardware fixings and mounting or installation devices are concealed in finished work.
- 2.2.2.2. Use non-corrosive metal fasteners of expansion type, toggle type or other permitted type of positive, mechanical anchor as required to suit construction to which accessory is to be mounted. Ensure exposed fasteners, where permitted, are finished to match adjacent accessory surface and countersunk. Where accessories are mounted to sheet metal, provide a 3 mm (1/8") thick minimum full-size metal back-up plate drilled and tapped to receive machine screws and finished to match adjacent sheet metal surface.

- 2.2.2.3. Ensure frameless accessories have 1 piece fronts with 90 degree formed returns at their edges and openings. Ensure returns are continuously welded and ground smooth at corners. Where accessory fronts are framed, ensure frame edges, both inside and outside, have 90 degree formed returns continuously welded and ground smooth at corners. Ensure doors also have 90 degree formed returns.
- 2.2.2.4. Use concealed stainless steel piano hinges which extend full-length of hinged element. Ensure hinged elements have concealed, mechanically-retained, rubber bumpers for silent closing, and close flush with faces of fronts or frames. Locate hinges to afford easy and unobstructed access to interiors taking into consideration location of accessory relative to surrounding and adjacent items and finishes.
- 2.2.2.5. Ensure portions of sheet metal accessory interiors visible in completed work are stainless steel. Ensure changes in plane are formed or continuously welded and ground smooth. Ensure sheet metal accessory parts concealed in finished installation are galvanized or stainless sheet steel. Ensure edges of sheet metal accessible by users or maintenance personnel are hemmed for safety with no sharp edges.
- 2.2.2.6. Ensure lettering or pressure sensitive international symbols on accessories is silk screened with durable paint to withstand wear or is engraved or embossed. Size, location and type face of lettering is subject to review. Ensure edges of letters are straight and sharp.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions:
  - 3.1.1.1. Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
  - 3.1.1.2. Verify gypsum board walls have been reinforced in accordance with Section 09 21 16 for wall mounted accessories.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. INSTALLATION**

- 3.2.1. Provide necessary wall reinforcement for grab bars and towel bars as detailed for 227 kg (500 lbs) downward pull.
- 3.2.2. Install washroom accessories in accordance with manufacturer's printed installation instructions.
- 3.2.3. Provide fastenings and mounting kits for washroom accessories.
- 3.2.4. Verify wall opening for correct dimensions, plumbness of blocking or frames and other preparation that would affect installation of washroom accessories.
- 3.2.5. Verify spacing of plumbing fixtures and toilet partitions that affect installation of washroom accessories.
- 3.2.6. Securely fasten accessories, level and plumb using appropriate fastenings as recommended by manufacturer.
- 3.2.7. Provide corrosion resistant fastenings. Where fasteners are exposed, use tamper-proof fasteners finished to match items secured.
- 3.2.8. Locate washroom accessories where indicated on Drawings and where directed by Consultant. Have Consultant review exact locations.
- 3.2.9. Provide manufacturer's recommended anchoring systems.
- 3.2.10. Fit flanges of accessories snug to wall surfaces.



**3.3. SITE QUALITY CONTROL**

- 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.4. ADJUSTING**

- 3.4.1. Test mechanisms, hinges, locks and latches.
- 3.4.2. Adjust and lubricate to ensure washroom accessories are in perfect working order.

**3.5. CLEANING**

- 3.5.1. Clean and polish mirrors, aluminum and stainless steel surfaces.
- 3.5.2. Remove protective coatings and paper including adhesives.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide appliances including but not limited to following:
  - 1.2.1.1. refrigerator/freezers.
  - 1.2.1.2. dishwasher.
  - 1.2.1.3. microwave.
  - 1.2.1.4. stove.
  - 1.2.1.5. washer.
  - 1.2.1.6. dryer.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of water supply and drainage systems: Division 22, Plumbing.
  - 1.2.2.2. Provision of electrical power: Division 26, Electrical.

**1.3. SUBMITTALS**

- 1.3.1. Shop Drawings: Submit Shop Drawings or catalogue sheets in accordance with Section 01 30 00 to fully illustrate work of this Section. Ensure Shop Drawings or manufacturer's catalogue sheets contain detailed description and bear item numbers, marked to show quantity, colour, model numbers, fabrication details and installation instructions.

**1.4. CLOSEOUT SUBMITTALS**

- 1.4.1. Operation and Maintenance Data: Submit maintenance instructions in accordance with Section 01 70 00.

**1.5. DELIVERY, STORAGE AND HANDLING**

- 1.5.1. Delivery and Acceptance Requirements: Deliver packaged materials in original, undamaged containers with manufacturer's labels and seals intact. Handle and store materials in accordance with manufacturer's and Supplier's recommendations to prevent damage thereto.
- 1.5.2. Storage and Handling Requirements: Protect work of this Section from damage of any kind. Protect other work from damage resulting from work of this Section. Replace damaged work which cannot be repaired, cleaned or restored.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURED UNITS**

- 2.1.1. Appliances: Provide as noted on Drawings or appliances shall be provided by Owner and installed as Work of this Section.

**PART 3 - EXECUTION**

**3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.2. INSTALLATION**

- 3.2.1. Conform to appliance manufacturer's printed instructions for accurate, secure installation. Ensure proper operation.
- 3.2.2. Provide work of this Section true to dimensions, square, plumb, level and free from distortion or defects detrimental to appearance and performance.
- 3.2.3. Provide necessary reinforcing including but not limited to steel stud backup and securely fasten components to suit design requirements. Ensure proper reinforcing has been provided as necessary.

**3.3. SITE QUALITY CONTROL**

- 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.4. CLOSEOUT ACTIVITIES**

- 3.4.1. Demonstration: Test operate appliances and demonstrate operation of same to satisfaction of Consultant at time of acceptance of completed work.

**3.5. PROTECTION**

- 3.5.1. Cover finished surfaces and protect exposed corners and areas vulnerable to damage by persons or by movement of materials, tools or equipment.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 5A - 2010, Construction Management Contract – for Services as amended in the Contract Documents.
  - 1.1.1.2. CCDC 17 - 2010, Stipulated Price Contract between Owner and Trade Contractor for Construction Management Projects as amended in the Contract Documents.
  - 1.1.1.3. Division 1 requirements and documents referred to therein.
- 1.1.2. Facility fall protection Work will be treated as “Design-Assist”. “Design-Assist” refers to the process where Trade Contractor awarded work of this Section is responsible for structural and performance design, fabrication and installation of facility fall protection in compliance with requirements of the Contract Documents, applicable codes at time of award and ordinance and requirement of local officials.
- 1.1.3. Facility fall protection design is based on mutually agreed upon design and details as submitted by Trade Contractor for final review by Consultant. Drawings covering work of this Section show design intent and are diagrammatic in nature. Drawings also show some general building standards for tying into adjacent building trades, which are to be completed and coordinated by this Section. In addition to Specification requirements, final design and performance of facility fall protection and approval by authorities having jurisdiction is responsibility of this Section.
- 1.1.4. Identify locations where system design proposed varies from Consultant’s design Drawings.

### **1.2. SUMMARY**

- 1.2.1. Section Includes: Provide facility fall protection including but not limited to following:
  - 1.2.1.1. safety and tie-back anchors.
  - 1.2.1.2. ground rigged davits.
  - 1.2.1.3. roof rigged davits.
  - 1.2.1.4. rigger sleeves.
  - 1.2.1.5. horizontal cable lifeline systems.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of structural cast-in-place concrete: Section 03 30 00, Cast-In-Place Concrete.
  - 1.2.2.2. Flashing at roof anchor system on an inverted roof system: Section 07 55 56, Fluid-Applied Protected Membrane Roofing.

### **1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. ACI: American Concrete Institute; [www.concrete.org](http://www.concrete.org).
  - 1.3.1.2. CISC: Canadian Institute of Steel Construction; [www.cisc-icca.ca](http://www.cisc-icca.ca).
  - 1.3.1.3. CRCA: Canadian Roofing Contractors' Association; [www.roofingcanada.com](http://www.roofingcanada.com).
  - 1.3.1.4. OBC: Ontario Building Code.
  - 1.3.1.5. OHSA: Ontario Occupational Health and Safety Act, Window Cleaning Regulation 859/90 as amended by 523/92; Regulation 213/91 as amended by 631/94 (Construction Projects).

1.3.2.	Reference Standards:	
1.3.2.1.	ASTM A123/A123M-17	- Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
1.3.2.2.	ASTM A153/A153M-16a	- Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
1.3.2.3.	ASTM A240/A240M-17	- Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
1.3.2.4.	ASTM A276/A276M-17	- Standard Specification for Stainless Steel Bars and Shapes
1.3.2.5.	ASTM A480/A480M-18	- Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
1.3.2.6.	ASTM A653/A653M-22	- Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
1.3.2.7.	ASTM B221M-21	- Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
1.3.2.8.	ASTM C920-18	- Standard Specification for Elastomeric Joint Sealants
1.3.2.9.	ASTM F836M-16e1	- Standard Specification for Style 1 Stainless Steel Metric Nuts
1.3.2.10.	ASTM F844-07a(13)	- Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use (Metric)
1.3.2.11.	ASTM F3125/F3125M-18	- Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength
1.3.2.12.	CSA G40.20-13(18)	- General Requirements for Rolled or Welded Structural Quality Steel
1.3.2.13.	CSA G40.21-13(18)	- Structural Quality Steel
1.3.2.14.	CSA S16-14(19)	- Design of Steel Structures
1.3.2.15.	CSA S136-16	- North American Standard for the Design of Cold-Formed Steel Structural Members
1.3.2.16.	CSA W47.1-19	- Certification of Companies for Fusion Welding of Steel
1.3.2.17.	CSA W47.2-11(15)	- Certification of Companies for Fusion Welding of Aluminum
1.3.2.18.	CSA W48-18	- Filler Metals and Allied Materials for Metal Arc Welding
1.3.2.19.	CSA W55.3-08(18)	- Certification of Companies for Resistance Welding of Steel and Aluminum
1.3.2.20.	CSA W59-18	- Welded Steel Construction (Metal Arc Welding)
1.3.2.21.	CSA W117.2-19	- Safety in Welding, Cutting, and Allied Processes
1.3.2.22.	CSA Z91-17	- Health and safety code for suspended equipment operations
1.3.2.23.	CSA Z271-20	- Design of suspended access equipment

**1.4. SUBMITTALS**

- 1.4.1. Shop Drawings:
  - 1.4.1.1. Indicate design, fabrication details, plans and elevations showing complete layout and configuration of system, locations, components, accessories and hardware and installation details, relationship to adjacent construction, materials, finishes, thicknesses and other pertinent data. Ensure Shop Drawings meet Occupational Health and Safety Act requirements. Include necessary Restrictive and Non-restrictive working usage notes and General Safety Notes.
  - 1.4.1.2. Ensure a licensed engineer specified herein is responsible for:
    - 1.4.1.2.1. production and review of Shop Drawings.
    - 1.4.1.2.2. sealing and signing each Shop Drawing and any associated calculations performed.
- 1.4.2. Delegated Design Submittals: Submit letter of compliance from licensed engineer certifying system and anchors meet performance requirements of Ministry of Labour of Ontario. Comply with CSA S16, CSA S136 and CSA W59, welded steel construction. Comply with CSA W117.2. Ensure welding of steel is undertaken only by a fabricator fully approved by Canadian Welding Bureau to requirements of CSA W47.1, CSA W55.3 and CSA W47.2, as may be applicable.

**1.5. CLOSEOUT SUBMITTALS**

- 1.5.1. Operation and Maintenance Data:
  - 1.5.1.1. Submit 1 copy of system Equipment Manual & Inspection Log Book, with “Initial Inspection - Certification for Use” and “Inspection Sign-Off” forms completed.
  - 1.5.1.2. Submit 2 copies of reduced as-built Shop Drawings laminated in clear plastic and framed, showing anchor locations and details and place inside building near roof accesses at locations directed by Owner.

**1.6. QUALITY ASSURANCE**

- 1.6.1. Qualifications:
  - 1.6.1.1. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.
  - 1.6.1.2. Licensed Professionals: Employ a licensed engineer carrying minimum \$2,000,000.00 professional liability insurance and is registered in the Province of Ontario.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
  - 2.1.1.1. Niagara Roof Anchors Inc.; [www.niagararooanchors.com](http://www.niagararooanchors.com)
  - 2.1.1.2. Pro-Bel Enterprises Ltd.; [www.pro-bel.ca](http://www.pro-bel.ca)
  - 2.1.1.3. Thaler Metal Industries Ltd.; [www.thalermetal.com](http://www.thalermetal.com)
  - 2.1.1.4. Telco Industries Inc.
- 2.1.2. Substitution Limitations: This Specification is based on Pro-Bel Enterprises Ltd.'s Products and systems. Comparable Products and systems from manufacturers listed herein may be reviewed provided they meet requirements of this Specification.

**2.2. MATERIALS**

- 2.2.1. Description:
  - 2.2.1.1. Regulatory Requirements: Comply with following:
    - 2.2.1.1.1. OBC in particular Division B, Part 4, Article 4.4.4.1.
    - 2.2.1.1.2. OHSA.
    - 2.2.1.1.3. CSA Z91 and CSA Z271.
  - 2.2.2. Performance/Design Criteria:
    - 2.2.2.1. Design fall arrest anchor system to suit building design requirements and to provide maintenance personnel access to exterior glazing of new addition without requirements to provide additional equipment for access.
    - 2.2.2.2. Locate anchorages to suit suspension equipment that will be used on building with respect to items such as reach, spacing, roof edge condition and similar items.
    - 2.2.2.3. Design fall arrest system in conformance to CSA S16 and CSA S136.
    - 2.2.2.4. Design may include cast-in-place roof anchor, bolt around truss anchor, roof anchor wrapping I beam and/or weld to structure roof anchor and similar items.
    - 2.2.2.5. Ensure number and locations of anchors required to provide complete and comprehensive window washing capabilities are part of design work of this Section.
    - 2.2.2.6. Structural Design:
      - 2.2.2.6.1. Design system fall arrest safety anchors and equipment supports to comply with following structural requirements:
        - 2.2.2.6.1.1. Supports for Suspended Platforms: Davits, rigging sleeves and monorails are used for suspending a powered platform from storage and rigging/working locations on building. These supports and structures to which they are attached are typically designed to 4.45 kN (1000 lbs) vertical service load plus impact with a factor of safety as per CISC requirements and/or ACI or other applicable construction codes and to 4 times rated load against fracture or detachment (i.e. 4 to 1 stability factor).
        - 2.2.2.6.1.2. Fall Arrest Safety Anchors: Designed to a maximum fall arresting force of typically 8.0 kN (1800 lbs) when wearing a body harness with a safety factor of 2 without any permanent deformation and to 22.24 kN (5000 lbs) against fracture or detachment.
      - 2.2.2.6.2. Employ a licensed engineer specified herein to:
        - 2.2.2.6.2.1. design components for work of this Section requiring structural performance.
        - 2.2.2.6.2.2. be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations.
  - 2.2.3. Structural Shapes, Plates, Etc.: New material conforming to CSA G40.20 and CSA G40.21, Grade 300W.
  - 2.2.4. Hollow Structural Sections (HSS): New material conforming to CSA G40.20 and CSA G40.21, Grade 350W, Class H.
  - 2.2.5. Stainless Steel:
    - 2.2.5.1. Bars and Shapes: Type 304 to ASTM A276/A276M.
    - 2.2.5.2. Flat-Rolled Plate and Sheet: Type 304 in accordance with ASTM A240/A240M and ASTM A480/A480M.
  - 2.2.6. Welding Materials: CSA W48 and CSA W59.

- 2.2.7. Aluminum Extrusions: ASTM B221M, size accurately formed as shown on Drawings, extruded aluminum alloy AA-6061-T6 for aluminum. Ensure surfaces are free from defects impairing appearance, strength and durability.
- 2.2.8. Galvanizing: Hot dipped galvanizing with minimum zinc coating of 600 g/m<sup>2</sup>.
- 2.2.9. Galvanized Sheet Steel: Supply 0.91 mm (20 ga) core thickness commercial quality to ASTM A653/A653M, CS Type A, with Z275 (G90) zinc coating designation to ASTM A653/A653M.
- 2.2.10. High Strength Bolts:
  - 2.2.10.1. Supply bolts, nuts and washers conforming to ASTM F3125/F3125M. Supply each type and size of bolt and nut of same manufacture and of same lot.
  - 2.2.10.2. Bolts: Heavy, hexagon head high strength structural bolts, of standard size, of lengths required for thickness of members joined and for type of connection.
  - 2.2.10.3. Nuts: Heavy hexagon semi-finished nuts.
  - 2.2.10.4. Washers: Flat and smooth hardened washers, quenched and tempered to suit applications and conforms to ASTM F844. Provide AISI Type 304 stainless steel washers at exterior locations.
  - 2.2.10.5. Hardened Steel Washers: To suit applications and conforms to ASTM F836M.
  - 2.2.10.6. Stainless Steel Bolts: To suit applications and conforms to ASTM F836M.
  - 2.2.10.7. Stainless Steel Nuts: To suit applications and conforms to ASTM F836M.
  - 2.2.10.8. Lock Washers: Helical spring type steel "lock" washers to suit applications and conforms to Federal specification FF-W-84. Provide AISI Type 304 stainless steel lock washers at exterior locations.
- 2.2.11. Sleeve and Pipe Insulation: Sprayed-in-place polyurethane, stone wool or fibreglass insulation. Primers for sprayed-in-place insulation as recommended by insulation manufacturers for substrate and surface conditions.
- 2.2.12. Sealant: ASTM C920, multi-component modified urethane base chemical curing. Conform to requirements of Section 07 92 00.
- 2.2.13. Dielectric Separator: Provide best grade, quick drying non-staining alkali resistant bituminous paint or epoxy resin solution or membrane type.
- 2.2.14. Finishes:
  - 2.2.14.1. Hot Dip Galvanizing:
    - 2.2.14.1.1. After fabrication, hot dip galvanize specific miscellaneous steel items noted on Drawings and/or called for herein. Plug relief vents air tight. After galvanizing, remove plugs, ream holes to proper size and re-tap threads. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with "METALHIDE® ONE PAC | 97-676" by PPG Architectural Coatings; [www.ppg.com](http://www.ppg.com), "Zinc Clad® 5 Organic Zinc-Rich Primer" by The Sherwin-Williams Company; [www.sherwin-williams.com](http://www.sherwin-williams.com) or "ZRC® Cold Galvanizing Repair Compound" by ZRC Worldwide; [www.zrcworldwide.com](http://www.zrcworldwide.com) in accordance with manufacturer's printed directions.
    - 2.2.14.1.2. Galvanize members exposed to elements when in final location; members embedded on exterior side of exterior walls; members imbedded in concrete; members specified in this Section or noted on Drawings.
    - 2.2.14.1.3. Hot-dip galvanize members in accordance with requirements of following ASTM standards with minimum coating weights or thicknesses as specified:
      - 2.2.14.1.3.1. Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123/A123M; average weight of zinc coating g/m<sup>2</sup> (oz/sq ft) of actual surface, for 4.8 mm (3/16") and less thickness members 460 g/m<sup>2</sup> (1.5 oz/sq ft), for 6 mm (1/4") and heavier members 705 g/m<sup>2</sup> (2.3 oz/sq ft).



- 2.2.14.1.3.2. Iron and Steel Hardware: ASTM A153/A153M; minimum weight of zinc coating, in g/m<sup>2</sup> (oz/sq ft) of surface shall be in accordance with Table 1 of ASTM A153/A153M, for the various classes of materials used on the Project.
- 2.2.14.1.3.3. Steel Sheet: ASTM A653/A653M; weight of zinc coating, per sq ft on both sides of sheet. Coating designation Z275 (G90), minimized spangle and chemically treated.
- 2.2.14.2. Colour: To be selected by Consultant.

### **2.3. COMPONENTS**

- 2.3.1. Safety and Tie-Back Anchors:
  - 2.3.1.1. Safety U-bars: Type 304 stainless steel with yield strength of 240 MPa (35 Ksi). Ensure U-bar is not less than 19 mm (3/4") diameter material with 38 mm (1-1/2") eye opening.
  - 2.3.1.2. Securement Bolts: Mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized.
  - 2.3.1.3. Hollow Steel Section (HSS) Piers: Mild steel, Type 300W with yield strength of 350 MPa (50 Ksi). Wall thickness to suit application, with "Pro-Bel Protex" 2.4 mm (3/32") thick, black coloured 2-component TPU polyurethane/polyurea coating system.
  - 2.3.1.4. Base Plate and Other Sections: "Pro-Bel Protex" coated mild steel with yield strength of 300 MPa (44 Ksi). Thickness and securement to suit application.
  - 2.3.1.5. Seamless Spun Aluminum Flashing (for Steel Pier Anchors): Aluminum with deck flange flashed in to CRCA recommendations. Seal top of aluminum flashing with conformable mastic tape and torch applied heat-shrink rubber collar flashing.
  - 2.3.1.6. Miscellaneous Bolts, Nuts and Washers: Mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized or Type 304 stainless steel with yield strength of 240 MPa (35 Ksi).
- 2.3.2. Ground Rigged Davits:
  - 2.3.2.1. Davit Booms: Aluminum sections of engineered length and size to suit application, equipped with: carrying handles; galvanized fixed shackle on outboard end; prominently displayed, non-corrosive data plate clearly stating "Maximum Service Capacity of boom, Manufacturer's Name, Serial No. and Manufacturing Date" and designed to carry minimum vertical service load of 4.5 kN (1,000 lbs.), i.e. rated load.
  - 2.3.2.2. Davit Masts: Round tubular steel section capable of rotating through 360°; carrying handles; connecting pins.
  - 2.3.2.3. Davit Arms:
    - 2.3.2.3.1. Davits to be demountable, portable, capable of being easily and quickly broken down into pieces weighing no more than 36.3 kg (80 lbs) for ease of carrying.
    - 2.3.2.3.2. Provide a davit or part of a davit weighing more than 36.3 kg (80 lbs) with a means for its transport, which keeps centre of gravity of davit at or below 915 mm (36") above safe surface during transport.
    - 2.3.2.3.3. Provide davits or davit components that require more than 36.3 kg (80 lbs) lifting effort to raise arm into position with a mechanical means for hoisting them into position.
    - 2.3.2.3.4. Davit arm booms equipped with rolling trolleys or friction trolleys to have stops to ensure trolley cannot become detached from boom.
  - 2.3.2.4. Davit Bases: Round, hollow steel section piers of mild steel, Type 350W with yield strength of 350 MPa (50 Ksi), with "Pro-Bel Protex" 2.4 mm (3/32") thick black coloured 2-component TPU polyurethane/polyurea coating system, with 19 mm (3/4") diameter U-bar safety anchor and securement to suit application.

- 2.3.2.5. Tethers: Secure pins and loose pieces using 3 mm (1/8") stainless steel cable complete with easily inserted lead connectors to avoid loss.
- 2.3.2.6. Plate and Other Sections: "Pro-Bel Protex" coated mild steel as per davit bases above with yield strength of 300 MPa (44 Ksi).
- 2.3.2.7. Miscellaneous Bolts, Nuts and Washers: Mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized or Type 304 stainless steel with yield strength of 240 MPa (35 Ksi).
- 2.3.3. Horizontal Cable Lifeline System:
  - 2.3.3.1. Hollow Steel (HSS) Pier Supports: Galvanized mild steel with yield strength of 300 MPa (50 Ksi). Wall thickness to suit application.
  - 2.3.3.2. Base Plate and Other Sections: Galvanized mild steel with yield strength of 300 MPa (44 Ksi). Thickness and securement to suit application.
  - 2.3.3.3. Securement Bolts: Mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized.
  - 2.3.3.4. Safety U-bars: Type 304 stainless steel with yield strength of 240 MPa (35 Ksi). U-bar to be not less than 19 mm (3/4") diameter material with 38 mm (1-1/2") eye opening.
  - 2.3.3.5. Miscellaneous Bolts, Nuts and Washers: Mild steel, Type 300W with yield strength of 300 MPa (44 Ksi), hot dipped galvanized or Type 304 stainless steel with yield strength of 240 MPa 35 Ksi).
  - 2.3.3.6. "Hands-Free" Horizontal Lifeline System:
    - 2.3.3.6.1. Cable: 8 mm (5/16") dia, Type 316 stainless steel with minimum breaking strength of 85 kN (19,125 lbs.), complete with permanently swedged cable ends.
    - 2.3.3.6.2. Data Plate: Equip cable system entry points with prominently displayed non-corrosive data plate clearly stating "Maximum Service Capacity and Number of Users".
    - 2.3.3.6.3. Standard Intermediate Support Brackets: Multi-position Type 316 stainless steel with reinforcing end caps and suitable for installation at any height. Secured using 13 mm (1/2") dia. fasteners.
    - 2.3.3.6.4. Mobile Intermediate Support Brackets: Multi-position, Type 316 stainless steel for working both sides of sloped roof at ridge point.
    - 2.3.3.6.5. Corner Units: Manufacturer's standard 90° or 135° flexible corner units as required.
    - 2.3.3.6.6. End Terminal Hardware: Stainless steel swedged termination at 1 end and stainless steel tensioner with shock absorber at other end, as required.
    - 2.3.3.6.7. Lanyard Cable Runner: Type 316 stainless steel with automatic runner bypass for continuous "hands-free" operation that can be inserted or removed anywhere on cable.
    - 2.3.3.6.8. Harness: Manufacturer's standard "hands-free" full body harness and lanyard complete with shock absorber.
  - 2.3.3.7. Double Lanyard (DL) Horizontal Lifeline:
    - 2.3.3.7.1. Cable: 8 mm (5/16") dia. galvanized steel with minimum breaking strength of 85 kN (19,125 lbs.), complete with matching permanently swedged or mechanically swedged cable ends.
    - 2.3.3.7.2. Data Plate: Equip cable system entry points with prominently displayed non-corrosive data plate clearly stating "Maximum Service Capacity and Number of Users".
    - 2.3.3.7.3. Tensioner: Steel turnbuckle, same material as cable.
    - 2.3.3.7.4. Harness: Manufacturer's standard full body harness with double lanyard and shock absorbers.

---

**PART 3 - EXECUTION**

**3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions that would be detrimental to installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.2. INSTALLATION**

- 3.2.1. Install fall arrest anchor system under supervision of licensed engineer registered in Province of Ontario.
- 3.2.2. Hand over items for casting into concrete at appropriate time. Supply handling requirements, instructions, anchorage information, dimensions, templates and service requirements for installation of work of this Section and supervise setting of anchorage devices and construction of other work incorporated with system.
- 3.2.3. Install work in accordance with reviewed Shop Drawings and manufacturer's instructions, true, tightly fitted and level or flush to adjacent surfaces, as suitable for installation conditions.
- 3.2.4. Provide anchorage and mounting devices required for installation of system.
- 3.2.5. Deform threads of tail end of anchor studs after nuts have been tightened to prevent accidental removal or vandalism.
- 3.2.6. Fill with insulation where required to suit design.
- 3.2.7. At anchor locations, provide seamless flashings. Fabricate flashings to suit roofing conditions. Seal top of anchor with 1-piece watertight cap. Rubber gaskets, grommets and "pitch pans" are not permitted.
- 3.2.8. Coordinate fall arrest anchor system installation with roofing and flashing work specified under roofing Section. Ensure integrity of roofing and flashing systems.
- 3.2.9. Seal between assemblies and adjacent materials to ensure watertight installations. Do sealing work in accordance with Section 07 92 00.
- 3.2.10. Clean and touch up steel surfaces with zinc rich primer where burned by field welding or where damaged.
- 3.2.11. Protect components where contact is made between dissimilar metals and between metals and cementitious materials to prevent electrolysis.

**3.3. SITE QUALITY CONTROL**

- 3.3.1. Site Tests and Inspections:
  - 3.3.1.1. Structural Inspection: Ensure a licensed engineer specified herein inspects work of this Section during erection/installation and submits sealed and signed Field Review Report within 5 Days of site visit.
  - 3.3.1.2. Test anchors for full 360 degrees to absolute failure (fracture). Ensure anchors are capable of resisting a minimum force of 22,000 N (5,000 lbf) applied in any direction without pullout or fracture; they shall also not yield or permanently deform when subjected to a force of 8896.4 N (2,000 lbf) in any direction.
  - 3.3.1.3. Complete inspection logbook to certify system for use. Carry out inspection of installation by licensed engineer registered in Ontario.
- 3.3.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.4. ADJUSTING**

- 3.4.1. Adjust and leave equipment in proper working order.

**3.5. CLEANING**

- 3.5.1. Upon completion of work remove debris, equipment and excess material from site. Clean and Make Good surfaces soiled or otherwise damaged in connection with work of this Section. Pay cost of replacing finishes or components that cannot be satisfactorily cleaned.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide acoustic isolated floating floors including but not limited to following:
  - 1.2.1.1. acoustic isolated floating floors.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Acoustic report: Section 00 30 00, Available Information.
  - 1.2.2.2. Filling and sealing of sawcut joints in concrete slab: Section 03 35 13, Concrete Floor Finishing.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. PVC: Polyvinyl Chloride.

**1.4. ADMINISTRATIVE REQUIREMENTS**

- 1.4.1. Preinstallation Meetings: Arrange preinstallation meeting 1 week prior to commencing work with all parties associated with trade as designated in Contract Documents or as requested by Consultant. Presided over by Construction Manager, include Consultant who may attend, Trade Contractor performing work of this trade, Owner's representative, testing company's representative and consultants of applicable discipline. Review Contract Documents for work included under this trade and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of work of this Section.

**1.5. SUBMITTALS**

- 1.5.1. Product Data: Submit manufacturer's Product data and installation instructions for each material and Product used.
- 1.5.2. Shop Drawings:
  - 1.5.2.1. Submit Shop Drawings in accordance with Section 01 30 00. Ensure Shop Drawings indicate material characteristics, details of construction, connections and relationship with adjacent construction.
  - 1.5.2.2. Ensure a licensed engineer specified herein is responsible for:
    - 1.5.2.2.1. production and review of Shop Drawings.
    - 1.5.2.2.2. sealing and signing each Shop Drawing and any associated calculations performed.

**1.6. QUALITY ASSURANCE**

1.6.1. Qualifications:

- 1.6.1.1. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.
- 1.6.1.2. Licensed Professionals: Employ a licensed engineer carrying minimum \$2,000,000.00 professional liability insurance and is registered in the Province of Ontario.
- 1.6.2. Mock-Ups: Construct minimum 10 m<sup>2</sup> (100 sq ft) mock-up sample at Project location designated by Consultant for review. Once reviewed with no objections recorded, sample remains part of finished work and used as a quality reference standard for balance of Project.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
  - 2.1.1.1. AcoustiGuard - WILREP Ltd.; [www.acoustiguard.com](http://www.acoustiguard.com)
  - 2.1.1.2. Pliteq Inc.; [www.pliteq.com](http://www.pliteq.com)
- 2.1.2. Substitution Limitations: Comparable Products from other manufacturers not listed herein may be reviewed provided they meet requirements of this Specification.

**2.2. MATERIALS**

2.2.1. Performance/Design Criteria:

- 2.2.1.1. Ensure floating floor isolation system is roll-out isolation mat floating floor system.
- 2.2.1.2. Ascertain loads and characteristics of supported structure affected by isolation system.
- 2.2.1.3. Ensure floating floor is free from any rigid connections to any part of building structure and designed to reduce transmission of airborne and structure-borne sound from mechanical equipment spaces and other acoustically active areas to rest of building.
- 2.2.1.4. Base normal design load calculation on weight of floating slab plus weight of walls, equipment and fixtures supported by floating floor isolation system plus 25% of specified live load.
- 2.2.1.5. Base maximum design load calculation on weight of floating slab plus weight of walls, equipment and fixtures supported by floating floor isolation system plus 100% of specified live load.
- 2.2.1.6. Locate additional structural reinforcing under slab edge when partition is supported on edge of floating slab.
- 2.2.1.7. Ensure dynamic frequency of floating floor system does not exceed 10 Hz excluding affects of air cavity below floating floor.
- 2.2.1.8. Overload Capacity: Ensure assemblies are capable of supporting minimum 6 times normal design load without any visible damage, buckling or permanent set and remain totally functional when overload is removed.
- 2.2.1.9. Design for minimum height of 50 mm (2") of elastomeric material. Ensure in all cases static deflection under maximum design load does not exceed 15% of total thickness of elastomeric material.
- 2.2.1.10. Provide concrete curb around perimeter of floating slab, including "internal" perimeter boundaries to shafts or other major service openings for large pipes, ducts or other similar equivalent items.

- 2.2.1.11. Structural Design: Employ a licensed engineer specified herein to:
  - 2.2.1.11.1. design components for work of this Section requiring structural performance.
  - 2.2.1.11.2. be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations.
- 2.2.2. Roll-Out Isolation Mat: Provide 1 of following:
  - 2.2.2.1. Dimpled rubber pads made from recycled rubber with following characteristics:
    - 2.2.2.1.1. Thickness: 25 mm (1").
    - 2.2.2.1.2. Roll Dimensions: 1220 mm (48") wide x 4.75 m (15') long.
    - 2.2.2.1.3. Density: 500 kg/m<sup>3</sup> - 600 kg/m<sup>3</sup> (31 pcf - 38 pcf).
    - 2.2.2.1.4. Permitted Product: "GenieMat®" by Pliteq Inc.
  - 2.2.2.2. Isolation Materials: Provide recycled rubber padding with an elastic polyurethane binder and with no PVC or formaldehyde. Permitted Product: "ISO-SEP 25HD" by AcoustiGuard - WILREP Ltd.
- 2.2.3. Perimeter Isolation Tape: 13 mm (1/2") thick flat, resilient, single-ply white polyethylene foam perimeter isolation strip; "GenieMat® PMI12 PF" by Pliteq Inc,
- 2.2.4. Seam Tape: Duct tape or high-quality carpet tape to secure butt joints and seams.
- 2.2.5. Sealant: "GenieClip™ ACS Acoustical Sealant" by Pliteq Inc.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. INSTALLATION**

- 3.2.1. Install acoustic isolated floating floor system in accordance with manufacturer's written instructions and acoustical report appended to Section 00 30 00.

#### **3.3. SITE QUALITY CONTROL**

- 3.3.1. Site Tests and Inspections:
  - 3.3.1.1. Structural Inspection: Ensure a licensed engineer specified herein inspects work of this Section during erection/installation and submits sealed and signed Field Review Report within 5 Days of site visit.
- 3.3.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

#### **3.4. CLEANING**

- 3.4.1. Upon completion of work, check concrete is not in threaded holes and ensure their cleanliness and proper function and remove debris, equipment and excess material from site.

### **END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide excavation and fill including but not limited to following:
  - 1.2.1.1. excavation and backfill for structures.
  - 1.2.1.2. underslab fill.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Geotechnical report: Section 00 30 00, Available Information.
  - 1.2.2.2. Porous fill under slabs: Section 03 30 00, Cast-In-Place Concrete.
  - 1.2.2.3. Filter aggregate for foundation drains and building sub-drains: Section 33 46 13, Foundation Drainage.

**1.3. REFERENCES**

- 1.3.1. Reference Standards:
  - 1.3.1.1. CSA A23.1-19 - Concrete materials and methods of concrete construction
  - 1.3.1.2. CSA G40.20-13(18) - General Requirements for Rolled or Welded Structural Quality Steel
  - 1.3.1.3. CSA G40.21-13(18) - Structural Quality Steel
  - 1.3.1.4. OPSS 1010-13 - Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material
  - 1.3.1.5. OPSS 1860-18 - Material Specification for Geotextiles

**1.4. SUBMITTALS**

- 1.4.1. Shop Drawings: Submit Shop Drawings and design data for shoring and bracing in accordance with Section 01 30 00. Ensure a licensed engineer specified herein is responsible for:
  - 1.4.1.1. production and review of Shop Drawings.
  - 1.4.1.2. sealing and signing each Shop Drawing and any associated calculations performed.

**1.5. QUALITY ASSURANCE**

- 1.5.1. Qualifications:
  - 1.5.1.1. Licensed Professionals: Employ a licensed engineer carrying minimum \$2,000,000.00 professional liability insurance and is registered in the Province of Ontario.



**1.6. SITE CONDITIONS**

- 1.6.1. Underground Services: Notify Public Utilities in advance of planned excavations adjacent to their services. Take care not to damage or displace encountered services. When such services are encountered notify Consultant immediately and protect, brace and support them. Advise Consultant which services require adjustment, relocation or abandonment. Where work on these services become necessary use following procedure:
- 1.6.1.1. Essential Services: Make necessary repairs only to maintain essential services satisfactory to Consultant and authorities having jurisdiction.
- 1.6.1.2. Known Services: Repair promptly at no expense to Owner.
- 1.6.1.3. Unknown Services: Repair promptly on Consultant's instructions. Submit complete breakdown of cost of such work. Amount approved will be added to Contract Price.
- 1.6.1.4. Record location of maintained, re-routed and abandoned underground services.

**PART 2 - PRODUCTS**

**2.1. MATERIALS**

- 2.1.1. Description:
- 2.1.1.1. Regulatory Requirements: Ensure shoring and trench timbering, in addition to requirements of local authorities are carried out in accordance with requirements of *The Occupational Health and Safety Act*, specified herein for construction Projects and other applicable regulations of Ontario Ministry of Labour.
- 2.1.2. Performance/Design Criteria:
- 2.1.2.1. Ensure shoring and bracing is designed by a licensed engineer registered in Province of Ontario.
- 2.1.2.2. Structural Design for Shoring and Bracing: Employ a licensed engineer specified herein to:
- 2.1.2.2.1. design components for work of this Section requiring structural performance.
- 2.1.2.2.2. be responsible for determining sizes, yield strengths, gauge thicknesses and joint spacing to allow thermal movement and loading of components in accordance with applicable codes and regulations.
- 2.1.3. Granular Material under Paved Areas and Slabs-On-Grade: Imported Granular "A" and Granular "B" materials conforming to OPSS 1010. Surplus excavated material, if it conforms to these requirements, may be used.
- 2.1.4. Granular Material for Work of Mechanical and Electrical Divisions:
- 2.1.4.1. Earth Trenches to 600 mm (24") Above Mechanical Pipe Work: Clean, natural, unwashed gravel or sand, ranging in size from medium gravel to medium sand, 100% passing 25 mm (1") sieve and 95% to 100% retained on 250 um (#60 sieve).
- 2.1.4.2. Earth Trenches - 100 mm (4") Envelope Surrounding Electrical Raceways and Wiring: Fine aggregate (sand) for concrete, graded, CSA A23.1.
- 2.1.4.3. Top Portion of Earth Trenches Specified Above, Concrete Trenches and Other Mechanical and Electrical Work in Areas Not to be Paved and Not to Receive Floor Slabs: As specified in Paragraph 2.1.5.
- 2.1.4.4. Top Portion of Earth Trenches Specified Above, Concrete Trenches and Other Mechanical and Electrical Work Under Paved Areas and Areas to Receive Floor Slabs: As specified in Paragraph 2.1.3.

- 2.1.5. Remaining Granular Material: Clean excavated materials free from waste materials, debris, rubbish, frozen portions, organic or cohesive matter and rocks larger than 100 mm (4") in diameter. If sufficient quantity of material is not available from excavation, use imported fill having same, or better characteristics.
- 2.1.6. Silt Fence:
  - 2.1.6.1. Structural Quality Steel Shapes for Silt Fence Posts: CSA G40.20 and CSA G40.21, Grade 300W.
  - 2.1.6.2. Wire Fencing: Standard wire fence, maximum mesh spacing 150 mm (6"), min wire dia 2 mm (14 ga).
  - 2.1.6.3. Geotextile Filter Cloth: OPSS 1860, Class I.
  - 2.1.6.4. Filter Aggregate: 19 mm (3/4") crushed stone.

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. PREPARATION**

- 3.2.1. Protection of In-Place Conditions:
  - 3.2.1.1. Shoring and Bracing:
    - 3.2.1.1.1. Provide necessary shoring and bracing for excavations and to existing building with special attention to areas indicated to be underpinned. Submit method of shoring and bracing for review before installing. Maintain shoring and bracing during work. Remove when no longer required and when notified.
    - 3.2.1.1.2. Ensure shoring and bracing properly retain banks of excavations and prevent caving-in or displacement or damage to surrounding or adjacent buildings or other property.
    - 3.2.1.1.3. Retain shoring and bracing until other work affected thereby is carried out.
    - 3.2.1.1.4. Erect shoring and bracing free of footings, foundations, walls or other such work so it may be removed entirely or in sections when it is no longer required and when directed, without causing damage or injury to Work or adjacent property.

#### **3.3. INSTALLATION**

- 3.3.1. Lines and Levels: Establish accurate lines and levels as required and supply batter boards, line stakes and templates and establish permanent reference lines and bench marks required.
- 3.3.2. Excavation includes all strata including frozen materials which can be ripped and excavated with heavy construction equipment.
- 3.3.3. Excavate to extent, elevations and depths required for completion of work, leaving sufficient space for removal of formwork, application of waterproofing and installation of foundation drains.
- 3.3.4. Keep excavation free of water by bailing, pumping or system of drainage as required and provide pumps, suction and discharge lines or well points of sufficient capacity and maintain until such time as permanent drainage system is installed or until Consultant agrees to its removal. Take necessary measures to prevent flow of water into excavation.

- 3.3.5. Ensure water discharged from dewatering systems is equal to or better in quality than receiving stream or sewer storm water and free of pollutants. Provide settling ponds and/or other treatment facilities as required to treat discharges in accordance with authorities having jurisdiction at no cost to Owner. Obtain permit from authority having jurisdiction for temporary diversion of water course.
- 3.3.6. Protect bottom and sides of excavations and trenches from freezing and from exposure to wet weather to prevent cave-ins and softening of bed upon which concrete or drains rest.
- 3.3.7. Keep bottoms of excavations clean and clear of loose materials, levelled and stepped at changes of levels with exception of excavations made for drainage purposes and those to slope as required.
- 3.3.8. Excavate areas under concrete slabs on grade and where permanent roads and walks will occur to depth required and sufficient to expose firm undisturbed subsoil, free of organic matter and to Consultant's satisfaction.
- 3.3.9. If removal of earth causes displacement of adjacent earth, remove disturbed earth at no additional cost to Owner.
- 3.3.10. Remove soft unconsolidated soils, muskeg and organic material encountered in excavations and fill void and any wells, slumps, cesspools or similar pits with well compacted clean dry fill of quality as herein specified. Where these conditions occur under or near footings obtain direction before proceeding.
- 3.3.11. After completion of excavation and prior to placing any concrete on bearing strata or placing of fill, notify Consultant to inspect exposed bearing surfaces. Do not proceed without authorization.
- 3.3.12. Should nature of subsoil at depths indicated prove to be unsatisfactory to Consultant for placing of structural work thereon, then upon Consultant's written order, excavate to greater depth until satisfactory bottom is reached. Payment for such additional excavation and backfill will be in accordance with General Conditions of the Contract.
- 3.3.13. Keep surfaces against which concrete or fill is placed free of frost.
- 3.3.14. Thaw out frozen surfaces beneath concrete slabs, paving or structure requiring firm foundation to unfrozen depth. Remove thawed softened material to firm base and fill void with well compacted clean dry fill of quality as herein specified.
- 3.3.15. If excavations reveal seepage zones, springs or other unexpected subsurface conditions which may necessitate revisions or additions to the Contract Documents, inform Consultant and obtain written instructions.
- 3.3.16. Silt Fencing:
- 3.3.16.1. Provide silt fence in locations indicated on Drawings.
- 3.3.16.2. Space posts at 3 m (10') maximum spacing and drive in ground min 500 mm (20"). Do not space posts more than 2 m (6') if wire fencing is not used for support.
- 3.3.16.3. Excavate trench for anchor [300 mm x 300 mm (12" x 12")] along post line on upslope side of barrier.
- 3.3.16.4. Fasten wire fence to upslope side of posts with tie wires or hog rings. Extend wire fence minimum 50 mm (2") into trench. Ensure height of fence above ground is 1000 mm (39").
- 3.3.16.5. Extend filter fabric 800 mm (32") into trench and over wire fence and tie to wire fence as indicated on Drawings. Ensure fabric does not extend more than 1000 mm (39") above ground. Stapling filter fabric to trees is not permitted.
- 3.3.16.6. Backfill trench and filter aggregate over filter fabric. Ensure no gaps exist between fabric and ground.
- 3.3.16.7. Conduct inspection of silt fence immediately after rainfall and daily during prolonged rainfall. Repair damage immediately.

- 3.3.16.8. Remove sediments trapped in filter after each storm and/or when deposits reach 1/2 height of barrier.
- 3.3.16.9. Remove silt fence when directed by Consultant.
- 3.3.17. Rock Excavation:
  - 3.3.17.1. If and when rock is encountered within limits of excavation immediately notify Consultant. Do not proceed with further excavation in area concerned until instructed. If rock excavation is required ensure it is paid for in accordance with General Conditions of the Contract. Site verification of extent of rock must be confirmed by Consultant prior to rock excavation.
  - 3.3.17.2. Rock includes conglomerate deposits or any other material so firmly cemented by natural processes as to present characteristics of solid rock, being so hard or so firmly cemented that, in opinion of Consultant, it is not practical to excavate and remove with power shovel except after thorough and continuous drilling and blasting. Frozen materials are not considered as rock.
  - 3.3.17.3. Ensure rock excavation for building extends to 1500 mm (5') outside building walls, including those for steps and other attachments to building.
- 3.3.18. Trench Excavating for Mechanical and Electrical Work:
  - 3.3.18.1. Include all types of strata in Contract Price for trench excavation.
  - 3.3.18.2. Ensure excavation for mechanical and electrical work is carried out in accordance with requirements specified herein and indicated on Drawings. Ensure such work is laid out under supervision of mechanical and electrical Sections. Coordinate mechanical and electrical work with respective Sections before commencement.
  - 3.3.18.3. Commence excavating of service trenches at low point; evenly pitch trenches and maintain trenches in dry condition. Excavate with suitable machinery or by hand as may be necessary to depths and dimensions required for work. Unless otherwise indicated on Drawings, excavate trenches to depth sufficient to provide minimum frost cover of 1500 mm (5') over pipe when laid.
  - 3.3.18.4. Cut and trim sides of trenches evenly and as near vertical as possible and shore as required to prevent cave-in.
  - 3.3.18.5. Keep bottom of trenches clean and clear of loose material and slope or grade as required. Hand trim last 100 mm (4") of trench excavation to ensure minimum disturbance to load bearing value of trench bottoms.
- 3.3.19. Backfilling:
  - 3.3.19.1. Proceed promptly with backfilling as building progresses after obtaining Consultant's review.
  - 3.3.19.2. Backfill evenly on both sides of foundation walls to avoid unequal fill pressures on walls whenever backfilling on both sides is possible, in locations where backfilling is only on 1 side of structure ensure that structure is properly shored and braced.
  - 3.3.19.3. Remove shoring material during backfilling.
  - 3.3.19.4. Place fill around foundation wall so footings will have minimum 1500 mm (5') coverage, measured at 45° from bottom of footing to protect against frost until final grading is complete.
  - 3.3.19.5. Place backfill and fill in 150 mm (6") thick maximum layers. Compact each layer before placing next.
  - 3.3.19.6. Ensure areas adjoining vulnerable building components which cannot be thoroughly compacted by drawn equipment receive equivalent compaction with mechanical tampers.
  - 3.3.19.7. Ensure fill is free of snow and ice and in no instance placed on frozen snow, or ice covered ground.

- 3.3.20. Exterior Filling and Rough Grading:
- 3.3.20.1. Cut and fill as required, areas of site to be landscaped or which will require changes of contours outside building and rough grade to levels required to accommodate finishes indicated on Drawings.
- 3.3.20.2. Before commencing grading remove debris from site and place permitted fill as specified and cut, grade and compact by permitted methods.
- 3.3.20.3. Provide minimum slope of 2% for distance of 3 m (10') away from building to provide drainage. Provide uniform slopes between points where elevations are given and between given elevations and existing grade levels.
- 3.3.20.4. Ensure graded surfaces are free from coarse material and stones greater than 100 mm (4") in diameter and left in satisfactory condition.
- 3.3.20.5. Should settlement occur Make Good as soon as possible to avoid ponding and interruption of traffic around building.
- 3.3.21. Underslab Fill:
- 3.3.21.1. Immediately after foundation walls are completed to floor level and backfill over mechanical and electrical services is completed, place and compact fill as required to bring level up to elevation of underside of porous fill provided under Section 03 30 00.
- 3.3.21.2. Inspect moisture content of fill prior to placing. Limit addition of water only to extent required to provide optimum moisture content for compaction. Puddling or flooding with water to compact fill is not permitted.
- 3.3.21.3. Prior to filling, proof roll existing earth sub-grade in order to identify inconsistencies or soft areas. Proceed with filling operations only after inconsistencies or soft areas have been reworked and compacted or excavated, backfilled and compacted as required to eliminate such conditions.
- 3.3.21.4. Place, moist and compact Granular "B" fill in 150 mm (6") lifts to a minimum compacted depth of 150 mm (6") terminating at underside of floor slab except where shown otherwise.
- 3.3.21.5. Fill existing earth subgrade with 150 mm (6") Granular "B" sub-base and 150 mm (6") Granular "A" base. Thoroughly compact as specified.
- 3.3.21.6. Make Good any subsequent settlement to Consultant's satisfaction.
- 3.3.22. Compaction Density: Refer to Geotechnical Report appended to Section 00 30 00.
- 3.3.23. Ramps:
- 3.3.23.1. Construct and maintain temporary access roads and ramps as required leading into each excavated areas as designated by Consultant with full coordination with shoring installation where applicable.
- 3.3.23.2. Design ramps of sufficient size to provide stability and to support movement of both haulage vehicles, construction equipment and concrete trucks. Construct such ramps and roads from site excavated material where available, provided they meet design requirements and construction schedule.
- 3.3.23.3. Remove temporary ramps and other access roads to suit construction schedule. Hand excavated areas clean for work to progress as required.
- 3.3.24. Water on Prepared Surfaces:
- 3.3.24.1. On surfaces to receive paving or concrete slabs, immediately remove any ponding water by permitted methods.
- 3.3.24.2. Where prepared subgrade soil under structural work and any compacted fill under concrete slabs or paving, is softened or disturbed by water, remove unsatisfactory material and replace with compacted fill as specified for respective work and locations.

**3.4. SITE QUALITY CONTROL**

3.4.1. Site Tests and Inspections:

3.4.1.1. Testing of materials and compaction may be carried out in accordance with requirements of Section 01 40 00 by testing laboratories designated by Consultant.

3.4.1.2. Structural Inspection: Ensure a licensed engineer specified herein inspects work of this Section during erection/installation and submits sealed and signed Field Review Report within 5 Days of site visit.

3.4.2. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**3.5. CLEANING**

3.5.1. Surplus Soil Disposal:

3.5.1.1. Remove from site rock, spoil and any excavated material not required or not allowed by Consultant for purpose of fill or backfill on site. Obtain Consultant's permission before removing such surplus and conform to local municipal requirements for disposal of such materials.

3.5.1.2. Reinstate existing work, such as asphalt paving, concrete sidewalk, sodding and similar items, disturbed to original condition and elevation. Clean and reinstate areas affected by work as directed.

**END OF SECTION**

**1. PART 1 - GENERAL**

**1.1. RELATED REQUIREMENTS**

- 1.1.2. Section 01 33 00 - Submittal Procedures
- 1.1.3. Section 01 45 00 - Quality Control
- 1.1.4. Section 01 35 29.06 - Health and Safety Requirements.
- 1.1.5. Section 01 57 13 – Temporary Erosion and Sediment Control

**1.2. REFERENCES**

- 1.2.2. American Society for Testing and Materials International (ASTM)
  - 1.2.2.1. ASTM D422-63 (2007)e2, Standard Test Method for Particle-Size Analysis of Soils.
  - 1.2.2.2. ASTM D698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
  - 1.2.2.3. ASTM D1557-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>)
    - 1.2.2.3.1.1.1. (2,700 kN-m/m<sup>3</sup>).
  - 1.2.2.4. ASTM D4318-10e1, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- 1.2.3. Canadian General Standards Board (CGSB)
  - 1.2.3.1. CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - 1.2.3.2. CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- 1.2.4. Canadian Standards Association (CSA International)
  - 1.2.4.1. CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
    - 1.2.4.1.1. CSA-A3001-13, Cementitious Materials for Use in Concrete.
  - 1.2.4.2. CSA-A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

**1.3. DEFINITIONS**

- 1.3.1. Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
  - 1.3.1.1. Rock: solid material in excess of 1.00 m; and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m<sup>3</sup> bucket. Frozen material not classified as rock.
  - 1.3.1.2. Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- 1.3.2. Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- 1.3.3. Topsoil
  - 1.3.3.1. Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
  - 1.3.3.2. Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 mm in any dimension.
- 1.3.4. Waste material: excavated material unsuitable for use in Work or surplus to requirements.

- 1.3.5. Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- 1.3.6. Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- 1.3.7. Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

**1.4. SUBMITTALS**

- 1.4.3. Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- 1.4.4. Quality Control: in accordance with Section 01 45 00 - Quality Control:
  - 1.4.4.1. Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
  - 1.4.4.2. Submit for review by Consultant proposed dewatering and heave prevention methods as described in PART 3 of this Section.
  - 1.4.4.3. Submit to Consultant written notice at least 3 days prior to excavation work, to ensure cross sections are taken.
  - 1.4.4.4. Submit to Consultant written notice when bottom of excavation is reached.
  - 1.4.4.5. Submit to Consultant inspection results and report as described in PART 3 of this Section.
- 1.4.5. Preconstruction Submittals:
  - 1.4.5.1. Submit construction equipment list for major equipment to be used in this section prior to start of Work.
  - 1.4.5.2. Submit records of underground utility locates, indicating: location plan of existing utilities as found in field.
- 1.4.6. Samples:
  - 1.4.6.1. Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
  - 1.4.6.2. Inform Consultant at least 2 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.

**1.5. QUALITY ASSURANCE**

- 1.5.1. Qualification Statement: submit proof of insurance coverage for professional liability.
- 1.5.2. Keep design and supporting data on site.
- 1.5.3. Engage services of qualified professional Engineer who is registered or licensed in Province of Ontario, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.
- 1.5.4. Do not use soil material until written report of soil test results are reviewed and approved by Consultant.
- 1.5.5. Health and Safety Requirements:
  - 1.5.5.1. Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

**1.6. WASTE MANAGEMENT AND DISPOSAL**

- 1.6.1. Divert excess aggregate materials from site to off-site at expense of contractor.

**1.7. EXISTING CONDITIONS**

- 1.7.2. Buried services:



- 1.7.2.1. Before commencing work verify location of buried services on and adjacent to site.
- 1.7.2.2. Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
- 1.7.2.3. Remove obsolete buried services within 2 m of foundations: cap cut-offs.
- 1.7.2.4. Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- 1.7.2.5. Prior to beginning excavation Work, notify authorities having jurisdiction and establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
- 1.7.2.6. Confirm locations of buried utilities by careful test excavations.
- 1.7.2.7. Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
- 1.7.2.8. Where utility lines or structures exist in area of excavation, obtain direction of Consultant before removing or re-routing. Costs for such Work to be paid by the Owner.
- 1.7.2.9. Record location of maintained, re-routed and abandoned underground lines.
- 1.7.2.10. Confirm locations of recent excavations adjacent to area of excavation.
  
- 1.7.3. Existing buildings and surface features:
  - 1.7.3.1. Conduct, with Consultant, condition survey of existing
  - 1.7.3.2. Buildings, trees and other plants, lawns, fencing, service poles, wires, pavement, survey bench marks and monuments which may be affected by Work.
  - 1.7.3.3. Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Consultant.
  - 1.7.3.4. Where required for excavation, cut roots or branches as directed by Consultant.

## **2. PRODUCTS**

### **2.1. MATERIALS**

- 2.1.1. Type 1 Fill Material – Granular A base in accordance with OPSS 1010.
- 2.1.2. Type 2 Fill Material – Granular B subbase in accordance with OPSS 1010.
  
- 2.1.3. Type 3 fill: selected material from excavation or other sources, approved by Consultant for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

## **3. EXECUTION**

### **3.1. TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- 3.1.1. Provide temporary erosion and sedimentation control measures as per Section 01 57 13 – Temporary Erosion and Sediment Control.
- 3.1.2. Inspect, repair, and maintain erosion and sedimentation control measures during construction.
- 3.1.3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.2. SITE PREPERATION**

- 3.2.1. Remove obstructions, ice, and snow, from surfaces to be excavated within limits indicated.
- 3.2.2. Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may

break evenly and clean.

**3.3. PREPARATION/PROTECTION**

3.3.1. Keep excavations clean, free of standing water and loose soil.

3.3.2. Where soil is subject to significant volume change due to change in moisture content, cover and protect to Consultant's approval.

3.3.3. Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

3.3.4. Protect buried services that are required to remain undisturbed.

**3.4. STOCKPILING**

3.4.1. Stockpile fill materials in areas designated by Consultant  
3.4.1.1. Stockpile granular materials in manner to prevent segregation.

3.4.2. Protect fill materials from contamination.

3.4.3. Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

**3.5. EXCAVATION**

3.5.1. Excavate to lines, grades, elevations and dimensions as indicated.

3.5.2. Remove concrete, masonry, paving, walks, demolished foundations and rubble, and other obstructions encountered during excavation.

3.5.3. Excavation must not interfere with bearing capacity of adjacent foundations.

3.5.4. For trench excavation, unless otherwise authorized by Consultant, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

3.5.5. Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Consultant.

3.5.6. Restrict vehicle operations directly adjacent to open trenches.

3.5.7. Dispose of surplus and unsuitable excavated material off site.

3.5.8. Do not obstruct flow of surface drainage or natural watercourses.

3.5.9. Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

3.5.10. Notify Consultant when bottom of excavation is reached.

3.5.11. Obtain Consultant approval of completed excavation.

3.5.12. Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Consultant.

3.5.13. Correct unauthorized over-excavation as follows:

3.5.13.1. Fill under bearing surfaces and footings with Type 2 fill compacted to not less than 100% of

- corrected Standard Proctor maximum dry density.
- 3.5.13.2. Fill under other areas with Type 2 fill compacted to not less than 95% of corrected Standard Proctor maximum dry density.
- 3.5.14. Hand trim, make firm and remove loose material and debris from excavations.
- 3.5.14.1. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

### **3.6. BACKFILLING**

- 3.6.1. Do not proceed with backfilling operations until completion of following:
  - 3.6.1.1. Consultant has inspected and approved installations.
  - 3.6.1.2. Consultant has inspected and approved of construction below finish grade.
  - 3.6.1.3. Inspection, testing, approval, and recording location of underground utilities.
  - 3.6.1.4. Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- 3.6.2. Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- 3.6.3. Do not use backfill material which is frozen or contains ice, snow or debris.
- 3.6.4. Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- 3.6.5. Backfilling around installations:
  - 3.6.5.1. Place bedding and surround material as specified elsewhere.
  - 3.6.5.2. Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
  - 3.6.5.3. Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 0.2 m.

### **3.7. RESTORATION**

- 3.7.1. Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Consultant.
- 3.7.2. Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- 3.7.3. Clean and reinstate areas affected by Work as directed by Consultant.
- 3.7.4. Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide pavement markings including but not limited to following:
  - 1.2.1.1. line painting.
  - 1.2.1.2. directional arrows and graphics.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Provision of cast-in-place concrete slabs: Section 03 30 00, Cast-In-Place Concrete.

**1.3. SUBMITTALS**

- 1.3.1. Product Data: Submit Product data for paint being used.
- 1.3.2. Shop Drawings: Submit a layout out Drawings indicating layout of lines.

**1.4. QUALITY ASSURANCE**

- 1.4.1. Qualifications:
  - 1.4.1.1. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

**1.5. SITE CONDITIONS**

- 1.5.1. Ambient Conditions: Do not apply line painting during wet weather.

**PART 2 - PRODUCTS**

**2.1. MANUFACTURERS**

- 2.1.1. Manufacturer List: Products of following manufacturers are permitted subject to conformance to requirements of Drawings, Schedules and Specifications:
  - 2.1.1.1. The Sherwin-Williams Company; [www.sherwin-williams.com](http://www.sherwin-williams.com)
- 2.1.2. Substitution Limitations: Comparable Products from manufacturers not listed herein may be reviewed provided they meet requirements of this Specification.

**2.2. MATERIALS**

- 2.2.1. Line Paint: Fast drying latex traffic paint white and/or yellow as indicated. Permitted Products: "Hotline® Fast Dry Latex Waterborne Traffic Marking Paint, TM2152, White and TM2153, Yellow" by The Sherwin-Williams Company.

**PART 3 - EXECUTION**

**3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

**3.2. APPLICATION**

- 3.2.1. Paint 100 mm (4") wide bay lines on concrete for parking stalls with each bay consecutively numbered with 50 mm (2") wide painted numbers in accordance with reviewed parking layout and/or in accordance with requirements of authorities having jurisdiction. Apply paint to clean, dry surface. Provide well defined lines; do not overspray.
- 3.2.2. Identify barrier free accessible parking bays and refuge areas with appropriate symbol designation and/or in accordance with requirements of authorities having jurisdiction.
- 3.2.3. Identify pedestrian walkways 100 mm (4") wide painted lines at 45° to path of travel and spaced at 450 mm (18") oc and/or in accordance with requirements of authorities having jurisdiction.
- 3.2.4. Take precautions to protect freshly painted line work from being marked or otherwise disturbed by traffic, by use of fluorescent cones or other means until paint is dry.
- 3.2.5. Identify low headroom areas with minimum 100 mm (4") wide band on leading edge marked "CAUTION LOW CLEARANCE" in 50 mm (2") high black letters at suitable intervals and/or in accordance with requirements of authorities having jurisdiction.

**3.3. SITE QUALITY CONTROL**

- 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. RELATED REQUIREMENTS**

- 1.1.1.1. Section 01 33 00 – Submittal Procedures.
- 1.1.1.2. Section 01 57 13 – Temporary Erosion and Sediment Control
- 1.1.1.3. Section 01 61 00 – Common Product Requirements.
- 1.1.1.4. Section 31 23 20 – Excavation, Trenching and Backfilling
- 1.1.1.5. Section 01 74 11 – Cleaning.

**1.2. REFERENCES**

- 1.2.1.1. ASTM International ``
- 1.2.1.2. ASTM D 2680-01(2014), Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
- 1.2.1.3. ASTM D 3034-14a, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- 1.2.1.4. ASTM D 3350-14, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
- 1.2.2. Canadian General Standards Board (CGSB)
  - 1.2.2.1. CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - 1.2.2.2. CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- 1.2.3. CSA International
  - 1.2.3.1. CSA A3000-13, Cementitious Materials Compendium.
  - 1.2.3.2. CSA A257 Series-14, Standards for Concrete Pipe and Manhole Sections.
  - 1.2.3.3. CSA B1800-11, Thermoplastic Non-pressure Pipe Compendium.
    - 1.2.3.3.1. CSA B182.1-11, Plastic Drain and Sewer Pipe and Pipe Fittings.
    - 1.2.3.3.2. CSA B182.2-11, PSM Type Polyvinylchloride PVC Sewer Pipe and Fittings.
    - 1.2.3.3.3. CSA B182.6-11, Profile Polyethylene (PE) Sewer Pipe and Fittings for Leak-Proof Sewer Applications.
  - 1.2.3.3.4. CSA B182.11-11, Standard Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.

**1.3. ADMINISTRATIVE REQUIREMENTS**

- 1.3.1.1. Scheduling:
- 1.3.1.2. Schedule Work to minimize interruptions to existing services and maintain existing sewage flows during construction.
- 1.3.1.3. Submit schedule of expected interruptions for approval and adhere to approved schedule.
- 1.3.1.4. Notify Consultant and building manager 24 hours minimum in advance of any interruption in service.

**1.4. ACTION AND INFORMATIONAL SUBMITTALS**

- 1.4.1. Submit in accordance with Section 01 33 00 - Submittal Procedures.
- 1.4.3. Product Data:
  - 1.4.3.1. Submit manufacturer's instructions, printed product literature and data sheets for pipes, and backfill and include product characteristics, performance criteria, physical size, finish and limitations.

- 1.4.4. Samples:
  - 1.4.4.1. Inform Consultant at least 4 weeks prior to beginning Work, of proposed source of bedding materials and provide access for sampling.
  - 1.4.5.1. Submit for testing at least 2 weeks prior to beginning Work, samples of materials proposed for use as follows:
    - 1.4.5.1.1. Type 1 Fill Material – Granular ‘A’
  - 1.4.6. Certificates:
    - 1.4.6.1. Certification to be marked on pipe.
  - 1.4.7. Test and Evaluation Reports:
    - 1.4.8.1. Submit manufacturer's test data and certification 2 weeks minimum before beginning Work.

**1.5. DELIVERY, STORAGE AND HANDLING**

- 1.5.1. Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- 1.5.2. Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- 1.5.3. Storage and Handling Requirements:
  - 1.5.3.1. Store materials in accordance with manufacturer's recommendations.
  - 1.5.3.2. Store and protect pipes from damage.
  - 1.5.3.3. Replace defective or damaged materials with new.
- 1.5.5. Packaging Waste Management: Dispose packaging materials off-site at contractor's expense.

**PART 2 - PRODUCTS****1.6. PLASTIC PIPE**

- 1.6.2. Type PSM Polyvinyl Chloride (PVC): to ASTM D 3034, CSA B182.2
  - 1.6.2.1. Standard Dimensional Ratio (SDR): 35
  - 1.6.2.2. Locked-in gasket and integral bell system
  - 1.6.2.3. Nominal lengths: 6 m – SDR 35.
  - 1.6.2.4. Size 100 mm diameter as per drawing

**1.7. SERVICE CONNECTIONS**

- 1.7.1. Type PSM Poly (Vinyl) Chloride: to CSA B182.2.
- 1.7.2. Plastic pipe: to CSA B182.1, with push-on joints.

**1.8. PIPE BEDDING AND SURROUND MATERIALS**

- 1.8.1. Granular A material in accordance with OPSS 1010.

**1.9. BACKFILL MATERIAL**

- 1.9.2. As indicated.

- 1.9.3. Type 3, in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

## **2. EXECUTION**

### **2.1. EXAMINATION**

- 2.1.1. Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sewer pipe installation in accordance with manufacturer's written instructions.
- 2.1.1.1. Visually inspect substrate in presence of Consultant.
- 2.1.1.2. Inform Consultant of unacceptable conditions immediately upon discovery.
- 2.1.1.3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

### **2.2. PREPARATION**

- 2.2.2. Temporary Erosion and Sedimentation Control:
- 2.2.3.1. Provide temporary erosion and sedimentation control measures as per Section 01 57 13 – Temporary Erosion and Sediment Control
- 2.2.3.2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- 2.2.3.3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- 2.2.4. Clean pipes and fittings of debris and water before installation and remove defective materials from site to approval of Consultant.
- 2.2.5. Clean and dry pipes and fittings before installation.
- 2.2.6. Obtain Consultant approval of pipes and fittings prior to installation.

### **2.3. TRENCHING**

- 2.3.1. Do trenching Work in accordance with Section 31 23 20 - Excavating, Trenching and Backfilling.
- 2.3.2. Protect trench from contents of sewer or sewer connection.
- 2.3.3. Trench alignment and depth require approval of Consultant prior to placing bedding material and pipe.

### **2.4. GRANULAR BEDDING**

- 2.4.1. Place bedding in unfrozen condition.
- 2.4.2. Place granular bedding materials in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.
- 2.4.3. Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.
- 2.4.3.1. Do not use blocks when bedding pipe.
- 2.4.4. Shape transverse depressions as required to suit joints.



2.4.5. Compact each layer full width of bed to 100% corrected maximum dry density.

2.4.6. Fill excavation below bottom of specified bedding adjacent to manholes or structures with compacted bedding material.

## **2.5. INSTALLATION**

2.5.2. Lay and join pipes to: ASTM C12.

2.5.4. Lay and join pipes in accordance with manufacturer's recommendations and to approval of Consultant.

2.5.5. Handle pipe using methods approved by Consultant.

2.5.5.1. Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

2.5.6. Lay pipes on prepared bed, true to line and grade, with pipe invert smooth and free of sags or high points.

2.5.6.1. Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

2.5.7. Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

2.5.8. Joint deflection permitted within limits recommended by pipe manufacturer.

2.5.9. Water to flow through pipe during construction, only as permitted by Consultant.

2.5.10. Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

2.5.11. Install plastic pipe and fittings in accordance with CSA B182.11.

2.5.12. Pipe jointing:

2.5.12.1. Install gaskets in accordance with manufacturer's written recommendations.

2.5.12.2. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

2.5.12.3. Align pipes before joining.

2.5.12.4. Maintain pipe joints free from mud, silt, gravel and foreign material.

2.5.12.5. Avoid displacing gasket or contaminating with dirt or foreign material. Gaskets so disturbed to be removed, cleaned and lubricated and replaced before joining is attempted.

2.5.12.6. Complete each joint before laying next length of pipe.

2.5.12.7. Minimize joint deflection after joint has been made to avoid joint damage.

2.5.13.1. At rigid structures, install pipe joints not more than 1.2 m from side of structure.

2.5.13.2. Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.

2.5.14. When stoppage of Work occurs, block pipes as directed by Consultant to prevent creep during down time.

2.5.15. Cut pipes as required for special inserts, fittings or closure pieces as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

~~2.5.16. Make watertight connections to manholes.~~

2.5.16.1. Use shrinkage compensating grout when suitable gaskets are not available.

2.5.17. Use prefabricated saddles or field connections approved by Consultant, for connecting pipes to existing sewer pipes.

2.5.17.1. Joints to be structurally sound and watertight.

## **2.6. PIPE SURROUND**

2.6.2. Place surround material in unfrozen condition.

2.6.3. Upon completion of pipe laying, and Consultant has inspected pipe joints, surround and cover pipes as indicated.

2.6.3.1. Leave joints and fittings exposed until field testing is completed.

2.6.4. Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.

2.6.5. Place layers uniformly and simultaneously on each side of pipe.

2.6.6. Compact each layer from pipe invert to mid height of pipe to 100% corrected maximum dry density.

2.6.7. Compact each layer from mid height of pipe to underside of backfill to 100% corrected maximum dry density.

2.6.8. When field test results are acceptable to Consultant, place surround material at pipe joints.

## **2.7. BACKFILL**

2.7.1. Place backfill material in unfrozen condition.

2.7.3. Place backfill material, above pipe surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

2.7.4. Under paving and walks, compact backfill to 100% corrected maximum dry density.

2.7.4.1. In other areas, compact to 100% corrected maximum dry density.

## **2.8. SERVICE CONNECTIONS**

2.8.2. Install pipe to CSA B182.11 and manufacturer's instructions and specifications.

2.8.3. Maintain grade for 100 and 125 mm diameter sewers at 1 vertical to 50 horizontal unless directed otherwise by Consultant.

2.8.5. Service connection pipe: not to extend into interior of main sewer.

2.8.6. Make up required horizontal and vertical bends from 45 degrees bends or less, separated by straight section of pipe with minimum length of 4 pipe diameters.

2.8.6.1. Use long sweep bends where applicable.

2.8.8. Plug service laterals with water tight caps or plugs as approved by Consultant.

**2.9. FIELD TESTING**

- 2.9.2. Repair or replace pipe, pipe joint or bedding found defective.
- 2.9.4. When directed by Consultant, draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.
- 2.9.5. Remove foreign material from sewers and related appurtenances by flushing with water.

**2.10. CLEANING**

- 2.10.1. Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- 2.10.1.1. Leave Work area clean at end of each day.
- 2.10.2. Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1. RELATED REQUIREMENTS**

- 1.1.2. Section 31 23 20 Excavation, Trenching and Backfill.
- 1.1.3. Section 01 33 00 – Submittal Procedures.
- 1.1.4. Section 01 74 11 Cleaning.

**1.2. REFERENCES**

- 1.2.2. ASTM International
  - 1.2.2.1. ASTM D 698-12e1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort ((12,400 ft-lbf/ft;) (600kN-m/m;)).
  - 1.2.2.2. ASTM D 2241-09, Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
  - 1.2.2.3. ASTM D 3034-14a, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- 1.2.3. Canadian General Standards Board (CGSB)
  - 1.2.3.1. CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - 1.2.3.2. CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.
  - 1.2.3.3. CGSB 41-GP-25M-77, Pipe, Polyethylene, for the Transport of Liquids.
- 1.2.4. CSA International
  - 1.2.4.1. CSA B137 Series-13, Thermoplastic Pressure Piping Compendium.

**1.3. ADMINISTRATIVE REQUIREMENTS**

- 1.3.2. Scheduling:
  - 1.3.2.1. Schedule Work to minimize interruptions to existing services.
  - 1.3.2.2. Submit schedule of expected interruptions and adhere to schedule approved by Consultant.
  - 1.3.2.3. Notify Consultant and building manager a minimum of 24 hours in advance of interruption in service.

**1.4. ACTION AND INFORMATIONAL SUBMITTALS**

- 1.4.1. Submit in accordance with Section 01 33 00 - Submittal Procedures.
- 1.4.3. Product Data:
  - 1.4.3.1. Submit manufacturer's instructions, printed product literature and data sheets for pipes and backfill and include product characteristics, performance criteria, physical size, finish and limitations.
- 1.4.5. Certification to be marked on pipe.
- 1.4.7. Manufacturer's Instructions: submit to Consultant 1 copy of manufacturer's installation instructions.

**1.5. DELIVERY, STORAGE AND HANDLING**

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

- 1.5.2. Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- 1.5.3. Storage and Handling Requirements:
  - 1.5.3.1. Store materials in accordance with manufacturer's recommendations.
  - 1.5.3.2. Store and protect pipes from damage.
  - 1.5.3.3. Replace defective or damaged materials with new.
- 1.5.5. Packaging Waste Management: Remove package and dispose off-site at contractors expense.

## **2. PRODUCTS**

### **2.1. MATERIALS**

- 2.1.1. Polyethylene pressure pipes: to CSA B137 CGSB 41-GP-25M:
  - 2.1.1.1. Type: HDPE - PE.
  - 2.1.1.2. Series: Pressure Class 100PSI
  - 2.1.1.3. Joints: Fernco couplers or approved equivalent.
  - 2.1.1.4. Polyethylene fittings: to CSA B137, for pipe sizes 4" and less.

### **2.2. PIPE BEDDING AND SURROUND MATERIALS**

- 2.2.1. Granular A material in accordance with OPSS 1010.

### **2.3. BACKFILL MATERIAL**

- 2.3.2. As indicated.
- 2.3.3. Type 3, in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

## **3. EXECUTION**

### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for pipe installation in accordance with manufacturer's written instructions.
  - 3.1.1.1. Visually inspect substrate in presence of Consultant.
  - 3.1.1.2. Inform Consultant of unacceptable conditions immediately upon discovery.
  - 3.1.1.3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

### **3.2. PREPARATION**

- 3.2.2. Temporary Erosion and Sedimentation Control:
  - 3.2.3.1. 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 sediment and erosion control drawings, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction.
  - 3.2.3.2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - 3.2.3.3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- 3.2.4. Pipes and fittings to be clean and dry.

3.2.5. Prior to installation, obtain Consultant's approval of pipes and fittings.

### **3.3. TRENCHING**

3.3.1. Do trenching Work, in accordance with Section 31 23 20 - Excavating, Trenching and Backfilling.

3.3.2. Trench alignment and depth require approval from Consultant prior to placing bedding material or pipe.

### **3.4. GRANULAR BEDDING**

3.4.1. Place granular bedding in unfrozen condition.

3.4.2. Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.

3.4.3. Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.

3.4.4. Shape transverse depressions as required to suit joints.

3.4.5. Compact each layer full width of bed to 100% corrected maximum dry density.

3.4.6. Fill excavation below design elevation of bottom of specified bedding with compacted bedding material.

### **3.5. INSTALLATION**

3.5.2. Avoid damage to machined ends of pipes in handling and moving pipe.

3.5.3. Maintain grade and alignment of pipes.

3.5.4. Align pipes carefully before jointing.

3.5.5. Joint deflection permitted within limits in accordance with pipe manufacturer's written recommendations.

3.5.6. Support pipe firmly over entire length, except for clearance necessary at couplings.

3.5.6.1. Do not use blocks to support pipe.

3.5.7. Keep pipe and pipe joints free from foreign material.

3.5.8. Avoid bumping gasket and knocking it out of position, or contaminating with dirt or other foreign material. Remove disturbed gaskets clean, lubricate and replace before jointing is attempted.

3.5.9. Support pipes using hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

3.5.10. Apply sufficient pressure in making joint to ensure that joint is complete to manufacturer's recommendations.

3.5.11. Apply restraint to pipe to ensure that joints when completed are held in place, by tamping fill material under and alongside pipe, or otherwise as approved by Consultant.

3.5.12. When stoppage of Work occurs, block pipe as directed by Consultant to prevent creep during downtime.

**3.6. PIPE SURROUND**

- 3.6.2. Place surround material in unfrozen condition.
- 3.6.4. Upon completion of pipe laying, and after Consultant has inspected pipe joints, surround and cover pipes as indicated. Leave joints and fittings exposed until field testing is completed.
- 3.6.5. Compact each layer from pipe invert to mid height of pipe to 100% corrected maximum dry density.
- 3.6.6. Compact each layer from mid height of pipe to underside of backfill to 100% corrected maximum dry density.
- 3.6.7. When field test results are acceptable to Consultant, place surround material at pipe joints.

**3.7. BACKFILL**

- 3.7.1. Place backfill material in unfrozen condition.
- 3.7.3. Place backfill material, above pipe surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
- 3.7.4. Under paving and walks, compact backfill to at least 95 % corrected maximum dry density. In other areas, compact to at least 95% corrected maximum dry density.

**3.8. FIELD TESTING OF FORCE MAIN**

- 3.8.3. Testing of force main to be carried out in presence of Consultant.
- 3.8.4. Strut and brace caps, bends and tees, to prevent movement when test pressure is applied.
- 3.8.5. Expel air from force main, by slowly filling main with water.
- 3.8.5.1. Drill and tap high points and install suitable cocks to vent air and to be shut when pressure is applied.
- 3.8.5.2. Remove cocks after satisfactory completion of test and seal holes with tight fitting plugs.
- 3.8.7. Apply hydrostatic test pressure of 1000 kPa based on elevation of lowest point in line and corrected to elevation of test gauge for hydrostatic test and 500 kPa for leakage test.
- 3.8.8. Apply pressure for 1 hour for pressure test and 2 hours for leakage test.
- 3.8.9. Examine exposed pipe, joints and fittings while system is under pressure.
- 3.8.10. Remove defective joints, pipe and fittings and replace with new sound material.
- 3.8.11. Define leakage as amount of water supplied from water storage tank in order to maintain test pressure for 2 hours.
- 3.8.13. Do not exceed allowable leakage 2.2L/mm of pipe size/km/day.
- 3.8.14. Locate and repair defects if leakage is greater than amount specified.
- 3.8.15. Repeat test until leakage is within specified allowance for full length of force main.
- 3.8.16. Complete backfill.
- 3.8.17. Repeat test after completing backfill. Locate and repair defects and backfill. Repeat tests, repairs and backfills as needed until leakage is less than amount specified.

**3.9. CLEANING**

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

3.9.1.1. Leave Work area clean at end of each day.

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

**END OF SECTION**



**PART 1 - GENERAL**

**1.1. GENERAL INSTRUCTIONS**

- 1.1.1. Read and conform to:
  - 1.1.1.1. CCDC 2 - 2020, Stipulated Price Contract as amended in the Contract Documents.
  - 1.1.1.2. Division 1 requirements and documents referred to therein.

**1.2. SUMMARY**

- 1.2.1. Section Includes: Provide foundation drainage including but not limited to following:
  - 1.2.1.1. foundation drains and building sub-drains.
- 1.2.2. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
  - 1.2.2.1. Closed drain pipes into which drains of this Section discharge: Division 22, Plumbing.
  - 1.2.2.2. Non-perforated drain lines from sump pits: Division 22, Plumbing.
  - 1.2.2.3. Excavating, backfilling and rough grading, for foundation drains and building sub-drains: Section 31 23 00, Excavation and Fill.

**1.3. REFERENCES**

- 1.3.1. Abbreviations and Acronyms:
  - 1.3.1.1. PVC: Polyvinyl Chloride.
- 1.3.2. Reference Standards:
  - 1.3.2.1. CSA A23.1-19 - Concrete materials and methods of concrete construction
  - 1.3.2.2. ASTM D3034-16 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
  - 1.3.2.3. ASTM D3350-21 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
  - 1.3.2.4. ASTM F679-16 - Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and fittings
  - 1.3.2.5. ASTM F949-20 - Standard Specification for Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

**1.4. SUBMITTALS**

- 1.4.1. Shop Drawings: Submit Shop Drawings in accordance with Section 01 30 00. Indicate clean out location in relation to adjoining work

**PART 2 - PRODUCTS**

**2.1. MATERIALS**

- 2.1.1. Foundation Drains and Building Sub-drains:
  - 2.1.1.1. PVC Pipe: DR 35, ASTM D3034 and ASTM F679 including solid and perforated pipe with sock, fittings, caps and push-on joints as required. Nominal pipe size 100 mm (4") unless indicated otherwise on Drawings.

- 2.1.1.2. High Density Polyethylene Pipe: ASTM D3350 and ASTM F949 including solid and perforated pipe with sock, fittings, caps and push-on joints as required. Nominal pipe size 100 mm (4") unless indicated otherwise on Drawings.
- 2.1.2. Pipe Joint Compound: PVC solvent cement.
- 2.1.3. Filter Aggregate: CSA A23.1, Clean pea gravel, 19 mm - 4.7 mm (3/4" to No. 4), free from organic matter, fines, chlorates and calcareous deposits; crushed Limestone is not permitted.
- 2.1.4. Geotextile: "Terrafix 270R" by Terrafix Geosynthetics Inc.; [www.terrafixgeo.com](http://www.terrafixgeo.com), "Mirafi® 140" by Tencate Geosynthetics; [www.tencategeo.us](http://www.tencategeo.us) or "Tygar Style 3341" by Tygar Geosynthetics; [www.tygargeosynthetics.com](http://www.tygargeosynthetics.com).

### **PART 3 - EXECUTION**

#### **3.1. EXAMINATION**

- 3.1.1. Verification of Conditions: Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation.
- 3.1.2. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

#### **3.2. INSTALLATION**

- 3.2.1. Verify trenches for drains are in accordance with Drawings.
- 3.2.2. If excavation reveals unexpected subsurface drainage conditions which may necessitate revisions to drainage system, advise Consultant immediately and do not proceed until directed.
- 3.2.3. Place geotextile in excavation and cover with filter aggregate, to pipe invert elevation. Slope as specified and tamp lightly.
- 3.2.4. Lay drains over aggregate in straight lines with perforations facing down. Minimum slope 0.10%, unless otherwise indicated on Drawings. Commence laying at outlet and proceed in upstream direction.
- 3.2.5. Use specially designed fittings at direction changes, connections and where drains connect to other types of pipe.
- 3.2.6. Seal joints with pipe joint compound in accordance with manufacturer's instructions. Protect drains against floatation until backfilled.
- 3.2.7. Do not cover drains with filter aggregate until reviewed.
- 3.2.8. After review, cover drains with filter aggregate to required depth and width and tamp lightly.
- 3.2.9. Wrap geotextile around filter aggregate as indicated on Drawings.
- 3.2.10. Have drain installation reviewed before backfilling and supervise backfilling to ensure geotextile is not displaced and pipe is not damaged.

#### **3.3. SITE QUALITY CONTROL**

- 3.3.1. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Consultant at no cost to Owner.

### **END OF SECTION**