

MONTGOMERY SISAM ARCHITECTS INC.

KAHLER SLATER

**UNIVERSITY OF TORONTO  
DENTISTRY BUILDING – CLINIC 2 RENOVATION**

124 EDWARD ST  
TORONTO, ON M5G 1G6

**PROJECT MANUAL  
VOLUME 1 of 3**

UofT Project No. P065-21-050  
MSA Project No. 24082

**SPECIFICATIONS**

Divisions 00 to 14

**ISSUED FOR TENDER**

May 29<sup>th</sup>, 2026

*Entuitive*  
**Structural**

*EXP Services Inc.*  
**Mechanical / Electrical / IT / Sustainability**

*LRI Engineering Inc.*  
**Building Code / Life Safety**

*Soberman Engineering Inc.*  
**Elevator Consultant**

*Thornton Tomasetti*  
**Acoustic Consultant**

*Allegion*  
**Hardware Consultant**

*Oktus Developments Inc.*  
**Logistics Consultant**

1            **Owner**

1.1           The University of Toronto  
Toronto, Ontario

2            **Project**

2.1           University of Toronto Faculty of Dentistry  
Clinic 2 Renovation  
Toronto, Ontario

3            **Consultants**

3.1           The Consultants who have prepared Drawings and/or Specifications and reports for  
the Work of the Contract are as follows;

.1           Architect:

**Montgomery Sisam Architects Inc.**  
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Toronto, Ontario  
M5T 2C8

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.2           Structural Engineer:

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Tel: 416.477.5832

.3           Mechanical / Electrical / IT / Sustainability Consultant

**EXP Services Inc.**  
220 Commerce Valley Drive West, Suite 110  
Markham, Ontario  
L3T 0A8

Tel: 905.695.3217

.4 Building Code Consultant:

**LRI Engineering Inc., Fire Protection & Building Code Engineers**

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Tel: 416.515.9331

.5 Acoustic Consultant:

**Thornton Tomasetti**

116 Spadina Ave., Suite 301  
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.6 Hardware Consultant:

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.7 Elevator Consultant:

**Soberman Engineering Inc.**

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M4T 1N5

Tel: 416.323.2133

.8 Logistics Consultant:

**Oktus Developments Inc.**

Toronto, Ontario

Tel: 416.890.9092

END OF SECTION

### **Design Discipline**

Documents prepared by the respective Consultants are designated by the following discipline symbols:

- Owner (O)
- Architect (A)
- Electrical Consultant (E)
- Elevator Consultant (ELEV)
- Hardware Consultant (H)
- Mechanical Consultant (M)
- Structural Consultant (S)
- Sustainability Consultant (SUS)

## **VOLUME 1 (Divisions 0-14)**

### **DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS**

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### **DIVISION 01 - GENERAL REQUIREMENTS**

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### **DIVISION 02 - EXISTING CONDITIONS**

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**DIVISION 03 - CONCRETE**

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03 51 13	Cementitious Topping	A	3

**DIVISION 04 - MASONRY**

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**DIVISION 05 - METALS**

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05 50 00	Miscellaneous and Metal Fabrications	A	12
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**DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES**

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**DIVISION 07 - THERMAL AND MOISTURE PROTECTION**

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07 85 00	Firestopping and Smoke Seals	A	10
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### **DIVISION 08 - OPENINGS**

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08 11 16	Interior Glazed Aluminum Doors and Partitions	A	5
08 11 18	Interior Glazed Aluminum Screen/Guard	A	5
08 33 13	Coiling Counter Doors	A	4
08 71 00	Door Hardware	H	20
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08 80 00	Glazing	A	8

### **DIVISION 09 - FINISHES**

<b>Section</b>	<b>Title</b>	<b>Discipline</b>	<b>Pages</b>
09 01 62	Terrazzo Restoration	A	6
09 21 16	Gypsum Board	A	16
09 27 00	Decorative Trowelled Finishes	A	4
09 30 00	Tile	A	7
09 30 27	Detectable/Tactile Indicators	A	4
09 51 00	Acoustical Ceilings	A	6
09 65 13	Resilient Base	A	3
09 65 16	Resilient Sheet Flooring	A	6
09 65 19	Resilient Tile Flooring	A	5
09 66 23	Epoxy Terrazzo Flooring	A	5
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09 67 23	Resinous Flooring	A	5
09 67 70	Waterproof Flooring	A	5
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### **DIVISION 10 - SPECIALTIES**

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### **DIVISION 11 - EQUIPMENT**

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**DIVISION 12 - FURNISHINGS**

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12 21 13	Windows Coverings	A	4

**DIVISION 13 - SPECIAL CONSTRUCTION**

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13 49 00	Radiation Protection	A	8

**DIVISION 14 - CONVEYING SYSTEMS**

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## **VOLUME 2**

Refer to Volume 2 package for Divisions 20 - 33.

## **VOLUME 3**

Refer to Volume 3 package for reports and reference documents.

END OF DOCUMENT

1            **REPORT(S) AND INFORMATION**

1.1           A copy of the following report(s) and information are appended under Volume 3.

.1           **REF-01 - Data Transfer Agreement**

MSA's Data Transfer Agreement  
(211201\_v03)  
Prepared by Montgomery Sisam Architects Inc.  
1 page

.2           **REF 02 - Acoustic, Noise and Vibration Control Report**

Acoustic, Noise and Vibration Control Report  
Issued for 100% CD  
University of Toronto  
Faculty of Dentistry Building Clinic 2 Renovation  
124 Edward Street  
Toronto, Ontario  
Prepared by: Thornton Tomasetti  
TT Project No.: 25013203.01  
Dated: January 9, 2026  
13 pages

.3           **REF 03 - Sustainability and Energy Modelling Report**

University of Toronto - Faculty of Dentistry Building  
- Clinic 2 Implementation (P065-20-110)  
124 Edward Street  
Toronto, Ontario  
Prepared by: EXP Services Inc.  
EXP Project No.: MRK-21019389-A0  
Dated: January 9, 2026  
26 pages

.4           **REF 04 - Code Report**

University of Toronto  
Faculty of Dentistry - Clinic 2 Renovation  
124 Edward Street  
Toronto, Ontario  
Prepared by: LRI Engineering Inc., Fire Protection & Building Code Engineers  
LRI File No.: 31671  
Dated: January 9<sup>th</sup>, 2026  
25 pages



- 1.2 Reports, general:
- .1 The report(s), by their nature, cannot reveal all conditions that exist or can occur on the site. Should conditions be found to vary substantially from the report, immediately notify Consultant in writing and await instructions.
  - .2 Contractor shall not be entitled to extra payment or extension of Contract Time for work which is required and which is reasonably inferable in the report(s) as being necessary.

END OF DOCUMENT

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for demolition and removal work in accordance with the Contract Documents.
- .2 Work included: Requirements for demolishing, salvaging and removing wholly or in part the various items designated on the drawings or required to be removed or partially removed for the receipt of the Work of this Contract, including not necessarily limited to:
  - .1 Alteration and renovations to existing building.
  - .2 Cutting and removing of walls, floors, ceilings, doors and frames, in the existing buildings as indicated on Drawings.
  - .3 Patching, making good openings and chases in walls, floors, ceilings, including the supply and installation of lintels, channels and finishes.
  - .4 Removal of rubbish, debris, demolished fixtures, fitments and items not scheduled to remain the Owner's property, resulting from the demolition and preparatory work.
  - .5 Remove abandoned services such as conduits, pipes, wiring, ducts, fixtures, equipment, etc. where required for the work or indicated on the drawings.
  - .6 Removal of all mechanical items including plumbing fixtures, services etc. where required for the work or indicated on drawings and or where not required to be relocated.
  - .7 Removal of existing electrical items including fixtures, etc. where required for the work or indicated on the drawings and not required to be relocated.
  - .8 Dust control during the operations of the work of this Section.
  - .9 Removal shall mean removal from site and safe disposal in a legal manner.

1.2 **REFERENCES**

- .1 CSA S350-M, Code of Practice for Safety in Demolition of Structures.

1.3 **SUBMITTALS**

- .1 Where required by Authorities having jurisdiction, submit a Fire Plan to local fire department for review and approval.
- .2 Submit shop drawings, diagrams and details in accordance with the Conditions of the Contract.
- .3 30 calendar days prior to start of demolition and removals work, submit for review, drawings, diagrams or details showing sequence of disassembly work and shoring of supporting structures in accordance with authorities having jurisdiction.
- .4 Submit for approval, a plan showing impacts, interruptions and delays to Owners operations.

- .5 Condition survey:
  - .1 Conduct a complete condition survey with the Consultant, of existing conditions which may be affected by Work.
  - .2 Thoroughly document existing conditions prior to commencing demolition, such as through taking photographs or noting on drawings any discrepancies.
  - .3 Submit intermittent photographs taken in instances when a previously obscured condition is revealed, such as when millwork is removed and exposes wall behind.
- .6 Have submissions signed and sealed by Professional Engineer licensed in Province of Ontario.
- .7 Submit to Consultant, details of where rubble, debris and other materials are to be disposed or reused. Include each disposal/reuse site location, operator's name and business address, type of license under which site operates, and criteria used by site to assess suitability of rubble, debris and other materials for disposal.
- .8 Give notice to Utility Authorities controlling services and appurtenances which will be affected by demolition work.

#### 1.4 **QUALITY ASSURANCE**

- .1 Prepare waste audits, waste reduction workplans, source separation programs and recycling programs as required by jurisdictional authorities and update programs and implement such programs as required.
- .2 Perform the work of this section in accordance with the 'Environmental Protection Act' including Ontario Regulation 102 and the 'Environmental Assessment Act' including Ontario Regulation 103.
- .3 Conform to Fire Code, Regulation under the Fire Marshals Act.
- .4 The demolition contractor must engage a registered professional engineer who holds a certificate of authorization and an appropriate level of liability insurance to prepare demolition procedures.
- .5 As part of the contract requirements, the engineer for the demolition contractor should be required to sign the general review commitment required by city building departments.

1.5 **SITE CONDITIONS**

- .1 Interruptions to Owners operations will not be permitted. Coordinate with Owner as required to avoid disruption to building operations during removal of mechanical and electrical services.
- .2 Perform operations, machine and equipment movements, deliveries and removals at time or times that will permit uninterrupted operations in and around structures, including parking, deliveries, and Site access and egress.
- .3 Take over structures to be demolished based on condition on date that Tenders close.

2 Products

2.1 **MATERIALS**

- .1 All materials requiring removal shall become the Contractor's property and shall be removed and disposed of from the site, as the work progresses, unless indicated otherwise.
- .2 Salvaged materials:
  - .1 Salvage and stockpile Products, materials, and equipment as specified herein, indicated on Site or indicated on drawings.
  - .2 Coordinate items to be salvaged with Consultant.
  - .3 Salvaged materials shall not be chipped, cracked, split, stained or damaged.
  - .4 Store items off of moist surfaces.

3 Execution

3.1 **GENERAL**

- .1 Clean up rubble and debris, resulting from work promptly and dispose at end of day or place in waste disposal bins. Empty bins on regular basis.
- .2 Stockpiling of rubble, debris, and surplus Products on Site will not be permitted.
- .3 Remove, handle and transport Products indicated to be salvaged and stored for future use. Transport Products to storage area(s) designated by Consultant. Perform work to prevent any damage to Products during removal and in storage. Products damaged during removal, will be inspected by Consultant. Consultant will determine extent of damage and accept or refuse Products.

- .4 List and description of items to be removed and stored and/or reused:
  - .1 Existing ceiling tiles and fixtures for reinstallation. Acoustic ceiling tiles laminated to gypsum board to be reinstalled under Section 09 21 16.
  - .2 Existing equipment as indicated.
  - .3 Existing fire hose cabinet for reinstallation.
  - .4 Existing AV devices and equipment as indicated.
  - .5 Additional items as indicated on the drawings or by the Consultant.
- .5 Tag and log all items to be salvaged to the satisfaction of the Consultant. Ensure identification tags do not damage items to be salvaged and are non-permanent, removable and durable.
- .6 Take precautions to guard against movement, settlement or collapse of adjacent services. Be liable for such movement, settlement or collapse caused by failure to take necessary precautions. Repair promptly such damage when ordered.

### 3.2 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.
- .2 Examine adjacent structures and other installations prior to commencement of demolition and removal work in accordance with Section 31 00 00.

### 3.3 **PRESERVATION OF REFERENCES**

- .1 Record location and designation of survey markers and monuments located within demolition area, prior to removal. Store and restore markers and monuments upon completion of Work or relocate as directed by Consultant.

### 3.4 **PROTECTION**

- .1 Prevent movement or damage of adjacent structures, services and parts of existing structure to remain. Supply and install bracing and shoring as required. Make good damage caused by demolition to acceptance of Consultant.
- .2 Protect adjacent structures and property against damage which might occur from falling debris or other causes. Repair or replace damage caused from work of this Section to acceptance of Consultant.
- .3 Do not interfere with use of adjacent structures and Work areas. Maintain free, safe passage to and from adjacent structures and Work areas.

- .4 Take precautions to support affected structures. If safety of structure being demolished, adjacent structures or services are endangered, cease demolition operations and take necessary action to support endangered item. Immediately inform Consultant. Do not resume demolition until reasons for endangering have been determined and corrected and action taken to prevent further endangering.
- .5 If movement or settlement occurs, install additional bracing and shoring as necessary and make good damage to acceptance of Consultant.
- .6 Hang tarpaulins where debris and other materials are lowered. Build in around openings with wood and plywood at locations used for removal of debris and materials.
- .7 Prevent debris from blocking surface drainage system, mechanical, and electrical systems which are required to remain in operation.
- .8 Pay particular attention to prevention of fire and elimination of fire hazards which would endanger Work or adjacent structures and premises.
- .9 Supply and install adequate protection for materials to be re-used, set on ground and prevent moisture pick-up. Cover stockpiles of materials with tarpaulins.
- .10 Close off access to areas where demolition is proceeding by barricades and post warning signs.
- .11 Supply, install and maintain legal and necessary barricades, guards, railings, lights, warning signs, security personnel and other safety measures, and fully protect persons and property.
- .12 Dust partitions:
  - .1 Prior to demolition work proceeding in existing structures, temporarily enclose Work areas, access and supply and install dustproof partitions. Design partitions to prevent dust and dirt infiltration into adjoining areas, prevent ingress of water.
  - .2 Prevent dust, dirt and water from demolition operations entering operational areas.
  - .3 Adjust and relocate partitions as required for various operations of work.
  - .4 Upon completion of work, remove and dispose of partitions from Site.
- .13 Dust protection:
  - .1 Roadways and sidewalks to be cleaned daily or as required.
  - .2 A designated truck loading area on granular material or existing asphalt to be used to mitigate tracking of demolition debris off Site.
  - .3 Loaded vehicles leaving Site to be cleaned of loose soil and debris with power washing or alternative method.
  - .4 Trucks loaded with indigenous soil or demolition debris to be covered by tarps or attached screens.

- .14 Blasting is not permitted.

### 3.5 PREPARATION

- .1 Disconnect and/or re-route electrical data, communication and telephone service lines entering structures to be demolished. Remove abandoned lines as indicated on Contract Drawings and as required for remedial work. Post warning signs on electrical lines and equipment which is required to remain energized.
- .2 Disconnect and cap designated mechanical services:
  - .1 Natural gas supply lines: As indicated on drawings, to be removed by qualified workers in accordance with gas company instructions.
  - .2 Sewer and water lines: Remove and dispose of as indicated on Contract Drawings and as required for remedial work.
  - .3 Other underground services: Remove and dispose of as indicated on Contract Drawings and as required for new addition and remedial work.
- .3 Disassemble and remove mechanical equipment, ductwork and piping complete with supports and associated components.
- .4 Do not disrupt active or energized utilities designated to remain undisturbed.
- .5 Perform rodent and vermin control to comply with health regulations.

### 3.6 DEMOLITION

- .1 Perform demolition with extreme care. Confine effects of demolition to those parts which are to be demolished.
- .2 Perform work and prevent inconvenience to persons outside those parts which are to be demolished.
- .3 Carry out demolition in accordance with the requirements of CSA S350-M.
- .4 Demolish parts of structure to permit remedial work as indicated.
- .5 Demolish foundation walls and footings, within areas of new construction and as shown on Contract Drawings.
- .6 Demolition shall proceed safely in systematic manner from roof to grade and as necessary to accommodate remedial work indicated. Work on each floor level shall be 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.
- .7 Do not overload floor or wall with accumulations of material or debris or by other loads.

- .8 Perform work to minimize dusting. Keep work area wetted down with fog sprays to prevent dust and dirt rising. Supply and install temporary water lines and connections that may be required. Upon completion, remove installed temporary water lines. Use covered chutes, water down.
- .9 Do not sell or burn materials on Site.
- .10 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as Work progresses.
- .11 At end of day's work, leave Work in safe condition with no part in danger of toppling or falling. Protect interiors of parts not to be demolished from exterior elements.
- .12 Drainage and sewer system protection:
  - .1 Ensure that no dust, debris or slurry enters drainage and sewer system on Site.
  - .2 Remove and dispose of debris and slurry promptly from Site.
  - .3 Comply with City of Toronto Sewer Use By-Law.
- .13 Roof removal work: In accordance with Section 07 50 00.
- .14 Concrete:
  - .1 Demolish concrete by methods which avoid impact loads on items which are not to be demolished.
  - .2 Where only part or parts of a concrete floor, wall, foundation or other items are to be demolished, use saw cuts to isolate areas which are to be demolished except where existing reinforcing steel is to be left in place. Prior to such isolating, install suitable support to prevent premature movement of area(s) being isolated and undesirable transfer of loads as cutting progresses. If necessary remove area(s) to be demolished by successively isolating small sections.
  - .3 Where reinforcing steel is to be left in place, use saw cuts from surface of concrete around perimeter(s) of area(s) to be demolished, chip concrete without damaging reinforcing steel. Retouch damaged epoxy coating of existing reinforcing steel.
- .15 Masonry:
  - .1 Demolish block walls in small sections of not more than 2 m<sup>2</sup>. Do not permit masonry to fall in mass from one level to another.
  - .2 Where only part(s) of a wall is to be demolished, install adequate support for adjacent part(s).
  - .3 After removal of masonry walls, grind smooth floors ready for new floor finish.
- .16 Steel: Where only part or parts of structure is to be demolished, dismantle and maintain structure stable. Do not place excessive loads on components. Install adequate temporary guys and supports to ensure stability and to prevent excessive loading. Support each component being disconnected from structure, and lower, do not drop, component after it is disconnected.



- .17 Cut openings through existing walls, partitions and floors. Establish exact location of steel reinforcing in existing concrete slabs or walls before cutting. Be responsible for damage to existing steel reinforcing and be liable for structural failure. Make good surfaces disturbed with materials to match existing.
- 18. Where doors are scheduled to be removed, include removal of door frames and door hardware.
- 19. Remove interior partitions, fittings, fixtures and accessories as indicated on drawings. Partitions and walls shall be removed full height to structure above.
- 20. Remove interior finishes, such as ceiling and floor finishes, where new finishes are indicated on Contract Drawings.
  - 1. Removal of existing ceilings shall include complete removal including bulkheads and suspension system.
  - 2. Removal of adhesive applied finishes shall include complete removal to substrate including adhesive. Take adequate care to prevent damage to substrate.
  - 3. Remove existing floor finishes, include mortar bed, underlayment or other cleavage membranes, underpad, base, floor moulding and transition strips.
- 21. Removal of wallpaper and adhesive where indicated. Grind surface to remove adhesive and any chemicals that might affect bonding of new applied finishes.
- .22 Where acoustic ceiling tiles are indicated for removal and subsequent reinstallation, the tile are to be removed and stored on site in a dry and safe location approved with the Consultant and Owner. The suspension system and framing is to be removed only as required for work above the ceiling, and subsequently re-installed with the ceiling tiles.
- 23. Demolish all other items indicated or required.

### 3.7 **RECYCLING**

- .1 Whenever possible, all materials shall be recycled. Pay all costs for this work.
- .2 Deliver to nearest appropriate recycling depot all materials accepted for recycling by Authorities having jurisdiction over the Place of Work, including but not limited to cardboard, paper, plastic, aluminum, steel, and glass.
- .3 Deliver to nearest appropriate depot all scrap and excess gypsum wallboard for recycling of this material.
- .4 Ceiling tiles to be stacked on skids and wrapped for recycling and delivered to nearest appropriate recycling depot.
- .5 Base building light fixture lamps to be placed on skids and wrapped for recycling and delivered to nearest appropriate recycling depot.

3.8            **DISPOSAL OF MATERIALS**

- .1        Remove from Site, rubble, debris, and other materials that can not be recycled resulting from demolition and removals work in accordance with authorities having jurisdiction, except where specified or indicated on Contract Drawings to be reused.
- .2        Conform to requirements of municipality's Works Department regarding disposal of waste materials.
- .3        Materials prohibited from municipality waste management facilities shall be removed from Site and dispose of at recycling companies specializing in recyclable materials.

3.9            **RESTORATION**

- .1        Where demolition removed a structure or installation, restore and rough grade area in accordance with Section 31 00 00 and authorities having jurisdiction.

END OF SECTION

- 
- 1 General
  - 1.1 **SECTION INCLUDES**
    - .1 Labour, Products, equipment and services necessary for topping work in accordance with the Contract Documents.
  - 1.2 **REFERENCES**
    - .1 ASTM C1708/1708M, Standard Test Method for Self-leveling Mortars Containing Hydraulic Cements.
    - .2 ASTM C348, Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
  - 1.3 **SUBMITTALS**
    - .1 Product data:
      - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
        - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations.
        - .2 Product transportation, storage, handling and installation requirements.
    - .2 Shop drawings:
      - .1 Submit shop drawings in accordance with the Conditions of the Contract indicating:
        - .1 Sections, details, materials, dimensions, thicknesses of each layer, maximum and minimum thicknesses, 3, 7, and 28 day load characteristics, and surface finishes.
    - .3 Certificates: Submit certification from manufacturer, stating that materials proposed for use are compatible with specified floor finishes.
  - 1.4 **QUALITY ASSURANCE**
    - .1 Installers qualifications: Perform work of this Section by a company that has a minimum of five years proven experience in installations of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.

- .2 Mock-up:
  - .1 Construct one room mock-up of topping in location acceptable to Consultant.
  - .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
  - .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
  - .4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

## 1.5 **SITE CONDITIONS**

- .1 Do not install work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
  - .1 Concrete temperature: 10°C minimum.
  - .2 Ambient air temperature: 16°C to 30°C.
  - .3 Precipitation: None.
- .2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 48 hours before, during, and 48 hours after installation.

## 2 **Products**

### 2.1 **MATERIALS**

- .1 Primer: Type as recommended by topping manufacturer to suit site conditions and intended end use.
- .2 Concrete based levelling compound:
  - .1 Compressive strength to ASTM C1708/1708M, 28 day, 4300 psi.
  - .2 Flexural strength to ASTM C348: 28 day, min. 850 psi.
  - .3 Acceptable material: 'TechLevel 150' by CustomTech or approved alternative by Ardex Engineered Cements.
- .3 Water: potable.

### 2.2 **MIXES**

- .1 Mix toppings in accordance with manufacturer's written instructions.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

- .1 Verify substrate surfaces are solid, free from surface water, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance. Obtain manufacturer's approval of substrate in writing, submit copy to Consultant.
- .2 Prohibit traffic on prepared areas until work of this Section is completed.
- .3 Supply and install temporary protection to adjacent surfaces, floor drains, and steel angles to prevent damage resulting from work of this Section.
- .4 Prior to application of topping, remove all debris by vacuuming.

3.3 **INSTALLATION**

- .1 Install topping in accordance with reviewed shop drawings and manufacturer's written instructions.
- .2 Levelling topping:
  - .1 Install levelling material in accordance with manufacturer's instructions, complete with aggregate material as required to achieve intended thickness.
  - .2 Let cure in accordance with manufacturer's recommendations.

3.4 **PROTECTION**

- .1 Provide temporary protection for surfaces subjected to concentrated loads before they have cured sufficiently to carry them without damage.
- .2 Prevent traffic over completed areas, and protect work of this Section from debris after final installation.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for concrete block masonry work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM A1064/A1064-M, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- .2 ASTM C207, Specification for Hydrated Lime for Masonry Purposes.
- .3 CAN/CSA A23.1-M, Concrete Materials and Methods of Concrete Construction.
- .4 CSA A165 Series, CSA Standards on Concrete Masonry Units.
- .5 CSA A179, Mortar and Grout for Unit Masonry.
- .6 CSA A370, Connectors for Masonry.
- .7 CSA A371, Masonry Construction for Buildings.
- .8 CAN/CSA A3000, Cementitious Materials Compendium.
- .9 CAN/CSA G30.18-M, Billet-Steel Bars for Concrete Reinforcement.
- .10 CSA S304, Design of Masonry Structures.

1.3 **SUBMITTALS**

- .1 Shop drawings: Submit shop drawings in accordance with the Conditions of the Contract indicating wall sections and details, reinforcing and anchors, special detailing, patterning and locations of control joints.
- .2 Samples:
  - .1 Submit samples in accordance with the Conditions of the Contract:
  - .2 Submit samples of each type and colour of masonry unit used prior to placing order.
  - .3 Submit samples of masonry anchors, and ties.
- .3 Quality control submittals: Submit manufacturer's certificates stating that materials supplied are in accordance with this Specification.

#### 1.4 **QUALITY ASSURANCE**

- .1 Provide plain and reinforced masonry in accordance with CSA A370, CSA A371, and CSA S304.
- .2 Cold Weather Protection:
  - .1 To CAN/CSA-A371 and as follows:
    - .1 Maintain temperature of mortar between 5°C and 50°C until batch is used or becomes stable.
    - .2 Maintain ambient temperature of masonry work and it's constituent materials between 5°C and 50°C and protect site from windchill.
    - .3 Maintain temperature of masonry above 0°C for minimum of 3 days, after mortar is installed.
    - .4 Preheat unheated wall sections in enclosure for minimum 72 hours above 10°C, before applying mortar.
    - .5 Do not use scorched aggregate. Do not use salts or anti-freezes. Only use approved smokeless heaters.
  - .3 Hot Weather Requirements:
    - .1 To CAN/CSA-A371 and as follows:
      - .1 Plan in advance for hot weather construction. Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
      - .2 Avoid using dry masonry in hot weather conditions. Use predampened masonry unit nominally saturated, but surface dry at time of laying. Do not dip masonry unit in bucket of water.
      - .3 Spread only enough mortar to permit soft setting of masonry units; do not over mix mortar materials; do not retemper mortar after 2 hours of use; do not retemper pigment coloured mortar; do not spread more than 900 mm (3') of mortar for placement of masonry unit.

#### 1.5 **DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver, store and handle Products in accordance with the Conditions of the Contract and as specified herein.
- .2 Remove unacceptable materials from Site and replace to acceptance of Consultant. Store materials off ground protected from wetting by rain, snow or ground water, or inter-mixture with earth or other materials. Store metal ties and reinforcement to prevent corrosion.
- .3 Do not concentrate storage of materials on any part of structure beyond design load, take particular care not to overload unsupported portions of structure which may have not attained their full design strength.
- .4 Comply with CAN3-A371. Do not use salt or calcium-chloride to remove ice from masonry surfaces.

- .5 Deliver mortar materials in original unbroken and undamaged packages with the maker's name and brand distinctly marked thereon. Prevent damage to units.
- .6 Keep masonry materials free from ice and frost. Keep units protected from concrete, mortar and other materials which could cause staining.

## 2 Products

### 2.1 **MASONRY UNITS**

- .1 Concrete block units:
  - .1 Lightweight units, CSA A165 Series, sizes as indicated on Contract Drawing, classifications as follows:
    - .1 H/15/D/M.
    - .2 SS/15/D/M.
    - .3 SF/15/D/M.
  - .2 Block (patching): To match existing where patching and infill work is required.
- .2 Special shapes: Unless indicated otherwise, supply and install corner returns, bull-nosed or double bull-nosed units for exposed and external corners, bond beams, sash blocks for control joints, solid block where noted, concrete block lintels over openings in concrete block walls and any additional special shapes as indicated.
- .3 Obtain each masonry unit type from same manufacturer. Supply and install units of uniform texture and colour for each kind required.
- .4 Supply masonry units with exposed surfaces free of cracks, chips, blemishes, and broken corners.

### 2.2 **ACCESSORIES**

- .1 Wire reinforcement: CAN3-A370, CAN3 A371, and ASTM A1064/A1064-M, hot dip galvanized. This specification is based on products manufactured by Blok-Lok Limited. Products by Fero Corporation are approved alternatives:
  - .1 Single wythe: Truss type; 'Blok-Trus BL30'.
- .2 Connectors: CSA A370 and CSA S304.
- .3 Reinforcing steel: CSA G30.18-M, Grade 400, refer to Contract Drawings for number, size, and location.
- .4 Loose steel lintels and lateral support angles: Supplied as part of work of Section 05 50 00.
- .5 Compressible filler: 75 x 6 mm thick preformed, polyurethane foam; 25V by Emseal Joint Systems Ltd.



- .6 Control joint filler: Prefabricated extruded rubber joint to suit wall thickness; RS Series Rubber Control Joint by Blok-Lok or approved alternative.

### 2.3 MORTAR MATERIALS

- .1 Loadbearing masonry: CSA A179, Type S, proportion method.
- .2 Interior non-loadbearing masonry: CSA A179, Type N, proportion method.
- .3 Cement: CAN/CSA A3000, Cementitious Materials Compendium, Type GU.
- .4 Hydrated lime: ASTM C207, Type S.
- .5 Masonry aggregate: CSA A179.
- .6 Water: Clean potable, free from deleterious elements and free from salts that can cause efflorescence.
- .7 Concrete fill and grout: Minimum 12.5 Mpa concrete in accordance with CSA A179.

## 3 Execution

### 3.1 EXAMINATION

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

### 3.2 PROTECTION

- .1 Supply and install temporary waterproof, non-staining coverings, secured against displacement, to extend over walls and down sides to protect masonry work from snow and wind driven rain, and from drying too quickly, until masonry work is completed and protected by flashings or other permanent construction.
- .2 Supply and install non-staining, protective coverings on horizontal and vertical surfaces to protect work of this Section from damage, staining, marking, and mortar droppings.

### 3.3 WORKMANSHIP

- .1 Perform masonry work in accordance with CAN3 A371 and as indicated .
- .2 Supply and install masonry work plumb, level and true to line, with vertical joints in alignment and horizontal courses level, uniform, and straight.

- .3 Install masonry work to a plane flatness and exposed end tolerance of 3 mm in 2400 mm.
- .4 Variation in alignment from unit to adjacent unit: 1.5 mm maximum.
- .5 Variation of mortar joint thickness: 3 mm every metre.

### 3.4 **MASONRY - GENERAL INSTALLATION**

- .1 Construct masonry work as required by jurisdictional authorities.
- .2 Before commencing masonry work, verify required limitations for wall heights, wall thicknesses, openings, bond, anchorage, lateral support, and compressive strengths of masonry units and mortars.
- .3 Construct masonry fire protection and fire separations of the thickness indicated on Drawings for the fire resistant ratings as noted on Drawings, and conforming to the Fire-Performance Ratings, Appendix 'D' to the National Building Code of Canada.
- .4 Fire separations and fire separations with fire resistance ratings: Construct walls tightly to construction above and at perimeter, and without openings or voids. Do not reduce the thickness of walls to less than the thickness indicated on the Drawings or for the required fire resistance rating where required.
- .5 Do not butter corner units, throw mortar droppings into joints, or excessively furrow bed joints. Do not shift or tap units after mortar has taken initial set. If adjustment is necessary after mortar has started to set, remove and replace with fresh mortar.
- .6 Do not use admixtures without Consultant's written acceptance.
- .7 Tool mortar joints slightly concave with non-staining tools unless indicated otherwise. Strike joints flush in non exposed areas or where shown on Contract Drawings. Use sufficient force to press mortar tight against masonry units on both sides of joints. Remove excess, remaining mortar material and burrs.
- .8 Install masonry walls 25 mm clear of underside of steel building frames, roof or floor deck. Install masonry with a 19 mm space beneath shelf angles and install compressible filler.
- .9 Cut masonry units with a wet saw to obtain straight, clean, even, unchipped edges. Cut units as required to fit adjoining work neatly or for flush mounted electrical outlets, grilles, pipes, conduit, leaving 3 mm maximum clearance. Use full-size units without cutting wherever possible.

- .10 Reinforce block walls with continuous wire reinforcement in every second block course. Supply and install prefabricated L and T sections. Cut, bend and lap reinforcing units as per manufacturer's printed directions for continuity at returns, offsets, pipe enclosures, and other special conditions. Bending of masonry reinforcement is not permitted.
- .11 Reinforce masonry walls with reinforcing steel as indicated on Drawings. Vertical reinforcing shall be fully grouted in masonry cores with grout.
- .12 At openings in block walls install extra reinforcement, so that first and second courses above and below openings are reinforced. Extend extra reinforcement 600 mm beyond opening in each direction.
- .13 Reinforce joint corners and intersections with strap anchors 400 mm o.c.
- .14 Do not place reinforcement across masonry wythes at control joints.
- .15 Install masonry with 10 mm thick joints unless indicated otherwise. Make vertical and horizontal joints equal and of uniform thickness.
- .16 Build control joints in masonry walls at intervals and in locations shown. Form joints for block walls using sash block units in accordance with details shown. Fill chase and joint with joint filler full height of control joints. Leave a depth of 13 mm for sealing unless otherwise shown.
- .17 Install control joints in masonry walls where indicated on drawings and at projections and changes in direction. Where control joints have not been indicated provide joints at 9150 mm o.c. for interior walls.
- .18 Supply and install solid block or metal lath under block, and fill block cells solid for lintel bearing and as required to secure built-in anchor bolts and/or anchors shown.
- .19 Do not tooth intersections of walls except as otherwise indicated.

### 3.5 **MORTAR MIXING**

- .1 Thoroughly mix mortar ingredients in proper quantities needed for immediate use to requirements of CSA A179.
- .2 Measure and batch mortar materials either by volume or weight, to accurately control and maintain proportions. Do not measure materials by shovel.
- .3 Mix mortar with maximum amount of water consistent with workability for maximum tensile bond strength within capacity of mortar.

- .4 Do not use mortar which has begun to set. Use mortar within 2 hours after initial mixing. Re-temper mortar during 2 hour period only as required to restore workability.
- .5 Add admixtures to requirements of manufacturer's instructions.
- .6 Provide uniformity of mix.

### 3.6 **BLOCK**

- .1 Lay blocks in running bond except as indicated otherwise. Align block webs vertically and install thicker ends of face shells up.
- .2 Install a full bed of mortar for first courses of masonry, for masonry units 100 mm thick and less, and between solid units. For remaining courses bed face shells, including vertical end joints, fully in mortar.
- .3 Install special shaped and sized concrete block units as indicated and as required for a complete and coordinated assembly and to minimize cut units.
- .4 Supply and install two courses of solid block beneath lintel bearing.
- .5 Stagger end joints in every course. Align joints plumb over each other in every other course.
- .6 Bond intersecting block walls in alternate courses. Where block work abuts concrete, anchor each block course to concrete.

### 3.7 **PATCHING**

- .1 Lay masonry in pattern to match existing except as indicated otherwise.
- .2 Install a full bed of mortar for first courses of masonry, for masonry units 100 mm thick and less, and between solid units.
- .3 Install special shaped and sized concrete block units as indicated and as required for a complete and coordinated assembly and to minimize cut units.
- .4 Supply and install two courses of solid block beneath lintel bearing.
- .5 Stagger end joints in every course. Align joints plumb over each other in every other course.
- .6 Bond intersecting block walls in alternate courses. Where block work abuts concrete, anchor each block course to concrete.

3.8 **LINTELS**

- .1 Install concrete block lintels over openings in masonry except where steel lintels are indicated.
- .2 Set lintels with minimum of 200 mm uniformly distributed bearing at each end.
- .3 Install reinforcing steel and concrete fill in block lintels.
- .4 Install loose steel lintels, as indicated in Contract Drawings. Centre over opening width.

3.9 **LATERAL SUPPORT ANGLES**

- .1 Where non load bearing unit masonry partitions meet structural elements at top of partitions, provide lateral supports as required by the Ontario Building Code and in accordance with Structural details. In areas where ceilings are scheduled, use 150 mm lengths of steel angle located each side of partition at 1200 mm and staggered.

3.10 **BUILT-IN ITEMS**

- .1 Coordinate and locate build-in items required to be built into masonry or supplied under work of other Sections including hollow metal doors, windows, lintels, sleeves, inserts, etc. Build-in items to present a neat, rigid, true and plumb installation.
- .2 Build wall openings, slots, and recesses required for ducts, grilles, pipes and other items.
- .3 Coordinate installation of conduit, outlet boxes and other mechanical and electrical built-ins with work of Divisions 21, 22, 23 and 26.
- .4 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as Work progresses.
- .5 Brace door jambs to maintain plumbness. Set anchors between metal frames and masonry and fill voids between hollow metal frames and masonry walls with mortar.

3.11 **INSTALLATION TOLERANCES**

- .1 Planes true to within 3 mm under 3 m straightedge.
- .2 Plumb within 6 mm in 3 m, or in 6 mm in 6 m at external corners, expansion joints, or other conspicuous lines.
- .3 Level within 6 mm in any bay or 6 m maximum distance, and 12 mm in 12 m or more.

- .4 Located from position shown, and from related position of columns, walls, and partitions within 12 mm in any bay or 6 m maximum distance, and 19 mm in 12 m or more.
- .5 Opening sizes within 6 mm of designated dimension.
- .6 Column and wall cross-section dimensions within minus 6 mm and plus 12 mm.
- .7 With joints to dimensions indicated, but in no case greater than 12 mm.

### 3.12 **REPAIR AND POINTING**

- .1 Remove and replace masonry units which are loose, chipped, broken, cracked, marked, stained, discoloured, or otherwise damaged. Supply and install new units to match adjoining units and install in fresh mortar, and point to eliminate evidence of replacement.
- .2 During tooling of joints, enlarge any cracks, holes, or other defects, point and completely fill with mortar.
- .3 Point-up joints including corners, openings and adjacent Work for a neat, uniform appearance, properly prepared for application of sealant compounds.

### 3.13 **CLEANING**

- .1 Obtain and follow unit masonry manufacturer's written instructions for cleaning of masonry.
- .2 Clean exposed, masonry surfaces, removing excess mortar as work progresses. Allow mortar droppings to partially dry then dry brush with a stiff fibre brush.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Design, labour, Products, equipment and services necessary for miscellaneous and metal fabrication work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 AAMA 2603, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
- .2 ASTM A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
- .3 ASTM A123, Specification for Zinc (Hot Dip Galvanized) Coatings on Iron & Steel Products.
- .4 ASTM A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .5 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- .6 ASTM A480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
- .7 ASTM A563/A563M, Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric).
- .8 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .9 ASTM F436, Specification for Hardened Steel Washers.
- .10 CISC/CPMA 1.73a, A Quick-Drying One-Coat Paint for Use on Structural Steel.
- .11 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.
- .12 CAN/CSA S16.1-M, Limit States Design of Steel Structures.
- .13 CSA S136, Cold Formed Steel Structural Members.
- .14 CSA S136.1-M, Commentary on CAN/CSA S136-M, Cold Formed Steel Structural Members.
- .15 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

- .16 CSA W48, Filler Metal and Allied Materials for Metal Arc Welding.
- .17 CSA W59-M, Welded Steel Construction (Metal Arc Welding).
- .18 CAN/CSA W117.2-M, Safety in Welding, Cutting and Allied Processes.
- .19 NAAMM, The National Association of Architectural Metal Manufacturers.
- .20 Steel Structures Painting Council (SSPC), Steel Structures Painting Manual, Vol. 2.

### **1.3 DESIGN REQUIREMENTS**

- .1 Design details and connections, where not shown on Drawings, in accordance with CAN/CSA-S16.1 and CSA S136.1.

### **1.4 SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
    - .2 Product transportation, storage, handling and installation requirements.
- .2 Shop drawings:
  - .1 Submit shop drawings for fabrication and erection of miscellaneous and metal items in accordance with the Conditions of the Contract indicating:
    - .1 Materials, core thicknesses, class of finish (AMP 555), connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

### **1.5 QUALITY ASSURANCE**

- .1 Retain a Professional Engineer, licensed in the Province of Ontario, with experience in work of comparable complexity and scope, to perform the following services as part of the work of this Section:
  - .1 Design steel stairs, handrails and railings and supports, and metal fabrication items that are required to resist live, dead, lateral, wind, or seismic loads.
  - .2 Review, stamp, date and sign shop drawings.



- .2 Workmanship: Fabricate work of this Section to meet the required class of workmanship indicated below in accordance with NAAMM's AMP 555, Section 8.
  - .1 Class 1: for use on direct exposed to view fabricated items:
    - .1 Exposed surfaces are finished smooth without pits, mill marks, nicks, burrs, sharp edges, and scratches filled or ground off. Defects should not show when painted, polished, or finished.
    - .2 Welds should be concealed where possible. Exposed welds are ground to small radius with uniform sized cove unless otherwise noted.
    - .3 Distortions should not be visible to the eye.
    - .4 Exposed joints are fitted to a hairline finish.
- .3 Execute welding by firms certified in accordance with CSA W47.1 Division 1 or 2.1. Ensure welding operators are licensed per CSA W47.1 for types of welding required by Work.
- .4 Perform stainless steel work in accordance with NAAMM, Code of Standard Practice for the Metal Industry, Workmanship, Class 1.

## 2 Products

### 2.1 MATERIALS

- .1 General:
  - .1 All materials under work of this Section, including but not limited to, primers and paints are to have low VOC content limits.
  - .2 Unless detailed or specified herein, standard products will be acceptable if construction details and installation meet intent of Drawings and Specifications.
  - .3 Include all materials, products, accessories, and supplementary parts necessary to complete assembly and installation of work of this Section.
  - .4 Incorporate only metals that are free from defects which impair strength or durability, or which are visible. Install only new metals of best quality, and free from rust or waves and buckles, and that are clean, straight, and with sharp defined profiles.
- .2 Structural shapes, plates, and similar items: CAN/CSA-G40.20/G40.21-M, Grade 350W. Hollow structural sections: CAN/CSA-G40.20/G40.21-M, Grade 350W, Class H.
- .3 Galvanized sheet steel: ASTM A653/A653M Grade A, Z275 Commercial Quality zinc coating, size and shape as shown.
- .4 Stainless steel sheet and plate: ASTM A480/A480M, Type 304, finish to AISI No. 4. Size as shown.

- .5 Threaded rods: ASTM A 307, Grade A, length and diameter as indicated.
  - .1 Nuts: ASTM A563/563M heavy hex carbon steel.
  - .2 Washers: ASTM F436/436M, hardened.
  - .3 Finish: Hot-dip zinc coating, ASTM A 153/153M, Class C.
- .6 Welding materials: CSA W48 and CSA W59-M.
- .7 Fasteners:
  - .1 Conforming to ASTM A307, Grade A, in interior dry areas not exposed to view, use zinc-plated bolts with hexagon heads and nuts.
  - .2 In typical areas exposed to view and interior humid areas, use bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws and machine bolts galvanized in accordance with ASTM A153.
  - .3 Supply bolts of lengths required to suit thickness of material being joined, but not projecting more than 6 mm beyond nut, without the use of washers.
- .8 Primer paint: CPMA 1.73a.
- .9 Powder coating finish:
  - .1 Interior grade, epoxy polyester coating conforming to AAMA 2603. Provide manufacturers recommended primer.
  - .2 Colour and finish as selected by the Consultant.
  - .3 Acceptable Product: 'Interpon D1000' by Interpon Powder Coatings (Akzo Nobel) or approved alternative by Tiger Drylac or PPG Architectural Coatings.
- .10 Galvanized primer paint: Inorganic zinc rich primer. For use on galvanized fabrications where touch up is to remain unpainted in finished work; Carbozinc 11WB by Carboline Company, Catha-Coat 305 by Devoe Coatings or Zinc Clad XI by Sherwin Williams.
- .11 Drilled inserts: "HSL-3" by Hilti Inc. or "Dynabolt Sleeve Anchors" by ITW Construction Products, heavy-duty anchors, sizes as shown.
- .12 Adhesive anchor system: 'HIT HY 200 Injectable Mortar with Hilti HAS Stainless Steel Anchor Rod System' by Hilti Ltd. or approved alternative by ITW Construction Products, complete with all components required for a complete installation.
- .13 Metal framing system:
  - .1 Provide galvanized steel metal channel framing system for exam lights, complete with all components and accessories as required for complete and secure installation and in accordance with requirements of authorities having jurisdiction.
  - .2 Manufactured by Unistrut or approved alternative.

- .14 Non-slip nosing inserts/strips:
  - .1 6 mm deep and 47 mm wide, cast-in safety tread inserts with type 6063-T5 extruded aluminum nosing base and epoxy/abrasive filler to have minimum 60% aluminum oxide content with three abrasive strips.
  - .2 Colour: Colour contrasting black colour.
  - .3 Acceptable Product: 'Supergrit Type 121' by Wooster Products Inc. or approved alternative.

## 2.2 **FABRICATION**

- .1 Verify dimensions of existing Work before commencing fabrications and report any discrepancies to the Consultant.
- .2 Fit and assemble work in shop where possible. Execute work in accordance with details and reviewed shop drawings.
- .3 Use self-tapping shake-proof screws on items requiring assembly by screws or as indicated. Use screws for interior metal work.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.
- .5 Execute shop welding to requirements specified.
- .6 Carefully make and fit details. Take special care with exposed finished work to produce a neat and correct appearance to the Consultant's acceptance.
- .7 Assemble members without twists or open joints.
- .8 Correctly size holes for connecting work of other trades where such can be determined prior to fabrication. Where possible, show holes on shop drawings. Place holes not to cause appreciable reduction in strength of member.
- .9 Draw mechanical joints to hairline tightness and seal countersunk screw and access holes for locking screws with metal filler where these occur on exposed surfaces.

## 2.3 **FABRICATED ITEMS**

- .1 Refer to Drawings for details of metal fabrication work and related items not specifically listed in this Section.
- .2 Where work is required to be built into work of other Sections supply such members to respective Sections.
- .3 Provide miscellaneous and metal fabrications, indicated on the drawings, listed below, and not indicated to be supplied under other Sections. Provide miscellaneous and metal fabrications including but not limited to the following:

- .4 Metal pan stairs (concrete infill):
  - .1 Fabricate steel channel stringer of size, construction and attachment to structure as shown. Close exposed ends of stringers with 3 mm thick steel closure plates welded to edges of exposed flange edges.
  - .2 Furnish treads, risers and landing permanent metal forms of steel sheet formed as shown; treads to be concrete filled in accordance with Division 3, with bare metal riser incorporating 19 mm dust cove. Fabricate landings for concrete fill of same material as stair treads, unless ribbed metal deck form is shown.
  - .3 Support treads, risers and landings as detailed on reviewed shop drawings.
  - .4 Provide specified non-slip nosing insert at metal pan stairs with exposed concrete as indicated. Seal exposed concrete in accordance with Section 09 67 72.
- .5 Metal pan stairs (precast terrazzo tread):
  - .1 Fabricate steel channel stringer of size, construction and attachment to structure as shown, with steel plates welded to stringer as shown.
  - .2 Furnish treads, risers and landing permanent metal forms of steel sheet formed as shown; treads to be fill with precast terrazzo tread under work of Section 09 66 24. Coordinate with work of noted Section as required for sizing and installation of precast terrazzo treads with metal pan stairs.
  - .3 Support treads, risers and landings as detailed on reviewed shop drawings.
- .6 Handrails, guardrails, and posts:
  - .1 Design railings to withstand minimum horizontal and vertical loads as required to meet requirements of authorities having jurisdiction. In no instance shall load design of railings be less than 3.0 kN/m horizontally and 1.5 kN/m vertically.
  - .2 Close open ends of metal handrails with 1.9 mm thick closure neatly welded. Fabricate railings, handrails, and guardrails as shown on drawings.
  - .3 Handrail bracket:
    - .1 Fabricate as shown. After fabrication, galvanized bracket in accordance with ASTM A123.
    - .2 Coordinate with Section 06 20 00 as required for sizing and installation of wood handrail.
  - .4 Plate guard:
    - .1 Provide 10 mm thick galvanized steel plate material for guards as shown on Contract Drawings.
    - .2 Fabricate plate materials true, free of marks, with edges straight and true and without visible distortion under all design conditions.
    - .3 Ensure plate materials are installed straight, smooth, plumb and free of wrinkles, buckles and defects in appearance.
  - .5 Finishes:
    - .1 Interior handrails, guardrails and posts (typical): Field painted steel in accordance with Section 09 91 00.
    - .2 Interior plate guard: Powder coated finish as specified herein, in colour as selected by the Consultant.

- .7 Plate closures and trims:
  - .1 Provide minimum 2 mm galvanized steel plate material for closures and trims at stairs as shown on Contract Drawings.
  - .2 Fabricate plate materials true, free of marks, with edges straight and true and without visible distortion under all design conditions.
  - .3 Ensure plate materials are installed straight, smooth, plumb and free of wrinkles, buckles and defects in appearance.
  - .4 Finish and colour: Powder coated finish as specified herein, in colour as selected by the Consultant.
- .8 Lintels: Galvanized lintels fabricated from CAN/CSA-G40.20/G40.21-M, Grade 350W, size and location as shown, width to be not less than 25 mm less than width of wall and extend 200 mm beyond opening at each end. Unless otherwise shown, fabricate lintels in block walls of galvanized steel sections.
- .9 Masonry lateral support angles:
  - .1 Supply only, to Section 04 22 00 for installation, all horizontal lateral support anchors at top of non-load-bearing masonry walls.
  - .2 Refer to Structural Drawings for size and spacing of required support anchors. Provide drilled holes as required for anchorage.
  - .3 Galvanized for all unheated and high humidity locations.
- .10 Hoist beams and divider beams: Structural steel sections, sizes indicated on drawings, Finish: Prime painted.
- .11 Steel ladders:
  - .1 Provide fixed access ladders in accordance with Ministry of Labour - Fixed Access Ladders: Engineering Data Sheet 2-04.
  - .2 Fabricate complete with steel stiffeners, rungs, angle rails, bent plate straps or angle brackets as shown.
  - .3 Ladders in elevator pits shall extend 1220 mm high above finished floor.
  - .4 Provide safety cages around ladders where indicated on Drawings, in accordance with Ministry of Labour requirements.
- .12 Millwork counter supports:
  - .1 Provide supports for millwork counters as required. Construct supports of 38 mm x 38 mm x 6 mm steel angles.
  - .2 Where indicated, conceal supports within cavity of drywall partition.
  - .3 Provide all drill holes required for concealed anchorage of counters and for anchoring to building structure.
- .13 Bench supports:
  - .1 Supply only, for installation under work of Section 06 20 00, bench supports constructed of steel plates of sizes noted. Provide supports at maximum 609 mm centres and not less than 152 mm from ends of bench run.
  - .2 Construct supports as detailed. Provide all drill holes required for concealed anchorage of wood bench and for anchoring to building structure.

- .14 Vanity skirt:
  - .1 Provide minimum 3 mm thick removable vanity skirt as shown on Contract Drawings, complete with supports and brackets as required for installation.
  - .2 Fabricate skirt materials true, free of marks, with edges straight and true and without visible distortion under all design conditions. Surfaces to be free from warp, twist, kinks, dents, buckle or other imperfections which may affect appearance or serviceability.
  - .3 Carefully fit joints tightly and weld.
  - .4 Continuously weld and grind smooth and flush without leaving blemishes on exposed surfaces.
  - .5 Finish and colour: Powder coat finish as specified herein, in colour as selected by the Consultant.
- .15 Support framing for exam lights:
  - .1 Provide threaded rods and metal framing as required for exam lights, continuously welded and securely anchored to structure above.
  - .2 Design framing and anchorage to support assembly dead loads and live loads, and lateral loads attributable to misuse and vandalism.
  - .3 Finish: Galvanized and field painted under Section 09 91 00.
- .16 Stainless steel millwork cladding:
  - .1 Provide minimum 1.9 mm (14 ga.) thick stainless steel cladding for millwork cubby doors as shown on Contract Drawings.
  - .2 Coordinate with Section 06 20 00 as required for sizing, installation and cut-outs.
- .17 Miscellaneous steel brackets, supports and angles:
  - .1 Supply and install or supply for installation by trades responsible, all loose steel brackets, supports and angles where indicated, except where such brackets, supports and angles are specified under work of other Sections. Drill for countersunk screws, expansion anchors and anchor bolts.
  - .2 Unless otherwise specified, prime paint for interior installation; galvanized finish for interior wet/humid area installation.
  - .3 Backing plates: Provide backing plates for items as shown on Contract Drawings.

## 2.4 STAINLESS STEEL WORK

- .1 Take all necessary precautions to safeguard against latent surface discolouration due to disturbance of the natural protective oxide coating of the material or to contamination from other sources.
- .2 Workmanship shall be the best standard practice for this type of work. Execute stainless steel work in accordance with the applicable instructions set forth in Atlas Stainless Steels' "Technical Data" handbook on stainless steel.

- .3 Do all stainless steel fabrication in clean shops, located away from areas where carbon steel is burnt, ground, or cut with abrasive wheels to ensure that carbon steel dust will not be embedded into the stainless steel, and as follows:
  - .1 In fabrication of stainless steel do not use tools and dies which have been used on carbon steels.
  - .2 Ensure tools and dies use for forming and cutting stainless steel are free of nicks and other damage.
  - .3 Do not use carbon grits and grinding wheels which will imbed foreign particles into stainless steel surfaces. Use only stainless steel wool when wool polishing is required.
  - .4 Stainless steel items, on which rust stains appear, shall be replaced with new fabricated material.

## 2.5 **ANCHORS AND FASTENING**

- .1 Use weld studs of size not larger than 10 mm for attaching miscellaneous materials and equipment to building steel. If weight of item requires larger fasteners use clips or brackets and secure by welding or through bolting.
- .2 Use self drilling expansion type concrete anchors for attaching to masonry and concrete
- .3 Do not secure items to steel deck.
- .4 Use steel beam clamps of two bolt design to transmit load to beam web. Do not use C and I clamps.

## 2.6 **WELDING**

- .1 Perform welding by electric arc process.
- .2 Execute welding to avoid damage or distortion to Work. Execute welding in accordance with following standards:
  - .1 CSA W48 - for Electrodes. If rods are used, only coated rods are allowed.
  - .2 CSA W59-M and CSA W59S1-M for design of connections and workmanship.
  - .3 CAN/CSA W117.2-M - for safety.
- .3 Thoroughly clean welded joints and expose steel for a sufficient distance to perform welding operations. Finish welds smooth. Supply continuous and ground welds which will be exposed to view and finish paint.
- .4 Test welds for conformance and remove work not meeting specified standards and replace to Consultant's acceptance.

**2.7 SHOP PAINTING**

- .1 Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.
- .2 Shop prime steel with one coat of primer paint to dry film thickness of 0.07 mm. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 deg C. 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.
- .3 Shop prime galvanized steel in accordance with CGSB 85-GP-16M.
- .4 Clean but do not paint surfaces being welded in field.
- .5 Do not paint surfaces embedded in concrete, but clean as if they were to be primed.
- .6 Do not prime steel to be fireproofed or to receive intumescent paint coating.
- .7 Do not prime machine finished surfaces, but apply an effective anti-rust compound.
- .8 Take precautions to avoid damage to adjacent surfaces.

**2.8 POWDER COAT FINISH**

- .1 Shop apply electrostatic coating in strict accordance with manufacturer's printed instructions.
- .2 Provide primer where required and one finish coat.
- .3 Ensure application of each coat into all corners, pinholes and other difficult areas and ensure full coverage to all surfaces.
- .4 Ensure a smooth finish, free of laps, sags, runs, pin holes, crawls and skips. Back lap all edges to achieve full coverage.



## 2.9 HOT DIP GALVANIZING

- .1 After fabrication, hot dip galvanize specific miscellaneous steel items as indicated. After galvanizing, plug relief vents air tight with appropriate aluminum plugs as suitable and required for intended metal fabricated item. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with zinc rich primer in accordance with manufacturer's printed directions.
- .2 Hot-dip galvanize members in accordance with requirements of the following ASTM, with minimum coating weights or thicknesses as follows:
  - .1 Rolled, pressed and forged steel shapes, plates, bars and strips: ASTM A123; average weight of zinc coating per square/metre of actual surface, for 4.8 mm and less thickness members 600 g/m<sup>2</sup> for 6 mm and heavier members 640 g/m<sup>2</sup>.
  - .2 Iron and steel hardware: ASTM A153; minimum weight of zinc coating, in ounces per square foot of surface, in accordance with ASTM A153, Table 1 for the various classes of materials used in the Work.

## 3 Execution

### 3.1 EXAMINATION

- .1 Examine previously installed work, upon which this Section depends, verify dimensions and condition of existing Work, and coordinate repairs, alterations, and rectification if necessary. Commencement of work of this Section is deemed to signify acceptance of existing, prior conditions.
- .2 Obtain Consultant's written approval prior to field cutting or altering of structural members.

### 3.2 ERECTION

- .1 Install metal fabrications in accordance with reviewed shop drawings and manufacturer's written instructions.
- .2 Fit joints and intersecting members accurately. Make work in true planes with adequate fastenings. Build and erect work plumb, true, square, straight, level and accurate to sizes detailed, free from distortion or defects detrimental to appearance or performance.
- .3 Perform drilling of concrete and steel as required to fasten work of this Section.
- .4 Erect rails and handrails in true vertical and horizontal planes, rigid, and free from whip.
- .5 Continuously weld connections for railings, and anchor directly to steel stringers.

**3.3 TOUCH UPS**

- .1 Paint bolt heads, washers, nuts, field welds and previously unpainted items. Touch up shop primer damaged during transit and installation, with primer to match shop primer.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Design, labour, Products, equipment and services necessary for non-penetrating stair and guard work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- .2 ANSI, H35.1M Alloy and Temper Designation Systems for Aluminum (Metric).
- .3 ASTM B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .4 ASTM B211, Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
- .5 ASTM B241/B241M, Standard Specification for Aluminum and Aluminum Alloy Seamless Pipe and Seamless Extruded Tube.

1.3 **DESIGN REQUIREMENTS**

- .1 Design non-penetrating stairs and guards to accommodate live, dead, lateral, wind, seismic, handling, transportation, and erection loads and requirements of authorities having jurisdiction.
- .2 Design railings to withstand minimum horizontal and vertical loads as required to meet requirements of authorities having jurisdiction. In no instance shall load design of railings be less than 3.0 kN/m horizontally and 1.5 kN/m vertically.

1.4 **SUBMITTALS**

- .1 Shop drawings:
  - .1 Submit shop drawings for fabrication and installation of aluminum guards and stairs in accordance with the Conditions of the Contract indicating:
    - .1 Details, sections, elevations, materials, core thicknesses, connections, joints, reinforcement, details of weighted feet, and accessories.

1.5 **QUALITY ASSURANCE**

- .1 Retain a Professional Engineer, licensed in the Province of Ontario, with experience in work of comparable complexity and scope, to perform the following services as part of the work of this Section:
  - .1 Design of non-penetrating stairs and guards.
  - .2 Review, stamp, and sign shop drawings.

1.6 **DELIVERY, STORAGE AND HANDLING**

- .1 Provide a temporary protective coating or other means of protection to protect metal finishes. Do not use adhesive papers or sprayed coatings which will become bonded to the finishes. Remove temporary protection after installation. Do not leave coating residue on any surface.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

- .1 Kee Safety, Ltd.
- .2 Precision Ladders, LLC.
- .3 Skyline Group.

2.2 **MATERIALS**

- .1 General:
  - .1 All materials under work of this Section, including but not limited to, coatings are to have low VOC content limits.
  - .2 Unless detailed or specified herein, standard products will be acceptable if construction details and installation meet intent of Contract Drawings and Specifications.
  - .3 Include all materials, products, accessories, and supplementary parts necessary to complete assembly and installation of work of this Section.
  - .4 Incorporate only metals that are free from defects which impair strength or durability, or which are visible. Install only new metals of best quality, and free from rust or waves and buckles, and that are clean, straight, and with sharp defined profiles.
  - .5 Provide pads, feet, and similar items are to be compatible with roof membrane.
  - .6 No mechanical fasteners or penetrations through roofing membrane will be permitted.
- .2 Aluminum materials:
  - .1 Aluminum extrusions, channels and flat bar: ASTM B211 and ANSI H35.1, high grade structural aluminum.
  - .2 Aluminum sheet: ASTM B209 and ANSI H35.1, high grade aluminum.
  - .3 Aluminum tubing: ASTM B241/B241M and ANSI H35.1, high grade aluminum or Schedule 40 aluminum piping.
  - .4 Stair tread material: Slip resistant expanded aluminum grating and checker plate material.
  - .5 Finish and colour: Manufacturer's standard powder coat finish conforming to AAMA 2605, in colour as selected by the Consultant.

- .3 Weighted base feet: Manufacturer's standard, non-penetrating, weighted rubber feet with base weights encased in rubber molding.
- .4 Fasteners: Corrosion resistant, stainless steel as recommended by manufacturer.

### 2.3 **FABRICATION**

- .1 Verify dimensions of existing work before commencing fabrications and report any discrepancies to the Consultant.
- .2 Fabricate non-penetrating stairs and guards in accordance with reviewed shop drawings and manufacturer's written instructions, and as follows:
  - .1 Side mounted, demountable guards, for mounting on structural steel supporting platform covered under Division 5 - Structural..
  - .2 Stairs and miscellaneous guards with non-penetrating bases.
- .3 Fit and assemble work in shop where possible. Execute work according to details and reviewed Shop Drawings.
- .4 Carefully make and fit details. Take special care with exposed finished work to produce a neat and correct appearance to the Consultant's acceptance.
- .5 Assemble members without twists or open joints.
- .6 Correctly size holes for connecting work of other trades where such can be determined prior to fabrication. Where possible, show holes on Shop Drawings. Place holes not to cause appreciable reduction in strength of member.
- .7 Fabricate stairs and guards to be complete with stairs, hand and kneerails, posts, kick plates, braces, end caps, adjustable elbows, splices, tubing, plates, feet and additional components as required for complete and secure installation.

## 3 Execution

### 3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.
- .2 Before commencing installation, examine the work of other Sections to which Work of this Section will be attached.

**3.2 INSTALLATION**

- .1 Install non-penetrating stairs and guards in accordance with reviewed shop drawings, manufacturer's written instructions and to meet requirements of authorities having jurisdiction.
- .2 Fit joints and intersecting members accurately.
- .3 Make work in true planes with adequate fastenings.
- .4 Build and erect work plumb, true, square, straight, level and accurate to sizes detailed, free from distortion or defects detrimental to appearance or performance.
- .5 Erect rails and handrails in true vertical and horizontal planes, rigid, and free from whip.
- .6 Ensure completed installation free from objectionable noise, rattles, wind whistles, and creak or noise due to thermal movement.

**3.3 REPAIR**

- .1 Inspect units for damage and correct immediately.

**3.4 CLEANING**

- .1 Clean surfaces of grime and dirt using acceptable and recommended means and methods.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for rough carpentry work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .2 ASTM A325, Specification for Bolts Quenched/Tempered Steel Nominal Thread Diameter M16 - M36 For Structural Steel Joints.
- .3 ASTM A653, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .4 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .5 ASTM F1667, Driven Fasteners: Nails, Spikes and Staples.
- .6 CAN/CSA O80 Series M, Wood Preservation.
- .7 CSA O121-M, Douglas Fir Plywood.
- .8 CAN/CSA O141, Softwood Lumber.
- .9 NLGA, Standard Grading Rules for Canadian Lumber, National Lumber Grades Authority.

1.3 **QUALITY ASSURANCE**

- .1 Lumber identification: Grade stamp of an agency certified by the Canadian Lumber Standards Accreditation Board.
- .2 Plywood identification: Grade mark in accordance with applicable CSA standards.
- .3 Lumber quality: Carefully select individual pieces so that knots and obvious defects will not interfere with placing bolts, proper nailing or making proper connections.
- .4 Moisture Content of wood at time of construction shall be 19% maximum.
- .5 Each piece of fire retardant treated lumber shall be shop marked with the ULC monogram respectively, in accordance with CAN/CSA O80-M.
- .6 Dimensions of lumber shall conform to dressed sizes specified in CAN/CSA-0141 unless actual dimensions are otherwise indicated or specified.

- .7 Dimensional references to lumber on Drawings and in Specifications are to nominal sizes unless actual dimensions are indicated. Such actual dimensions shall be dry size.
- .8 Lumber defects: Discard wood with defects which will render a piece unable to serve its intended function. Lumber will be rejected by Consultant for excessive warp, twist, bow, crook, mildew, fungus, or mould, as well as for improper cutting and fitting, whether or not it has been installed.

#### 1.4 ENVIRONMENTAL REQUIREMENTS

- 1. When it is required that wood maintain dimensional stability and tolerances to ensure accurate installation of later work, store and install it only in dry areas, and where no further installation of moist materials is contemplated.

#### 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- .1 Store materials in a dry area. Cover materials with tarpaulins or polyethylene sheets to prevent moisture absorption and impairment of structural and aesthetic properties. Vent to allow air movement. Tie covering to keep in place.

### 2 Products

#### 2.1 MATERIALS

- .1 General:
  - .1 All materials under work of this Section, including but not limited to, adhesives are to have low VOC content limits.
  - .2 Adhesives - Urea-formaldehyde-free glues.
  - .3 All composite wood and/or agrifibre products (including core materials) and adhesives used to fabricate laminated assemblies used in building must not contain added urea-formaldehyde.
- .2 Lumber: Softwood, G4S, moisture content 19% or less at time of installation, in accordance with the following:
  - .1 Lumber shall be of same species and grade, equally seasoned and shall be processed and stamped at same mill.
  - .2 CSA O141 and NLGA Standard Grading Rules for Canadian Lumber.
  - .3 Board quality: Construction or better.
  - .4 Dimension quality:
    - .1 Structural joists, planks, and framing: No. 1 Select Structural.
    - .2 Light framing: Construction.
- .3 Plywood: CSA O121-M, G1S, unsanded, T & G, standard construction, laminated with waterproof adhesive, exterior grade, Thickness as indicated on drawings.



- .4 Fire retardant treatment of lumber and plywood (interior and protected locations): 'FlamePRO FRTW' by Koppers, 'Dricon FRT' by Arxada, or approved alternative, conforming to ASTM E84, to provide a flame spread rating of 25 or less.
- .5 Rough hardware: Conforming to ASTM F1667; Nails, bolts, screws, anchors, expansion shields, and other fastenings required to frame and fix rough carpentry as follows:
  - .1 Nails, spikes and staples: Spiral type.
  - .2 Bolts: ASTM A325; 12.7 mm diameter minimum with nuts and washers unless noted otherwise.
  - .3 Screws: Countersunk head, full thread type.
  - .4 Proprietary fasteners: Toggle bolts, expansion shields, lag bolts, screws, inorganic fibre plugs, recommended for purpose by manufacturer.
  - .5 Galvanize rough hardware used in fire treated wood and hardware exposed to the atmosphere.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **GENERAL**

- .1 Lay out work carefully and to accommodate work of others. Cut and fit accurately: erect in position indicated by Drawings.
- .2 Install rough carpentry to allow for expansion and contraction of the materials.
- .3 Cut work into lengths as long as practicable and with square ends. Align, level, square, plumb, and secure work permanently in place. Brace work temporarily as required. Join work only over solid backing.
- .4 Bore holes true to line and to same size as bolts. Drive bolts into place for snug fit, and use plates or washers for bolthead and nut bearings. Turn up bolts and lag screws tightly when installed, and again just before concealed by other work or at completion of Work.
- .5 Provide anchors, bolts, and inserts required for attachment of the work of this Section, to those performing the work of other Sections and who are responsible for their installation.
- .6 Do not attach work by wood plugs or blocking in concrete or masonry. Use lead shields, expansion shields, or similar methods only as approved by Consultant.

### 3.3 MISCELLANEOUS WOODWORK

- .1 Fit and install wood furring, strapping, grounds and blocking. Adequately size, correctly place and conceal members for finishes, fitments and for work under other Sections. Do not assume that Drawings show required work exactly or completely. Anchor wood members securely in place.
- .2 Install rough bucks, nailing strips and linings to rough openings as required for backing for frames and other work.
- .3 Except where steel supports are specifically shown, provide wood blocking and supports in metal stud partitions for fastening of item such as casework and other wall mounted accessories. Have respective trades approve the location of such wood blocking.
- .4 Bolt wood blocking or nailing strips to steel framing.
- .5 Align and plumb faces of furring and blocking to tolerance of 1:600.
- .6 Use fire retardant lumber for blocking/framing in ceiling\spaces, partitions and bulkheads.

### 3.4 BACKBOARDS

- .1 Install plywood backboards, primed and painted white on both sides, with fire retardant paint.
- .2 Use minimum 19 mm thick plywood on 19 x 38 mm furring around perimeter and at maximum 300 mm intermediate spacing.

### 3.5 FASTENERS

- .1 Frame, anchor, fasten, tie and brace members for required strength and rigidity.
- .2 Countersink bolts and bolt heads as required for clearance of other work.
- .3 Size fasteners to penetrate base member by half of fastener length minimum. Minimize splitting of wood members by staggering nails in direction of grain.
- .4 For plywood use spiral, annular or resin coated nails and staples.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products equipment and services necessary for finish carpentry work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ANSI/HPVA HP-1, Hardwood and Decorative Plywood.
- .2 ANSI/NEMA LD 3, High-Pressure Decorative Laminates.
- .3 APA - The Engineered Wood Association.
- .4 ASTM F1667, Driven Fasteners: Nails, Spikes and Staples.
- .5 Architectural Woodwork Manufacturers Association of Canada (AWMAC).
- .6 North American Architectural Woodwork Standards (NAAWS).
- .7 CSA O121-M, Douglas Fir Plywood.
- .8 CAN/CSA O141, Softwood Lumber.
- .9 CSA O151-M, Canadian Softwood Plywood.
- .10 National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber.

1.3 **SUBMITTALS**

- .1 Shop drawings: Submit shop drawings of finish carpentry work in accordance with the Conditions of the Contract indicating:
  - .1 Materials, thicknesses, sizes, finishes, wood species, grades, profiles, connection attachments, shop jointing, field jointing, reinforcing, anchorage, fastener types and sizes, location of exposed fastenings, mechanical and electrical service routes, service outlets, cutout locations, and sizes.
  - .2 Include erection drawings, plans, elevations, sections, and details as applicable.
- .2 Samples: Submit samples of the following in accordance with the requirements of the Conditions of the Contract:
  - .1 Two representative pieces of each type of wood to receive a stained or natural finish.
  - .2 Two representative pieces of each type of wood finished as specified.
  - .3 Two of each colour, pattern, gloss, and texture of plastic laminate, in manufacturer's standard tag size.

- .4 Two samples of laminated plastic joints, edging, cutouts and postformed profiles.
  - .5 Two of each acrylic polymer solid surface, in 100 x 75 x 12 mm samples.
  - .6 Two samples of melamine surfaced board, edging and postformed profiles.
  - .7 One of each item of finish carpentry hardware.
- .3 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

#### 1.4 **QUALITY ASSURANCE**

- .1 Execute work of this Section by member of AWMAC, with 5 years experience in finish carpentry work of comparable complexity and scope. Submit proof of experience upon Consultant's request.
- .2 Fabricate finish carpentry work in accordance with NAAWS, Premium Quality materials and installation unless otherwise indicated. Perform work in accordance with the definition of Good Workmanship as defined in the NAAWS.
- .3 Remove and replace finish carpentry work which does not conform to the NAAWS or as amended by these Specifications.
- .4 Mock-up:
  - .1 Shop fabricate one mock-up of a base cabinet, wall cabinet, and counter top for each type of surfacing specified, complete with hardware and shop applied finishes, installed in location acceptable to Consultant.
  - .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with work.
  - .3 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.

#### 1.5 **DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver, store, and handle finish carpentry in accordance with the NAAWS. Control the temperature and humidity in accordance with the NAAWS recommendations, before, during, and after finish carpentry delivery, and also during storage and installation.
- .2 Cover finished plastic laminated work with heavy kraft paper or put in cartons during shipment. Protect installed surfaces by approved means. Do not remove until immediately before final inspection.

1.6 **EXTENDED WARRANTY**

- .1 Submit an extended warranty for plastic laminate work of this Section in accordance with General Conditions, except that warranty period is extended to 2 years from date of Ready-for-Takeover.
  - .1 Warrant against defects in material and workmanship including but not limited to opening of joints, cracking, shrinkage, warpage, and delamination of plastic laminate.
  - .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **MATERIALS**

- .1 General:
  - .1 All materials under work of this Section, including but not limited to, adhesives and mastics, are to have low VOC content limits.
  - .2 Adhesives - Urea-formaldehyde-free glues.
  - .3 All composite wood and/or agrifibre products (including core materials) and adhesives used to fabricate laminated assemblies used in building must not contain added urea-formaldehyde.
- .2 Concealed framing lumber and plywood:
  - .1 Eastern Spruce, Balsam Fir, or Jack Pine, to CAN/CSA O141, NLGA, and NAAWS Custom Grade, S4S, average moisture content 7% +/- 2% at installation.
  - .2 Softwood plywood: CSA O151-M; 19 mm unless indicated otherwise, (G2S).
- .3 Hardwood lumber: Maple, unless otherwise indicated, to NHLA and NAAWS Premium Grade, S4S, average moisture content 7% +/- 2% at installation.
- .4 Veneer core plywood (substrate):
  - .1 CSA O121-M, sanded, douglas fir plywood (DFP), G2S, Grade A-A, for typical veneer core substrate.
  - .2 APA, Grade A-A, where hardwood plywood is required by NAAWS for millwork items.
  - .3 Sizes, thickness and shapes as indicated.
- .5 Marine grade plywood (sinks, splashes, where shown): APA, Grade A-A, T & G, composed entirely of Douglas Fir or Western Larch, laminated with structural waterproof adhesive, exterior grade. Thickness as indicated on drawings.

- .6 Wood veneer (WD-1):
  - .1 Maple, unless otherwise indicated, conforming to ANSI/HPVA HP-1 having finishes and meeting grades as follows:
    - .1 Opaque finish, Grade B.
  - .2 Face veneer cut: As indicated.
  - .3 Sizes, thickness, and shapes as indicated.
- .7 Plastic laminate (PL): Provide plastic laminates conforming to ANSI/NEMA LD 3 as follows:
  - .1 Flatwork face sheet: 1.2 mm thick, heavy wear resistance.
  - .2 Vertical interior face sheets: 0.8 mm thick.
  - .3 Postformed face sheet: 0.8 mm thick.
  - .4 Backing sheet: thickness to match face sheet, high pressure laminate, manufactured by same manufacturer as face sheet.
  - .5 Plastic laminate type and colour (PL-1): 'Limber Maple (10734)' by Wilsonart or approved alternative by Arborite, Formica, Forbo, Nevamar, and Pionite.
  - .6 Edging to be done in 3 mm thick PVC to match laminate colour.
- 8. Melamine surfaced board:
  - .1 Provide melamine surfaced board for inside facing of millwork, unless otherwise indicated.
  - .2 ANSI A208.2, no urea-formaldehyde, melamine faced douglas fir veneer core plywood or MDF conforming to APA requirements as specified and where indicated. Manufactured by Egger Group, Panolam Surface Systems or Uniboard Canada Inc.
  - .3 Colour: Interior millwork surfaces to be white.
  - .4 Edging to be done in 3 mm thick PVC to match melamine colour.
- .9 Acrylic polymer solid surfacing (SS):
  - .1 12 mm thick sheet stock for countertops and window sills, with bullnose edge and all cutouts as required.
  - .2 Acrylic polymer solid surfacing types and colours:
    - .1 Acrylic polymer solid surfacing (SS-1): 'Wilsonart Solid Surface' in colour 'Frosty White Mirage (1573MG)' by Wilsonart or approved alternative by A-dec, Corian, or Meganite.
    - .2 Acrylic polymer solid surfacing (SS-2): 'Corian Solid Surface' in colour 'Dove (12040344)' by Corian or approved alternative by A-dec, Meganite or Wilsonart.
    - .3 Acrylic polymer solid surfacing (SS-3): 'Wilsonart Solid Surface' in colour 'Aspen Quartzite (9245SS)' by Wilsonart or approved alternative by A-dec, Corian, or Meganite.
  - .3 Installation and seam adhesives to be as recommended by solid surfacing manufacturer, colour matched to solid surfacing.
  - .4 Welded joints: Provide welded seams at solid surfacing type SS-3. Final installation of solid surfacing material to appear as one continuous surface, with no visible joints.

- .10 Laminating adhesive: CSA O112 Series, water resistant type, low VOC content, selected by laminate manufacturer for intended end use.
- .11 Draw bolts and splines: Type as recommended by fabricator.
- .12 Nails and staples: Conforming to ASTM F1667; Size and type to suit application, galvanized for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.
- .13 Bolts, nuts, washers, blind fasteners, lags and screws: Size and type to suit application. Stapling is not acceptable.
- .14 Adhesive and bituminous mastic: Selected by the millwork fabricator with low VOC content.
- .15 Miscellaneous metals: In accordance with Section 05 50 00, such as but not limited to metal bench and counter supports.
- .16 Millwork counter support (wall mounted, prefabricated):
  - .1 Surface mounted, heavy duty aluminum countertop support brackets with rounded ends. Finish to be selected by the Consultant.
  - .2 Size countertop brackets as required.
  - .3 Acceptable Product: 'Surface Mounted EH Countertop Support Bracket' by Rakks or approved alternative.
- .17 Z-clips: Concealed Z-clips for installation of wall panels, selected by millwork fabricator.
- .18 Resin panel: In accordance with Section 08 80 00.
- .19 Suspension system components (for wood ceiling panels): In accordance with Section 09 21 16.
- .20 Resilient base: In accordance with Section 09 65 13.

## 2.2 **HARDWARE**

- .1 The following hardware is the minimum quality standard for the work of this Section. Alternatives may be considered provided they are approved by Consultant prior to ordering of products.
- .2 Drawer slides: Full extension, 8400 Series by Knappe & Vogt.
- .3 Pilasters: Clear anodized aluminum recessed shelf standards with 12 mm divisions, Model 233 by Knappe & Vogt.

- .4 Clips: Bright zinc plated, adjustable height shelf supports, Model 256 by Knappe & Vogt.
- .5 Hinges:
  - .1 Cabinet hinges: Heavy duty, concealed, 100 degree, clip, self closing, Model MODUL by Blum.
  - .2 Cubby door hinges: Face mounted, 108 degree, one piece, adjustable self-closing hinge, 'TEC 863' by Grass America.
- .6 Drawer and cabinet pulls: 10 mm dia. x 106 mm wide, stainless steel with matt finish, 115.61.601 by Hafele.
- .7 Magnetic catches: Model 918 by Knappe & Vogt.
- .8 Locks: Cam locks/deadbolt locks complete with lock core by Hafele, type to suit application and installation. All drawers and doors to be lockable.

### 2.3 PLASTIC LAMINATE WORK

- .1 Perform plastic laminate work in accordance with NAAWS and ANSI/NEMA LD 3.
- .2 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .3 Unless otherwise indicated or specified, laminate plastic laminates to veneer core plywood in accordance with manufacturer's written instructions, excluding items such as cabinet doors, drawer front components, and wall and ceiling panels which shall use moisture resistant MDF as the core substrate.
- .4 Laminate postformed laminates to MDF core in accordance with manufacturer's written instructions.
- .5 Fabricate core surfaces and profiles with continuous support and bond over entire surface to receive plastic laminate.
- .6 Apply plastic laminate backing sheets to balance shrinkage stresses induced by plastic laminate face sheets.
- .7 Joints:
  - .1 Install joints in accordance with reviewed shop drawings.
  - .2 Jointing shall be placed at logical locations in intended millwork item and shall meet the overall aesthetic intent of the Consultant.
  - .3 Minimize joints in plastic laminate work.
  - .4 Do not install joints in plastic laminate work in less than 2400 mm o.c.
  - .5 Locate joints minimum 610 mm from cut-outs.
  - .6 Offset core and plastic laminate facing joints.
- .8 Form shaped profiles and bends as indicated, using postformed grade laminate to laminate manufacturer's instructions.



- .9 Edging to be done using 3 mm thick PVC to match plastic laminate colour to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.
- .10 Apply laminated plastic liner sheet to interior of cabinetry and where indicated.
- .11 Fabricate units by solid surfacing manufacturer's certified or approved fabricator/installer. Fabricate built-up profiles as indicated.

## 2.4 FABRICATION

- .1 Finish carpentry work required by this Section is to include but not be limited to the following items:
  - .1 Casework and countertops.
  - .2 Shelving.
  - .3 Window sills.
  - .4 Benches.
  - .5 Cubbies with stainless steel faced doors.
  - .6 Handrails.
  - .7 Ledges.
  - .8 Wood wall panels.
  - .9 Solid surface wall panels.
  - .10 Wood ceiling panels.
- .2 Be responsible for methods of construction and for ensuring that materials are rigidly and securely attached and will not be loosened by the work of other sections.
- .3 Coordinate locations of concealed supports and blocking with other parts of work. Provide cutouts for outlet boxes and other fixtures.
- .4 Fabricate work in a manner which will permit expansion and contraction of the materials without visible open joints. Conceal joints and connections in wherever possible.
- .5 Set nails and countersink screws, apply wood filler to indentations, sand smooth and leave ready to receive finish.
- .6 Mitre exposed corners, no end grain shall be visible in completed installation.
- .7 Finished millwork shall be free from bruises, blemishes, mineral marks, knots, shakes and other defects and shall be selected for uniformity of colour, grain and texture.
- .8 Shelving to cabinetwork to be adjustable unless otherwise noted.
- .9 Recess shelf standards, unless noted otherwise. Stagger recessed shelf standards on opposite sides of divider.

- .10 Do not exceed maximum 760 mm unsupported span for 19 mm thick shelving. House fixed shelving into gables and divisions.
- .11 Shop assemble finish carpentry to accommodate delivery and handling and to ensure passage through building openings.
- .12 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.
- .13 Window sills:
  - .1 Provide solid surface window sills where indicated and as detailed.
  - .2 Conceal all fixings.
  - .3 Provide all solid continuous blocking and shims required for installation.
- .14 Millwork glazing: Coordinate with Section 08 80 00 as required for sizing of resin panels with intended millwork items.
- .15 Wall and ceiling panels:
  - .1 Wall and ceiling panels to be designed to meet requirements of authorities having jurisdiction.
  - .2 Wall panels: Provide wood veneer faced wall panels on MDF core substrate and solid surface wall panels as indicated.
  - .3 Ceiling panels (WDP-1): Provide wood veneer faced ceiling panels on MDF core substrate as indicated.
  - .4 Panel sizes as shown on Contract Drawings.
  - .5 Provide cutouts for electrical fixtures, diffusers, and sprinklers as required to suit Work of this Project.
  - .6 Ceiling framing system and associated components, to be in accordance with Section 09 21 16. Coordinate with noted Section for sizing and installation of ceiling panels.
  - .7 Conceal all fixings.
  - .8 Provide all solid continuous blocking and shims required for installation.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **INSTALLATION**

- .1 Install finish carpentry work in accordance with NAAWS and tolerances for architectural woodwork and reviewed shop drawings.
- .2 Millwork glazing: Coordinate with Section 08 80 00 as required for installation of resin panels with intended millwork items.
- .3 Set and secure finish carpentry in place, rigid, plumb, square, and level.
- .4 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate columns, fixtures, outlets, or other projecting, intersecting or penetrating objects leaving a 0.8 mm gap maximum.
- .5 Coordinate cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures, in finish carpentry. Round internal corners of cut-outs and seal exposed cores.
- .6 Form joints to conceal shrinkage.
- .7 Install draw bolts and splines in laminated plastic counter top joints at maximum spacing 450 mm o.c., and 75 mm from edge. Make joints flush, hairline butt joints.
- .8 Install finishing hardware accurately and securely in accordance with manufacturer's directions, adjust and clean.
- .9 Install prefinished millwork at locations shown on drawings. Position accurately, level, plumb straight.
- .10 Apply bituminous coating over wood framing members in contact with masonry or cementitious construction.
- .11 Melamine panels: Assemble melamine millwork using dowelled/wafered-and-glue construction. Installed melamine panels shall not show any exposed fasteners on finished/exposed surfaces.
- .12 Acrylic polymer solid surfacing:
  - .1 Install solid surfacing in accordance with manufacturer's instructions.
  - .2 Adhere and weld joints in accordance with manufacturer's written instructions. For welded joints, ensure surface has a continuous appearance with no visible joints.
  - .3 Align work plumb and level.
  - .4 Seal perimeter of fabrication to adjacent construction in accordance with Section 07 92 00.
  - .5 Wall panels: Ensure that wall panels are securely fastened in true vertical and horizontal manner.
  - .6 Sills: Install window sills level, plumb and even in locations as indicated and ensure that sills are securely fastened.

- .13 Benches:
  - .1 Construct benches of sizes and details as noted.
  - .2 Anchor wood to supports in a concealed manner.
  - .3 Mitre joints at corners. Keep joints to a minimum.
  - .4 Round all corners, edges and ends.
  - .5 Install bench brackets and supports supplied under work of Section 05 50 00.
- .14 Wood handrail:
  - .1 Construct wood handrail of sizes and details as noted.
  - .2 Round all corners, edges and ends.
  - .3 Install handrail brackets supplied under work of Section 05 50 00.
- .15 Cubbies:
  - .1 Stainless steel clad cubby doors: Laminate stainless steel sheet to exterior grade plywood with acceptable laminating adhesive as outlined above for plastic laminate. Follow stainless steel requirements as indicated in Section 05 50 00.
  - .2 Set and secure cubbies in place, rigid, plumb, square, and level.
  - .3 Adjust cubby doors for smooth and efficient operation.
- .16 Panels:
  - .1 Install wall and ceiling paneling in locations indicated on drawings.
  - .2 Ensure that panels are securely fastened in true vertical and horizontal manner.
  - .3 Coordinate with Section 09 21 16 as required for wood ceiling system work.
- .17 Fastening:
  - .1 Coordinate wall securement, anchorage, and blocking for finish carpentry items.
  - .2 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
  - .3 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
  - .4 Provide heavy duty fixture attachments for wall mounted cabinets.
  - .5 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round cleanly cut hole and plug with wood plug to match material being secured.
- .18 Remove and replace damaged, marked, or stained finish carpentry.
- .19 Adjust millwork hardware for smooth and efficient operation.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Provide work of this Section including but not limited to the following:
  - .1 Cut openings through existing waterproofing to accommodate new penetrations.
  - .2 Make good waterproofing around new construction and penetrations.

1.2 **SUBMITTALS**

- .1 Product data: Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating systems, materials, and methods of installation used, showing system and each component. Certify compliance of each component with applicable standards.
- .2 Shop drawings: Submit shop drawings in accordance with the Conditions of the Contract indicating details of waterproofing system, flashings, control joints, method of tying in existing waterproofing with new waterproofing and similar items.

1.3 **QUALITY ASSURANCE**

- .1 Qualification: Execute work of this Section by manufacturer-approved, skilled, qualified, and experienced workers, trained in installation of work of this Section.

1.4 **EXTENDED WARRANTY**

- .1 Submit an extended written warranty for existing waterproofing alterations in accordance with the General Conditions, except that warranty period is extended to 5 years from date of Ready-for-Takeover.
  - .1 Warrant work against water leakage and failure to stay in place.
  - .2 Coverage: Complete replacement including effected adjacent work.

2 Products

2.1 **MATERIALS**

- .1 All materials under work of this Section, including but not limited to, coatings and sealants are to have low VOC content limits.
- .2 General: The existing waterproofing system consists of the types of waterproofing listed below. Verify actual system in the field by means of a simple cut test and report to the Consultant result of test. Make good cut areas.
- .3 Waterproofing alterations: To match existing waterproofing type and complete with accessories and components as required for watertight and complete installation.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **PROTECTION**

- .1 Provide adequate protection to materials and work of this Section from damage.

3.3 **PREPARATION AND INSTALLATION**

- .1 Clean all surfaces to be waterproofed free from dirt, grease, oil, efflorescence, paint and dust to the satisfaction of the manufacturer.
- .2 Fill all voids and provide flashings with manufacturer recommended filler material.
- .3 After installation of new work, reinstate waterproofing system and provide necessary sealant to ensure continuity of waterproofing.
- .4 Install waterproofing in accordance with reviewed shop drawings and manufacturer's written instructions to provide a watertight and continuous system where membrane requires repair and has been affected by Work of this Project.
- .5 Sealant: Apply sealant where required to form weathertight seal between waterproofing and adjoining surfaces. Use primers and joint filler recommended by sealant manufacturer. Work shall consist of bedding between members where possible and with neatly formed bead where exposed.

3.4 **PROTECTION**

- .1 Supply and install temporary protection and barricades to prevent mechanical damage or contamination such as oils or solvents, until waterproof membrane assembly is covered by subsequent parts of Work.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for the application of cementitious waterproofing work at the interior floor and walls of elevator pit (s) in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM C39/C39M, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- .2 ASTM C267, Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes.
- .3 CRD-C48, Standard Test Method for Water Permeability of Concrete.
- .4 NSF/ANSI, Standard 61, Drinking Water System Components - Health Effects.

1.3 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, installation details, physical properties, detailed application and installation instructions, and limitations.
    - .2 Product transportation, storage, and handling requirements.
- .2 Shop drawings: Submit shop drawings in accordance with the Conditions of the Contract indicating materials, details, dimensions, thickness, treatment of joints and cracks, protection, penetration details, and relationship to adjacent construction.
- .3 Certificates:
  - .1 Submit certifications for items required at least 4 weeks prior to installation of work of this Section.
  - .2 Submit manufacturer's certification that waterproofing system materials and accessories supplied are compatible, meet Specification requirements and that installer is approved by membrane manufacturer.
  - .3 Submit inspection reports, within 3 working days after each inspection, and certification by manufacturer confirming that installations are in accordance with manufacturer's requirements.
- .4 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

## 1.4 QUALITY ASSURANCE

- .1 Installers qualifications: Perform work of this Section by a company that has a minimum of five years proven experience in the installation of cementitious waterproofing of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.
- .2 Cementitious waterproofing system shall be tested in accordance with the following standards and conditions, and the testing results shall meet or exceed the performance requirements as specified herein:
  - .1 Independent Laboratory: Testing shall be performed by an independent laboratory meeting the requirements of the Standards Council of Canada. Testing laboratory shall obtain all concrete samples and water proofing product samples.
  - .2 Crystalline Penetration: Crystallizing capability of waterproofing material shall be evidenced by independent SEM (Scanning Electron Microscope) photographs documenting penetration of crystal-forming waterproofing material to a depth of 50 mm.
  - .3 Permeability:
    - .1 Independent testing shall be performed according to U.S. Army Corps of Engineers CRD-C48.
    - .2 Concrete samples (treated and untreated) to have design strength of 13.8 MPa and thickness of 50 mm. No admixtures permitted.
    - .3 Coatings to have maximum thickness of 1 mm per coat with up to two coats permitted.
    - .4 Samples to be pressure tested to 1.2 MPa (121.5 m head of water).
    - .5 Treated samples, after crystalline growth has occurred, shall exhibit no measurable leakage.
  - .4 Chemical Resistance:
    - .1 Independent testing shall be performed according to ASTM C267 and ASTM C39/C39M.
    - .2 Concrete samples (treated and untreated) to have design strength of 27.6 MPa. No admixtures permitted.
    - .3 Coatings to have maximum thickness of 1 mm per coat with up to two coats permitted.
    - .4 Untreated and treated specimens to be immersed for a minimum of 84 days in following chemical solutions: hydrochloric acid (3.5pH), brake fluid, transformer oil, ethylene glycol, toluene, caustic soda.
    - .5 Treated specimens shall exhibit no detrimental effects after exposure, and shall have a minimum of 14% increase in compressive strength versus untreated control specimens.
    - .6 Potable Water Approval: Independent testing shall be performed according to NSF/ANSI Standard 61 and approval for use of waterproofing material on structures holding potable water shall be evidenced by NSF/ANSI certification.



- .3 Mock-up:
  - .1 Construct one 1 m<sup>2</sup> mock-up of waterproofing in location acceptable to Consultant.
  - .2 Demonstrate as a minimum one inside corner, one outside corners, surface preparation, and typical installation.
  - .3 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with work.
  - .4 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
  - .5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.
- .4 Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

#### 1.5 **DELIVERY, STORAGE, AND HANDLING**

- .1 Store packaged materials in original undamaged containers with manufacturers labels and seals intact, in dry enclosed area, off the ground. Prevent damage of materials during handling and storage.
- .2 Handle and store materials in accordance with manufacturers written instructions.

#### 1.6 **SITE CONDITIONS**

- .1 Do not install work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
  - .1 Ambient air and surface temperature are below: 5°C.
  - .2 Precipitation: None.
- .2 Ensure that temperature of substrate and its moisture content conforms to manufacturer's minimum requirements, before proceeding with work.
- .3 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 24 hours before, during, and 24 hours after installation.

#### 1.7 **EXTENDED WARRANTY**

- .1 Submit an extended warranty for cementitious waterproofing work in accordance with the General Conditions of the Contract, except that warranty period is extended to five years from date of Ready-for-Takeover.
  - .1 Warrant work against leakage.
  - .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **MATERIALS**

- .1 Cementitious waterproofing system:
  - .1 Furnish a waterproofing system comprising of cement quartz and other non-toxic chemicals, and additives which, on contact with moisture, produce a crystalline growth throughout the capillary voids in the concrete.
  - .2 Acceptable Products:
    - .1 'Permaquik Crystalline Waterproofing' by Tremco.
    - .2 'Cem-Kote CW Plus' by W.R. Meadows.
    - .3 Or equivalent product(s) by Sika Inc. or Xypex Chemical Corporation.

2.2 **MIXES**

- .1 Mix waterproofing material, by volume with clean water free from salt and deleterious materials, to the required proportions and consistency in accordance with manufacturer's written recommendations to achieve.
- .2 Mix waterproofing material in quantities that can be applied within 20 to 30 minutes from time of mixing.
- .3 As mixture thickens, stir frequently, but do not add additional water. Do not mix bonding agents or admixtures with cementitious waterproofing materials.

3 Execution

3.1 **EXAMINATION**

- .1 Verify that concrete surfaces are sound and clean, and that form release agents and materials used to cure the concrete are compatible with waterproofing treatment.
- .2 Examine surfaces to be waterproofed for form tie holes and structural defects such as honeycombing, rock pockets, faulty construction joints and cracks. Such defects to be repaired in accordance with manufacturer's written instructions.
- .3 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

### 3.2 PREPARATION

- .1 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance. Obtain manufacturer's approval of substrate in writing, submit copy to Consultant.
- .2 Concrete surfaces to receive waterproofing shall have an open capillary system to provide tooth and suction, and shall be free from scale, excess form oil, laitance, curing compounds and foreign matter.
- .3 Smooth surfaces or surfaces covered with excess form oil or other contaminants shall be washed, lightly sand-blasted, water-blasted, or acid etched with muriatic acid as necessary to provide a clean absorbent surface. Surfaces to be acid-etched shall be saturated with water prior to application of acid.
- .4 Surface defects shall be repaired in accordance with manufacturer's instructions and as follows:
  - .1 Form Tie Holes, Construction Joints, Cracks: Chip out defective areas in a "U" shaped slot 25 mm wide and a minimum of 25 mm deep. Clean slot of debris and dust. Soak area with water and remove excess surface water. fill the foregoing with material suited for the purpose by the material manufacturer and finish flush to wall.
  - .2 Rock Pockets, Honeycombing or Other Defective Concrete: Rout out defective areas to sound concrete. Remove loose materials and saturate with water. Remove excess surface water and fill with material suited for the purpose by the material manufacturer and finish flush to wall.
  - .3 Prior to application of waterproofing treatment, thoroughly saturate concrete surfaces with clean water as required to ensure migration of crystalline chemicals into voids and capillary tracts of the concrete. Remove free surface water before application.

### 3.3 INSTALLATION

- .1 Install cementitious waterproofing in accordance with reviewed shop drawings and manufacturer's written instructions.
- .2 Construction Joints: Apply waterproofing in slurry form at a minimum rate of 1.0 kg/m<sup>2</sup> to joint surfaces between concrete pours. Moisten surfaces prior to slurry application. Where joint surfaces are not accessible prior to pouring new concrete, consult manufacturer for application procedure.
- .3 Walls:
  - .1 Apply waterproofing uniformly to concrete surfaces with semi-stiff bristle brush or broom, or suitable spray equipment.
  - .2 Apply waterproofing in 2 coats to a minimum application rate of 1.0 kg/m<sup>2</sup>.

- .3 When brushing, work slurry well into surface of the concrete, filling surface pores and hairline cracks. When spraying, hold nozzle close enough to ensure that slurry is forced into pores and hairline cracks.
- .4 Slabs:
  - .1 Remove ponding water on slab and allow concrete to dry to a damp appearance.
  - .2 Over freshly floated concrete, broadcast waterproofing material dry onto concrete at time in initial set at a minimum rate of 1.0 kg/m<sup>2</sup>. Float and then machine trowel concrete to a smooth, level and dense surface. Free from trowel marks, ridges, pinholes, and other defects.
  - .3 If it is not possible to broadcast waterproofing onto slab, waterproofing can be installed in slurry form. Application would be similar to wall application specified herein.

### 3.4 **CURING**

- .1 Begin curing as soon as waterproofing has hardened sufficiently so as not to be damaged by a fine spray. Cure waterproofing with a mist fog spray of clean water three times a day for 2 to 3 days, or cover treated surfaces with damp burlap for the prescribed period. In warm climates, more than three sprayings per day may be necessary to prevent excessive drying of coating.
- .2 During the curing period, protect treated surfaces from damage by wind, sun, rain and temperatures below 2°C. If plastic sheeting is used for protection, it must be raised off of waterproofing coating to allow sufficient air circulation.

### 3.5 **FIELD QUALITY CONTROL**

- .1 Flood test:
  - .1 Do not conceal waterproofing until inspection and testing are completed to satisfaction of Consultant.
  - .2 Temporarily plug drains and dam horizontal surface areas to be tested and flood with water to minimum depth of 50 mm.
  - .3 Maintain flooded depth for 24 hours.
  - .4 If leaks occur repair and retest.
  - .5 Remove water at end of test.

### 3.6 **CLEANING**

- .1 Clean to Consultant's approval, soiled surfaces, spatters, and damage caused by work of this Section.
- .2 Check area drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from site.

END OF SECTION

- 
- 1 General
  - 1.1 **SECTION INCLUDES**
    - .1 Labour, Products, equipment and services necessary for water repellent sealer work in accordance with the Contract Documents.
  - 1.2 **REFERENCES**
    - .1 ASTM C642, Standard Test Method for Density, Absorption, and Voids in Hardened Concrete.
  - 1.3 **SUBMITTALS**
    - .1 Product data:
      - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
        - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, limitations, preparation and installation requirements.
        - .2 Product transportation, storage, and handling requirements.
    - .2 Reports/certificates:
      - .1 Submit manufacturer's written acceptance of substrate prior to application.
      - .2 Submit applicator's current certificate of approval, for application of sealer, by the material manufacturer as proof of compliance.
      - .3 Submit letter certifying that materials proposed for use on this project meet criteria specified, are compatible with each other, and that the manufacturer had recommended the product for its intended end use.
      - .4 Submit inspection report after application of sealer.
      - .5 Submit certification from sealer manufacturer that installation meets specified and manufacturer's requirements.
    - .3 Closeout submittals: Submit maintenance data for incorporation into Operations and Maintenance Manuals in accordance with the Conditions of the Contract.
    - .4 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

#### 1.4 **QUALITY ASSURANCE**

- .1 Installers qualifications: Perform work of this Section by a company that has a minimum of five years proven experience in work of similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.
- .2 Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

#### 1.5 **DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.
- .2 Store product in location protected from freezing, damage, construction activity, precipitation, and direct sunlight, in strict accordance with manufacturer's recommendations.
- .3 Prior to application, condition products in accordance with manufacturer's recommendations.
- .4 Handle all products with appropriate precautions and care as stated on Material Safety Data Sheet.

#### 1.6 **SITE CONDITIONS**

- .1 Do not install work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
  - .1 Ambient air and surface temperature: 5°C to 38°C
  - .2 Precipitation: None.
- .2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 24 hours before, during, and 24 hours after installation.

#### 1.7 **EXTENDED WARRANTY**

- .1 Submit an extended warranty for the work of this Section in accordance with General Conditions, except that warranty period is extended to five years from date of Ready-for-Takeover.
  - .1 Warrant against loss of water repellency when tested as follows:
    - .1 Modified ASTM C642 procedure: Treated concrete shall not absorb more than 0.75% water for a period of 24 hours.
  - .2 Coverage: Complete repair of defective areas and reapplication of sealer.

2 Products

2.1 **MATERIALS**

- .1 All materials under work of this Section, including but not limited to, primers, sealants, sealers, and paints are to have low VOC content limits.
- .2 Water repellent sealer:
  - .1 Clear, penetrating, water based, breathable, minimum 40% active silane based sealer. For use at slab on grade mechanical rooms.
  - .2 Acceptable Products:
    - .1 'Protectosil Aqua-Trete 40' by DRE Industries Inc.
    - .2 'Sikagard H 400' by Sika Canada Inc.
- .3 Cleaning agents: As recommended by material manufacturer, harmless to substrates and adjacent finished surfaces.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.
- .2 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, and any other foreign matter detrimental to performance. Obtain manufacturer's approval of substrate in writing, submit copy to Consultant.

3.2 **PREPARATION**

- .1 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from work of this Section.
- .2 Thoroughly clean all surfaces to receive sealer by steel shotblasting or other method approved by the manufacturer.

3.3 **SEALER APPLICATION**

- .1 Apply sealer in accordance with manufacturer's written instructions.
- .2 Apply sealer without dilution or alteration in any way.
- .3 Apply sealer with low pressure airless spray equipment (15 Psi) capable of flooding the surface to obtain uniform coverage and extending sealer 100 mm up walls.

- .4 Apply sealer at a minimum application rate of 4.3 m<sup>2</sup>/L.
- .5 Apply sealer by method other than spray application only at locations where overspray would affect adjacent materials.

3.4 **FIELD QUALITY CONTROL**

- .1 Immediately after sealing has been completed, have the sealer manufacturer's representative visit the site to inspect, test, and approve the application. Submit written inspection report to Consultant.
- .2 Deficiencies in the application shall be repaired at no cost to Owner.

3.5 **PROTECTION**

- .1 Prevent traffic over sealed areas, and protect work of this Section from debris after installation.

END OF SECTION



- 
- 1 General
    - 1.1 **SECTION INCLUDES**
      - .1 Labour, Products, equipment and services necessary for thermal insulation work in accordance with the Contract Documents.
    - 1.2 **REFERENCES**
      - .1 ASTM C665, Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
    - 1.3 **SUBMITTALS**
      - .1 Product data: Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating characteristics, performance criteria, and limitations. Indicate installation requirements and techniques, storage, and handling criteria and installation procedure acceptable to manufacturer.
      - .2 Certification: Submit installer's certification verifying compliance with specification requirements.
    - 1.4 **QUALITY ASSURANCE**
      - .1 Qualifications: Execute work of this Section by company specializing in thermal insulation work with minimum of three years, recent, documented experience, on work of comparable complexity and scope.
  - 2 Products
    - 2.1 **MATERIALS**
      - 1. Batt insulation (fire-rated/acoustic): ASTM C665, paperless, semi-rigid, spun stone wool fibre mats, of thickness as indicated on Contract Drawings, 'MinWool SAFB' by Johns Manville, 'SAFB Thermafiber' by Owens Corning Inc. or 'Rockwool AFB' by Rockwool.
  - 3 Execution
    - 3.1 **EXAMINATION**
      - .1 Verify condition of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

**3.2 INSTALLATION**

- .1 Install thermal insulation in longest panel sizes possible in accordance with manufacturer's instructions.
- .2 Butt insulation with moderate contact and, cut and fit them tightly around other construction elements.
- .3 Make thermal insulation continuous, maintain thermal protection continuity and secure to prevent displacement. Ensure that insulation is tight to substrate without air gaps.
- .4 Cut and fit thermal insulation tightly around electrical boxes, plumbing and heating pipes and ducts, and other protrusions.
- .5 Leave 75 mm separation between thermal insulation and heat emitting devices such as recessed light fixtures.
- .6 Cut and trim thermal insulation neatly to fit spaces; do not compress insulation to fit.
- .7 Fill miscellaneous cavities with insulation to maintain continuity of thermal barrier. Do not compress insulation to fit.
- .8 Arrange for Consultant to review thermal insulation before it is enclosed.

**3.3 SECUREMENT**

- .1 Batt insulation (fire-rated/acoustic):
  - .1 Install batt insulation in partitions, between studs, and as indicated on Contract Drawings and in accordance with the manufacturer's instructions.
  - .2 Fill stud cavities to full height of partitions and carefully cut and fit required batt insulation type around services and protrusions.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Provide work of this Section including but not limited to the following:
  - .1 Cut openings through existing roofing to accommodate new penetrations.
  - .2 Make good roofing around new penetrations.

1.2 **REFERENCES**

- .1 ASTM C920, Specification for Elastomeric Joint Sealants.
- .2 CGSB 37-GP-15M, Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.
- .3 CAN/ULC S704, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced.
- .4 CAN/ULC S107, Methods of Fire Tests of Roof Coverings.
- .5 FM (Factory Mutual), Roof Assembly Classifications.
- .6 OIRCA, Ontario Industrial Roofing Contractors Association.
- .7 ULC (Underwriters Laboratories of Canada), List of Equipment and Materials for Building Materials, Fire Resistance, and Fire-stop Systems and Components.

1.3 **DESIGN REQUIREMENTS**

- .1 Conform to applicable local code for roof assembly fire hazard requirements.
- .2 UL: Class B Fire Hazard Classification.
- .3 FM: Roof Assembly Classification, of Class 1 Construction, wind uplift requirement of I-90, in accordance with FM 128.
- .4 Design roof system to meet local Wind Uplift Requirements.

1.4 **SPECIAL SITE CONSTRUCTION**

- .1 No bitumen kettles, torches or open flames are allowed on site. All roof components to be mechanically fastened or adhered in adhesive.
- .2 Interior protection for work to be provided by Contractor.

- .3 Minimize disruptions to regular building activities. Noisy work to be performed outside of regular office/operating hours. Arrange special access and times to project site with the Owner's designee.
- .4 Staging area to be determined on site with the Consultant and Owner.
- .5 All salvaged flashings, cleats, and hook strips from the designated roof replacement areas to be recycled and subsequent value credited to the Owner.

#### 1.5 SUBMITTALS

- .1 Provide initial schedule within five (5) working days after Contract award, showing anticipated progress stages and final completion of work. Work shall not commence before work schedule is provided.
- .2 Product data: Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating systems, materials, and methods of installation proposed for use, showing system and each component. Certify compliance of each component with applicable standards.
- .3 Shop drawings: Submit shop drawings in accordance with the Conditions of the Contract indicating details of roof system, flashings, control joints, method of tying in existing vapour retarder with new vapour retarder, insulation, roofing membranes and similar items.
- .4 Sample copy of Contractor's warranty.

#### 1.6 QUALITY ASSURANCE

- .1 Qualification: Perform work of this Section by a company that is a member in good standing of the Ontario Industrial Roofing Contractors Association (OIRCA) and has a minimum of 5 years proven acceptable roofing experience on installations of similar complexity and scope.
- .2 Perform roofing work in accordance with the CRCA Roofing Specifications Manual and in accordance with membrane manufacturer's printed installation instructions.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- .1 All work to be conducted from the exterior using swing-stage, hoist, etc. If cranes or boom-trucks are required, written approval and permits are required from the Owner prior to arrival of any vehicle used for this purpose.
- .2 Site storage is limited. Location of storage to be coordinated with Owner.
- .3 All materials shall be delivered and stored in their original packaging bearing the manufacturers label, grade and product weight, including all other related standards, specifications, and the like.

- .4 All materials shall be adequately protected from inclement weather conditions and stored in a dry, well ventilated and weather protected location.
- .5 Only materials to be installed on the same day shall be removed from the protected location to the work site.
- .6 During extreme temperature, materials shall be stored in a heated location with a 4.4 deg. C minimum temperature and removed only as needed.
- .7 Modified bitumen rolls shall be kept clear of all flame and/ or spark's when not being applied directly to the roof structure.
- .8 All materials in a rolled configuration shall be stored on end, elevated off the ground on a pallet or skid, to protect the bottom surface from foreign debris and moisture.
- .9 When possible, the Contractor should restrict stock piling of material in one location on the roof surface to prevent exceeding the specified deck live load capacity.
- .10 Handle and store products in a manner to prevent damage and deterioration.
- .11 Remove and replace damaged products at own expense and to the satisfaction of the Consultant.

1.8 **SITE CONDITIONS**

- .1 Interruptions to Owners operations will not be permitted.
- .2 Do not remove existing roofing system when weather conditions threaten the integrity of the building contents or intended continued occupancy.

1.9 **EXTENDED WARRANTY**

- .1 At completion of this work, provide a signed OIRCA warranty to the Owner covering defects of workmanship for a period of 2 years commencing from Ready-for-Takeover. Agree to make good promptly any defects which occur or become apparent within the warranty period in conjunction with the membrane manufacture's warranty. Defects shall include but not be limited to leakage, failure to stay in place, lifting, and deformation.

2 Products

2.1 MATERIALS

- .1 General: Verify actual system in the field by means of a simple cut test and report to the Consultant result of test. Make good cut areas.
- .2 Roofing system components:
  - .1 Roofing and flashing membrane: 2-ply SBS modified bitumen, mopping grade, with granulated cap sheet.
  - .2 Bitumen: Asphalt conforming to CSA A123.4-M, Type 2 for roofing and Type 3 for base flashings and installation of insulation.
  - .3 Insulation: CAN/ULC-S704, Type 3; closed cell polyisocyanurate. Provide appropriate cover board.
  - .4 Vapour barrier: To match existing.
  - .5 Miscellaneous components: To match existing.
- .3 Fasteners: Of same material as sheet metal secured, of type, length and size suitable for the particular conditions.
- .4 Dimension lumber: Grade stamped, dressed, kiln dried lumber having a maximum moisture content at time of installation, of 15% for 50 mm or less in thickness, and 19% for stock over 50 mm thick in accordance with NLGA.
- .5 Roof lumber: NLGA, 122b-Construction Light Framing Grade Jack Pine, S4S, pressure treated to CAN/CSA O80-M using CCA waterborne preservative treatment, impregnated to a net retention of 0.25 lbs/cu.ft. Treated lumber shall bear quality assurance grade stamp of certifying agency.
- .6 Sealant: In accordance with ASTM C920 and compatible with roofing system components.
- .7 Stack flashing units and roof drains: By Division 22.
- .8 Liquid applied resin membrane flashing:
  - .1 Flexible, reinforced, monolithic waterproof flashing membrane constructed on site using minimum two coats of polyurethane and bitumen blended resin or modified polymer based resin, complete with polyester or fleece mesh reinforcement.
  - .2 Acceptable system: 'Alsan Flashing and Reinforcement' by Soprema Inc. or approved alternative.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **WORKMANSHIP**

- .1 Execute roofing work which is not specifically covered by these Specifications, is in accordance with applicable standards in Canadian Roofing Contractors Association (CRCA), the Canadian Modified Bitumen Manufacturer's Association's recommendations, manufacturer's preprinted and published specifications and to ULC S107, to FM 1-28 and 1.49 criteria, compliance with local fire insurance requirements and/or local building codes, except where specified otherwise.
- .2 Do priming for asphalt roofing in accordance with CAN/CGSB 37-GP-15M and as recommended by membrane manufacturer.
- .3 Adhesives or sealants and liquid primers will not be applied until surfaces are dry.
- .4 Inspect the underside of roof deck when installing fasteners, where possible, to avoid accidental damage.
- .5 While work is in progress, all steps must be taken to safeguard the building from damage due to the elements.
- .6 Advise the Consultant of adjustments to specified roofing procedures recommended by the manufacturer or due to site conditions. Written approval is needed to make any adjustments to the specified procedures.

3.3 **PROTECTION**

- .1 Existing roofing: Do not use existing roof areas as storage or work staging area, except to extent required in accomplishing work. Provide temporary protection boards as previously specified, and protect areas of work from precipitation while existing construction is open.
- .2 Provide adequate protection to materials and Work of this Section from damage.
- .3 Provide protection covering of 19 mm thick plywood underlaid with 25 mm thick polystyrene board adhered to plywood sheathing. Place protection covering over all roofed areas when working from, or over, such roof surfaces where the roofing membrane is exposed to potential damage.
- .4 Cover walls and adjacent work where materials are hoisted and used.

- .5 Use warning signs and barriers. Maintain in good order until completion of work.
- .6 Protect roof from traffic and damage by placing suitable runways over all new membrane work. Comply with precautions deemed necessary by Consultant.
- .7 At end of each day's work, or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage.
- .8 Contractor is to take care as not to damage any previously performed work, any closely located buildings and all grounds in the vicinity during roofing operations. Contractor shall protect against dust infiltration and other such occurrences. Garbage chutes are to be located as to minimize their exposure to the building and its occupants. Protect walls by means of tarpaulins where garbage chutes and hoisting equipment are located. Cover dumpsters and bins so that debris does not blow away.
- .9 Only equipment that will not adversely affect the deck (damage or alter) is to be used.
- .10 Roof access is to be unobstructed. Doorways and fire routes are to be kept clear of any obstacles.
- .11 All non-used materials are to be removed and stored at a location that will prevent any damage (moisture, ultraviolet breakdown, etc.).
- .12 Protect rolls from flattening by storing on ends on skids.
- .13 Moisture sensitive products and exposed building substrates are to be protected with all work being halted during inclement weather including but not limited to rain fall, snow, drizzle, fog and hail.
- .14 Protect all openings and safeguard all vents, stacks, and drains from weather and contamination from debris.

#### 3.4 **REMOVAL OF EXISTING ROOF**

- .1 Verify that existing roof surface is clear and ready for Work of this Section.
- .2 Coordinate Work with removal and reinstallation of affected mechanical and electrical equipment and associated roof penetrations.
- .3 At all locations where new openings are required in the existing roofing system, carefully cut and remove portions of existing roofing as required for remedial work required by this Section, including but not limited to cants, blocking and metal flashings. Seal all open roof edges to prevent damage to unfinished and undisturbed roof areas.



- .4 Remove only enough existing roofing system materials that can be replaced with new roof system the same day of as the weather will permit in a day.
- .5 Where sections of roof are removed or where new roofing are required. Cut back minimum of 230 mm outside line of opening or removal area to facilitate future flashing.
- .6 Remove roofing system over area to be demolished. Cut roof decking with power tools to ensure straight edges. Leave free ends 300 mm maximum in length, unless adequately supported.
- .7 Supply and install plywood catchboard immediately under areas to be cut, to protect structure interior from falling debris. Install catchboard in combination with dust/weather protection.
- .8 Provide temporary protective sheeting over uncovered deck surfaces. Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights or temporary fasteners. Provide for surface drainage from sheeting to existing drains.
- .9 Do not permit traffic over unprotected or repaired deck surface.

### 3.5 PREPARATION AND INSTALLATION

- .1 Clean roof back a sufficient distance to perform the cutting of openings and other work on the roof. Clean overlap area free from dirt and loose material with compressed air before proceeding with roofing work.
- .2 After installation of new work, reinstate roofing system and provide sheet metal flashings as shown.
- .3 Vapour retarder:
  - .1 Lap vapour retarder ends and edges 50 mm minimum. Roll vapour retarder and laps for continuous adhesion over entire substrate area; use manufacturer's recommended roller.
  - .2 Cut and fit vapour retarder as required for passage of protrusions, ensuring continuous adherence to substrate and continuity with existing roof vapour barrier.
- .4 Rough carpentry: Install continuous wood nailers around roof openings at edges of insulation. Use specified fasteners for securing wood to deck. Pressure treated wood cut on the job shall have cut ends coated with a concentrated solution of wood preservative.
- .5 Insulation: Place insulation in tight contact with abutting surfaces. Cut insulation board through the board thickness and trim to provide plain butt joints; do not break or tear insulation board to fit detail. Verify method of existing insulation securement.

- .6 Modified bitumen membrane repairs and installation:
  - .1 Install modified bitumen membrane with new materials using the same type of membrane and bitumen already installed in the existing membrane system. All supplied roof materials to be compatible with the existing roof system components.
  - .2 Cut out damaged and deteriorated existing membrane sections in logical rectangular segments as required. Dispose of all debris and dirt to an appropriate site.
  - .3 Use two (2) plies of new specified modified bitumen base sheet and cap sheet membrane with an attachment method appropriate for existing building and installation.
  - .4 Cap sheet membrane to have granulated surface where left exposed. Colour to match existing as close as possible.
  - .5 Install new modified bitumen base sheet across repair area and extend minimum 102 mm past edge, onto existing modified bitumen membrane. Ensure a good bond to existing membrane. Self-adhering base sheet flashings to be installed with membrane primer as specified.
  - .6 Carry new modified bitumen cap sheet over new base sheet and extend a minimum of 102 mm past edge, on to existing modified bitumen membrane. Ensure a good bond to existing membrane.
  - .7 All side and end laps of the base sheet and cap sheet shall be heat welded with hot air gun to the satisfaction of the Consultant.
- .7 Modified bitumen flashing membrane repairs and installation:
  - .1 All modified bitumen membrane flashing repairs to be carried out with new modified bitumen flashings. All new roof materials to be compatible with the existing roof system components.
  - .2 Modified bitumen membrane flashing repairs are to consist of two (2) plies of new specified modified bitumen membrane using attachment method appropriate for existing building and installation.
  - .3 Extend new base sheet flashings a minimum 102 mm past the existing repair area. Self-adhering base sheet flashings to be installed with membrane primer as specified.
  - .4 Carry new cap sheet flashing a minimum of 102 mm past the base sheet flashing. Ensure a good bond between the modified bitumen flashings.
  - .5 All side and end laps of the base sheet flashing and cap sheet flashing shall be heat welded with hot air gun to the satisfaction of the Consultant.
- .8 Sealant: Apply sealant where required to form weathertight seal between flashing and adjoining surfaces and between flashing and other work of this Section. Use primers and joint filler recommended by sealant manufacturer. Work shall consist of bedding between members where possible and with neatly formed bead where exposed.

- .9 Liquid applied resin membrane flashings:
  - .1 Where specifically indicated in detail drawings and at any junctions where conventional installation of membrane flashings are not feasible, install new liquid applied resin flashing system.
  - .2 Resin system to be a layered application consisting of two coats of liquid resin encapsulating a layer of polyester or fleece mesh reinforcement.
  - .3 Tape off all areas to receive liquid applied resins in square or rectangular shapes. Finish installation to be neat and clean.
  - .4 Liquid applied resin flashing system to follow in accordance with manufacturer's written instructions and specifications.
- .10 Make all repairs to existing roof as necessary in accordance with OIRCA requirements, best standard practice and to complete satisfaction of the Consultant.

### 3.6 ROOF ACCESSORIES

- .1 Prior to application of membrane, set stack flashing units, and other roof penetration accessory units in accordance with manufacturer's Product data. Install removable cap per accessory manufacturer's Product data as applicable.
- .2 Seal joints at items projecting through membrane watertight to acceptance of Consultant.

### 3.7 CLEAN-UP

- .1 Clean up and remove from job site on a daily basis, all rubbish and surplus materials resulting from this work.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for spray applied fireproofing work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM E72, Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
- .2 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .3 ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
- .4 ASTM E814, Methods of Fire Tests of Through-Penetration Fire Stops.
- .5 CAN/ULC S101, Standard Methods of Fire Endurance Test of Building Construction and Materials.
- .6 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .7 Technical Manual 12-A, Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials by Association of the Wall and Ceiling Industry (AWCI).
- .8 UL 1479, Standard Method of Fire Tests of Through-Penetrations.

1.3 **DESIGN REQUIREMENTS**

- .1 Design fireproofing for structural members, floor/ceiling assemblies, and floor/roof assemblies as restrained or unrestrained rated assemblies as indicated on structural drawings.

1.4 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
    - .2 Product transportation, storage, handling and installation requirements.

- .2 Certification:
  - .1 Submit certified documentation for each worker performing Work of this Section, to substantiate 5 years minimum of experience in sprayed fireproofing installation and that fireproofing has been applied in accordance with ULC, cUL or WH designs.
  - .2 Submit test results in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.
  - .3 Submit installer's and Product manufacturer's certification verifying compliance with Contract Documents.
  - .4 For assemblies not tested and rated in accordance with CAN/ULC S101 and CAN/ULC S102, submit proposals and test reports based on related designs using accepted fireproofing design criteria, and where authority having jurisdiction has approved significant changes from tested assembly on basis of an engineering study; study calculations shall accompany report.
  - .5 Submit manufacturer's inspection reports and verification/certification that work has been correctly installed.
- .3 Extended warranty: Submit extended warranties signed and registered by the manufacturer providing the warranties in the name of the Owner for the timeframe and coverage specified in this Section.

#### **1.5 QUALITY ASSURANCE**

- .1 Qualifications: Execute work of this Section by manufacturer-approved, skilled, qualified, and experienced workers, trained in installation of work of this Section and that fireproofing has been applied in accordance with ULC and or cUL designs.
- .2 Regulatory Requirements: Be responsible for securing approval of materials and installation of work from authority having jurisdiction:
  - .1 Perform work in compliance with ULC or cUL listed designs for the required fire resistance ratings.
  - .2 Submit signed engineering proposals to Authority having Jurisdiction for acceptance if there are no listed designs that match project conditions.
  - .3 Perform tests required by Authorities having Jurisdiction.
- .3 Manufacturer's Site Inspection: Manufacturer's technical representative shall inspect work at suitable intervals during application and at conclusion of work of this Section, to ensure work is correctly installed.
- .4 Minimum acceptable physical performance standards are those stated herein. Materials having higher performance standards are not precluded from submission or acceptance.

- .5 Mock-up:
  - .1 Construct one 1 m<sup>2</sup> mock-up of fireproofing in location acceptable to Consultant.
  - .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with work.
  - .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
  - .4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

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

- .1 Store materials in dry, protected area, off ground in original undamaged, sealed containers. Discard any bags or containers that have been exposed to water before use.
- .2 Deliver sprayed fireproofing materials in original unopened containers bearing manufacturer's name, brand of product, certification labels for fire hazard and fire resistance classifications (ULC, cUL or WH labels).

#### 1.7 **SITE CONDITIONS**

- .1 Maintain a 5°C air and substrate temperature for 24 hours before, during, and 24 hours after application in accordance with manufacturer's instructions.
- .2 Ventilate to dry fireproofing. In enclosed areas circulate interior air and exhaust to the exterior.

#### 1.8 **PROTECTION**

- .1 Protect adjacent surfaces and equipment around application areas from overspray, marring or damage. Clean, polish or replace materials damaged to acceptance of Consultant.

#### 1.9 **EXTENDED WARRANTY**

- .1 Submit an extended warranty for fireproofing work in accordance with General Conditions, except that warranty period is extended to 5 years from date of Ready-for-Takeover.
  - .1 Warrant that the sprayed fireproofing shall remain free of defects in materials and quality of work. Promptly correct defects and deficiencies which become apparent within warranty period to satisfaction of Owner and at no additional cost to the Owner.
  - .2 Defects shall include but not limited to flaking, delamination, fibre loss, crazing and cracking or evidence of other defects of finish.

- .3 Performance failure of any component of sprayed fireproofing system; defective work shall be removed and replaced with acceptable work at no cost to Owner and at such times as designated by Owner.
- .4 Coverage: Complete replacement including affected adjacent parts.

## 2 Products

### 2.1 MATERIALS

- .1 General:
  - .1 All materials under work of this Section, including but not limited to, primers, adhesives, paints, and sealers are to have low VOC content limits.
  - .2 Materials shall be certified as fire resistant by ULC, cUL or WH in accordance with CAN/ULC-S101 or ASTM E119, and shall be asbestos free.
  - .3 Materials shall not induce deterioration of members to which they are applied.
  - .4 Bonding agents, binders, accessories, cleaning solvents, aggregates and sealers shall be in accordance with base material manufacturer's recommendation.
  - .5 Mixing water shall be clear and free from injurious amounts of oil, acid, alkali, organic matter, sediment or any other deleterious or stain-producing substances.
- .2 Primer: As recommended by spray fireproofing manufacturer.
- .3 Spray fireproofing: CAN/ULC S101, spray applied, gypsum-based cementitious fireproofing with a minimum density of 240 kg/m<sup>3</sup>.
  - .1 'Southwest Type 5GP' by Carboline.
  - .2 'Caico 300' by Isolatek International.
- .4 Sealer: Clear, water based acrylic sealer, as recommended by fireproofing manufacturer, qualified for use in ULC or cUL Design specified or indicated.
- .5 Metal lath: Expanded metal lath fabricated from material of weight, configuration, and finish required to comply with fire resistance designs acceptable to Authority having Jurisdiction and fire resistive material manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive sprayed fire-resistive material.
- .6 Water: Clean, free from organic and mineral impurities which would be harmful to application.

2.2           **MIXING**

- .1       Mix Products in accordance with manufacturer's instructions.
- .2       Do not use partially set, frozen, caked or lumpy materials. Mix each batch separately in mechanical mixer and clean mixer free of particles before mixing new batch.

3             Execution

3.1           **EXAMINATION**

- .1       Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.
- .2       Verify that substrates are compatible and have suitable bonding characteristics to receive fireproofing.
- .3       Ensure written confirmation is received from steel fabricators of the specific surface preparation procedures and primers used to ascertain compatibility with work of this Section.
- .4       Ensure that items required to penetrate fireproofing are placed before installation of fireproofing.
- .5       Do not apply fireproofing until all clips, hangers, inserts, sleeves and similar items have been installed in areas to receive sprayed fireproofing.
- .6       Ensure that ducts, piping, equipments, or other items which would interfere with application of fireproofing are not positioned until fireproofing is completed.
- .7       Ensure that painted surfaces to receive sprayed fireproofing are compatible with fireproofing materials and bond requirements.

3.2           **PREPARATION**

- .1       Prime substrates where required by ULC or by sprayed fireproofing material manufacturer, unless compatible shop primer has been applied and is in satisfactory condition to receive work.
- .2       Clean surfaces of steel members free of dust, dirt, oil, grease, loose paint, mill scale, rust and other foreign matter in accordance with manufacturers written instructions which would interfere with bond of fireproofing. Steel to receive fireproofing should have no primers or coatings applied to the surface prior to application.



- .3 Install metal lath where required to comply with fire resistance ratings and fireproofing manufacturer's written recommendations for conditions of exposure and intended use. Securely attach lath to substrate in position required for support and reinforcement of fire-resistive material. Use anchorage devices of type recommended in writing by sprayed fire-resistive material manufacturer. Attach lathing accessories where indicated or required for secure attachment to substrate.
- .4 Coat substrates with bonding adhesive where required to achieve fire resistance rating or as recommended in writing by spray fireproofing manufacturer for material and application indicated.
- .5 Use temporary enclosures to prevent spray from contaminating air beyond application area. Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of fireproofing material. Protect walls, windows, floors and other surfaces around areas to be fireproofed, from marring or damage.

### 3.3 **APPLICATION**

- .1 Apply fireproofing in separate coats in accordance with the manufacturer's written instructions to total thickness required to achieve fire ratings shown on the Contract Drawings. Comply with accepted ULC or Intertek Testing Services design.
- .2 Apply fireproofing on steel members as indicated and as required by authorities having jurisdiction.
- .3 Maintain continuity of fireproofing without gaps or voids.
- .4 Water tamping: Provide low pressure spray to finished surface of fireproofing to provide dense, medium smooth surface.
- .5 Board tamping: Provide board tamping before curing when used in high velocity plenum and in vertical contact areas, such as columns in mechanical rooms, to provide additional surface protection.
- .6 Apply sealer to surfaces of fireproofing in accordance with the manufacturer's instructions after tamping.
- .7 Do all cutting, patching and repairing of damage caused by work of this Section or of unsatisfactory fireproofing as directed. Repair areas cut out or damaged as result of testing.
- .8 Except as provided above, repair damaged spray fireproofing at expense of those causing damage. Do all repairs before fireproofing concealed, or if exposed, before final inspection.

3.4            **FIELD QUALITY CONTROL**

- .1        Perform field tests as required by Authorities having Jurisdiction. Tests to be carried out as outlined in Technical Manual 12-A by AWCI and UL 1479.
- .2        Where installed materials are found not to meet performance criteria, remove material and replace with new material to meet specified criteria at no additional cost to the Owner.

3.5            **CLEANING UP**

- .1        After application clean off any overspray and broom clean floor.
- .2        Clean exposed wall, ceiling or other surfaces of fireproofing materials to the acceptance of Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for intumescent fireproofing work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM D2240, Standard Test Method for Rubber Property - Durometer Hardness.
- .2 ASTM D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- .3 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .4 ASTM E761, Standard test method for Compressive Strength of Sprayed Fire-Resistive Materials Applied to Structural Members.
- .5 AWCI, Association of the Wall and Ceiling Industries - International.
- .6 AWCI Technical Manual 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials; an Annotated Guide.
- .7 Technical Manual 12-B, 'Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials by Association of the Wall and Ceiling Industry (AWCI)
- .8 ULC, Underwriter's Laboratories of Canada.

1.3 **SYSTEM DESCRIPTION**

- .1 Provide intumescent fireproofing to provide a fire resistance rating of 120 minutes for new steel beams and items indicated on drawings.

1.4 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data for each material used in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations.
    - .2 Product transportation, storage, handling and installation requirements.

- .2 Samples:
  - .1 Submit following samples in accordance with the Conditions of the Contract.
    - .1 Two 150 x 300 mm samples of intumescent fireproofing applied to 3 mm steel plate cut back to show primer, intumescent coating and topcoat demonstrating colour and finish for Consultant approval.
- .3 Certificates: Submit ULC certification for designs of fire resistive coating application to substrate materials required and test reports showing compliance with specified physical performance characteristics and physical properties.

#### **1.5 QUALITY ASSURANCE**

- .1 Installers qualifications: Perform work of this Section by a company that has a minimum of five years proven experience in the installation of intumescent fireproof coatings on project of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.
- .2 Inspection and testing:
  - .1 An independent testing laboratory/company may be selected by the Consultant to test random samples as applied, to verify thickness of thin-film intumescent fire-resistive coating in accordance with AWCI Technical Manual 12-B. Inspection shall be carried out prior to application of topcoat.
  - .2 Correct deficiencies and have such corrected work approved by Inspection/Testing Company before work is continued.

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

- .1 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Ship, store and deliver at temperatures not less than 50°F (10°C); protect from freezing.
- .2 Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

#### **1.7 SITE CONDITIONS**

- .1 Do not install work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
  - .1 Ambient air and surface temperature: 10°C minimum.
  - .2 Precipitation: None.
  - .3 Relative Humidity: 40-60%.
- .2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 24 hours before, during, and 24 hours after installation.

2 Products

2.1 **MATERIALS**

- .1 All materials under work of this Section, including but not limited to, coatings are to have low VOC content limits.
- .2 Intumescent fireproofing system: 'A/D Firefilm III System' by Carboline or 'Caico SprayFilm' by Isolatek International, meeting the following performance criteria as a minimum.
  - .1 Primer: Recommended by manufacturer for substrate being fireproofed.
  - .2 Intumescent coating:
    - .1 Hardness (Shore "D"): Durometer D65-70 in accordance with ASTM D2240.
    - .2 Surface Burning Characteristics: Class "A", in accordance with ASTM E84.
    - .3 Density 1425 kg/m<sup>2</sup>.
    - .4 Bond strength: 861 kPa in accordance with ASTM D4541.
    - .5 Compressive strength: 5.2 MPa at 10 % deformation, in accordance with ASTM E761.
  - .3 Top coat: Top coat as approved by intumescent film manufacturer for intended application. Colour to be selected by Consultant.

2.2 **MIXES**

- .1 Mix intumescent fireproof coating components in accordance with manufacturer's written instructions.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Verify that all clips, hangers, sleeves and similar devices have been attached. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **PREPARATION**

- .1 Protect work of other trades against overspray and make good at own expense any such damage. Provide adequate covering by drop cloths, masting or tarpaulins to surfaces, or on fitments in contact with, or adjacent to, surfaces to be fireproofed.
- .2 Clean surfaces, to be fireproofed, free of dust, grease, oils, etc. in accordance with manufacturer's recommendations. Ensure surfaces are free of any extraneous matter which could be detrimental to a satisfactory and acceptable finish.

- .3 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance. Obtain manufacturer's approval of substrate in writing, submit copy to Consultant.
- .4 Prime surfaces to be fireproofed with specified primer in accordance with manufacturer's recommendations.
- .5 Inspect primed surfaces to be fireproofed for gouges, marks, pinholes, nibs, etc. Properly prepare same by patching, filling, smoothing or any other surface preparation necessary to ensure a satisfactory surface finish.
- .6 Ensure written confirmation is received from steel fabricators of the specific surface preparation procedures and primers used for the application of fireproofing materials to ascertain compatibility with work of this Section:
  - .1 Verify that substrate surfaces are ready to receive work. Commercial blast cleaning (SSPC SP6) is required for minimum surface preparation. Weld flashes should be ground smooth prior to commencement of application. Select primer from manufacturer's list of approved primers.

### 3.3 APPLICATION

- .1 Install intumescent fireproofing in accordance with manufacturer's written instructions.
- .2 Install intumescent fireproofing at the proper consistency to ensure a satisfactory surface finish.
- .3 Use-up materials within shelf life period recommended by manufacturer.
- .4 Ensure finished work is uniform as to sheen, gloss, colour, and texture.
- .5 Patching: Patch and repair any fire resistive coating that has been damaged in accordance with patching recommendations of material manufacturer. If coating becomes damaged, rebuild thickness by spray or brush. Fill small areas with trowel. When dry, smooth and finish to match adjacent surfaces.

### 3.4 FIELD QUALITY CONTROL

- .1 Perform field tests as required by Authorities having Jurisdiction. Tests to be carried out as outlined in Technical Manual 12-B by AWCI.

3.5            **CLEANING**

- .1        Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions. Remove and legally dispose of construction debris.
- .2        Work will not be considered complete until all spatters, drippings, smears and overspray have been cleaned and removed to the satisfaction of Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for firestopping and smoke seals work in accordance with the Contract Documents.
- .2 Work of this Section shall include firestopping on both new and existing penetrations through new and existing walls. Several existing walls will need to be fire-rated that currently do not have a rating or their rating has been compromised.

1.2 **REFERENCES**

- .1 ASTM C303, Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
- .2 ASTM C920, Standard Specification for Elastomeric Joint Sealants.
- .3 ASTM C1104, Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
- .4 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .5 ASTM E814, Test Method for Fire Tests of Through-Penetration Fire Stops.
- .6 ASTM E2174, Standard Practice for On-Site Inspection of Installed Fire Stops.
- .7 ASTM E2393, Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
- .8 ASTM E3037, Standard Test Method for Measuring Relative Movement Capabilities of Through-Penetration Firestop Systems.
- .9 ASTM G21, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- .10 CAN/ULC S101, Standard Methods of Fire Endurance Tests of Building Construction and Materials.
- .11 CAN/ULC S102, Surface Burning Characteristics of Building Materials and Assemblies.
- .12 CAN/ULC S114, Standard Method of Test for Determination of Non-Combustibility in Building Materials.
- .13 CAN/ULC S115, Standard Method of Fire Tests of Firestop Systems.



- .14 CAN/ULC S129, Standard Method Of Test For Smoulder Resistance Of Insulation (Basket Method).
- .15 CAN/ULC S702, Thermal Insulation, Mineral Fibre for Buildings.
- .16 International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.
- .17 UL 1479, Standard for Fire Tests of Through-Penetration Firestops.

### 1.3 **DEFINITIONS**

- .1 Fire Separation: A construction assembly, plane or device, either vertical or horizontal, which is required to prevent the passage of fire and smoke for a prescribed period of time. Proof of compliance to required time rating shall be by ULC, Warnock Hersey (or similar approved) certification or shall be as listed in the Ontario Building Code Supplementary Standard SB-2.
- .2 Smoke Separation: A construction assembly, plane or device, either vertical or horizontal, which is not required to prevent the passage of fire for a prescribed period of time but is required to prevent the passage of smoke. A "Smoke Separation" is also known as a "Fire Separation with No Rating" or a "Zero Hour Rated Separation".
- .3 Non-Rated Separation: A construction assembly, plane or device, either vertical or horizontal, which is not required to prevent the passage of fire for a prescribed period of time and is not required to prevent the passage of smoke.

### 1.4 **FIRESTOPPING/FIRE RESISTIVE JOINT SYSTEM DESCRIPTIONS**

- .1 Firestopping and smoke seals: ULC or Intertek Testing Services listed Products and systems in accordance with CAN/ULC S115, CAN/ULC S101 where relevant, and NBC and OBC requirements suitable to actual application and installation conditions.
- .2 Firestop applications that exist for which no ULC or cUL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar ULC or cUL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.
- .3 Firestop and smoke seal system shall achieve a fire resistance rating and smoke seal rating equal to that of assemblies into which they are installed.
- .4 Provide smoke sealants over firestopping materials or combination smoke seal/firestop seal material to form air tight barriers to retard the passage of gas and smoke.

- .5 Non-rated fire separations: Provide L-Rated smoke protection firestop system for application on both sides of separation.
- .6 Dynamic joints:
  - .1 Firestopping and smoke seals located at movement joints shall be designed with movement capability.
  - .2 Where required, fire and smoke stop systems shall be designed to account for expansion or contraction in construction joints and mechanical piping, movement of structural elements and movement due to sound and vibration control of mechanical installations.
- .7 Insulated pipes and ducts: Design and test listed firestop systems with actual insulation materials penetrating the fire separation, as indicated on system design listing.
- .8 Wet areas: Water-based products are unacceptable in wet areas or areas that may be subject to occasional water exposure or flooding during and after construction. Products used in such areas are to have a W-rating.
- .9 Architectural considerations:
  - .1 Conceal firestopping materials, unless otherwise permitted or unavoidable.
  - .2 When exposed to view, firestop system must be selected in consideration with criteria, such as architectural finish, potential traffic, physical damage and exposure to moisture and heat. Provide firestop systems suitable for and to accommodate these conditions.
- .10 Environment considerations:
  - .1 Select materials to suit the environment in which they will be used during and after curing and the intended use of space.
  - .2 Ensure compatibility of the proposed materials/products for the following instances:
    - .1 Spaces containing sensitive electronic equipment.
    - .2 Preventing contamination of laboratory and manufacturing environments.
    - .3 Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- .11 Penetrations in fire-resistance-rated walls:
  - .1 Firestopping and smoke seal system ratings to be determined per CAN/ULC S115, CAN/ULC S101 where relevant, and as required by the NBC or OBC.
  - .2 The firestopping and smoke seal systems selected shall have been tested at an elevated differential pressure of 50 Pa where such pressure is required by the NBC or OBC. Where not required, systems shall have been tested at 2.5 Pa.

- .12 Penetrations in horizontal assemblies:
  - .1 Firestopping and smoke seal system ratings to be determined per CAN/ULC S115, CAN/ULC S101 where relevant, and as required by the NBC or OBC.
  - .2 The firestopping and smoke seal systems selected shall have been tested at an elevated differential pressure of 50 Pa where such pressure is required by the NBC or OBC. Where not required, systems shall have been tested at 2.5 Pa.
- .13 Microbial and fungal resistance: Provide firestopping capable of achieving a Class 0 rating when tested in accordance with ASTM G21 for antibacterial and antifungal properties to inhibit growth of bacteria, mould, mildew and fungi.
- .14 Penetrations by polypropylene pipes through any fire separation required to have a fire resistance rating shall be protected by a firestop system with an FT rating.
- .15 Firestopping and smoke seals within mechanical and electrical assemblies shall be provided as part of the work of Divisions 21, 22, 23, 26, 27, and 28 respectively.

## 1.5 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate cUL or ULC reference standard, characteristics, limitations.
    - .2 Product transportation, storage, handling and installation requirements.
    - .3 Submit firestop and smoke seal manufacturer's Product data for materials and prefabricated devices, including manufacturer's printed installation instructions.
    - .4 Submit material safety data sheets provided with product delivered to job-site.
- .2 Shop drawings:
  - .1 Submit shop drawings in accordance with the Conditions of the Contract indicating:
    - .1 Fire rated and smoke sealed systems for each typical application.
    - .2 Construction details, accurately reflecting actual job conditions.
    - .3 ULC or Intertek Testing assembly listing.
    - .4 Each floor and wall assembly requiring firestop system with each corresponding ULC firestop system.
    - .5 Required joints and penetrations movement.
    - .6 Required STC rating.
    - .7 Required F/FT, L ratings.
    - .8 Manufacturer's engineering judgment identification number and drawing details when no ULC or cUL system is available for an application.

- .3 Certification:
  - .1 Submit certified documentation from manufacturer for each worker performing work of this Section.
  - .2 Submit installer's and Product manufacturer's certification verifying compliance with the Contract Documents and conformance with ASTM E814, CAN/ULC S115, and CAN/ULC S101 where relevant.

## 1.6 **QUALITY ASSURANCE**

- .1 Installers qualifications:
  - .1 Perform work of this Section by a company that has a minimum of five years proven experience in the installation of firestopping and smoke seal work of a similar size and nature and that is approved by manufacturer. The work is to be installed by a Subcontractor with at least one of the following qualifications if pre-formed devices are not used as defined:
    - .1 FM 4991 Approved Contractor.
    - .2 ULC Approved Contractor.
    - .3 Hilti Accredited Fire Stop Specialty Contractor.
  - .2 Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.
- .2 Manufacturer's direct representative and/or fire protection specialist shall be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures conforming to manufacturer's written recommendations published in their literature and drawing details.
- .3 Pre-construction meetings: Arrange with manufacturer's representative, Contractor, Consultant and Field Engineer to determine responsibility for handling such issues as FT rated partitions, firestop custom details, compatibility, mixed penetrations, movement, required STC ratings, penetrations filling ratio, pressure differential, water rating and to review installation procedures 48 hours in advance of installation.

## 1.7 **DELIVERY STORAGE AND HANDLING**

- .1 Deliver materials to Place of Work in manufacturer's unopened containers, containing classification label with labels intact and legible at time of use and ULC or cUL labels where applicable.
- .2 Do not use damaged or adulterated materials exceeding their expiry date.
- .3 Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.

1.8 **SITE CONDITIONS**

- .1 Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

- .1 Acceptable manufacturers of rated systems include:
  - .1 3M
  - .2 Hilti Canada Corporation.
  - .3 Specified Technologies Inc. (STI Firestop)
  - .4 Tremco Ltd.

2.2 **GENERAL SYSTEM REQUIREMENTS**

- .1 All materials under work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.
- .2 Do not use Products containing asbestos.
- .3 Firestopping components shall not contain volatile solvents or require special application to protect plastic pipe from firestopping compound.
- .4 Provide smoke seal sealant in following colours:
  - .1 Grey or white in finished areas.
  - .2 Red in unfinished areas.
- .5 Firestop and smoke sealant for overhead and vertical joints for floor to be sealant.
- .6 W-rating: Class 1 rating in accordance with water leakage test per UL1479.

2.3 **MATERIALS**

- .1 General:
  - .1 Following materials have been provided for convenience. Contractor shall provide complete system with all components and accessories as required for fire resistant and smoke seal installation.
  - .2 The firestop and smoke seal systems selected shall have been tested at an elevated differential pressure of 50Pa where such pressure is required by the NBC or OBC. Where not required, systems shall have been tested at 2.5 Pa.

- .2 Provide the following basis-of-design Products or approved alternatives for internal partitions:
  - .1 For rated walls, top of wall preformed solution: 'Model CFS TTS' by Hilti.
  - .2 For non-rated walls, top of wall preformed solution: 'Model CFS TTS SA' by Hilti.
  - .3 For rated and non-rated walls, bottom of wall preformed solution: 'Model CFS BTS' by Hilti.
  - .4 For rated walls, top of wall sealant: 'Model CP 606' by Hilti.
  - .5 For non-rated walls, top of wall sealant: 'Model CS S SA Light' by Hilti.
  - .6 For rated walls, top of wall spray: 'Model CFS SP WB' by Hilti.
  - .7 For non-rated walls, top of wall spray: 'Model CP 572' by Hilti.
- .3 Provide the following basis-of-design Products or approved alternatives for edge of slab conditions:
  - .1 Preformed edge of slab solution: 'Model EOS QS' by Hilti.
  - .2 Edge of slab sealant: 'Model CFS S SIL SL' by Hilti.
  - .3 Edge of slab spray: 'Model CFS SP WB' by Hilti.
  - .4 Edge of slab spray: 'Model CFS SP SIL' by Hilti.
- .4 Provide the following basis-of-design Products or approved alternatives for mechanical and electrical conditions:
  - .1 Preformed cast-in place firestop device: 'Model CFS-CID U' by Hilti.
  - .2 Preformed firestop speed sleeve: 'Model CP 653 BA' by Hilti.
  - .3 Preformed modular firestop sleeve system: 'Model CFS-MSL' by Hilti.
  - .4 Preformed firestop drop-in device: 'Model CFS-DID' by Hilti.
  - .5 Preformed firestop collar: 'Model CP 643N' by Hilti.
  - .6 Preformed wrap strips: 'Model CP 648E/648S' by Hilti.
  - .7 Preformed firestop putty pad: 'Model CP 617' by Hilti.
  - .8 Preformed firestop box insert: 'Firestop Box Insert' by Hilti.
  - .9 Preformed firestop block: 'Model CFS-BL' by Hilti.
  - .10 Preformed composite sheet: 'Model CFS-COS' by Hilti.
  - .11 Intumescent firestop sealant: 'Model FS-ONE MAX' by Hilti.
  - .12 Fire foam: 'Models CP 620/CP 660' by Hilti.
  - .13 Flexible firestop sealant: 'Model CP 606' by Hilti.
  - .14 Firestop silicone sealant gun grade: 'Model CFS-S SIL GG' by Hilti.
  - .15 Firestop silicone sealant self-leveling: 'Model CFS-S SIL SL' by Hilti.
- .5 Use only firestop products that have been 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.

- .6 Accessories:
  - .1 Provide components for each firestopping and smoke seal systems that are needed to install fill materials.
  - .2 Use only components specified by firestopping material manufacturer and approved by the qualified testing agency.
  - .3 Accessories include, but are not limited to the following items:
    - .1 Permanent forming, damming and backing material.
    - .2 Temporary forming material.
- .7 Primer: As recommended by firestopping sealant manufacturer.

### 3 Execution

#### 3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.
- .2 Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- .3 Verify that substrates and surfaces to receive firestopping and smoke seals are clean, dry, and frost free.

#### 3.2 **PREPARATION**

- .1 Prepare, modify, and adjust void sizes, proportions, and conditions to conform to fire rated and smoke sealed assembly requirements such as assembly opening size and dimensional restrictions.
- .2 Clean surfaces to remove material detrimental to bond including dust, paint, rust, oil, grease, moisture, frost and other foreign matter to manufacturers recommendations.
- .3 Mask adjacent surfaces to avoid spillage and over-coating of adjacent surfaces. Remove stains from adjacent surfaces.

#### 3.3 **INSTALLATION**

- .1 Install firestopping and smoke seal systems in accordance with reviewed Shop Drawings, manufacturer's instructions and fire rated assembly to establish continuity and integrity of fire separations.
- .2 Install firestop insulation in compacted thicknesses required by ULC design. Compress insulation as recommended by manufacturer.
- .3 Install primers as recommended by firestop and smoke seal Product manufacturers.

- .4 Install temporary forming, damming, back-up as required, remove after materials have achieved initial cure and will resist displacement.
- .5 Install firestop and smoke seal filler in horizontal joints as recommended by manufacturer.
- .6 Use resilient, elastomeric firestopping and smoke seal systems in following locations:
  - .1 Openings and sleeves for future use.
  - .2 Penetration systems subject to vibration or thermal movement.
  - .3 Penetration systems in acoustical containment enclosures.
- .7 Trowel and tool exposed firestop and smoke seal. Product surfaces to uniform, smooth finish.
- .8 Seal joints to ensure an air and water resistant seal capable of withstanding compressions and extensions due to thermal wind or seismic joint movement.
- .9 Taped joints will not be acceptable.
- .10 Repair damaged firestopped and smoke sealed surfaces to acceptance of Consultant.
- .11 Identification:
  - .1 Identify firestopping and smoke seals with pressure-sensitive, self-adhesive, preprinted plastic labels. Attach labels permanently to surfaces adjacent to and within 150 mm of firestopping edge, so labels will be visible to anyone seeking to remove penetrating items or firestopping.
  - .2 Include the following information on labels:
    - .1 The words "Warning - Firestopping and smoke seals - Do Not Disturb. Notify Building Management of Any Damage."
    - .2 Installing Subcontractor's name, address, and phone number.
    - .3 Designation of applicable testing and inspecting agency.
    - .4 Date of installation.
    - .5 Manufacturer's name.
    - .6 Installer's name.
  - .3 Identification labels and markings to be indelible for the expected service life of the installation.
  - .4 Provide identification labels at each penetration.
- .12 Do not cover materials until full cure has taken place.

### 3.4 **INSPECTION AND TESTING**

- .1 Inspection of through-penetration firestopping shall be performed in accordance with ASTM E2174 to ensure that firestopping and smoke seals have been installed in accordance with Contract documents and to tested and listed firestop system.
- .2 Inspection of joints shall be performed in accordance with ASTM E2393.



**3.5 CLEAN-UP**

- .1 Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.
- .2 Remove excess materials and debris immediately after application.

**3.6 SCHEDULE OF FIRESTOP AND SMOKE SEAL LOCATIONS**

- .1 Following firestop and smoke seal location schedule is included for convenience and may not be complete. Examine Contract Drawings and other specification sections and determine entire extent of work of this Section. Generally provide systems with required fire and smoke ratings at following locations:
  - .1 Gaps at intersections of fire-resistance rated walls and partitions.
  - .2 Control and sway joints in fire-resistance rated walls and partitions.
  - .3 Gaps at top of fire-resistance rated partitions and walls.
  - .4 Penetrations through fire-resistance rated walls and partitions including but not limited to mechanical and electrical services and openings and sleeves for future use.
  - .5 Penetrations through fire-resistance rated floor slabs, ceilings, and roofs.
  - .6 Perimeter of retaining angles on rigid ducts greater than 0.012 m<sup>2</sup>, firestopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
  - .7 Where indicated on drawings.
  - .8 At non-rated assemblies that require a smoke seal.
  - .9 Existing walls requiring a fire rating or where their fire rating has been compromised.
  - .10 Where required by the National Building Code and Ontario Building Code.

END OF SECTION

- 
- 1 General
- 1.1 **SECTION INCLUDES**
- .1 Labour, Products, equipment and services necessary for sealant work in accordance with the Contract Documents.
  - .2 Work of this Section does not include sealants in firestopping and smoke sealed assemblies.
  - .3 Work of this Section does not include sealant work identified in individual specification sections.
- 1.2 **REFERENCES**
- .1 ASTM C834, Specification for Latex Sealants.
  - .2 ASTM C920, Specification for Elastomeric Joint Sealants.
  - .3 ASTM C1330, Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
- 1.3 **SUBMITTALS**
- .1 Product data: Submit Product data in accordance with the Conditions of the Contract describing type, composition and recommendations or directions for surface preparation, material preparation and material installation.
  - .2 Samples:
    - .1 Submit following samples in accordance with the Conditions of the Contract:
      - .1 Two samples of sealant/caulking, for colour selection.
      - .2 Two samples of back-up material and primer for physical characteristics.
  - .3 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.
- 1.4 **QUALITY ASSURANCE**
- .1 Qualifications: Work of this Section shall be executed by trained applicators approved by sealant manufacturer and having a minimum of 5 years proven experience.
- 1.5 **SITE CONDITIONS**
- .1 Do not install materials when ambient air temperature is less than 5 °C, when recesses are wet or damp, or to manufacturer's recommendations.

## 1.6 DELIVERY, STORAGE AND HANDLING

- .1 Arrange delivery of materials in original, unopened packages with labels intact, including batch number, and ensure that on-site storage is kept to a minimum. Do not store materials on site where there exists any danger of damage from moisture, direct sunlight, freezing and other contaminants.

## 1.7 EXTENDED WARRANTY

- .1 Submit an extended warranty for sealant work in accordance with General Conditions, except that warranty period is extended to 2 years from date of Ready-for-Takeover.
  - .1 Warrant against leakage, cracking, crumbling, melting, shrinkage, running, loss of adhesion and staining adjacent surfaces.
  - .2 Coverage: Complete replacement including affected adjacent work.

## 2 Products

### 2.1 MATERIALS

- .1 General:
  - .1 All materials under work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.
  - .2 Use materials as received from manufacturers, without additives or adulterations. Use one manufacturer's Product for each kind of Product specified.
- .2 Sealant **Type A**: ASTM C920, Type S, Grade NS; One-part mildew-resistant silicone, in standard colours selected.
  - .1 'Dowsil 786 Mildew Resistant Silicone Sealant' by Dow Consumer Solutions.
  - .2 'Sikasil GP Mildew Resistant' by Sika.
  - .3 'Tremsil 200 Silicone Sealant' by Tremco Ltd.
- .3 Sealant **Type B**: ASTM C834; Pure acrylic siliconized sealant; in standard white colour (paintable).
  - .1 '950A Siliconized Acrylic Latex Caulk' by Sherwin Williams.
  - .2 'Tremflex 834 Siliconized Sealant' by Tremco Ltd.
- .4 Sealant **Type C**: Acoustic sealant (non-rated), non-hardening acoustic sealant for use at non-rated assemblies, ASTM C834; Lightweight, acrylic, mould resistant sealant, paintable. 'Lightweight Smoke and Acoustic Sealant CS-S SA Light' by Hilti or approved alternative.

## 2.2 ACCESSORIES

- .1 Primers: Type recommended by material manufacturers for various substrates, primers to prevent staining of adjacent surfaces encountered on project.
- .2 Joint backing: ASTM C1330; Round, solid section, closed cell, skinned surface, soft polyethylene foam gasket stock, compatible with primer and sealant materials, 30 to 50% oversized, Shore A hardness of 20, tensile strength 140 to 200 kPa. Bond breaker type surface.
- .3 Bond breaker: Type recommended by material manufacturers.
- .4 Void filler around the window frames to be one part expanding polyurethane foam.
- .5 Cleaning agents: As recommended by material manufacturer, non-staining, harmless to substrates and adjacent finished surfaces.

## 2.3 MIXING

- .1 Follow manufacturers instructions on mixing, shelf and pot life.

## 3 Execution

### 3.1 EXAMINATION

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

### 3.2 PREPARATION

- .1 Protect adjacent exposed surfaces to prevent smearing, staining or other damage, by masking or other means, prior to performing work. Make good any damage caused by sealant application. Remove protection upon completion and clean adjacent, exposed surfaces of any compound deposited upon such surfaces.
- .2 Prepare joints to receive sealants to manufacturer's instructions. Ensure that joints are clean and dry and ferrous surfaces are free from rust and oil.
- .3 Clean recesses to receive sealant, to be free of dirt, dust, loose material, oil, grease, form release agents and other substances detrimental to sealant's performance.
  - .1 Remove lacquer or other protective coatings from metal surfaces, without damaging metal finish, using oil-free solvents. Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sand blasting.
  - .2 Ensure recess is dry.

- .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings. Remove incompatible coatings as required.
- .4 Ensure that all materials in contact with sealant are compatible. Test substrate for adhesion.
- .5 All sealant profiles and joint widths are to be in accordance with manufacturer's requirements to accommodate anticipated movements. Unless otherwise specified, minimum joint widths are to range from 18-25 mm.
- .6 Install polyethylene backing rod in joints 6 mm or more in width. Roll backing rod into joint. Do not stretch or bend backing rod. Install bond breaker to back of recess.
- .7 Prime sides of recess, in accordance with sealant manufacturer's instructions.
- .8 Prime all surfaces to ensure proper bond to tile, to eliminate potential staining of porous surfaces, and as required by sealant manufacturer.
- .9 Condition products for use in accordance with manufacturer's recommendations.

### 3.3

#### **INSTALLATION**

- .1 Apply sealant immediately after adjoining work is in condition to receive such work. Apply sealant in continuous bead using gun with correctly sized nozzle. Use sufficient pressure to evenly fill joint.
- .2 Ensure sealant has full uniform contact with, and adhesion to, side surfaces of recess. Superficial painting with skin bead is not acceptable. Tool sealant to smooth surface, free from ridges, wrinkles, sags, air pockets, embedded impurities, dirt, stains or other defects.
  - .1 At recesses in angular surfaces, finish sealant with flat profile, flush with face of material at each side.
  - .2 At recesses in flush surfaces, finish compound with concave face, flush with face of material at each side.
- .3 Make sealant bead uniform in colour.
- .4 Cure sealants in accordance with sealant manufacturer's instructions. Do not cover up sealants until proper curing has taken place.
- .5 Immediately remove excess compound or droppings which would set up or become difficult to remove from adjacent finished surfaces, using recommended cleaners, as work progresses. Do not use scrapers, chemicals or other tools which could damage finished surfaces. Remove defective sealant.
- .6 Clean recesses and re-apply sealant.

- .7 Remove masking tape immediately after joints have been sealed and tooled.

### 3.4 **CLEANING**

- .1 Clean surfaces adjacent to joints, remove sealant smears or other soiling resulting from application of sealants. At metal surfaces, remove residue. Do not mar or damage finishes on materials adjacent to joints. Repair or replace marred or damaged materials.

### 3.5 **SCHEDULE OF LOCATIONS**

- .1 Following sealant location schedule is included for convenience and may not be complete. Examine Contract Drawings and other specification sections and determine entire extent of work of this Section. Generally seal following locations:
  - .1 Concrete, masonry, wood and stone to metal.
  - .2 Wood to masonry, concrete and stone.
  - .3 Metal to metal.
  - .4 All dissimilar materials.
  - .5 Where 'sealant' or 'caulking' is indicated on drawings.
- .2 Sealant **Type A:**
  - .1 Control joints in vertical tiled areas.
  - .2 Between vanity and tile.
  - .3 Between vanity and mechanical fixtures/fittings.
  - .4 Between access panels and tile.
  - .5 Between tiles and adjacent materials.
  - .6 Between all other mechanical/plumbing fixtures and adjacent finishes.
- .3 Sealant **Type B:**
  - .1 Perimeter of millwork counters.
  - .2 Perimeter of interior windows and frames.
  - .3 Junction between drywall and masonry.
- .4 Sealant **Type C:** For sound-rated partitions requiring non-rated acoustic sealant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for metal door and frame work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .2 ASTM A924/A924M, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .3 ASTM E90, Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- .4 CAN4/ULC-S104M, Standard Method for Fire Test of Door Assemblies.
- .5 CAN4/ULC-S105M, Standard Specification for Fire Door Frames, Meeting the Performance Required by CAN4/ULC-S104M.
- .6 CAN/CGSB-1.198, Cementitious Primer, (for Galvanized Surfaces).
- .7 CAN/ULC-S702, Thermal Insulation, Mineral Fibre for Buildings.
- .8 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
- .9 CSA W59-M, Welded Steel Construction (Metal Arc Welding).
- .10 CSDMA, Canadian Steel Door Manufacturers Association.
- .11 NFPA 80, Standard for Fire Doors and Other Opening Protectives.

1.3 **SUBMITTALS**

- .1 Product data: Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating door and frame construction.
- .2 Shop drawings:
  - .1 Submit shop drawings in accordance with the Conditions of the Contract for each type of door and frame indicating:
    - .1 Thickness and type of steel.
    - .2 Thickness and type of core.
    - .3 Thickness and type of steel stiffeners and location of them within the door.

- .4 Thickness and type of metal facing on edges of door and method of fastening.
- .5 Location of mortises, reinforcement, anchorages, joining, welding, sleeving, exposed fasteners, openings and arrangement for hardware.
- .2 Include schedule identifying each unit with door marks and numbers relating to numbering on Contract Drawings and in door schedule. Indicate doors and frames to be fire rated.

#### 1.4 QUALITY ASSURANCE

- .1 Perform work in accordance with requirements of the Canadian Steel Door Manufacturer's Association (CSDMA).
- .2 Label and list fire rated doors and frames by an organization acceptable to authorities having jurisdiction and accredited by the Standards Council of Canada in conformance with CAN4/ULC-S104M and CAN4/ULC-S105M for ratings indicated, Labelling shall be in accordance with NFPA 80.

#### 2 Products

##### 2.1 ACCEPTABLE MANUFACTURERS

- .1 Daybar Industries Limited
- .2 Fleming Doors Products.
- .3 Steelcraft.
- .4 Vision Hollow Metal Limited.

##### 2.2 MATERIALS

- .1 General: All materials under work of this Section, including but not limited to, primers are to have low VOC content limits.
- .2 Steel: ASTM A924/A924M, Class 1; Commercial grade steel, hot dip galvanized to ASTM A653/A653M, ZF120 galvanized coating.
- .3 Minimum base steel thickness:
  - .1 Frames 1.6 mm
  - .2 Typical doors 1.2 mm
  - .3 Acoustic doors 1.6 mm
  - .4 Interior stiffeners 0.9 mm
  - .5 Lock/strike reinforcements 1.6 mm
  - .6 Hinge reinforcements 2.7 mm
  - .7 All other reinforcement 1.6 mm
  - .8 Top and bottom channels 1.2 mm



- .9 Glazing stops 0.9 mm
- .10 Guard boxes 0.9 mm
- .11 Jamb spreaders 0.9 mm.
- .4 Primer: CAN/CGSB 1.198.
- .5 Core material:
  - .1 Interior doors: Mineral fibre insulation with a minimum face density of 24 kg/m<sup>3</sup>.
  - .2 Sound rated doors: Mineral fibre insulation with a minimum face density of 24 kg/m<sup>3</sup>.
  - .3 Fire rated doors: Mineral fibre insulation to CAN/ULC S702, Type 1A; 24 kg/m<sup>3</sup>.
- .6 Screws: Stainless steel screws with countersunk flat head.
- .7 Door silencers: Type 6-180, black neoprene.
- .8 Frame anchors:
  - .1 Frames in masonry: 1.2 mm minimum, adjustable T-strap jamb anchors.
  - .2 Frames in steel stud partitions: 0.9 mm minimum steel anchors of suitable design securely welded inside each jamb.
  - .3 Frames in existing walls: 0.9 mm minimum frame anchors to suit design.
  - .4 Labeled frames: In accordance with ULC requirements.
- .9 Floor anchors: 1.6 mm minimum adjustable floor clip angles with 2 holes for anchorage to floor.
- .10 Labels for fire doors and door frame: Brass plate, riveted to door and door frame.
- .11 Grilles: Corrosion resistant steel with baked enamel finish. Model 61DG Series by Nailor Industries Inc or approved alternative by Hart and Cooley.
- .12 Glass and glazing: In accordance with Section 08 80 00.
- .13 Acoustic gaskets: In accordance with Section 08 71 00.

## 2.3 FABRICATION

- .1 General
  - .1 Fabricate doors and frames in accordance with reviewed shop drawings.
  - .2 Welding: CSA W59-M to produce a finished unit with no visible seams or joints, square, true and free of distortion.
  - .3 Welding: Continuous unless specified otherwise. Execute welding by a firm fully acceptable to the Canadian Welding Bureau to requirements of CSA W47.1.
  - .4 Form profiles accurately to details shown on Contract Drawings.
  - .5 Ream and remove burrs from drilled and punched holes.

- .6 Grind welded corners and joints to a flat plane and fill with metallic filler and sand to a uniform smooth finish. Apply one coat of primer.
- .2 Frames and screens:
  - .1 Fabricate frames of welded construction. Cut mitres and joints accurately and weld continuously on inside of frame profile.
  - .2 Construct large frame sections with provision for on Site assembly to suit Site conditions.
  - .3 Blank, reinforce, drill and tap frames for mortised, templated hardware. Protect mortised cut-outs with guard boxes.
  - .4 Reinforce frames where required for surface mounted hardware.
  - .5 Reinforce frames over 1200 mm wide with roll formed steel channels or hollow structural sections specified in Section 05 50 00 and as indicated on drawings.
  - .6 Prepare each door opening for single stud rubber door silencers, 3 for single door openings located in strike jamb, and 2 for double door openings located in head.
  - .7 Install 2 channel or angle spreaders per frame, to ensure correct frame alignment. Install stiffener plates or spreaders between frame trim where required, to prevent bending of trim and to maintain alignment when setting in place.
  - .8 Form channel glazing stops minimum 16 mm height, accurately cut, mitred, fitted and fastened to frame sections with stainless steel counter-sunk, flat head screws spaced at maximum 450 mm throughout and 50 mm from each end.
  - .9 Provide the following requirements for electrified frame applications:
    - .1 Low voltage wire conduit for required electrified hardware devices.
    - .2 Junction boxes for all frame mounted electrified hardware devices, complete with required connectors to in frame low voltage wire conduit.
- .3 Anchorage:
  - .1 Anchor units to floor and wall construction. Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb, minimum number of anchors for each jamb:
    - .1 Frames up to 2285 mm 3 anchors.
    - .2 Frames from 2285 mm to 2440 mm 4 anchors.
  - .2 Where frames are to be set in masonry or concrete, supply adjustable anchors to trade installing frame.
  - .3 Fabricate frames for installation in steel stud partitions with steel anchors of suitable design, minimum number of anchors for each jamb:
    - .1 Frames up to 2285 mm height 4 anchors.
    - .2 Frames 2285 mm to 2440 mm 5 anchors.
  - .4 Frames in previously placed concrete, masonry, precast or structural steel: Anchors located at 150 mm maximum from top and bottom of each jamb, and intermediate anchors at maximum 660 mm o.c.

- .4 General door requirements:
  - .1 Hollow steel construction, flush swing type, of sizes to conform to details, schedules and reviewed shop drawings with provisions for cut-outs for glass and grilles and reinforced to receive hardware fastenings.
  - .2 Blank, reinforce, drill and tap doors for mortised, templated hardware. Where required, reinforce doors for surface mounted hardware and door closers.
  - .3 Reinforce oversized doors with steel channels and plates specified in Section 05 50 00 and as indicated on drawings.
  - .4 Where openings are required, form integral cut-outs with framing, glass stop moldings and division bars.
  - .5 Install grilles to fit tight and secure into openings.
  - .6 Bevel both stiles of single doors 1 in 16.
  - .7 Reinforce doors with galvanized metal stiffeners at 150 mm o.c.
  - .8 Provide the following requirements for electrified door applications:
    - .1 In door low voltage wire raceways.
    - .2 Steel astragals for hollow metal doors.
    - .3 Reinforcement for all door mounted electrified hardware devices as required and as indicated on Contract Drawings.
- .5 Interior doors:
  - .1 Supply and install inverted, recessed, mechanically interlocked with tack welded channels at top and bottom of doors.
  - .2 Fabricate doors with joints between front and back panels meeting on stile edges. Make joints mechanically interlocked and tack welded for entire height of door. After welding has been completed, grind joints smooth to match metal. Ensure that no filler is used in joints.
  - .3 Fill hollow space within door and vertical stiffeners from top to bottom with mineral fibre batt insulation.
- .6 Fire rated doors:
  - .1 Supply and install inverted, recessed, spot welded channels at top and bottom of doors. Supply and install steel flush top caps on exterior doors.
  - .2 Fabricate doors with joints between front and back panels meeting on stile edges. Make joints mechanically interlocked and tack welded for entire height of door. After welding has been completed, grind joints smooth to match metal. Ensure that no filler is used in joints.
  - .3 Fabricate doors to achieve fire rating as indicated on drawings and in accordance with ULC. Provide ULC label plate on door at hinged edge midway between top hinge and head of door.
- .7 Sound rated doors:
  - .1 Supply and install inverted, recessed, spot welded channels at top and bottom of doors. Provide 1.6 mm continuous flush steel non-removable end caps, welded in place.
  - .2 Mortise, reinforce, drill and tap doors to receive sound seals.
  - .3 Fabricate doors with joints between front and back panels meeting on stile edges. Make joints mechanically interlocked, adhesive assisted with edge seams.

- .4 Fabricate doors to achieve STC ratings as indicated on drawings and in accordance with ASTM E90.
- .5 Fill hollow space within door and vertical stiffeners from top to bottom with mineral fibre insulation.
- .6 Acoustic gaskets for noted sound rated doors to be provided by Section 08 71 00.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **HOLLOW METAL DOOR, FRAME AND SCREEN INSTALLATION**

- .1 Install hollow metal doors, frames and screens in accordance with reviewed shop drawings, manufacturer's written instructions and to meet CSDMA requirements.
- .2 Install hollow metal doors, frames and screens plumb, square, level, secure, and at correct elevation.
- .3 Install doors clear of floor finishes, and with the correct rebate opening for the door installation. Install door silencers.
- .4 Secure anchorages and connections to adjacent construction. Brace frames rigidly in position while building-in. Remove temporary steel shipping jamb spreaders. Install wood spreaders at third points of frame rebate height to maintain frame width. Supply and install vertical supports as indicated on drawings for openings over 1200 mm in width. Remove wood spreaders after frames have been built-in.
- .5 Allow for structural deflection and prevent structural loads from being transmitted to hollow metal frames.
- .6 Touch-up areas where galvanized coating has been removed or damaged with primer.
- .7 Fire rated doors: Install fire rated doors and frames in accordance with requirements of NFPA 80.
- .8 Sound rated doors:
  - .1 Install sound rated doors and gasketing in accordance with manufacturer's written instructions and to achieve STC ratings as scheduled.
  - .2 Adjust head and jamb gasketing to make proper contact against door around the entire perimeter. Adjust door bottom to make proper contact against floor across the full width of the door.

- .3 Proper contact is defined as follows: properly adjusted gasket shall be under slight compression when door is closed. Degree of compression must be even throughout full length of seal on all sides. Door must close fully without assistance.

### 3.3 **ADJUSTING AND CLEANING**

- .1 Adjust doors for smooth and balanced door movement.
- .2 Clean doors, frames and screens.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Design, labour, Products, equipment and services necessary for interior glazed aluminum door and partition work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 AAMA 611, Voluntary Standards for Anodized Architectural Aluminum.
- .2 AAMA CW-10, Care and Handling of Architectural Aluminum from Shop to Site.
- .3 ANSI, H35.1M Alloy and Temper Designation Systems for Aluminum (Metric).
- .4 ASTM A653/A653M, Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .5 ASTM B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .6 ASTM B221M, Specification for Aluminum-Alloy Extruded Bars, Rods, Wires, Shapes and Tubes.
- .7 ASTM E90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- .8 ASTM F738M, Specification for Stainless Steel Metric Bolts, Screws, and Studs.

1.3 **DESIGN REQUIREMENTS**

- .1 Design partition system to be 89 mm wide, with flush joints, system components, door frames, glazed aluminum doors, glazed openings, and all trim components.
- .2 Design partition system to provide a minimum STC of 30 when tested in accordance with ASTM E90.
- .3 Design partition system to be complete with clear silicone joints between glass panels, installed free of debris.
- .4 All joints and beads shall be created with neat consistent lines.

#### 1.4 SUBMITTALS

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
    - .2 Product transportation, storage, handling and installation requirements.
- .2 Shop drawings:
  - .1 Submit shop drawings in accordance with the Conditions of the Contract indicating:
    - .1 Location, construction, adjacent construction, elevations, sections, panel sizes, interior structure and/or reinforcement, door and glazing modules, frame details, trim, connection to ceiling grid system, details, anchorages, dimensions, thickness, joints, and finishes.
    - .2 Supply templates and required information to enable accurate sizes and locations of cut-outs for hardware.
- .3 Samples:
  - .1 Submit following samples in accordance with the Conditions of the Contract.
    - .1 One 300 mm long sample of door frames, glazing framing and trim.
    - .2 One of each component used in the partition system i.e. ceiling fixing device and other component parts.
    - .3 Submit 2 samples of each finish hardware item and include manufacturer's parts lists and installation instructions.
    - .4 Submit hardware component samples illustrating style, colour and finish. Tag samples identifying applicable Specification article number, brand name and number, finish, building location, date and catalogue number.
    - .5 Do not order hardware until samples have been accepted. Submit new samples to replace rejected samples. Supply hardware and finishes identical to each accepted sample.
- .4 Close-out submittals:
  - .1 Submit maintenance instructions for incorporated into the Operations and Maintenance Manual as part of the Conditions of the Contract.
  - .2 Maintenance instructions shall specify warnings of any maintenance practice or materials that may damage or disfigure the work of this Section of the Work.

1.5 **QUALITY ASSURANCE**

- .1 Installers qualifications: Perform work of this Section by a company that has a minimum of five years proven experience in the installation of framing and screen systems of a similar size and nature and that is approved by manufacturer. Submit to Consultant, installer's current certificate of approval by the material manufacturer as proof of compliance.

1.6 **SITE CONDITIONS**

- .1 Do not begin work of this Section until:
  - .1 Floor and ceiling finishes are complete.
  - .2 Substrate and ambient temperature is above 15°C.
  - .3 Relative humidity is below 80 %.
- .2 Deliver hardware to Site packaged, labelled and cross-referenced to hardware list for each item and it's scheduled installation location.
- .3 Install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements 48 h before, during, and 48 h after installation.

1.7 **DELIVERY, STORAGE, AND HANDLING**

- .1 Handle aluminum in accordance with AAMA CW-10.
- .2 Protect aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather. Do not remove before final cleaning of building.

2 **Products**

2.1 **ACCEPTABLE PRODUCT(S) AND MANUFACTURER(S)**

- .1 'SRT In-Line Glazing Wall System' by PC350 or approved alternative.

2.2 **MATERIALS**

- .1 General:
  - .1 Select hardware in accordance with applicable codes and regulations.
  - .2 Replace and pay for defective hardware including hardware which was incorrectly selected, and remedial and installation costs.
  - .3 Ensure that hardware selected will function correctly, meets Contract requirements and Ontario Building Code and authorities having jurisdiction.
- .2 Galvanized steel sheet: ASTM A653/A653-M, Z275; cold rolled, galvanized steel sheet.



- .3 Aluminum extrusions: ASTM B221 and ANSI H35.1 AA6063 alloy, T5 temper.
- .4 Aluminum sheet: ASTM B209 and ANSI H35.1 AA1100 aluminum alloy, H14 temper, minimum 3.0 mm thick.
- .5 Sliding doors and door hardware:
  - .1 Low profile extruded aluminum frame with glazing as scheduled in Section 08 80 00.
  - .2 Door hardware:
    - .1 Provide manufacturer's standard heavy duty hardware as required for complete work of this Section and as specified herein.
    - .2 Hardware to provide smooth, gentle soft close glide and come with braking mechanism and seal, in size shown on drawings.
    - .3 Provide manufacturer's standard door pull in colour to match frame.
- .6 Glazing frames: Extruded aluminum, complete with snap-on glazing stops and neoprene gaskets for setting glass.
- .7 Glazing, sealants and glazing materials: In accordance with Section 08 80 00.
- .8 Trim: Aluminum, finish to match frames.
- .9 Fasteners: ASTM F738M; Stainless Steel Type 304.

### 2.3 FINISHES

- .1 Aluminum finish: Clear anodized to AAMA 611 per Aluminum Association Designation System for Aluminum Finishes AA-M12C22A41.

## 3 Execution

### 3.1 EXAMINATION

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

### 3.2 INSTALLATION

- .1 Install interior aluminum door, frame, and screen systems in accordance with reviewed Shop Drawings and manufacturer's written instructions.
- .2 Install partition system on top of floor finish and accurately fitting to suspended ceiling.
- .3 Erect partitions plumb, square, straight, rigid, and with horizontal lines level. Accurately fit and fasten to abutting surfaces.

- .4 Provide reinforcement and bracing wherever necessary to ensure lateral stability.
- .5 Install continuous light/sound seal at junction between partition system and ceilings, floors, and adjacent abutting surfaces.
- .6 Glaze partition and door systems in accordance with Section 08 80 00.
- .7 Door hardware:
  - .1 Install door hardware to reviewed shop drawings, manufacturers' written instructions, applicable codes and regulations.
  - .2 Clean and adjust hardware for correct performance.
  - .3 Adjust operable parts for correct function.
- .8 Install ceiling trims, base moulding, corners, and other trim to provide a complete system.
- .9 The complete installation shall be free of exposed screws or other fasteners, with surfaces free of tool marks, scratches or any other marred surface detrimental to appearance.

### 3.3 **CLEANING**

- .1 Upon completion of work of this section, remove strippable coatings, clean surfaces, and adjust doors for proper operation.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Design, labour, Products, tool, equipment and services necessary for structural silicone glazed interior screen/guard system work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels - Series: Components, Coatings and Finishes.
- .2 AAMA CW-10, Care and Handling of Architectural Aluminum from Shop to Site.
- .3 ANSI H35.1M, Alloy and Temper Designation Systems for Aluminum (Metric).
- .4 ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
- .5 ASTM B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .6 ASTM B221M, Specification for Aluminum-Alloy Extruded Bars, Rods, Wires, Profiles and Tubes.
- .7 ASTM F738M, Specification for Stainless Steel Metric Bolts, Screws, and Studs.
- .8 CSA-A500, Building Guards.
- .9 CSA S157/S157.1, Strength Design in Aluminum.

1.3 **DESIGN REQUIREMENTS**

- .1 Prevent deflection and permanent or progressive glazing displacement. Restrict horizontal and vertical mullion deflection to less than  $L/175$  and 19 mm maximum for heights under 4115 mm and  $L/240$  and 25 mm maximum for heights over 4115 mm.
- .2 Design glass guard system to CSA-A500, CAN/CGSB-12.20-M and CSA-S157/S157.1. Design units to accommodate live, dead, lateral, seismic, handling, transportation, and erection loads.
- .3 Design glazed guard system incorporating a full top protection/cap rail along the top edge of the glass, secured in place.
- .4 Design anchorage inserts for installation as part of other Sections of Work. Design anchorage assemblies with a minimum safety factor of 2.0.

- .5 Provide all reinforcing within aluminum members as required by design and OBC to provide structurally sound assembly. In any case, mullion size shall not be increased due to provision of reinforcing.

#### 1.4 SUBMITTALS

- .1 Shop Drawings:
  - .1 Submit Shop Drawings in accordance with the Conditions of the Contract indicating:
    - .1 Plans, sections, details, type of extrusions, profiles, thicknesses, seals, finishes, closures, fillers, and end caps, and sealants.
    - .2 Products and glazing types.
    - .3 Anchorage inserts, system installation tolerances.
    - .4 Reinforcement, anchorage, assembly fixings.
    - .5 Detailing, locations, and allowances for movement, expansion, contraction.
- .2 Samples:
  - .1 Submit two samples of following in accordance with the Conditions of the Contract.
    - .1 250 mm long samples of extrusion, finish and colour.
- .3 Reports/certificates:
  - .1 Submit documentation to substantiate ten years of experience in glazed screen/guard manufacture and installation.
  - .2 Submit written manufacturer's certificate certifying compliance with the specifications.
- .4 Close-out submittals: Submit data for incorporated into the Operations and Maintenance Manual as part of the Conditions of the Contract.
- .5 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

#### 1.5 QUALITY ASSURANCE

- .1 Retain a licensed Professional Engineer, registered in Province of Ontario, to perform following services for interior structural silicone glazed screen and guard work:
  - .1 Design of glazed aluminum screen and guard system.
  - .2 Review, stamp, and sign Shop Drawings.
  - .3 Conduct on-Site inspections and prepare and submit inspection reports.

1.6 **DELIVERY, STORAGE, AND HANDLING**

- .1 Handle glazed screen/guard work in accordance with AAMA CW-10.
- .2 Protect surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather. Do not remove before final cleaning of building.

1.7 **EXTENDED WARRANTY**

- .1 Submit an extended warranty for glazed screen/guard work in accordance with General Conditions, except that warranty period is extended to 3 years from date of Ready-for-Takeover.
  - .1 Warrant against failure to meet the design criteria and requirements and finish degradation.
  - .2 Coverage: Complete replacement including affected adjacent work.

2 **Products**

2.1 **ACCEPTABLE MANUFACTURER(S) AND SYSTEM(S)**

- .1 Structural glazed interior aluminum screen/guard system:
  - .1 'ThermaWall 2600 Series' by Alumicor Limited.
  - .2 Or approved alternative by Kawneer or Oldcastle Building Envelope.

2.2 **MATERIALS**

- .1 General: All materials under work of this Section, including but not limited to, sealants and coatings are to have low VOC content limits.
- .2 Aluminum extrusions and channels: ASTM B221 and ANSI H35.1 AA6063 alloy, T6 temper. Profile and dimensions: Refer to Contract Drawings.
- .3 Aluminum sheet: ASTM B209 and ANSI H35.1 AA1100 aluminum alloy, H14 temper, minimum 1.29 mm for sheets less than 610 mm wide and minimum 2.05 mm for sheets of a greater dimension.
- .4 Reinforcements and anchors: ASTM A167, Type 316. Size as shown.
- .5 Glass, glazing and structural silicone glazing materials: In accordance with Section 08 80 00.
- .6 Frame sealant: Type as recommended by the glazed screen work manufacturer. Colour of sealant to be white to match framing/PT-1 wall paint.

- .7 Anchors, clips, and angles: Stainless steel.
- .8 Closures and trim: 1 mm minimum aluminum sheet, finish to glazed screen/guard.
- .9 Screws, bolts and other fasteners: ASTM F738M; Stainless Steel Type 316.

### 2.3 **FABRICATION**

- .1 Fabricate sections true to detail, free from defects impairing appearance, strength and durability. Fabricate extrusions with sharp, well defined corners.
- .2 Fabricate, fit, and secure framing joints and corners accurately, with flush surfaces, and hairline joints.
- .3 Conceal anchors, reinforcement and attachments from view. Fabricate reinforcement in accordance with design requirements.
- .4 Do not expose manufacturer's identification labels on glazed partition assemblies.
- .5 Fabricate cap, filler and closure pieces as necessary for a complete installation.
- .6 Fabricate glazed screen/guard work closures and trim from aluminum sheet.

### 2.4 **FINISH**

- .1 Extrusion finish: 'Duranar (XL)' by PPG in accordance with AAMA 2605. Colour: To match white colour of PT-1 wall paint.

## 3 Execution

### 3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

### 3.2 **INSTALLATION**

- .1 Install structural silicone glazed screen/guard system work in accordance with reviewed Shop Drawings, manufacturer's written instructions and to meet requirements of authorities having jurisdiction.
- .2 Install work of this Section securely, in correct location, level, square, plumb, at proper elevations, free of warp or twist.
- .3 Install caps, closures, and trim pieces.

- .4 Install sills in maximum lengths possible. For sills over 1200 mm in length, maintain 3 mm to 6 mm space at each end.
- .5 Refer to Contract Drawings for glazing type locations. Install glazing in accordance with Section 08 80 00.
- .6 Install glass in guards properly centred with uniform bite and face and edge clearance, free from twist, warp or other distortion likely to develop stress.
- .7 Remove damaged or unacceptable Products and assemblies from Site and replace to Consultant's acceptance.
- .8 Install glass presence markers, in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

### 3.3 ERECTION TOLERANCES

- .1 Tolerances: Non-cumulative.
  - .1 Maximum variation from plumb: 1.5 mm/3 m non-cumulative or 12 mm/30 m, whichever is less.
  - .2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.
  - .3 Vertical and horizontal positions: +/- 3 mm.
  - .4 Racking of face: 6 mm, nil in elevation.
  - .5 Maximum perimeter sealant joint between glazed screens and adjacent construction: 12 mm.

### 3.4 JOINT BACKING AND GLAZED SCREEN/GUARD WORK SEALANT

- .1 Prepare substrate surface and mask as recommended by sealant manufacturer.
- .2 Install joint backing and sealant at glazed screen/guard work and perimeter joints in accordance with sealant manufacturer's instructions. Tool sealant. Remove excess sealant.

### 3.5 CLEANING

- .1 Maintain glazed screen and guard work, inside and outside, in clean condition throughout construction period.
- .2 Remove labels, protective material, and glass presence markers from prefinished surfaces.
- .3 Wash glazed screen and guard work with solution of mild detergent in warm water, with particular attention to recesses and corners. Wipe surfaces clean and dry.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for coiling counter door work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .2 ASTM B211M, Specification for Aluminum and Aluminum-Alloy Bars, Rods and Wires.
- .3 CSA C22.1, Canadian Electrical Code, Part 1, Safety Standards for Electrical Installations.

1.3 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations.
    - .2 Product transportation, storage, handling and installation requirements.
- .2 Shop drawings:
  - .1 Submit shop drawings in accordance with the Conditions of the Contract indicating:
    - .1 Elevations, sections, details, materials, operating components, dimensions, gauges, finishes and relationship to adjacent construction.
    - .2 Complete electrical wiring diagrams including electrical schematics and sequence of operation.
    - .3 Indicate each type of coiling counter door, arrangement of hardware, operating mechanism and required clearances.
- .3 Closeout submittals:
  - .1 Submit following for each Product for incorporation into Operations and Maintenance Manuals in accordance with the Conditions of the Contract:
    - .1 Identification: Manufacturing name, type, year, and serial number.
    - .2 Performance criteria and maintenance data.
    - .3 Operating instructions and safety precautions.



#### 1.4 DELIVERY, STORAGE AND HANDLING

- .1 Package or crate, and brace products to prevent distortion in shipment and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings.

#### 2 Products

#### 2.1 MATERIALS

- .1 Aluminum:
  - .1 Aluminum extrusions: ASTM B211; Aluminum Association alloy AA6063-T5
  - .2 Aluminum sheet: ASTM B209; utility sheet.
- .2 Perforated steel panels: Manufacturer's standard perforated steel panel material.
- .3 Electrical work: In accordance with Division 26 - Electrical.

#### 2.2 MANUFACTURED UNITS

- .1 Coiling counter grille doors:
  - .1 Curtain shall consist of 51 mm on center extruded aluminum sections, each framed by continuous double "C" hinges holding 0.91 mm (20 ga.) thick steel perforated panels sized at 44 mm high x 400 mm wide separated by 44 mm high x 1.3 mm thick aluminum slats.
  - .2 Guides:
    - .1 41 mm wide x 70 mm deep vertical extruded aluminum curtain guide sections with nylon brush seal to allow smooth operation, with top stoppers installed on each guide to stop upward movement of curtain in secured position.
    - .2 Guides to be fastened to wall construction and building framing.
  - .3 End plates:
    - .1 Provide steel plates not less than 5 mm thick, with dimensions appropriate to coil size, to support the ends of the barrel assembly with sealed, self-aligning shaft bearings.
    - .2 End plate assembly to be attached to guides.
  - .4 Barrel: 102 mm diameter steel pipe barrel for motorized operation, designed to carry curtain load with a maximum allowable deflection of 2.5 mm per linear meter in width.
  - .5 Bottom bar: 32 mm wide x 76 mm high tubular extruded aluminum section, with interlock switch.
  - .6 Hood: 3-sided aluminum hood shall be 1 mm thick. aluminum equipped with intermediate supports where required, to cover barrel and grille assembly.

- .7 Motorized operation:
  - .1 Pre-installed tubular motor operator in 102 mm diameter x 3 mm wall barrel.
  - .2 Maintenance free motor with thermal protection to prevent overload is equipped with a compact manual override crank. 120V, 60Hz required to power motor.
  - .3 Torque as recommended by manufacturer.
  - .4 Operator shall be capable of 11 rpm. The mechanic limit adjustment will synchronize operator with door in the open and closed positions.
- .8 Electric key switch: Control station shall be two position, open/close, constant pressure type for flush mounting. Standard electrical enclosure and 120V wiring provided by Division 26 - Electrical.
- .9 Finishes:
  - .1 All aluminum shall be clear anodized.
  - .2 Manufacturer's standard powder coat finish for perforated steel panel material, in colour as selected by the Consultant.
- .10 Acceptable Products: 'Slim Roll-Air' by MobilFlex Folding & Rolling Closures Inc. or approved alternative by Amstel, Overhead Door Corporation or Wayne Dalton.

## 2.3 FABRICATION

- .1 Verify dimensions of existing work before commencing fabrications and report discrepancies to Consultant.
- .2 Fabricate work in accordance with reviewed shop drawings.
- .3 Fabricate work free from defects impairing function, appearance, strength and durability.
- .4 Fabricate work with materials, and with component dimensions and gauges, reinforcing, attached anchors and fastenings of adequate strength to prevent warping, buckling, opening of joints and seams, loosening of hardware, distortion, and displacement within limits of intended and specified use.
- .5 Conceal and weld connections wherever possible.
- .6 Fit joints and junctions between components tightly and in true planes.
- .7 Isolate from each other dissimilar metals, and metal from masonry to prevent electrolysis.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **INSTALLATION**

- .1 Install coiling counter doors in accordance with reviewed shop drawings and manufacturer's written instructions.
- .2 Supply information and templates required for installation of work of this Section; and assist or supervise, or both, the setting of anchorage built into the work of others.
- .3 Install hangers, brackets, fastenings, track, operating hardware and fittings, and other specified equipment under manufacturer's supervision and instructions.
- .4 Install controller units and other electrical equipment required for door operation. Power supply to door and wiring shall be provided by Division 26 - Electrical. Comply with requirements of Division 26 - Electrical, CSA C22.1 and Ontario Hydro Electrical Safety Code.
- .5 Attach work to opening frame and building construction as suitable for door operation, and to avoid conflict with the work of others. Do not use fastenings which penetrate through walls.

3.3 **REPAIR**

- .1 Refinish damaged or defective work so that no variation in surface appearance is discernible. Refinish work at site only if approved by Consultant.

3.4 **ADJUSTING**

- .1 Adjust work to provide free-running, tightly closing and properly balanced operation. Ensure that installation is free from warp, twist or other distortion. Lubricate operating hardware.

END OF SECTION

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Related Sections:

1. Division 01 "General Requirements" sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
2. Division 08 Sections:
  - a. "Metal Doors and Frames"
  - b. "Interior Aluminum Doors and Frames"
3. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
4. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. CAN/ULC S104-15 - Standard Method for Fire Tests of Door Assemblies
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. Ontario Building Code

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
  - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
  - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
  - a. Wiring Diagrams: For power, signal, and control wiring and including:
    - 1) Details of interface of electrified door hardware and building safety and security systems.
    - 2) Schematic diagram of systems that interface with electrified door hardware.
    - 3) Point-to-point wiring.
    - 4) Risers.
3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
  - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. Door Hardware Schedule:
  - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
  - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
  - c. Indicate complete designations of each item required for each opening, include:
    - 1) Door Index: door number, heading number, and Architect's hardware set number.
    - 2) Quantity, type, style, function, size, and finish of each hardware item.
    - 3) Name and manufacturer of each item.
    - 4) Fastenings and other pertinent information.
    - 5) Location of each hardware set cross-referenced to indications on Drawings.
    - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
    - 7) Mounting locations for hardware.
    - 8) Door and frame sizes and materials.
    - 9) Degree of door swing and handing.
    - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:

- a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
- b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
- c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
- d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
- e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
- f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
  - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
  - b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
  - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
  - b. Catalog pages for each product.
  - c. Final approved hardware schedule edited to reflect conditions as installed.
  - d. Final keying schedule
  - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
  - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
  - a. Fire door assemblies, in compliance with NFPA 80.
  - b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
  2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
  3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
    - a. For door hardware: DHI certified AHC or DHC.
    - b. Can provide installation and technical data to Architect and other related subcontractors.
    - c. Can inspect and verify components are in working order upon completion of installation.
    - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
  4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- B. Certifications:
1. Fire-Rated Door Openings:
    - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
    - b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
  2. Smoke and Draft Control Door Assemblies:
    - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
    - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
  3. Electrified Door Hardware
    - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
  4. Accessibility Requirements:
    - a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.
- C. Pre-Installation Meetings
1. Keying Conference

- a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
  - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
  - 2) Preliminary key system schematic diagram.
  - 3) Requirements for key control system.
  - 4) Requirements for access control.
  - 5) Address for delivery of keys.
2. Pre-installation Conference
  - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - b. Inspect and discuss preparatory work performed by other trades.
  - c. Inspect and discuss electrical roughing-in for electrified door hardware.
  - d. Review sequence of operation for each type of electrified door hardware.
  - e. Review required testing, inspecting, and certifying procedures.
  - f. Review questions or concerns related to proper installation and adjustment of door hardware.
3. Electrified Hardware Coordination Conference:
  - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

#### 1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.



- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

#### 1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
  - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
  - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
    - a. Mechanical Warranty
      - 1) Locks
        - a) Schlage L Series: 10 years
      - 2) Exit Devices
        - a) Von Duprin: 10 years
      - 3) Closers
        - a) LCN 4000 Series: 30 years
      - 4) Automatic Operators
        - a) 2 years
    - b. Electrical Warranty
      - 1) Locks
        - a) Schlage: 3 years
      - 2) Exit Devices
        - a) Von Duprin: 3 years

#### 1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.

- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

## 2.02 MATERIALS

### A. Fabrication

- 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
- 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
- 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

### B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

- 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

### C. Cable and Connectors:

- 1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
- 2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
- 3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

## 2.03 HINGES

### A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product:
  - a. Ives 5BB series

### B. Requirements:

- 1. Provide hinges conforming to ANSI/BHMA A156.1.
- 2. Provide five knuckle, ball bearing hinges.
- 3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
  - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high

- b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
- 4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
  - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
  - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
- 5. 2 inches or thicker doors:
  - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
  - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
- 6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
- 7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
- 8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
  - a. Steel Hinges: Steel pins
  - b. Non-Ferrous Hinges: Stainless steel pins
  - c. Out-Swinging Exterior Doors: Non-removable pins
  - d. Out-Swinging Interior Lockable Doors: Non-removable pins
  - e. Interior Non-lockable Doors: Non-rising pins
- 9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

## 2.04 ELECTRIC POWER TRANSFER

### A. Manufacturers:

- 1. Scheduled Manufacturer and Product:
  - a. Von Duprin EPT-10

### B. Requirements:

- 1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
- 2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

## 2.05 FLUSH BOLTS

### A. Manufacturers:

- 1. Scheduled Manufacturer:
  - a. Ives

### B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

## 2.06 COORDINATORS

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives

### B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes, or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

## 2.07 MORTISE LOCKS

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Schlage L9000 series

### B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches. Provide motor based electrified and motor based latch retraction locksets that comply with the following requirements:
  - a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.

- b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case
  - c. Low maximum current draw – maximum 0.4 amps (Lever control) and maximum 2.0 amps (Latch retraction) to allow for multiple locks on a single power supply.
  - d. Low holding current (Lever control or latch retraction) – maximum 0.01 amps to produce minimal heat, eliminate “hot levers” in electrically locked applications and motorized latch retraction applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
  - e. Connections – provide quick-connect Molex system standard.
8. (OPTION Key Override) Provide locks with a key override feature built into the chassis that allows the outside key to retract the deadbolt and/or latchbolt, overriding the inside thumbturn when it is being held in the locked position - where the XL13-439 option is specified in the hardware sets.
9. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
- a. (OPTION Vandlgard) Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
  - b. Lever Design: <INSERT LEVER DESIGN>.

## 2.08 EXIT DEVICES

### A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product:
  - a. Von Duprin 98/35A series

### B. Requirements:

- 1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
- 2. Cylinders: Refer to "KEYING" article, herein.
- 3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
- 4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
- 5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
- 6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
- 7. Provide flush end caps for exit devices.
- 8. Provide exit devices with manufacturer's approved strikes.
- 9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
- 10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
- 11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
- 12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.

13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

## 2.09 ELECTRIC STRIKES

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Von Duprin 6000 Series

### B. Requirements:

1. Provide electric strikes designed for use with type of locks shown at each opening.
2. Provide electric strikes UL Listed as burglary resistant that are tested to a minimum endurance test of 1,000,000 cycles.
3. Where required, provide electric strikes UL Listed for fire doors and frames.
4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

## 2.10 Electronic locks

### A. Salto electronic locksets supplied by U of T

## 2.11 POWER SUPPLIES

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Schlage/Von Duprin PS900 Series

### B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
  - a. 12/24 VDC Output, field selectable.
  - b. Class 2 Rated power limited output.
  - c. Universal 120-240 VAC input.
  - d. Low voltage DC, regulated and filtered.
  - e. Polarized connector for distribution boards.
  - f. Fused primary input.

- g. AC input and DC output monitoring circuit w/LED indicators.
- h. Cover mounted AC Input indication.
- i. Tested and certified to meet UL294.
- j. NEMA 1 enclosure.
- k. Hinged cover w/lock down screws.
- l. High voltage protective cover.

## 2.12 CYLINDERS

### A. Manufacturers:

- 1. Scheduled Manufacturer and Product:
  - a. Supplied by the U of T

## 2.13 KEYING

### A. Scheduled System:

- 1. Supplied by U of T

## 2.14 DOOR CLOSERS

### A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product:
  - a. LCN 4040XP series

### B. Requirements:

- 1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
- 2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
- 3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
- 4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
- 5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
- 6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
- 7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
- 8. Pressure Relief Valve (PRV) Technology: Not permitted.
- 9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).

10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
11. Closers shall be capable of being upgraded by adding modular mechanical or electronic components in the field.

## 2.15 DOOR CLOSERS

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. LCN 1460 series

### B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory.
2. Provide door closers with fully hydraulic, full rack and pinion action cast iron cylinder.
3. Closer Body: 1-1/4-inch (32 mm) diameter, with 5/8-inch (16 mm) diameter heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

## 2.16 ELECTRO-MECHANICAL CLOSER/HOLDERS

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. LCN SEM7800 Series

### B. Requirements:

1. Provide single-point or multi-point hold-open electromechanical closer/holders as specified. Coordinate voltage requirements and provide transformer if necessary.
2. Provide closer/holders that function as full rack and pinion door closer when current is interrupted or continuous hold-open is not engaged.
3. Provide door closers with fully hydraulic, full rack and pinion action with high strength cylinder and full complement bearings at shaft.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.



7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

## 2.17 PROTECTION PLATES

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives

### B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

## 2.18 ELECTRO-MECHANICAL AUTOMATIC OPERATORS

- A. Norton 4100 and 7100 series Provide as specified in hardware sets.

## 2.19 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

### A. Manufacturers:

1. Scheduled Manufacturers:
  - a. Glynn-Johnson

### B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

## 2.20 DOOR STOPS AND HOLDERS

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives

### B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.

4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

## 2.21 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

### A. Manufacturers:

### B. Scheduled Manufacturer:

1. Zero International

### C. Seals and Gasketing: Provide continuous gasketing on exterior openings, to the head and jambs, forming a continuous seal between the door and the frame. Provide smoke, light, or sound gasketing on interior doors where indicated.

1. Provide self-tapping fasteners for aluminum extruded gasketing being applied to hollow metal frames.
  - a. Provide non-corrosive fasteners for all exterior applications.
  - b. Provide security fasteners where indicated.
2. Provide neoprene, EPDM, silicone, or nylon brush inserts as specified in hardware sets. Provide non brush inserts of solid or sponge cell, as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

### D. Smoke Labeled Gasketing: At all smoke labeled openings, provide smoke listed perimeter gasketing assemblies complying with NFPA 105 listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for smoke control ratings indicated based on testing according to UL 1784.

### E. Fire Listed Gasketing: Assemblies complying with NFPA 80 that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction for fire ratings indicated based on testing according to UL-10C.

1. Where frame-applied intumescent seals are required by the manufacturer, provide gaskets that comply with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies and UBC 7-2, Fire Tests of Door Assemblies.

### F. Sound-Rated Gasketing: Provide acoustic gasketing to meet Sound Transmission Class (STC) rating required.

### G. Meeting-Stile Gasketing: Provide meeting-stile gasketing that fastens to the meeting stiles forming a continuous seal when doors are closed.

### H. Door Sweeps or Shoes: Apply to the bottom of the door to close the gap between the door bottom and finished floor or saddle threshold.

1. Provide solid neoprene, EPDM, silicone, or nylon brush type of seal as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

### I. Automatic Door Bottoms:

1. Provide closed cell sponge, bulb neoprene, or EPDM type of seal as specified in hardware sets.
2. Door bottom to be mortised, semi mortised, or surface mount as with a minimum thickness as specified in hardware sets.

J. Rain Drips:

1. Provide overhead rain drips for out-swinging hollow metal doors that are not covered against 45 degree blowing rain. Aluminum extrusion to be a minimum of .088 inches thick and extend 2.50 inches from the face of the frame, in anodized finish to match door.
2. Door sweeps or shoes with integral rain drip must meet ADA requirements

K. Thresholds: Provide threshold units not less than 4 inches wide, formed to accommodate change in floor elevation where indicated, and fabricated to accommodate door hardware and fit door frames.

1. Threshold extrusion to be a minimum thickness as specified in hardware sets.

## 2.22 MAGNETIC HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
  - a. LCN

B. Requirements:

1. Provide wall or floor mounted electromagnetic door release as specified with minimum of 25 pounds of holding force. Coordinate projection of holder and armature with other hardware and wall conditions to ensure that door sits parallel to wall when fully open. Connect magnetic holders on fire-rated doors into the fire control panel for fail-safe operation.

## 2.23 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Schlage

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

## 2.24 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
  1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
  2. Custom Steel Doors and Frames: HMMA 831.
  3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
  4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
  - 1. Conduit, junction boxes and wire pulls.
  - 2. Connections to and from power supplies to electrified hardware.
  - 3. Connections to fire/smoke alarm system and smoke evacuation system.
  - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
  - 5. Connections to panel interface modules, controllers, and gateways.
  - 6. Testing and labeling wires with Architect's opening number.
- J. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- K. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.
- L. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- M. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- N. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- O. Thresholds:
  - 1. Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
  - 2. Aluminum thresholds to be cut-in, and scribed around mullions, frame members, and stops. Do not butt to thresholds. Provide a continuous surface across full width of opening from jamb to jamb.
  - 3. Where aluminum panic-type (rabbeted) thresholds with neoprene inserts are specified, undercut doors as required to properly mate with seal in threshold.
- P. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- Q. Perimeter Gasketing:

1. Apply to head and jamb, forming seal between door and frame.
  2. Install gasketing in a manner eliminating need to cut any seal to install surface mounted hardware. Install compatible mounting bracket for surface mounted hardware unless minimum 1/4 inch thick solid aluminum seals are provided for mounting of surface applied hardware.
- R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

### 3.03 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
  2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
  3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

### 3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

### 3.05 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

Legend:



↗ Electrified Opening

Door Numbers	HwSet#
021E	01
124K ↗	02
134 ↗	03
135K	04
135S ↗	05
202K ↗	06
202V ↗	07
207A	08
207B	08
207C	08
207D	08
207G	08
207H ↗	09
207J	08
207K	08
207M	08
207N	08
207P	08
207Q	08
207S	08
207T	08
207U	08
207V	08
207X	03.1
208 ↗	11
210A ↗	12
210B	13
212 ↗	09
216A ↗	15
217A ↗	16
217B ↗	16
217OH-1	17
217OH-2	17
218A ↗	16
218B ↗	16
218OH-1	17
218SA	18
218SB ↗	19
219 ↗	11
219A ↗	20
219C ↗	21
219K ↗	25
219OH-1	17

Door Numbers	HwSet#
219OH-2	17
219OH-3	17
220A	14
220B	14
226B	03.1
226C ↗	10
226L ↗	27
226S ↗	27
227W ↗	22
319	18
319A	26
M204S	24



Legend:







-  Link to catalog cut sheet  
 Electrified Opening

Hardware Group No. 01

For use on Door#(s)

021E

Provide each SGL door(s) with the following:




















QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 114X102MM		652	IVE
1	EA	STOREROOM LOCK	L9080L 03B		626	SCH
1	EA	MORTISE CYLINDER	U OF T LOCK SHOP SUPPLIED		626	UNK
1	EA	SURFACE CLOSER	4040XP REG		689	LCN
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	GASKETING	188S-BK (1XW 2XH)		BK	ZER

Hardware Group No. 02 - DOOR OPERATOR

For use on Door#(s)

124K

Provide each PR door(s) with the following:






QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 114X114MM		652	IVE
2	EA	POWER TRANSFER	EPT10 CON		 689	VON
1	EA	ELEC FIRE EXIT HARDWARE	QEL-9849-L-BE-F-03-LBL 24 VDC		 626	VON
1	EA	ELEC FIRE EXIT HARDWARE	QEL-9849-L-BE-F-03-LBLAFL 24 VDC		 626	VON
2	EA	OH STOP	100S ADJ		630	GLY
2	EA	AUTO OPERATOR	4100LE		 689	HOR
			DOUBLE OPERATOR CONTINUOUS HEADER. MOUNT PUSH SIDE			
2	EA	ACTUATOR	CM-60/2		 630	CAM
2	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	GASKETING	188S-BK (1XW 2XH)		BK	ZER
2	EA	MEETING STILE	8192AA X DR HT		AA	ZER
2	EA	WIRE HARNESS	CON-____ (SIZE TO SUIT)			SCH
1	EA	WIRE HARNESS	CON-6W			SCH
1	EA	POWER SUPPLY	PS904 900-4RL KL900 120/240 VAC		 LGR	SCE

Hardware Group No. 03 - SALTO

For use on Door#(s)

134

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 127X114MM		652	IVE
1	EA	SALTO ELECTRONIC LOCK	U OF T SUPPLIED	✈	626	SAL
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	SET	SOUND GASKETING	475AA-S (1XW 2XH)		AA	ZER
1	EA	DOOR BOTTOM(MORTISE)	355AA X DR WIDTH UNDERCUT HM DOOR BOTTOMFOR ENGAGEMENT OF DOOR BOTTOM TO FLOOR MATERIAL		AA	ZER







NOTE: U OF T LOCK SHOP WILL SUPPLY SALTO HARDWARE FOR CONTRACTOR TO INSTALL AND LOCK SHOP WILL DO FINAL COMMISSIONING. TYPICAL

Hardware Group No. 03.1

For use on Door#(s)

207X 226B

Provide each SGL door(s) with the following:








QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 127X114MM		652	IVE
1	EA	CLASSROOM LOCK	L9070L 03B		626	SCH
1	EA	MORTISE CYLINDER	U OF T LOCK SHOP SUPPLIED		626	UNK
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	SET	SOUND GASKETING	475AA-S (1XW 2XH)		AA	ZER
1	EA	DOOR BOTTOM(MORTISE)	355AA X DR WIDTH UNDERCUT HM DOOR BOTTOMFOR ENGAGEMENT OF DOOR BOTTOM TO FLOOR MATERIAL		AA	ZER

Hardware Group No. 04

For use on Door#(s)

135K

Provide each SGL door(s) with the following:










QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 114X114MM		652	IVE
1	EA	PASSAGE SET	L9010 03B		626	SCH
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP EDA ST-3068		689	LCN
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	GASKETING	188S-BK (1XW 2XH)		BK	ZER

Hardware Group No. 05

For use on Door#(s)

135S










Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 114X102MM		652	IVE
1	EA	AUTO FLUSH BOLT	FB31P		630	IVE
1	EA	DUST PROOF STRIKE	DP2		626	IVE
1	EA	CLASSROOM LOCK	L9070L 03B		626	SCH
1	EA	MORTISE CYLINDER	U OF T LOCK SHOP SUPPLIED		626	UNK
1	EA	COORDINATOR	COR X FL		628	IVE
2	EA	SURFACE CLOSER	4040XP REG		689	LCN
2	EA	KICK PLATE	8400 205MM X LDW		630	IVE
2	EA	MAGNET	SEM7850 12V/24V/120V CONNECT TO FIRE PANEL		689	LCN
1	EA	GASKETING	188S-BK (1XW 2XH)		BK	ZER
1	EA	MEETING STILE	383AA X DR HT		AA	ZER

Hardware Group No. 06 - DOOR OPERATOR

For use on Door#(s)  
202K











Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 114X114MM		652	IVE
1	EA	POWER TRANSFER	EPT10 CON		✓ 689	VON
1	EA	ELEC FIRE EXIT HARDWARE	QEL-98-L-BE-F-03-CON 24 VDC		✓ 626	VON
1	EA	AUTO OPERATOR	4100LE		✓ 689	HOR
2	EA	ACTUATOR	CM-60/2		✓ 630	CAM
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	GASKETING	188S-BK (1XW 2XH)		BK	ZER
1	EA	POWER SUPPLY	PS902 900-4RL KL900 120/240 VAC		✓ LGR	SCE

Hardware Group No. 07 - CARD ACCESS/DOOR OPERATOR

For use on Door#(s)  
202V

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 114X114MM NRP		652	IVE
1	EA	POWER TRANSFER	EPT10 CON	 ✓	689	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL-98-L-NL-F-03-CON 24 VDC	 ✓	626	VON
1	EA	RIM CYLINDER	U OF T SUPPLIED		626	UNK
1	EA	AUTO OPERATOR	4100LE	 ✓	689	HOR
2	EA	ACTUATOR	CM-60/2	 ✓	630	CAM
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	GASKETING	188S-BK (1XW 2XH)		BK	ZER
1	EA	WIRE HARNESS	CON-____ (SIZE TO SUIT)	✓		SCH
1	EA	WIRE HARNESS	CON-6W	✓		SCH
1	EA	SALTO CREDENTIAL READER	U OF T SUPPLIED	✓	BLK	SAL
1	EA	DOOR CONTACT	679-05 __ TO SUIT DOOR MATL	 ✓	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-4RL KL900 120/240 VAC	 ✓	LGR	SCE

OPERATIONAL DESCRIPTION:DOOR IS NORMALLY CLOSED AND LOCKED. OUTSIDE TRIM IS ALWAYS LOCKED AGAINST ENTRY.AUTHORIZED CREDENTIAL MOMENTARILY RELEASES ELECTRIC LATCH ALLOWING ENTRY. MECHANICAL KEY ALSO RETRACTS LATCHES ALLOWING ENTRY.OUTER ACTUATOR IS ENABLE/DISABLED BY ACCESS CONTROL TIME CLOCK. RX SWITCH (INTEGRAL TO LOCKING HARDWARE) MONITORS AUTHORIZED EGRESS.DOORCONTACT MONITORS WHEN DOOR OPENS AND CLOSES.FREE EGRESS AT ALL TIMES.WITH LOSS OF POWER DOOR REMAINS LOCKED.

Hardware Group No. 08

For use on Door#(s)

207A	207B	207C	207D	207G	207J
207K	207M	207N	207P	207Q	207S
207T	207U	207V			

Provide each SL door(s) with the following:






QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	HARDWARE	ALL HARDWARE BY DOOR SUPPLIER			UNK

Hardware Group No. 09 - SALTO

For use on Door#(s)

207H 212

Provide each SGL door(s) with the following:





QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 114X102MM		652	IVE
1	EA	SALTO ELECTRONIC LOCK	U OF T SUPPLIED	✈	626	SAL
1	EA	SURFACE CLOSER	1461 REG STD		689	LCN
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	GASKETING	188S-BK (1XW 2XH)		BK	ZER

Hardware Group No. 10 - SALTO

For use on Door#(s)

226C

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 114X102MM		652	IVE
1	EA	SALTO ELECTRONIC LOCK	U OF T SUPPLIED	✈	626	SAL
1	EA	SURFACE CLOSER	1461 REG STD		689	LCN
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE









NOTE: U OF T LOCK SHOP WILL SUPPLY SALTO HARDWARE FOR CONTRACTOR TO INSTALL  
AND LOCK SHOP WILL DO FINAL COMMISSIONING. TYPICAL

Hardware Group No. 11 - SALTO

For use on Door#(s)

208 219

Provide each SGL door(s) with the following:














QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 127X114MM		652	IVE
1	EA	SALTO ELECTRONIC LOCK	U OF T SUPPLIED	✈	626	SAL
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP REG ST-1630		689	LCN
1	EA	TOP JAMB MTG PLATE	4040XP-18TJ SRT		689	LCN
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	SET	SOUND GASKETING	475AA-S (1XW 2XH)		AA	ZER
1	EA	DOOR BOTTOM(MORTISE)	355AA X DR WIDTH UNDERCUT HM DOOR BOTTOMFOR ENGAGEMENT OF DOOR BOTTOM TO FLOOR MATERIAL		AA	ZER

Hardware Group No. 12 - DOOR OPERATOR

For use on Door#(s)

210A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 127X114MM		652	IVE
1	EA	STOREROOM LOCK	L9080L 03B		626	SCH
1	EA	MORTISE CYLINDER	U OF T LOCK SHOP SUPPLIED		626	UNK
1	EA	ELECTRIC STRIKE	6211 FS CON 12/16/24/28 VAC/VDC	 ⚡	630	VON
1	EA	AUTO OPERATOR	7100 MOUNT PUSH SIDE	 ⚡	689	HOR
1	EA	AURA PUSH TO LOCK PUSH TO OPEN COMBO SWITCH	CM-2520/4854SE1	 ⚡		CAM
1	EA	AURA ILLUMINATED ACTUATOR	CM-45/455SE1	⚡	630	CAM
3	EA	EMERGENCY STRIP 3' 0" LONG	NEXGEN(TAPESWITCH) TO READ: "EMERGENCY ALARM - PRESS FOR ASSISTANCE"(BLACK LETTERING ON YELLOW BACKGROUND)	⚡		UNK
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	SET	SOUND GASKETING	475AA-S (1XW 2XH)		AA	ZER
1	EA	DOOR BOTTOM(MORTISE)	355AA X DR WIDTH UNDERCUT HM DOOR BOTTOMFOR ENGAGEMENT OF DOOR BOTTOM TO FLOOR MATERIAL		AA	ZER
1	EA	WIRE HARNESS	CON-6W	⚡		SCH
1	EA	DOOR CONTACT	679-05 __TO SUIT DOOR MATL	 ⚡	BLK	SCE
1	EA	LED OCCUPIED INDICATOR	CM-AF500	 ⚡		CAM
1	EA	ADVANCED LOGIC RELAY	CX-33	 ⚡		CAM
1	EA	EMERG CALL KIT UNIV RESTRMS	CX-WEC10K2	⚡		CAM
1	EA	POWER SUPPLY	PS902 KL900 120/240 VAC	 ⚡	LGR	SCE

NOTE: REFER TO U OF T DRAWING DOC WR-04 FOR MOUNTING LOCATIONS OF TAPESWITCH









OPERATIONAL DESCRIPTION: DOOR NORMALLY CLOSED AND UNLOCKED. ON INGRESS, PRESS OUTSIDE ACTUATOR TO ACTIVATE DOOR OPERATOR OR PUSH/PULL ON LOCKSET LEVER. ONCE DOOR IS CLOSED AND LATCHED OCCUPANT DEPRESSES "PUSH TO LOCK" BUTTON TO SECURE OUTSIDE OF DOOR; DISABLING OUTSIDE ACTUATOR AND ELECTRIC STRIKE. MECHANICAL KEY OVERRIDE PROVIDES ACCESS. IF OCCUPANT IS IN DISTRESS, ACTIVATING THE EMERGENCY CALL SYSTEM DEVICE ACTIVATES AN AUDIBLE AND VISUAL SIGNAL DEVICES INSIDE AND OUTSIDE THE WASHROOM. EGRESS IS FREE AT ALL TIMES BY PRESSING ON INSIDE ACTUATOR TO ACTIVATE OPERATOR OR BY DEPRESSING ON INSIDE LOCKSET LEVER. UPON EGRESS DOOR IS UNLOCKED, OUTSIDE ACTUATOR IS ENABLED AND ELECTRIC STRIKE IS UNSECURE. WITH LOSS OF POWER DOOR REMAINS LOCKED.

Hardware Group No. 13

For use on Door#(s)  
210B






Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 114X102MM		652	IVE
1	EA	PRIVACY W DB & INDICATOR	L9456L 03B L583-363 OS-OCC		626	SCH
1	EA	MORTISE CYLINDER	U OF T LOCK SHOP SUPPLIED		626	UNK
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	SET	SOUND GASKETING	475AA-S (1XW 2XH)		AA	ZER
1	EA	DOOR BOTTOM(MORTISE)	355AA X DR WIDTH UNDERCUT HM DOOR BOTTOMFOR ENGAGEMENT OF DOOR BOTTOM TO FLOOR MATERIAL		AA	ZER

Hardware Group No. 14

For use on Door#(s)  
220A 220B





Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 114X102MM NRP		652	IVE
1	EA	STOREROOM LOCK	L9080L 03B		626	SCH
1	EA	MORTISE CYLINDER	U OF T SUPPLIED - MEDECO CYL		626	MED
1	EA	SURFACE CLOSER	1461 CUSH STD		689	LCN
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	GASKETING	188S-BK (1XW 2XH)		BK	ZER

Hardware Group No. 15 - SALTO

For use on Door#(s)  
216A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 114X102MM NRP		652	IVE
1	EA	SALTO ELECTRONIC LOCK	U OF T SUPPLIED	✍	626	SAL
1	EA	SURFACE CLOSER	1461 CUSH STD		689	LCN
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	GASKETING	188S-BK (1XW 2XH)		BK	ZER

Hardware Group No. 16 - CARD ACCESS/DOOR OPERATOR

For use on Door#(s)

217A 217B 218A 218B

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 127X114MM		652	IVE
1	EA	POWER TRANSFER	EPT10 CON		✓ 689	VON
1	EA	EU ELR MORTISE LOCK	L9692LEU 03B RX CON 12/24 VDC		✓ 626	SCH
1	EA	MORTISE CYLINDER	U OF T LOCK SHOP SUPPLIED		626	UNK
1	EA	AUTO OPERATOR	4100LE MOUNT PULL SIDE		✓ 689	HOR
2	EA	ACTUATOR	CM-60/2		✓ 630	CAM
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	SET	SOUND GASKETING	475AA-S (1XW 2XH)		AA	ZER
1	EA	DOOR BOTTOM(MORTISE)	355AA X DR WIDTH UNDERCUT HM DOOR BOTTOMFOR ENGAGEMENT OF DOOR BOTTOM TO FLOOR MATERIAL		AA	ZER
1	EA	WIRE HARNESS	CON-____ (SIZE TO SUIT)		✓	SCH
1	EA	WIRE HARNESS	CON-6W		✓	SCH
1	EA	SALTO CREDENTIAL READER	U OF T SUPPLIED		✓ BLK	SAL
1	EA	DOOR CONTACT	679-05 __TO SUIT DOOR MATL		✓ BLK	SCE
1	EA	POWER SUPPLY	PS902 900-4RL KL900 120/240 VAC		✓ LGR	SCE

OPERATIONAL DESCRIPTION:DOOR IS NORMALLY CLOSED AND LOCKED. OUTSIDE TRIM IS ALWAYS LOCKED AGAINST ENTRY.AUTHORIZED CREDENTIAL MOMENTARILY RETRACTS LATCHBOLT ALLOWING ENTRY.DOOR OPERATOR ACTIVATED BY USING CREDENTIAL AND PRESSING OUTSIDE ACTUATOR. MECHANICAL KEY ALSO RETRACTS LATCH ALLOWING ENTRY.INSIDE ACTUATOR ALWAYS ACTIVE. RX SWITCH (INTEGRAL TO LOCKING HARDWARE) MONITORS AUTHORIZED EGRESS.DOOR CONTACT MONITORS WHEN DOOR OPENS AND CLOSES.FREE EGRESS AT ALL TIMES WITH LOSS OF POWER DOOR REMAINS LOCKED.

Hardware Group No. 17

For use on Door#(s)

217OH-1 217OH-2 218OH-1 219OH-1 219OH-2 219OH-3

Provide each RU door(s) with the following:







QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	HARDWARE	ALL HARDWARE BY DOOR SUPPLIER			UNK

Hardware Group No. 18

For use on Door#(s)

218SA 319

Provide each SGL door(s) with the following:








QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 114X114MM		652	IVE
1	EA	PASSAGE SET	L9010 03B		626	SCH
1	EA	SURFACE CLOSER	4040XP REG		689	LCN
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	GASKETING	188S-BK (1XW 2XH)		BK	ZER

Hardware Group No. 19 - SALTO

For use on Door#(s)

218SB

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 114X114MM NRP		652	IVE
1	EA	SALTO ELECTRONIC LOCK	U OF T SUPPLIED		626	SAL
1	EA	SURFACE CLOSER	4040XP REG		689	LCN
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	SET	SOUND GASKETING	475AA-S (1XW 2XH)		AA	ZER
1	EA	DOOR BOTTOM(MORTISE)	355AA X DR WIDTH UNDERCUT HM DOOR BOTTOMFOR ENGAGEMENT OF DOOR BOTTOM TO FLOOR MATERIAL		AA	ZER

Hardware Group No. 20 - CARD ACCESS/DOOR OPERATOR

For use on Door#(s)

219A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 127X114MM NRP		652	IVE
1	EA	POWER TRANSFER	EPT10 CON		✓ 689	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-QEL-9875-L-BE-F-03-CON 24 VDC		✓ 626	VON
1	EA	MORTISE CYLINDER	U OF T LOCK SHOP SUPPLIED		626	UNK
1	EA	AUTO OPERATOR	4100LE MOUNT PUSH SIDE		✓ 689	HOR
2	EA	ACTUATOR	CM-60/2		✓ 630	CAM
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	SET	SOUND GASKETING	475AA-S (1XW 2XH)		AA	ZER
1	EA	DOOR BOTTOM(MORTISE)	355AA X DR WIDTH UNDERCUT HM DOOR BOTTOMFOR ENGAGEMENT OF DOOR BOTTOM TO FLOOR MATERIAL		AA	ZER
1	EA	WIRE HARNESS	CON-____ (SIZE TO SUIT)		✓	SCH
1	EA	WIRE HARNESS	CON-6W		✓	SCH
1	EA	SALTO CREDENTIAL READER	U OF T SUPPLIED		✓ BLK	SAL
1	EA	DOOR CONTACT	679-05 __TO SUIT DOOR MATL		✓ BLK	SCE
1	EA	POWER SUPPLY	PS902 900-4RL KL900 120/240 VAC		✓ LGR	SCE












OPERATIONAL DESCRIPTION:DOOR IS NORMALLY CLOSED AND LOCKED. OUTSIDE TRIM IS ALWAYS LOCKED AGAINST ENTRY.AUTHORIZED CREDENTIAL MOMENTARILY RETRACTS LATCHBOLT ALLOWING ENTRY.DOOR OPERATOR ACTIVATED BY USING CREDENTIAL AND PRESSING OUTSIDE ACTUATOR. MECHANICAL KEY ALSO RETRACTS LATCH ALLOWING ENTRY.INSIDE ACTUATOR ALWAYS ACTIVE. RX SWITCH (INTEGRAL TO LOCKING HARDWARE) MONITORS AUTHORIZED EGRESS.DOOR CONTACT MONITORS WHEN DOOR OPENS AND CLOSES.FREE EGRESS AT ALL TIMES WITH LOSS OF POWER DOOR REMAINS LOCKED.

Hardware Group No. 21 - CARD ACCESS/DOOR OPERATOR

For use on Door#(s)

219C

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 127X114MM NRP		652	IVE
1	EA	POWER TRANSFER	EPT10 CON	 ✓	689	VON
1	EA	EU ELR MORTISE LOCK	L9692LEU 03B RX CON 12/24 VDC	 ✓	626	SCH
1	EA	MORTISE CYLINDER	U OF T LOCK SHOP SUPPLIED		626	UNK
1	EA	AUTO OPERATOR	4100LE MOUNT PUSH SIDE	 ✓	689	HOR
2	EA	ACTUATOR	CM-60/2	 ✓	630	CAM
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	SET	SOUND GASKETING	475AA-S (1XW 2XH)		AA	ZER
1	EA	DOOR BOTTOM(MORTISE)	355AA X DR WIDTH UNDERCUT HM DOOR BOTTOMFOR ENGAGEMENT OF DOOR BOTTOM TO FLOOR MATERIAL		AA	ZER
1	EA	WIRE HARNESS	CON-____ (SIZE TO SUIT)	✓		SCH
1	EA	WIRE HARNESS	CON-6W	✓		SCH
1	EA	SALTO CREDENTIAL READER	U OF T SUPPLIED	✓	BLK	SAL
1	EA	DOOR CONTACT	679-05 __TO SUIT DOOR MATL	 ✓	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-4RL KL900 120/240 VAC	 ✓	LGR	SCE














OPERATIONAL DESCRIPTION:DOOR IS NORMALLY CLOSED AND LOCKED. OUTSIDE TRIM IS ALWAYS LOCKED AGAINST ENTRY.AUTHORIZED CREDENTIAL MOMENTARILY RETRACTS LATCHBOLT ALLOWING ENTRY.DOOR OPERATOR ACTIVATED BY USING CREDENTIAL AND PRESSING OUTSIDE ACTUATOR. MECHANICAL KEY ALSO RETRACTS LATCH ALLOWING ENTRY.INSIDE ACTUATOR ALWAYS ACTIVE. RX SWITCH (INTEGRAL TO LOCKING HARDWARE) MONITORS AUTHORIZED EGRESS.DOOR CONTACT MONITORS WHEN DOOR OPENS AND CLOSES.FREE EGRESS AT ALL TIMES WITH LOSS OF POWER DOOR REMAINS LOCKED.

Hardware Group No. 22 - DOOR OPERATOR

For use on Door#(s)

227W

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 127X114MM		652	IVE
1	EA	STOREROOM LOCK	L9080L 03B		626	SCH
1	EA	MORTISE CYLINDER	U OF T LOCK SHOP SUPPLIED		626	UNK
1	EA	ELECTRIC STRIKE	6211 FS CON 12/16/24/28 VAC/VDC	 ✎	630	VON
1	EA	OH STOP	100S ADJ		630	GLY
1	EA	AUTO OPERATOR	7100	 ✎	689	HOR
1	EA	AURA PUSH TO LOCK PUSH TO OPEN COMBO SWITCH	MOUNT PULL SIDE CM-2520/4854SE1	 ✎		CAM
1	EA	AURA ILLUMINATED ACTUATOR	CM-45/455SE1	✎	630	CAM
3	EA	EMERGENCY STRIP 3' 0" LONG	NEXGEN(TAPESWITCH) TO READ: "EMERGENCY ALARM - PRESS FOR ASSISTANCE"(BLACK LETTERING ON YELLOW BACKGROUND)	✎		UNK
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	SET	SOUND GASKETING	475AA-S (1XW 2XH)		AA	ZER
1	EA	DOOR BOTTOM(MORTISE)	355AA X DR WIDTH UNDERCUT HM DOOR BOTTOMFOR ENGAGEMENT OF DOOR BOTTOM TO FLOOR MATERIAL		AA	ZER
1		LED OCCUPIED INDICATOR				
1	EA	WIRE HARNESS	CON-6W	✎		SCH
1	EA	DOOR CONTACT	679-05 __TO SUIT DOOR MATL	 ✎	BLK	SCE
1	EA	LED OCCUPIED INDICATOR	CM-AF500	 ✎		CAM
1	EA	ADVANCED LOGIC RELAY	CX-33	 ✎		CAM
1	EA	EMERG CALL KIT UNIV RESTRMS	CX-WEC10K2	✎		CAM
1	EA	POWER SUPPLY	PS902 KL900 120/240 VAC	 ✎	LGR	SCE

NOTE: REFER TO U OF T DRAWING DOC WR-04 FOR MOUNTING LOCATIONS OF TAPESWITCH

OPERATIONAL DESCRIPTION: DOOR NORMALLY CLOSED AND UNLOCKED. ON INGRESS, PRESS OUTSIDE ACTUATOR TO ACTIVATE DOOR OPERATOR OR PUSH/PULL ON LOCKSET LEVER. ONCE DOOR IS CLOSED AND LATCHED OCCUPANT DEPRESSES "PUSH TO LOCK" BUTTON TO SECURE OUTSIDE OF DOOR; DISABLING OUTSIDE ACTUATOR AND ELECTRIC STRIKE. MECHANICAL KEY OVERRIDE PROVIDES ACCESS. IF OCCUPANT IS IN DISTRESS, ACTIVATING THE EMERGENCY CALL SYSTEM DEVICE ACTIVATES AN AUDIBLE AND VISUAL SIGNAL DEVICES INSIDE AND OUTSIDE THE WASHROOM. EGRESS IS FREE AT ALL TIMES BY PRESSING ON INSIDE ACTUATOR TO ACTIVATE OPERATOR OR BY DEPRESSING ON INSIDE LOCKSET LEVER. UPON EGRESS DOOR IS UNLOCKED, OUTSIDE ACTUATOR IS ENABLED AND ELECTRIC STRIKE IS UNSECURE. WITH LOSS OF POWER DOOR REMAINS LOCKED.







Hardware Group No. 23 - Not Used

Hardware Group No. 24

For use on Door#(s)

M204S

Provide each SGL door(s) with the following:


QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 114X102MM NRP		652	IVE
1	EA	PASSAGE SET	L9010 03B		626	SCH
1	EA	SURFACE CLOSER	4040XP EDA ST-3068		689	LCN
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	GASKETING	188S-BK (1XW 2XH)		BK	ZER

Hardware Group No. 25

For use on Door#(s)

219K

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	MORTISE CYLINDER	U OF T SUPPLIED - MEDECO CYL		626	MED
			KEY SWITCH			
1	EA	HARDWARE	ALL HARDWARE TO REMAIN			UNK
1	EA	KEY SWITCH	653-1415 L2 ATS 12/24 VDC		630	SCE
			TO CONTROL ADO			

NOTE: USE ADO TO KEEP DOORS HELD OPEN. CONNECT ADO TO FIRE PANEL.







Hardware Group No. 26

For use on Door#(s)

319A

Provide each SGL door(s) with the following:










QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 114X102MM NRP		652	IVE
1	EA	STOREROOM LOCK	L9080L 03B		626	SCH
1	EA	MORTISE CYLINDER	U OF T LOCK SHOP SUPPLIED		626	UNK
1	EA	OH STOP	90S		630	GLY
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE

Hardware Group No. 27 - CARD ACCESS

For use on Door#(s)

226L 226S

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	HINGE	5BB1 114X102MM CONFIRM HINZE SIZE AND TYPE		652	IVE
1	EA	ELECTRIC HINGE	5BB1 114X102MM CON TW8		✓ 652	IVE
1	EA	ELEC FIRE EXIT HARDWARE	RX-98-L-F-M996-03-FS-CON		✓ 626	VON
1	EA	MORTISE CYLINDER	U OF T SUPPLIED - MEDECO CYL		626	MED
1	EA	SURFACE CLOSER	4040XP REG		689	LCN
1	EA	KICK PLATE	8400 205MM X LDW		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	GASKETING	188S-BK (1XW 2XH)		BK	ZER
1	EA	WIRE HARNESS	CON-____ (SIZE TO SUIT)	✓		SCH
1	EA	WIRE HARNESS	CON-6W	✓		SCH
1	EA	SALTO CREDENTIAL READER	U OF T SUPPLIED	✓	BLK	SAL
1	EA	DOOR CONTACT	679-05 __TO SUIT DOOR MATL		✓ BLK	SCE
1	EA	POWER SUPPLY	PS902 KL900 120/240 VAC		✓ LGR	SCE

OPERATIONAL DESCRIPTION:DOOR IS NORMALLY CLOSED AND LOCKED. OUTSIDE TRIM IS ALWAYS LOCKED AGAINST ENTRY.AUTHORIZED CREDENTIAL MOMENTARILY UNLOCKS TRIM ALLOWING ENTRY. MECHANICAL KEY ALSO RETRACTS LATCH ALLOWING ENTRY. RX SWITCH (INTEGRAL TO LOCKING HARDWARE) MONITORS AUTHORIZED EGRESS.DOOR CONTACT MONITORS WHEN DOOR OPENS AND CLOSES.FREE EGRESS AT ALL TIMES WITH LOSS OF POWER DOOR REMAINS UNLOCKED.

1 General

1.1 **SECTION INCLUDES**

- .1 Design, labour, Products, equipment, tools, and services necessary for glass and glazing work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM C920, Specification for Elastomeric Joint Sealants.
- .2 ASTM D2240, Test Method for Rubber Property - Durometer Hardness.
- .3 ASTM E84, Test Method for Surface Burning Characteristics of Building Materials.
- .4 CAN/CGSB-12.1-M, Tempered or Laminated Safety Glass.
- .5 CAN/CGSB-12.3-M, Flat, Clear Float Glass.
- .6 Glass Association of North America (GANA) Glazing Manual.
- .7 NFPA 80, Standard for Fire Doors and Other Opening Protectives.
- .8 ULC CAN4 S104-M, Standard Method for Fire Tests of Door Assemblies.
- .9 ULC CAN4 S106-M, Standard Method for Fire Tests of Window and Glass Block Assemblies.

1.3 **DESIGN REQUIREMENTS**

- .1 Design glazing work to accommodate live, dead, lateral, seismic, handling, transportation, and erection loads.

1.4 **SUBMITTALS**

- .1 Shop drawings:
  - .1 Submit shop drawings in accordance with the Conditions of the Contract indicating as a minimum:
    - .1 Fabrication and erection of glazing elements indicating materials, thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

- .2 Samples:
  - .1 Submit following samples in accordance with the Conditions of the Contract.
  - .2 Submit one sample of each type of glass.
    - .1 300 x 300 mm of laminated glass, clear and gradient pattern.
    - .2 300 x 300 mm of fire rated glass.
    - .3 300 x 300 mm of resin panels.
    - .4 300 x 300 mm of each glass film.
- .3 Certificates: Submit manufacturer's certification that glass and glazing materials are compatible.
- .4 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

## 1.5 QUALITY ASSURANCE

- .1 Installers qualifications: Perform work of this Section by a company that has a minimum of five years proven experience in the installation of glazing units of a similar size and nature.
- .2 Fire Protective Rated Glass: Each lite shall bear permanent, nonremovable label of ULC certifying it for use in tested and rated fire protective assemblies.

## 1.6 SITE CONDITIONS

- .1 Glaze with compounds, sealants, or tapes only when glazing surfaces are at temperatures over 4°C, and when positive that no moisture is accumulating on them from rain, mist, or condensation.
- .2 When temperature of glazing surfaces is below 4°C, obtain from Consultant and material manufacturer approval of glazing methods and protective measures which will be used during glazing operations.

## 2 Products

### 2.1 ACCEPTABLE MANUFACTURERS

- .1 Glass manufacturers:
  - .1 Cardinal Glass Industries.
  - .2 Guardian Industries.
  - .3 Vitro Architectural Glass.

## 2.2 MATERIALS

- .1 General:
  - .1 All materials under work of this Section, including but not limited to, primers, coatings, sealers, sealants, adhesives and cleaners are to have low VOC content limits.
  - .2 All coatings of a similar type shall be applied in a single production run to ensure colour match.
  - .3 Edges of glass shall be free from spalls, flake chips or rough chips which would be either visible or compromise the adhesion of the exterior weather seal or reduce the strength of glass when subjected to temperature differentials.
- .2 Tempered glass (**TGL**): CAN/CGSB-12.1-M, Type 2, Class B, Category II, clear, minimum 6 mm thick.
- .3 Low iron glass, float and tempered (**LIFGL & LITGL**):
  - .1 CAN/CGSB-12.3-M or CAN/CGSB-12.1-M, clear low iron float or tempered glass as specified and scheduled, glazing quality, minimum thickness as specified, low iron content, colourless.
  - .2 Acceptable Products: 'Ultra White Low Iron' by Guardian Industries or 'Starphire Ultra Clear Glass' by Vitro Architectural Glass.
- .4 Low iron laminated glass, clear and patterned interlayers (**LGL**):
  - .1 Clear low iron laminated glass (**LGL1**): Clear low iron laminated glass to CAN/CGSB-12.1, Category II, consisting of two layers of 5 mm thick clear low iron float glass (LIFGL) as specified, sandwiching a 0.8 mm thick clear PVB interlayer. Nominal thickness of 11 mm.
  - .2 Clear low iron tempered/laminated glass with gradient pattern (**LGL2**): Clear tempered/laminated glass to CAN/CGSB-12.1, Category II, consisting of two layers of 6 mm thick clear low iron tempered glass (LITGL) as specified, sandwiching a 0.8 mm thick PVB interlayer having a gradient pattern with white to clear colouring and matching Consultant approved samples. Nominal thickness of 13 mm.
  - .3 PVB interlayer to be 'Butacite PVB' film by Dupont or approved alternative.
- .5 Fire rated glass (**FRGL**): 20 min. to 3 hr. fire rating tested to ULC CAN4 S104-M and ULC CAN4 S106-M, 8 mm thick or as otherwise noted on Door Schedule with appropriate labelling stating fire rating and approval, clear polished glass. Firelite Plus by Technical Glass Products or approved alternative.

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- .6 Decorative resin panels (**RP-1**):
    - .1 Minimum 12.7 mm thick, unless otherwise indicated, specially-formulated polyester resin, fire testing to ASTM E84, Class C with a flame spread of 95 and smoke density of 450.
    - .2 Panels to be impact resistant and shatter proof.
    - .3 Colour: To be selected by the Consultant from manufacturer's full colour range.
    - .4 Acceptable Product: 'Chroma' by 3form Inc. or approved alternative.
  - .7 Glass films (**GF**):
    - .1 Vision strip/safety visual cues (**GF-1**):
      - .1 Provide 50 mm wide opaque safety vision strips where indicated. For use on interior sliding glass doors as indicated.
      - .2 Opaque vision strip as selected by Consultant and manufactured by 3M or approved alternative.
    - .2 Opaque film (**GF-2**): Opaque glass film as selected by Consultant and manufactured by 3M or approved alternative. For use on interior windows.
    - .3 Translucent film (**GF-3**): Translucent glass film as selected by Consultant and manufactured by 3M or approved alternative. For use on exterior windows.
    - .4 Frosted film (**GF-4**): Frosted glass film selected by Consultant and manufactured by 3M or approved alternative. For use on interior sliding glass doors as indicated.
    - .5 Application patterns as indicated on drawings.
  - .8 Glazing and rebate primers, sealants, sealers, and cleaners: Compatible with each other. Type as recommended by sealant, spline, and glass manufacturer.
  - .9 Glazing sealant (structural glazing - interior):
    - .1 Silicone, One Part in accordance with ASTM C920, Type S or M, Grade NS, Class 25, clear for vertical joints.
    - .2 Structural glazing tensile bead: 'Proglaze SSG' by Tremco or 'Dowsil 795' by Dow Consumers Solution.
  - .10 Glazing tape: 'Polyshim II' glazing tape EPDM shim.
  - .11 Glazing tape (fire rated glass): Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.
  - .12 Setting Block: Silicone setting blocks with Shore A durometer hardness of 85, plus or minus 5 to ASTM D2240, sized to suit glazing method, glass unit weight and area.
  - .13 Edge blocks: Silicone, 75-80 Shore A durometer hardness to ASTM D2240, self adhesive on face, sized with 3 mm clearance from glass edge and spanning glass thickness(es).

- .14 Glass presence markers: Easily removable, non-residue depositing.
- .15 Screws, bolts and fasteners: Type 304 stainless steel.
- .16 Channel: Extruded aluminum channel with powder coat finish, in colour as selected by the Consultant. Manufactured by C.R. Laurence or Inkan Limited.

## 2.3 **INTERIOR GLAZING AND FILM SCHEDULE**

- .1 General: Professional Engineer of relevant framing system to confirm glazing composition and thickness of glazing used at partition and screen applications serving as a guard.
- .2 **Glazing Type GL-1:** Minimum 9.5 mm thick clear tempered glass (TGL) used for glass sidelights and screens.
- .3 **Glazing Type GL-1A:** Minimum 6 mm thick clear tempered glass (TGL) used for vision panels of non-rated interior doors.
- .4 **Glazing Type GL-2:** Nominal 11 mm thick clear low iron laminated glass (LGL1) where indicated.
- .5 **Glazing Type GL-3:** Minimum 8 mm thick fire rated ceramic glass (FRGL) used at interior glass lites in fire-rated doors and partitions.
- .6 **Glazing Type GL-4:** Nominal 13 mm thick, clear low iron tempered/laminated glass with gradient pattern (LGL2), for use at feature wall/guard.
- .7 **Glazing Type RP:** Minimum 9.5 mm thick resin panels (RP), for use in millwork divider screens as shown.
- .8 **Film Type 1:** Opaque safety vision strip film (GF-1) for interior sliding glass doors as indicated.
- .9 **Film Type 2:** Opaque film (GF-2) for interior windows as indicated.
- .10 **Film Type 3:** Translucent film (GF-3) for exterior windows as indicated.
- .11 **Film Type 4:** Frosted film (GF-4) for interior sliding glass doors as indicated.

## 2.4 **FABRICATION**

- .1 Verify glazing dimensions on Site.
- .2 Clearly label each glass lite with maker's name and glass type. Ensure labels are easily removable, non-residue depositing type. Do not remove labels until after Work is accepted by Consultant.

- .3 Fabricate glazing not less than 3 mm smaller than rebate size in either dimension; allow for edge spacers, shims, and setting blocks as necessary.
- .4 Work shall have smooth finished surfaces free from distortion and defects detrimental to appearance and performance.
- .5 Carefully make and fit details. Take special care with exposed finished work to produce a neat and correct appearance to the Consultant's acceptance.

### 3 Execution

#### 3.1 EXAMINATION

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.
- .2 Verify that openings for glazing are correctly sized and within tolerance.
- .3 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
- .4 Laminated glass edges shall be completely covered by tape to protect against sealants and water if required by manufacturer.

#### 3.2 PREPARATION

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

#### 3.3 INSTALLATION

- .1 Provide glazing in accordance with FGIA recommendations. Provide continuous contact between glazing tapes and gasket to the glazing.
- .2 Install glazing to the work of Sections 06 20 00, 08 11 13, 08 11 16 and 08 11 18.
- .3 Provide neat, straight sight lines. Trim excess glazing tape flush with top of stops and fixed leg of frames.
- .4 Remove protective coatings, glazing stops, clean rebate and glass contact surfaces with solvent, wipe dry.

- .5 Apply primer/sealer to contact surfaces, prior to glazing.
- .6 Apply glazing tape as per manufacturer's instructions including recommended corner sealant.
- .7 Edge of setting blocks to be a minimum of 150 mm from corners in accordance with IGMA requirements.
- .8 Install glazing in accordance with reviewed shop drawings and manufacturer's written instructions. Install glazing with full contact and adhesion at perimeter. Maintain edge clearance recommended by glass manufacturer.
- .9 Apply a continuous heel bead of sealant around perimeter of inboard lite of the sealed unit and the metal framing.
- .10 Re-install glazing stops ensuring continuous contact and rattle-free installation. Do not distort glass. Trim tape protruding more than 2 mm above stop.
- .11 Do not cut or abrade tempered, heat treated, or coated glass.
- .12 Install glass presence markers in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.
- .13 Remove, dispose of, and replace broken, cut, abraded glass, and defective glass including but not limited to production dimples, roller wave or marks, tong marks, chips, cracks, etc.
- .14 Interior glass: Glaze interior glass using glazing gasket glazing tape.
- .15 Structural glazing, general:
  - .1 Glaze units in accordance with reviewed shop drawings and in accordance with manufacturer's written instructions.
  - .2 Balustrade glazing: Mount glass rigidly in base pocket to proper spacing, level, alignment and plumb.
- .16 Fire rated glass:
  - .1 Install fire rated glass in accordance with ULC and NFPA 80 requirements
  - .2 Place setting blocks located at quarter points of glass with edge block no more than 150 mm from corners.
  - .3 Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.
  - .4 Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.
  - .5 Place glazing tape on free perimeter of glazing in same manner described above.
  - .6 Install removable stop and secure without displacement of tape.
  - .7 Install so that appropriate ULC markings remain permanently visible.



- .17 Resin panel material:
  - .1 Install resin panel materials in accordance with manufacturer's written instructions.
  - .2 Coordinate with Section 06 20 00 as required for sizing and installation of resin panel material for intended millwork items.
  - .3 Provide aluminum channels for resin panels and all cut-outs and holes for fastenings required.
  - .4 Ensure resin panel materials are installed level, secure and plumb installation.
- .18 Glass film
  - .1 Install glass film with adhesive, applied in accordance with film manufacturer's instructions.
  - .2 Place without air bubbles, creases or visible distortion.
  - .3 Fit tight to glass perimeter with razor cut edge.

#### 3.4 **CLEANING**

- .1 Immediately remove sealant and compound droppings from finished surfaces.
- .2 Remove labels, protective material, and glass presence markers from prefinished surfaces.
- .3 Clean glass surfaces with cleaning agents and methods in accordance with manufacturer's written instructions.
- .4 Do not wash glass film for 30 days after installation.
- .5 Do not use bristle brushes on glass film.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for cementitious terrazzo restoration work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 CSA A23.1, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
- .2 CAN/CSA A3000, Cementitious Materials Compendium.
- .3 TTMAC, Terrazzo, Tile and Marble Association of Canada

1.3 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, limitations, and trouble-shooting protocol.
    - .2 Product transportation, storage, handling and installation requirements.
- .2 Shop drawings:
  - .1 Submit shop drawings in accordance with the Conditions of the Contract indicating:
    - .1 Terrazzo layout.
    - .2 Perimeter conditions, junctions with dissimilar materials.
    - .3 Setting details.
- .3 Certificates: Submit manufacturer's certificates stating that materials supplied are in accordance with this specification.
- .4 Closeout submittals: Submit recommended maintenance instructions and listing of recommended maintenance Products for incorporation into Operations and Maintenance Manuals in accordance with the Conditions of the Contract.

1.4 **QUALITY ASSURANCE**

- .1 Installers qualifications: Perform work of this Section by a company that is a member in good standing of the Terrazzo Tile and Marble Association of Canada and has a minimum of five years proven experience in the application of terrazzo of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.

1.5 **SITE CONDITIONS**

- .1 Do not install work of this Section outside of the following environmental ranges without the Consultant's and Product manufacturer's written acceptance:
  - .1 Ambient air and surface temperature: 15°C to 30°C.
  - .2 Precipitation: None.
- .2 Install temporary protection and facilities to maintain the Product manufacturer's, and specified, environmental requirements for 7 Days before, during, and 7 Days after installation.

2 **Products**

2.1 **MATERIALS**

- .1 Cement: Portland cement to meet specified requirements of CAN/CSA A3000, Normal or High-Early strength. Use white portland cement in white matrix.
- .2 Sand: To meet specified requirements of CSA A23.1, sharp, screened, washed. Use white sand in white matrix.
- .3 Water: Potable, free from acids, alkalies, oil, or organic materials.
- .4 Divider strips: Divider strips with integral anchorage, in size, material and profile to match existing.
- .5 Topping:
  - .1 Marble chips: To meet specified requirements of Terrazzo, Tile and Marble Association of Canada, match existing size gradation and colour.
  - .2 Colour pigments: Pure mineral, alkali-resistant, non-fading, colour to match existing.
- .6 Cleaner: To meet specified requirements of #1000 Series of Terrazzo, Tile and Marble Association of Canada.
- .7 Sealer: Clear impregnating sealer compatible with system meeting TTMAC requirements.

- .8 Floor finish: To meet specified requirements of Type #3001 of Terrazzo, Tile and Marble Association of Canada and compatible with impregnating sealer.
- .9 Curing agent: Non-staining, maximum moisture retention 0.015 grams, to meet specified requirements of Terrazzo, Tile and Marble Association of Canada.

## 2.2 **MIXES**

- .1 Underbed:
  - .1 One part cement to four parts sand by volume.
  - .2 Add water to product stiff mix, but use no more than four gals/80 lb. bag of cement to make workable.
- .2 Topping:
  - .1 Marble chip aggregate and cement mixed dry with colour pigments to match existing. Grind a small area to determine the true colours of existing terrazzo and chip gradation.
  - .2 Water shall not exceed 18 L/bag of cement.
  - .3 Prepare topping by mechanical mixing with materials added in the following order: one-half of aggregate, total of cement, water, remaining aggregate.

## 3 Execution

### 3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

### 3.2 **PREPARATION**

- .1 Take extreme care that surfaces adjacent to terrazzo work are protected from staining by terrazzo materials, and that slurry is not tracked into other building areas any time during installation.
- .2 Sweep backing surfaces clean of all loose materials, and remove the debris. Clean off contaminants which would cause a defective installation.
- .3 Locate and prepare for equipment or accessories recessed in finished terrazzo work.

### 3.3 APPLICATION

- .1 General:
  - .1 Installation shall match existing type. Provide match with existing colours and textures.
  - .2 Profile of base shall match existing. Where bases are of different profiles, install new base of profile to match finished installation.
  - .3 When patching terrazzo, extend area to nearest divider strip in all directions.
- .2 Underbed for bonded installation:
  - .1 Wet backing surfaces with water, remove excess, and when surface water has dried, slush into soaked backing a neat portland cement grout.
  - .2 Immediately following application of grout, place underbed, spread evenly, and screed to true levels to receive specified topping.
- .3 Divider strips:
  - .1 Install divider strips in underbed while it is still semi-plastic.
  - .2 Locate divider strips accurately. Set them straight, aligned, to line up with existing and at correct level; make junctions tight; and firmly trowel them along edges into underbed to ensure anchorage.
  - .3 Set edging strips at junctions with other floor finishes to provide precisely for their thicknesses and finished levels after grinding. At openings set edging strips under doors.
  - .4 Extend divider strips at right angles across borders.
- .4 Placing of topping:
  - .1 Let underbed cure for at least 24 hours.
  - .2 Wet top of underbed with water, remove excess, and when surface water had dried slush into soaked underbed a neat Portland cement grout of same colour cement and pigment as for matrix.
  - .3 Apply topping to slurry or underbed while it is still wet.

### 3.4 TOPPING

- .1 Standard finish:
  - .1 Into wet topping surface of floors, sprinkle wet aggregate of same materials in same proportions as specified for topping.
  - .2 Apply so that finish surfaces match existing.
- .2 Surface preparation:
  - .1 After finish aggregates are added, immediately roll floor topping with a heavy roller to compact and to remove excess water and cement. Pack bases.
  - .2 Hand trowel all terrazzo surfaces to expose divider strips level with topping.
- .3 Curing:
  - .1 Cure topping for a minimum of six days following placing.
  - .2 Cure to ensure that topping is kept damp until cement is hydrated.
  - .3 Use wet mats or sand, paper or plastic sheets, or liquid curing compound.

### 3.5 **FINISHING**

- .1 Grind terrazzo surfaces by machine. Hand rub places inaccessible to grinding machines.
- .2 Constantly flood surfaces with water during grinding.
- .3 For initial grinding, use 24 to 60 grit grinding stones.
- .4 After initial grinding, wash surfaces clean, remove all residue from holes and voids, and thoroughly rinse with only water.
- .5 Trowel plastic grout, of same mix and colour as matrix, into holes and voids of wetted surface, and remove excess. When grout begins to set, work it into holes and voids with burlap or excelsior pads, and remove excess.
- .6 Cure grout for a minimum of 48 hours as specified above for curing.
- .7 Give final grinding with 120 grit stones and water.
- .8 Wash off surfaces thoroughly after grinding.

### 3.6 **SITE TOLERANCES**

- .1 Finish surfaces shall be level or straight within a tolerance of 1.6 mm between division strips.

### 3.7 **REPAIR**

- .1 Before Project completion, remove and replace defective, off-colour, and damaged work. Defective work shall include areas where distribution of surface aggregate is visually different from surrounding area. Removed areas shall be completely bounded by divider strips or edges. Regrout and regrind surfaces left with open fissures and holes.

### 3.8 **CLEANING AND SEALING**

- .1 Scrub terrazzo surfaces with an abundance of clean water. Use machine scrubbers where possible for floors.
- .2 Rinse with clean water and allow to dry.
- .3 Remove dust with heavy-duty vacuum cleaner.
- .4 If further cleaning is required, use Terrazzo, Tile and Marble Association of Canada #1001 cleaner in accordance with their specifications.

- .5 Sealing and finish coats:
  - .1 As soon as possible after final cleaning, apply a coat of suitable impregnating sealer in accordance with manufacturer's written instructions.
  - .2 Apply two coats of floor finish.

**3.9 PROTECTION**

- .1 Prevent all traffic and work on newly laid floors by barricading areas for at least 24 hours following installation.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Design, labour, Products, equipment and services necessary for gypsum board work.

1.2 **REFERENCES**

- .1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .2 ASTM C475, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .3 ASTM C645, Specification for Nonstructural Steel Framing Members.
- .4 ASTM C754, Specification for Steel Framing Members to Receive Screw-Attached Gypsum Board.
- .5 ASTM C834, Standard Specification for Latex Sealants.
- .6 ASTM C840, Specification for Application and Finishing of Gypsum Board.
- .7 ASTM C1002, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- .8 ASTM C1178, Specification for Glass Mat Water-Resistant Gypsum Backing Board.
- .9 ASTM C1278, Specification for Fiber-Reinforced Gypsum Panel.
- .10 ASTM C1396, Specification for Gypsum Board.
- .11 ASTM E1264, Classification for Acoustical Ceiling Products.

1.3 **DESIGN REQUIREMENTS**

- .1 Design gypsum board wall and ceiling systems with a maximum deflection of  $l/360$ .
- .2 Design ceiling suspension system in accordance with manufacturer's printed directions and ASTM C754.
- .3 Design ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.
- .4 Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.



- .5 Design suspension system to support weight of mechanical and electrical items such as air handling boots and lighting fixtures, and with adequate support to allow rotation/relocation of light fixtures.
- .6 Design subframing as necessary to accommodate, and to circumvent, conflicts and interferences where ducts or other equipment prevent the regular spacing of hangers.
- .7 Design wall framing system and reinforce as necessary to accommodate and support items attached to and supported by wall framing system.
- .8 Design wall framing system for wall assemblies with a height greater than 3000 mm and those assemblies incorporating non-standard gypsum board assemblies including, but not limited to, abuse resistant gypsum board, large format tile applications, etc.
- .9 Gypsum board material used in STC rated partitions shall have a minimum surface mass of 10.7 kg/m<sup>2</sup> (2.2 lbs/ft<sup>2</sup>).
- .10 Design partitions to serve as guards and withstand guard loads in accordance with OBC requirements where indicated and required.
- .11 Wood ceiling suspension system:
  - .1 Design complete ceiling framing system for ceiling panels in accordance with ASTM C754 and to support ceiling loads including mechanical and electrical fixtures.
  - .2 Design for a safety factor of at least twice the anticipated load.
  - .3 Design ceiling system to have a maximum deflection of 1/360.
  - .4 Design ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.
  - .5 System to be designed and fabricated to permit accurate alignment to building lines and consistent joint dimension.
  - .6 Design framing system to support weight of mechanical and electrical items such as air handling boots and lighting fixtures, and with adequate support to allow rotation / relocation of light fixtures.
  - .7 Design subframing as necessary to accommodate, and to circumvent, conflicts and interferences where ducts or other equipment prevent the regular spacing of framing.
  - .8 Ceiling framing system indicated on Drawings are diagrammatic only and serves to indicate only the intended appearance and performance criteria.

#### 1.4 REGULATORY REQUIREMENTS

- .1 Provide fire separations and fire protection exactly as specified in test design specification that validates the specified rating. Verify that work specified in other Sections, as a part of the entire assembly, meets applicable validating test design specification.

## 1.5 SUBMITTALS

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
    - .2 Product transportation, storage, handling and installation requirements.
- .2 Shop Drawings:
  - .1 Submit Shop Drawings in accordance with the Conditions of the Contract indicating:
    - .1 Wall assemblies, suspension systems, adjacent construction, elevations, sections and details, dimensions, thickness, finishes and relationship to adjacent construction.
    - .2 Framing and blocking for items being supported of wall systems.
    - .3 Fire rated designs.
    - .4 Details of wood ceiling framing system.
- .3 Samples:
  - .1 Submit samples in accordance with the Conditions of the Contract of the following:
    - .1 Two 300 mm long samples of mullion closures demonstrating profile, colour and finish.
    - .2 Two 150 x 150 mm acoustic tile for lamination to gypsum board, demonstrating close match to existing ceiling tile.
- .4 Certifications: Submit written certification stating that suspended ceiling system is designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

## 1.6 QUALITY ASSURANCE

- .1 Installer's Qualifications (gypsum board, typical): Execute the work of this Section by skilled, qualified, and experienced workers trained in the installation of the work of this Section.
- .2 Installer's Qualification's (mullion closures): Perform work by a company that employs installers and supervisors who are trained and approved by mullion closure manufacturer.

- .3 Retain a Professional Engineer, licensed in Province of Ontario, with experience in work of comparable complexity and scope, to perform following services as part of work of this Section:
  - .1 Design of wall systems with height greater than 3000 mm and at non-standard gypsum board assemblies including, but not limited to, assemblies incorporating, abuse resistant gypsum board, large format tile applications, etc.
  - .2 Design of suspended gypsum board assemblies.
  - .3 Design of suspended wood ceiling assemblies.
  - .4 Review, stamp, and sign Shop Drawings and design calculations.
  - .5 Conduct shop and on-site inspections, prepare and submit written inspection reports verifying that this part of Work is in accordance with Contract Documents and reviewed Shop Drawings.
- .4 Mock-up:
  - .1 Construct one 1 m<sup>2</sup> mock-up of acoustic tile laminated to gypsum board ceiling system in location acceptable to Consultant.
  - .2 Demonstrating match with existing ceiling assembly, installation procedures and workmanship.
  - .3 Arrange for Consultant's and manufacturer's review and acceptance prior to start of installation.
  - .4 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
  - .5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

## 1.7 SITE CONDITIONS

- .1 Do not begin work of this Section until:
  - .1 Mechanical and electrical work above the ceiling is complete.
  - .2 Substrate and ambient temperature is above 15°C.
  - .3 Relative humidity is below 80 %.
  - .4 Ventilation is adequate to remove excess moisture.
- .2 Install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements 24 h before, during, and 24 h after installation.

2 Products

2.1 MATERIALS

- .1 General: All materials under work of this Section, including but not limited to, sealants, adhesives, and primers are to have low VOC content limits.
- .2 Steel framing: ASTM C754; ASTM A653/A653-M, Z275; cold rolled, galvanized steel sheet.
  - .1 Bailey Metal Products Limited.
  - .2 Corus Metal Profiles.
- .3 Steel studs and track runners: ASTM C645; Galvanized steel studs and runners, 32 mm wide x depth as indicated on Contract Drawings. Formed from galvanized steel sheet, thicknesses as follows:
  - .1 Studs less than 3000 mm: Minimum 0.53 mm (25 ga.).
  - .2 Studs greater than 3000 mm and non-standard assemblies: Minimum 0.91 mm (20 ga.), unless stud thickness of greater thickness is required to accommodate intended loading, spans, or conditions.
  - .3 Track runners and ancillary components to match stud thickness.
- .4 Sheet steel blocking: Galvanized sheet steel: ASTM A653/A653M Grade A, Z275 Commercial Quality zinc coating. 1.2 mm thick (18 ga.) thick for use as sheet blocking.
- .5 Main carrying channels: ASTM C645; Formed from galvanized steel sheet, 38 x 19 mm cold rolled, channels.
- .6 Resilient channel: ASTM C645; 0.5 mm thick galvanized metal, 57 mm wide x 12 mm deep for walls and ceiling to reduce sound transmission.
- .7 Furring channels: ASTM C645; Formed from galvanized steel sheet, 22 mm winged flange type, cold rolled.
- .8 Furring channels (hat type): ASTM C645; 0.5 mm base steel thickness, galvanized. 70 mm wide x 22 mm deep hat shaped channel.
- .9 Heavy duty furring channels: ASTM C645; 0.9 mm steel thickness, galvanized hat shaped channel with a wider and deeper size as required by manufacturers.
- .10 Hanger wires: 4.1 mm minimum diameter galvanized pencil rod.
- .11 Tie wire: 1.6 mm thick minimum diameter, soft annealed, galvanized steel wire.
- .12 Corner bead, casing bead, and special shapes: Formed from 0.6 mm thick minimum, galvanized steel sheet, designed to be concealed by joint compound.

- .13 Mullion closures:
  - .1 Provide all components and accessories as required for complete installation of mullion closures as required to suit gap/transition condition. Sized to suit gap condition.
  - .2 Extruded aluminum mullion closures with manufacturer's standard powder coat finish to match curtain wall colour.
  - .3 Furnish units in lengths of sufficient additional length to allow for field trimming to required length to match variations in construction tolerances of adjacent systems.
  - .4 Fasteners: Types as recommended by closure manufacturer, compatible with all materials.
  - .5 Sealant: Type as recommended by closure manufacturer.
  - .6 Acceptable Product: 'Mullion Mate Partition Gap Closures' by Gordon Inc. or approved alternative by Mull-It-Over Products.
- .14 Deflection track: ASTM C 645 top runner with 50.8-mm- deep flanges, in thickness indicated for studs and in width to accommodate depth of studs.
- .15 Deflection track (fire rated): Provide 25 mm deep leg deflection track where indicated on rated walls. 'Fire Trak Shadowline' by Fire Trak Corporation or approved alternative.
- .16 Ceiling clips: Hot dip galvanized partition attachment clips, in square and reveal edge; 'PAC 15 Series' to match grid system by CGC Inc. or approved alternative.
- .17 Gaskets (acoustic partitions): Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 3.2 mm thick, in width to suit steel stud size.
- .18 Control joint strip: Roll formed from galvanized steel sheet, with a tape protected recess, 6 mm wide x 11 mm deep.
- .19 Screw fasteners: ASTM C1002 Type S; Corrosion resistant.
- .20 Concrete anchors: tie wire sleeve anchors, 'Redi-Drive Anchors' by ITW Red Head or approved alternative.
- .21 Batt insulation: In accordance with Section 07 21 00.
- .22 Standard and acoustic sealants: In accordance with Section 07 92 00.
- .23 Fire rated sealants: Provide fire rated sealants for use at fire rated assemblies in accordance with Section 07 85 00.
- .24 Gypsum board: ASTM C1396; gypsum board 15.9 mm thickness, unless otherwise indicated, of maximum practical lengths to minimize end joints. Furnish Board by Certainteed Gypsum Canada, CGC Inc., or Georgia-Pacific Canada LP.

- .25 Fire rated gypsum board: ASTM C1396; gypsum board 15.9 mm thick of maximum practical lengths to minimize end joints, unless indicated otherwise. Furnish Type X Board by Certainteed Gypsum Canada, CGC Inc., or Georgia-Pacific Canada LP.
- .26 Abuse resistant panels: ASTM C1396; 15.9 mm thick unless indicated otherwise on drawings; 'Abuse Resistant' by Certainteed Gypsum Canada, 'Sheetrock AR' by CGC Inc. or 'ToughRock' by Georgia-Pacific Canada LP.
- .27 Moisture and mould resistant board: 15.9 mm thick, unless otherwise indicated, of maximum practical lengths to minimize end joints, unless indicated otherwise; 'M2Tech Moisture and Mould Resistant' by Certainteed Gypsum Canada, 'Sheetrock Mold Tough' by CGC Inc. or 'DensArmor Plus High Performance Interior Panel' by Georgia-Pacific Canada LP.
- .28 Tile Backer: Water resistant tile backer board meeting ASTM C1178 or ASTM C1278, thickness as indicated. 'Diamondback Tile Backer' by Certainteed Gypsum Canada, 'Fiberock Aqua-Tough Underlayment' by CGC Inc. or 'Dens Shield' by Georgia-Pacific Canada LP.
- .29 Salvaged/replacement acoustic tiles (for use in X-GWB-2):
  - .1 Salvaged acoustic tiles for supply under Section 02 40 00 and lamination to gypsum board under work of this Section.
  - .2 Where new replacement acoustic tiles are required, provide the following closely matched tile to match overall existing ceiling assembly:
    - .1 ASTM E1264, type 3, Form 2, Pattern CE; wet-formed mineral fiber with factory applied vinyl latex paint, tongue and groove edge, sized at 305 x 305 mm, minimum 15 mm thick, having white colour.
    - .2 Acceptable Product: 'Fine Fissured' by Armstrong Ceiling Tiles or approved alternative by CGC Inc., Certainteed Ceilings Canada or Rockfon.
- .30 Shaftwall gypsum system:
  - .1 Steel J-Runner: ASTM C645; Rolled formed sheet steel, 25 gauge, by CGC, Gypsum Corporation or approved alternative.
  - .2 C-H stud: hot-dipped galvanized by CGC, Gypsum Corporation or approved alternative.
  - .3 Liner Panel: ASTM C1396; Gypsum wallboard panel, Thickness: 25.4 mm, Width: 610 mm. 'M2Tech Shaftliner Type X' by Certainteed Gypsum Canada, or approved alternative by CGC or Gypsum Corporation.
  - .4 Face Panel: ASTM C1396; Gypsum wallboard panel, 1 layer, Thickness: 15.9 mm, Width: 1219 mm. 'GlasRoc Shaftliner Type X' by Certainteed Gypsum Canada, or approved alternative by CGC or Gypsum Corporation.
- .31 Special trim pieces: to include, but not limited to, the following:
  - .1 Reveal trim: Formed from extruded aluminum alloy 6063 T5, manufactured by Fry Reglet, Gordon Trims, or approved alternative.
  - .2 J trim: Formed from extruded aluminum alloy 6063 T5, manufactured by Fry Reglet, Gordon Trims, or approved alternative.

- .32 Primer: Where indicated by board manufacturer, provide primer as required to achieve finishes as defined in ASTM C840.
- .33 Joint reinforcing tape:
  - .1 Standard gypsum board: ASTM C475; 50 mm wide x 0.25 mm thick, perforated paper, with chamfered edges.
  - .2 Moisture resistant and tile backer boards: ASTM C475; fibreglass mat joint tape as recommended by board manufacturer to suit location.
- .34 Bonding adhesive: Type for purpose intended and as recommended and approved by manufacturer.
- .35 Joint and patching compound: ASTM C475; Asbestos-free, supplied by manufacturer of gypsum board used.
- .36 Fast setting patching compound: ASTM C475; Asbestos-free, Sheetrock or Durabond by CGC Inc., 'Moisture and Mold Resistant Setting Compound with M2Tech' by Certainteed Gypsum Canada or approved alternative.
- .37 Access doors: Supplied by other Sections for installation as part of the work of this Section.
- .38 Wood veneer ceiling panels: In accordance with Section 06 20 00.
- .39 Lead lined gypsum board and lead sheet materials: In accordance with Section 13 49 00.

### 3 Execution

#### 3.1 EXAMINATION

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

#### 3.2 SUSPENSION FRAMING

- .1 Install ceiling systems in accordance with reviewed Shop Drawings and manufacturer's written instructions.
- .2 Install hanger wires plumb and securely anchored to the building structural framing, independent of walls, pipes, ducts, and metal deck; install additional framing and hangers to bridge interference items.
- .3 Install hanger wires at 1200 mm maximum centres along carrying channels, not less than 25 mm, and not more than 150 mm from channel ends.

- .4 Install additional hangers at lighting fixture and ductwork locations. Do not attach hanger wires to mechanical or electrical equipment. Do not support mechanical and electrical fixtures and fitting on ceiling without the ceiling manufacturer's written acceptance.
- .5 Install main carrying channels transverse to structural framing members. Lap main carrying channels 200 mm minimum at splices and wire each end with two loops and prevent clustering or lining-up of splices.
- .6 Install furring channels at 400 mm o.c., not less than 25 mm, and not more than 150 mm from perimeter walls, at openings, at interruptions in ceiling continuity, and at change in plane. Install furring channels to a tolerance of 3 mm maximum in 3600 mm.
- .7 Install additional main carrying and furring channels to frame and to reinforce openings such as recessed lighting fixtures, access hatches, ceiling grilles, outlet boxes, ventilating outlets and similar items.

### 3.3 **STEEL STUDS AND FURRING**

- .1 Install steel studs and furring in accordance with reviewed Shop Drawings and manufacturer's written instructions.
- .2 Provide 1.2 mm (18 ga.) thick galvanized sheet blocking for locations as indicated on Contract Drawings.
- .3 Install steel stud partitions to underside of structure unless indicated otherwise.
- .4 Install track runners at floors, ceilings, and underside of structure; align track runners accurately and secure to structure at 600 mm centres maximum.
- .5 Install double top track runner assembly to prevent the transmission of structural loads to steel studs.
- .6 Install steel studs vertically at 400 mm o.c., unless otherwise indicated, and not more than 50 mm from abutting walls, at openings, and at each side of corners. Install studs securely to track runners.
- .7 Schedule and coordinate steel framing installation with mechanical and electrical services installation.
- .8 Install full height, double studs at door and service openings, fastened together and stiffened back to the structure to prevent vibration when doors close.



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- .9 Provide double studs boxed together at all openings, sill, head and jambs and at door jambs, fastened together and stiffened back to the structure to prevent vibration. At each opening exceeding 900 mm in width or at lead lined door frames, double studs shall be 20 ga. extending to structure above, and adequately anchored at each end. Provide steel studs above and below openings spaced at 400 mm oc maximum. All metal stud partitions above doors and screens over 1220 mm wide shall be secured to structure over and reinforced with sway bracing to stabilize walls to prevent lateral movement.
  - .10 Erect three studs at corner and intermediate intersections of partitions. Space 50 mm apart and brace together with wired 19 mm channels.
  - .11 Stiffen partitions over 2440 mm high or 3000 mm long, or both, with horizontal bracing extended for full length of partitions. Provide one line of bracing in partitions. Space lines to provide equal unbraced panels. Provide bracing for portions of partitions over door openings in partitions over 3000 mm high, and bracing both above and below openings in partitions located no greater than 150 mm from top and bottom of opening, and extending two stud spaces beyond each edge of opening for both doors and windows. Wire tie or weld bracing to studs.
  - .12 Frame control joints using back to back double studs at abutting structural elements, at dissimilar backup interface, at dissimilar walls and ceilings, at structural expansion and control joints, at door and other openings, and at 9000 mm maximum spacing in continuous runs. Install control joint strips and secure in place.
  - .13 Install additional support framing at openings and cutouts for built-in equipment, upper cabinet support, access panels and similar items.
  - .14 Attach to framing adequate steel reinforcing members or an 1.2 mm (18 ga.) steel stud mounted horizontally and notched around furring members to support the load of, and to withstand the withdrawal and shear forces imposed by, items installed upon the work of this Section. Such items include, but are not restricted to, miscellaneous metals, coat hooks, washroom accessories, handrail anchors, grab bars, guards, wall-hung cabinets and fitments, shelving, miscellaneous specialties; Owner supplied equipment; and minor mechanical and electrical work. Heavy mechanical and electrical equipment shall be self-supporting in Divisions 21, 22, 23 and 26.
  - .15 Provide for support and incorporation of flush-mounted and recessed mechanical and electrical equipment and fixtures only after consultation and verification of methods with those performing the work of Divisions 21, 22, 23 and 26.
  - .16 Install cross bracing in accordance with the steel stud manufacturer's recommendations.

### 3.4 FIRE RATED ASSEMBLIES

- .1 Install Products in fire rated assemblies in strict accordance with reviewed Shop Drawings and applicable tested and approved designs required by Authorities Having Jurisdiction.
- .2 Install firestop fill material behind fire rated acoustical sealant and provide firestop identification tag.
- .3 Stiffen fire rated walls over 3.66 m high, where linear length of wall is greater than 2.44 m between perpendicular wall supports, with diagonal bracing above the ceiling extending perpendicular to wall at a 45° angle to structure above. Locate diagonal bracing at maximum 2.44 m o.c.
- .4 Where double layers of gypsum board are shown, and required for fire rating, screw first layer to studs and furring and laminate the second layer to the first using joint filler as an adhesive. Stagger joints between first and second layers.

### 3.5 BATT INSULATION

- .1 Install non-rated and fire-rated/acoustic insulation as required for Work of this Project in accordance with Section 07 21 00.

### 3.6 ACOUSTICAL PARTITIONS AND SEALANT

- .1 Install acoustical sealant to acoustically insulated partitions in accordance with the manufacturer's instructions and Contract Drawings.
- .2 Install acoustical sealant under floor runner track, at entire partition perimeter on both sides and at both sides of openings, cut-outs, and penetrations, concealed from view in the final installation. Where larger gaps exist in acoustically sensitive partitions, provide a gypsum board patch.
- .3 Smooth acoustical sealant with trowel prior to skin forming.
- .4 Stagger gypsum board joints between layers in multi-layer assemblies.
- .5 Electrical outlets:
  1. Electrical outlets must not be placed back-to-back within the same stud cavity.
  2. Separate electrical outlets by at least one stud cavity to reduce noise flanking between adjacent rooms.
  3. For junction boxes larger than 4-gang located in STC rated walls, ensure junction box is completely sealed on 5 sides and that there is minimum 38 mm space between back surface of box and opposite gypsum board layer. Seal back boxes with acoustic putty pad as specified in Section 07 85 00.

**3.7 RADIATION PROTECTION MATERIALS**

- .1 Coordinate with Section 13 49 00 as required for lead lined gypsum board and lead sheet materials to meet radiation protection requirements of the Project.

**3.8 GYPSUM BOARD**

- .1 Comply with ASTM C840. Install gypsum board in accordance with reviewed Shop Drawings and manufacturer's written instructions.
- .2 Install gypsum board vertically or horizontally, whichever results in fewer end joints. Locate end joints over supporting members.
- .3 Install gypsum board in lightly butted contact at edges and ends and with 1.6 mm maximum open space between boards; do not force gypsum board into place. Do not install imperfect, damaged or damp boards.
- .4 Install gypsum board butting paired tapered edge joints, and mill-cut or field-cut end joints; do not place tapered edges against cut edges or ends.
- .5 Install vertical joints minimum 300 mm from the jamb lines of openings and stagger vertical joints over different studs on opposite sides of partitions.
- .6 Do not locate joints within 200 mm of corners or openings, except where control joints occur at jamb lines or where openings occur adjacent to corners. Where necessary, place a single vertical joint over the centre of wide openings.
- .7 Install gypsum board over concrete and concrete masonry units with adhesive as recommended by gypsum board manufacturer where indicated on Drawings.
- .8 Cut, drill and patch gypsum board as may be necessary to accommodate the work of other trades.
- 9. Fire separations:
  - .1 Construct gypsum board assemblies, where located, in accordance with tested assemblies to obtain required or indicated fire rated assemblies. As a minimum fire separations shall consist of metal framing covered on both sides by fire-rated gypsum board.
  - .2 Install assemblies tightly to enclosing constructions to maintain integrity of the separations. Install casing beads at all perimeter edges.

### 3.9 LAMINATED ACOUSTIC TILES

- .1 Install acoustic tile, gypsum board and adhesive materials in accordance with reviewed Shop Drawings, manufacturer's written instructions and to the satisfaction of the Consultant.
- .2 Install acoustic tile over gypsum board with adhesive as recommended by gypsum board manufacturer at intended ceiling assembly to provide a seamless and continuous appearance with existing ceiling assembly.
- .3 Apply adhesive to back of acoustic uniformly using a manufacturer recommended trowel. Allow adhesive to dry tacky to the touch.
- .4 Offer tiles to gypsum board substrate and ensure full adhesion.
- .5 Remove adhesive seepage while adhesive is still wet, in accordance with manufacturer's recommendation.

### 3.10 SHAFTWALL LINER

- .1 Plan and lay out metal framing components to ensure that all wall sections are plumb and properly aligned.
- .2 Install J-track along the ceiling line and vertically at columns and abutting partitions, positioning the long legs closest to the shaft, using powder actuated fasteners or other approved method. Secure each piece with the appropriate fasteners spaced a maximum 610 mm O.C.
- .3 Attach J-track to the floor with fasteners spaced at 610 mm O.C.
- .4 Install Shaftliner panels vertically. The leading edge of the first panel must be attached to the long leg of the vertical J-track with 41 mm Type S screws spaced 610 mm O.C. Secure the top and bottom edges using the same fasteners and spacing.
- .5 Friction-fit C-H stud into the top and bottom tracks and slide it snugly against the Shaftliner panel. Make sure the edge of the board is in full contact with the centre web of the stud and covered by all the tabs.
- .6 Place the next Shaftliner panel between the tabs and flange on the opposite side of the C-H stud and secure it to the top and bottom track with 41 mm Type S screws spaced 610 mm O.C.
- .7 Install subsequent Shaftliner panels and C-H studs in the same manner. Check periodically to ensure they are plumb.
- .8 At the end of a partition run, cut the last Shaftliner panel slightly narrower and shorter than the opening to facilitate installation.

- .9 For walls exceeding 3.7 m in height, Shaftliner panel end joints shall fall alternately in the upper and lower 1/3 of the partition. Use a C-H stud placed horizontally between panels to secure each joint.
- .10 Frame all cut openings in the shaft side with J-track, providing adequate structural support for openings over 1219 mm.

### 3.11 **CORNER, CASING BEADS AND TRIM**

- .1 Corner reinforcing bead: Install along all external angles, erect plumb, level and with a minimum of joints. Secure with screws at 225 mm o.c. apply filler over flanges flush with nose of the bead and extending at least 75 mm onto surface of board each side of corner. When filler dries, apply a thin coat of topping cement and blend onto adjoining surfaces.
- .2 Casing bead: Install where wallboard butts against a surface having no trim concealing the juncture and where shown on drawings. Erect casing beads plumb or level, with minimum joints, and secure with screws at 300 mm o.c. apply filler over flange flush with bead and extending at least 75 mm onto surface of board. When dry, apply a thin coat of topping cement and blend onto adjoining surfaces.
- .3 Recess channels and trim: Install recess channels and special metal trim where shown. Secure to substrate. Provide casing beads full height on wallboard edges at recess channels and metal trim.
- .4 Mullion closures:
  - .1 Install mullion closures in accordance with reviewed shop drawings, manufacturer's written instructions and to meet intended STC ratings.
  - .2 Measure and cut mullion closures to proper lengths.
  - .3 Notch around horizontal mullions, sills, or other obstructions leaving appropriate gap for differential movement between mullion closure and obstruction.
  - .4 Securely fasten and apply sealant at closures as recommended by manufacturer.

### 3.12 **JOINT TAPING AND FINISHING**

- .1 Install reinforcing tape and a minimum of 3 coats of joint compound over gypsum board joints, metal trim and accessories, and screw fasteners in accordance with the gypsum board manufacturer's instructions.
- .2 Fill gaps between ,and any imperfections in, gypsum boards with joint compound, allow to dry, and sand smooth ready for painting.
- .3 Install finished gypsum board work smooth, seamless, plumb, true, flush, and with square, plumb, and neat corners.

- .4 Finish gypsum board in accordance with ASTM C840 to the following grades:
  - .1 Level 0: No taping, finishing, or accessories required. Use above suspended ceilings and within other concealed spaces, unless the assembly is fire rated, sound rated, sound or smoke controlled, or unless the space serves as an air plenum.
  - .2 Level 1: At joints and interior angles embed tape in joint compound. Leave surface free of excess joint compound. Tool marks and ridges are acceptable. Use above suspended ceilings and within other concealed spaces if the gypsum board assembly is fire rated, sound rated, sound or smoke controlled, or the space serves as an air plenum.
  - .3 Level 2: At joints and interior angles embed tape in joint compound with one separate coat of joint compound applied over joints, angles, fastener heads, and accessories. Use for water resistant gypsum board indicated for use as a substrate for ceramic tile.
  - .4 Level 3: At joints and interior angles embed tape in joint compound with two separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply joint compound smooth and free of tool marks and ridges. Use where heavy grade wall coverings are the final decoration.
  - .5 Level 4: At joints and interior angles embed tape in joint compound with three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply joint compound smooth and free of tool marks and ridges. Use for all locations except those indicated for other finish levels.
  - .6 Level 5: At joints and interior angles embed tape in joint compound with three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply a thin skim coat of joint compound, or a material manufactured especially for this purpose, to the entire surface. Leave surface smooth and free of tool marks and ridges. Use where semi-gloss or gloss finish coatings are the final decoration.

### 3.13 **WOOD CEILING SYSTEMS**

- .1 Provide ceiling framing system as required to support wood veneer ceiling panels provided under Section 06 20 00.
- .2 Coordinate with work of noted Section as required for stud framing and subframing, installed as part of the work of this Section. Final installation coordination and tolerances are deemed to be joint responsibility by this Section and Section 06 20 00.
- 3. Install ceiling framing system and associated components in accordance with reviewed Shop Drawings, manufacturer's written instructions and to the satisfaction of the Consultant.

### 3.14 **ACCESS DOORS**

- .1 Install access doors, supplied as part of other parts of the work, in accordance with manufacturer's written instructions.

3.15      **SITE TOLERANCES**

- .1      Install metal support systems to ensure that, within a tolerance of +3 mm and -1.5 mm for plaster thickness, finish surfaces will be flat within 3 mm under a 3 m straightedge, and with no variation greater than 1.5 mm in any running 300 mm, and that surface planes shall be within 3 mm of dimensioned location.

3.16      **WORK IN EXISTING AREAS**

- .1      In existing areas, where existing gypsum board work has been demolished and/or damaged and repair work is required, provide new gypsum board finish.
- .2      Thoroughly prepare areas to be repaired. Provide neat, clean and straight cuts.
- .3      Finish all repair work as specified for new work.
- .4      In existing areas where existing openings are to be filled in with gypsum board, provide new gypsum board wall and ceiling construction. Ensure new board faces are flush with faces of abutting existing walls and ceilings.

3.17      **REPAIR**

- .1      Make good cut-outs for services and other work, fill in defective joints, holes and other depressions with joint compound.
- .2      Make good defective work, and ensure that surfaces are smooth, evenly textured and within specified tolerances to receive finish treatments.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for decorative trowelled finish work in accordance with the Contract Documents.

1.2 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, limitations, and trouble-shooting protocol.
    - .2 Product transportation, storage, handling and installation requirements.
- .2 Samples:
  - .1 Submit following samples in accordance with the Conditions of the Contract.
    - .1 Two 300 x 300 mm samples of decorative trowelled finish, demonstrating texture and colour for the Consultant's review.
- .3 Closeout submittals: Submit maintenance instructions for decorative trowelled finishes for incorporation into Operations and Maintenance Manuals in accordance with the Conditions of the Contract.

1.3 **QUALITY ASSURANCE**

- .1 Installers qualifications: Perform work of this Section by a company that has a minimum of five years proven experience in the application of decorative trowelled finish work of a similar size and nature and that is approved by manufacturer.
- .2 Mock-up:
  - .1 Construct one 1 m<sup>2</sup> mock-up of decorative trowelled finish, in location acceptable to Consultant.
  - .2 Demonstrate levelling and filling of small holes and localized patching of larger holes.
  - .3 Demonstrate trowelled finish application techniques, colour, texture and workmanship.
  - .4 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with work.
  - .5 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
  - .6 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.



1.4 **DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver materials in original unopened packages, with each package bearing legible labels identifying manufacturer, product name and grade, contents, colour and product standard.
- .2 Store materials in cool, dry locations, out of sunlight, protected from weather and damage, in compliance with manufacturer's storage instructions.

1.5 **SITE CONDITIONS**

- .1 Do not install work of this Section outside of manufacturer recommended environmental ranges without Consultant's and Product manufacturer's written acceptance.
- .2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 24 hours before, during, and 24 hours after application.

2 Products

2.1 **MATERIALS**

- .1 Decorative trowelled finish:
  - .1 Levelling/filler compound: Elastomeric compound compatible with substrate and system, type as recommended by finish manufacturer.
  - .2 Decorative trowelled finish:
    - .1 Seamless, waterproof, acrylic and cement-based, decorative microtopping, trowelled finish in colour 'Silver Grey'.
    - .2 Acceptable Product: 'Solidro Acrylic Microcement' by Ideal Work or approved alternative.
- .2 Water: Clean, fresh, potable, and free of mineral or organic matter which can affect plaster.

2.2 **MIXES**

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

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

### 3.2 **PREPARATION**

- .1 Prepare intended substrates in accordance with manufacturer's written instructions.
- .2 Verify substrate surfaces are solid, free from surface water, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance.
- .3 Prior to applying over intended surfaces, remove all deleterious material. Ensure intended substrate is free of adhesive, chemicals or other foreign matter that would affect the bond of the new trowelled finish.
- .4 Apply a skim coat of a manufacturer recommended elastomeric compound to level the surface and to fill small holes. Where large holes are present, conduct localized patching as required to provide a smooth and level surface.
- .5 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from work of this Section. Do not plaster adjacent to aluminum or other finished work until such work is masked.

### 3.3 **INSTALLATION**

- .1 Apply decorative trowelled finish in accordance with manufacturer's written instructions, to a minimum thickness of 2 mm.
- .2 Comply with material manufacturer's requirements and recommendations regarding termination of work each day and when resuming work.
- .3 Apply trowelled finish with manufacturer recommended trowel, to achieve intended texture and overall aesthetic to match Consultant approved samples and approved mock-up.
- .4 Apply trowelled finish continuous across wall areas, starting and ending at natural breaks in the surface, such as expansion joints, control joints, termination points, and corners.
- .5 Avoid excessive working of surface.

### 3.4 **REPAIR**

- .1 Touch up and refinish minor defective areas. Refinish entire coated surface where finish is damaged or otherwise unacceptable.

3.5            **CLEANING**

- .1        Remove promptly as application progresses spilled or spattered materials from adjacent surfaces. Do not mar surfaces while removing.
- .2        Leave storage and mixing areas clean and in same condition as equivalent spaces in Project.

3.6            **PROTECTION**

- .1        Protect finished adjoining work, during execution of decorative trowelled finish work, with polyethylene sheets or similar protection.
- .2        Remove surplus material, tools, equipment and debris from work area on completion of work.

END OF SECTION

- 
- 1 General
- 1.1 **SECTION INCLUDES**
- .1 Labour, Products, equipment and services necessary for tile work in accordance with the Contract Documents.
- 1.2 **REFERENCES**
- .1 ANSI A108/A118/A136.1, Installation of Ceramic Tile.
- .2 ANSI A137.1, Specifications for Ceramic Tile.
- .3 ASTM C144, Specification for Aggregate for Masonry Mortar.
- .4 CAN/CSA A3000, Cementitious Materials Compendium.
- .5 TTMAC Specification Guide 09 30 00 Tile Installation Manual.
- .6 TTMAC, Maintenance Guide.
- 1.3 **SUBMITTALS**
- .1 Product data:
- .1.1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
- .1.1.1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations and warranties.
- .1.1.2 Product transportation, storage, handling and installation requirements.
- .2 Shop drawings:
- .2.1 Submit shop drawings in accordance with the Conditions of the Contract indicating:
- .2.1.1 Tile layout, patterns, and colour arrangement.
- .2.1.2 Perimeter conditions, junctions with dissimilar materials.
- .2.1.3 Setting details.
- .3 Samples:
- .3.1 Submit following sample panels in accordance with the Conditions of the Contract.
- .3.1.1 Each colour, texture, size, and pattern of tile.
- .3.1.2 Adhere tile samples to 400 x 400 x 12.5 mm thick cement board complete with selected grout colour in joints.
- .4 Certificates: Submit manufacturer's certificates stating that materials supplied are in accordance with this specification.

- .5 Closeout submittals: Submit recommended maintenance instructions and listing of recommended maintenance Products for incorporation into Operations and Maintenance Manuals in accordance with the Conditions of the Contract.

- .6 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

#### 1.4 **QUALITY ASSURANCE**

- .1 Perform work of this Section by a company that is a member in good standing of the Terrazzo Tile and Marble Association of Canada with proven, acceptable experience on installations of similar complexity and scope.

#### 1.5 **DELIVERY, STORAGE AND HANDLING**

- .1 Deliver materials in adequate crates or containers with manufacturer's name and product description clearly marked.
- .2 Handle and store tiles in a manner to avoid chipping, breakage or the instruction of foreign matter. Take precautions to protect the mortar and grout admixtures from freezing or from excessive heat.

#### 1.6 **SITE CONDITIONS**

- .1 Do not install work of this Section outside of the following environmental ranges without the Consultant's and Product manufacturer's written acceptance:
  - .1 Ambient air and surface temperature: 15<sup>0</sup>C to 45<sup>0</sup>C.
  - .2 Precipitation: None.
- .2 Install temporary protection and facilities to maintain the Product manufacturer's, and specified, environmental requirements for 7 Days before, during, and 7 Days after installation.

#### 1.7 **MAINTENANCE**

- .1 Submit extra tile amounting to 3% of gross area covered, allowing proportionately for each pattern and type specified and which are part of the same Production run as installed Products. Store maintenance Products as directed by the Consultant.

2 Products

2.1 **MATERIALS**

- .1 General: All materials under work of this Section, including but not limited to, sealants, adhesives, and sealers are to have low VOC content limits.
- .2 Tile:
  - .1 To ANSI A137.1.
  - .2 Supply coves, caps, inside and outside corners and bullnose tile as required.
  - .3 Where unfinished tile edge is exposed, supply cap to Consultant's selection.
  - .4 Tile types:
    - .1 Porcelain wall tile (PCT-1): Minimum 9 mm thick, porcelain wall tiles sized at 117 x 600 mm, in matte finish, 'Join' in colour 'Ink' by Stone Tile International or approved alternative.
    - .2 Ceramic wall tile (CT-1): Minimum 8 mm thick, ceramic wall tiles sized at 50 x 250 mm, in matte finish, 'Kyushu' in colour 'Bianco' by Stone Tile International or approved alternative.
- .3 Tile base: Tile base to match wall tile (PCT-1). Height as shown.
- .4 Wall edge and tile base cap protection: Stainless steel edge, continuous at all exposed tile edges, depth as required to suit tile thickness. 'Schiene-E' by Schluter Systems or approved alternative.

2.2 **ACCESSORIES**

- .1 Cement: CAN/CSA A3000, Type GU.
- .2 Sand: ASTM C144.
- .3 Water: Potable and free of minerals and other contaminants which are detrimental to mortar and grout mixes.
- .4 Polymer additive: 'Mortar Admix' by Custom Building Products, 'Keralastic' by Mapei Inc or approved alternative by Flextile Ltd. or Laticrete International.
- .5 Thin-set mortar: 2 component to ANSI A108/A118/A136.1:
  - .1 'Prolite Premium LFT Mortar' by Custom Building Products, '56SR/51 w/44' by Flextile Ltd., '254/255' by Laticrete International or 'Kerabond with Keralastic Latex Additive' by Mapei Inc.
  - .2 White coloured mortar shall be provided at appropriate tile types including, but not limited to; glass tile, light coloured marble, green marble and light coloured granite.
- .6 Primer: To meet specified requirements of adhesive manufacturer.

- .7 Cleaner: In accordance with TTMAC's requirements and as recommended by tile manufacturer.
- .8 Epoxy grout:
  - .1 ANSI A108/A118/A136.1, Non-sag additive for work on vertical surfaces, Epoxy grout material shall be non-toxic, low odour, water cleanable and stain resistant. 'CEG-Lite' by Custom Building Products, '110 flex' by Flextile Ltd., 'Spectralock' by Laticrete International, or 'Kerapoxy CQ' by Mapei Inc.
  - .2 Grout colours:
    - .1 Grout colour (Type 1): Grey colour to match Consultant approved samples, for use with PCT-1.
    - .2 Grout colour (Type 2): To match tile colour and Consultant approved samples, for use with CT-1.
- .9 Tile sealant: In accordance with Section 07 92 00.

## 2.3 MIXES

- .1 Levelling bed mix:
  - .1 1 part Portland cement.
  - .2 4 parts sand.
  - .3 1 part water (including polymer additive), adjusted for water content of sand.
  - .4 1/10 part polymer additive.

## 3 Execution

### 3.1 EXAMINATION

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

### 3.2 SURFACE PREPARATION

- .1 Clean and dry surfaces thoroughly. Remove oil, wax, grease, dust, dirt, paint, tar, primers, form release agents, curing compound, and other foreign material from substrate surfaces which may prevent or reduce adhesion.
- .2 Neutralize any trace of strong acids or alkali from the substrate.

### 3.3 CONTROL JOINTS

- .1 Provide control, expansion and isolation joints in accordance with TTMAC specification 301MJ and as indicated on drawings. Install in locations indicated on drawings and specified herein.
- .2 Continue control, construction, and cold joints in the structural substrate up through the tile finish, and align with mortar joints where possible. Review joint locations on Site with the Consultant.
- .3 Install joint widths to match grout joint widths, except where a minimum width is indicated.
- .4 Install control joints in the following typical locations:
  - .1 Aligned over changes in type of substrate.
  - .2 At the restraining perimeters such as walls and columns.
  - .3 Interior areas (not subject to sunlight): 6 mm minimum width, at 7320 mm o.c. maximum.
  - .4 Interior areas (subject to sunlight): 6 mm minimum width, at 3660 mm o.c. maximum.
  - .5 As indicated on the Contract Drawings.
- .5 Seal control joints in accordance with Section 07 92 00.

### 3.4 LEVELLING BED

- .1 Install a levelling bed on uneven substrate surfaces, level and plumb substrates in accordance with the following tolerances:
  - .1 Vertical surfaces: 3 mm in 2.4 m maximum.
- .2 Clean structural substrate control joints and blow-clean with compressed air. Grout fill control joints flush to slab with levelling bed.

### 3.5 GENERAL INSTALLATION REQUIREMENTS

- .1 Install tiles in accordance with manufacturer's instructions and TTMAC Specification Guide 09 30 00 Tile Installation Manual. Manufacturer's installation instructions govern over TTMAC Installation Manual.
- .2 Lay out work to produce a symmetrical pattern with minimum amount of cutting. Ensure cut tile at room perimeter and at joints is not less than ½ full size.
- .3 Install trim to be placed under tile in locations indicated on Drawings.
- .4 Set tiles in place and rap or beat with a beating block as necessary to ensure a proper bond and to level surface. Align tile for uniform joints and allow to set until firm. Clean excess mortar from surface of tile with a wet cloth or sponge while mortar is fresh.



- .5 Ensure following minimum mortar contact coverage to back of tiles. Contact must be evenly distributed to give full support of the tile.
  - .1 98% for large format (305 mm x 305 mm or greater) interior applications.
  - .2 90% for non-large format interior applications.
- .6 Adjust joints between units uniform, plumb, straight, even, and true, with adjacent tile flush. Align grout joints in both directions unless indicated otherwise.
- .7 Align base and wall grout joints.
- .8 Install tile accessory fittings for a complete and fully coordinated tile assembly.
- .9 Install wall tile full height unless indicated otherwise.
- .10 Do not place tile, trim, and accessories over control, expansion, or isolation joints. Stop materials in either side on joints and provide control, expansion and isolation joints as specified.
- .11 Cut and fit tile neatly around piping, fittings, joints, projections and around recesses items e.g. washroom accessories. Where surface mounted equipment and accessories are installed on tile surfaces, extend tile over surfaces. Cut edges smooth, even, and free from chipping; chipped and broken edges are not acceptable.
- .12 Do not proceed with grouting until minimum 48 hours after tile has set, to prevent displacement of tiles.
- .13 Apply each specified grout in accordance with grout manufacturer's directions to produce watertight, filled joints without voids, cracks and excess grout. Thoroughly compact and tool grout. Finish grout flush to edge thickness of tile and remove excess grout with soft burlap or sponge moistened with clean water.

### 3.6 **CLEANING**

- .1 Clean off excess grout with soft burlap or sponge moistened with clean water.
- .2 Polish wall tile after grout has cured in accordance with TTMAC recommendations in the Maintenance Guide; do not use acid for cleaning.
- .3 Re-point joints after cleaning as required to eliminate imperfections, then re-clean as necessary. Avoid scratching tile surfaces.

### 3.7 **JOINT BACKING AND TILE SEALANT**

- .1 Install joint backing and sealant in accordance with Section 07 92 00.

3.8            **PROTECTION**

- .1        Protect tiled assemblies for 72 hours minimum, after final installation.
- .2        Prevent direct impact, vibration and heavy hammering on adjacent and opposite walls for 24 hours minimum, after final installation.
- .3        Cover work temporarily with building paper properly lapped and taped at joints until work has been approved by Consultant.

END OF SECTION

- 
- 1 General
  - 1.1 **SECTION INCLUDES**
    - .1 Labour, Products, equipment and services necessary for detectable/tactile indicators work in accordance with the Contract Documents.
  - 1.2 **REFERENCES**
    - .1 ISO 23599, Assistive Products for Blind and Vision-Impaired Persons - Tactile Walking Surface Indicators.
  - 1.3 **DESIGN REQUIREMENTS**
    - .1 Design detectable/tactile warning surface system conforming to ISO 23599.
  - 1.4 **SUBMITTALS**
    - .1 Product data:
      - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
        - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations and warranties.
        - .2 Product transportation, storage, handling and installation requirements.
    - .2 Shop drawings:
      - .1 Submit shop drawings in accordance with the Conditions of the Contract indicating:
        - .1 Perimeter conditions, junctions with dissimilar materials.
        - .2 Setting details.
    - .3 Samples: Submit two 300 x 300 mm samples of each type of detectable/tactile warning surfaces in accordance with the Conditions of the Contract.
    - .4 Closeout submittals: Submit recommended maintenance instructions and listing of recommended maintenance Products for incorporation into Operations and Maintenance Manuals in accordance with the Conditions of the Contract.
  - 1.5 **DELIVERY, STORAGE AND HANDLING**
    - .1 Deliver materials in adequate crates or containers with manufacturer's name and product description clearly marked.
    - .2 Handle and store tactile warning surfaces in a manner to avoid chipping or breakage. Take precautions to protect the adhesives from freezing or from excessive heat.

1.6 **SITE CONDITIONS**

- .1 Do not install work of this Section outside of the following environmental ranges without the Consultant's and Product manufacturer's written acceptance:
  - .1 Ambient air and surface temperature: Minimum 40°F.
  - .2 Precipitation: None.
- .2 Install temporary protection and facilities to maintain the Product manufacturer's, and specified, environmental requirements for 7 Days before, during, and 7 Days after installation.

1.7 **MAINTENANCE**

- .1 Submit extra tactile warning surfaces amounting to 3% of gross area covered, allowing proportionately for each pattern and type specified and which are part of the same Production run as installed Products. Store maintenance Products as directed by the Consultant.

2 Products

2.1 **MATERIALS**

- .1 All materials under work of this Section, including but not limited to, sealants and adhesives are to have low VOC content limits.
- .2 Tactile attention indicators (TAI):
  - .1 Provide 4 mm high tactile warning dome indicators, in Type 316L, marine grade, stainless steel with non-slip concentric rings, with top diameter of 22 mm and base shaft height of 18 mm, arranged in intended pattern.
  - .2 Individual domes, Advantage One Concentric Ring 316L Stainless Steel Dome (ADV-D-1281-N) by Advantage Tactile Systems or approved alternative.
  - .3 Adhesive: Type as recommended by tactile dome manufacturer.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

### 3.2 **PREPARATION**

- .1 Prepare substrate using steel aggregate blast method and vacuum substrate free of debris and dust.
- .2 Fill minor cracks and voids and prime surfaces in accordance with manufacturer's recommendations.
- .3 Protect adjacent surfaces from damage resulting from this work. Mask and/or cover adjacent surfaces, fixtures, and equipment as necessary.
- .4 Clean, prime and seal surfaces as recommended by detectable tactile warning surfaces manufacturer.

### 3.3 **DOMES INDICATOR INSTALLATION**

- .1 Install tactile dome indicators in accordance with manufacturers written instructions using adhesive and to conform to standards and intended pattern.
- .2 Set indicators true and square to areas as detailed on drawings.
- .3 Lay template material out over intended floor surface to receive indicators and secure in place.
- .4 Drill a hole true and straight to a depth of 25 mm using appropriate size drill to match shaft of tactile indicator being installed.
- .5 Anchor template as required to prevent movement of template prior to drilling remainder of holes.
- .6 Move and situate template as required to create repeatable patterns or for installation in multiple locations.
- .7 Vacuum or sweep dust following drilling of each hole.
- .8 Apply adhesive to fill a quarter ( $\frac{1}{4}$ ) of the drilled hole in accordance with adhesive manufacturer's written instructions.
- .9 Insert indicator firmly into hole.
- .10 Remove excess adhesive around indicator's perimeter.

**3.4 CLEANING AND PROTECTION**

- .1 Clean tactile warning surfaces in accordance with manufacturer's written instructions.
- .2 Prevent traffic over new installed detectable/tactile warning surfaces and protect for 24 hours minimum, after final installation.
- .3 Cover work temporarily with plywood until work has been approved by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Design, labour, Products, equipment and services necessary for acoustical ceiling work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .2 ASTM C635, Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- .3 ASTM C636, Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
- .4 ASTM C645, Specification for Non-Load Bearing (Axial) Steel Studs, Runners (Tracks), and Rigid Furring Channels for Screw Application of Gypsum Board.
- .5 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .6 ASTM E1264, Classification for Acoustical Ceiling Products.
- .7 CAN/ULC S102, Surface Burning Characteristics of Building Materials and Assemblies.

1.3 **DESIGN REQUIREMENTS**

- .1 Design ceiling suspension systems in accordance with ASTM C636 and manufacturer's printed directions.
- .2 Design tile ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority. Acoustic panel system is not designed to carry the weight of electrical equipment.
- .3 Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.
- .4 Design tile suspension system to support weight of mechanical and electrical items such as air handling boots and lighting fixtures, and with adequate support to allow rotation/relocation of light fixtures. Acoustic panel system is not designed to carry the weight of mechanical and electrical equipment.
- .5 Design subframing as necessary to accommodate, to avoid conflicts and interferences where ducts or equipment prevent regular spacing of hangers.

#### 1.4 SUBMITTALS

- .1 Shop drawings:
  - .1 Submit shop drawings in accordance with the Conditions of the Contract indicating:
    - .1 Suspension system layout including hangers and supports for acoustic tile system.
    - .2 Acoustic panel system including suspension system, hangers, supports and panel sizes and locations.
    - .3 Conditions at abutting, intersecting, and penetrating construction.
    - .4 Dimensioned locations of lighting fixtures, diffusers, sprinkler heads and other items that pierce the ceiling plane.
- .2 Samples:
  - .1 Submit following samples in accordance with the Conditions of the Contract:
    - .1 One full-size sample of each type of tile panels to be used.
    - .2 One of each type of suspension system members.
- .3 Certificates: Submit written certification stating that suspended ceiling system is designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

#### 1.5 QUALITY ASSURANCE

- .1 Mock-up:
  - .1 Construct one 2 m<sup>2</sup> mock-up for each type of ceiling system incorporating typical light fixture and other typical mechanical and electrical fixtures.
  - .2 Test the adequacy of the suspension system to support the fixtures without deflection of ceiling or failure of hanging wire anchorage. Supply copy of Test Results to Consultant.
  - .3 Change materials and installation methods if tests indicate proposed system is inadequate and re-test as necessary until system approved.
  - .4 Give early notice to Consultant and Mechanical and Electrical Trades and co-operate with them in selecting suitable location for sample ceiling and timing of installation and test.
  - .5 Do not commence general installation work until sample ceiling approved, then install ceiling to conform with approved samples.
  - .6 Mock-up may form part of final Work, if acceptable to Consultant. Remove and dispose of mock-ups which do not form part of Work.

#### 1.6 SITE CONDITIONS

- .1 Do not install the work of this Section until:
  - .1 Mechanical and electrical work above the ceiling is complete.
  - .2 Relative humidity is below 80 %.
  - .3 Ventilation is adequate to remove excess moisture.
  - .4 Areas are closed and protected against weather, and maintained at no less than 10°C.



- .2 Install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements 24 h before, during, and after installation.

## 1.7 MAINTENANCE

- .1 Submit extra acoustic ceilings amounting to 2% of gross ceiling area, allowing proportionately for each pattern and type specified to nearest full carton. Submit Products which are part of same production run as installed Products. Store maintenance Products as directed by Consultant.

## 1.8 DELIVERY, STORAGE AND HANDLING

- .1 Transport, handle and store material in manner to prevent warp, twist, damage to panel edges and surfaces in accordance with Manufacturer's recommendations.
- .2 Any warped and/or damaged panels and trim shall be rejected and be replaced by new, straight, undamaged and acceptable material at no cost to Owner.
- .3 Bent, twisted or otherwise damaged Tee grid suspension components shall not be used under any circumstances. Replace such damaged items with new undamaged material at no additional cost to Owner.
- .4 Store material in warm, dry place away from water and the elements. Protect against undue loading stresses and shock.
- .5 All packaged material shall be delivered in original manufacturers wrappers and containers with labels and seals intact. All cartons shall bear U.L. label.

## 2 Products

### 2.1 MATERIALS

- .1 Galvanized steel sheet: ASTM A653/A653-M, Z275; cold rolled, galvanized steel sheet.
- .2 Main carrying channels: ASTM C645; Channels formed from galvanized steel sheet, 38 x 19 mm cold rolled.
- .3 Subframing: ASTM C645; Channels formed from galvanized steel sheet, dimensions and spans as required.
- .4 Hangers: 2.6 mm minimum diameter, galvanized steel wire.
- .5 Tie wire: 1.6 mm minimum diameter, soft annealed galvanized steel wire.
- .6 Concrete anchors: tie wire sleeve anchors, 'Redi-Drive Anchors' by ITW Red Head or approved alternative.

- .7 Wall mouldings and accessories, including but not limited to, corner caps, edge mouldings, panel hold over clip, metal closures, and trim. Finish and colour: same as main tees.
- .8 Exposed main, cross tees, and relocatable cross tees: ASTM C635, 38 mm high steel, bulb tee design double steel web, rectangular single spans without exceeding a deflection of 1/360 of the span. Splices to be integral and reversible; cross tee interlocking into main tee. Colour and finish: Manufacturer's standard white.
  - .1 15/16" suspension system:
    - .1 Provide specified 15/16" galvanized steel suspension system, complete with integral gasket.
    - .2 Acceptable Product:
      - .1 'Clean Room Co-Extruded Steel (Gasketed)' by Armstrong World Industries Inc.
      - .2 Or approved alternatives by CGC Inc., Certainteed Ceilings Canada or Rockfon/Chicago Metallic.
- .9 Acoustic tiles (ACT-1, 1A & 2):
  - .1 ASTM E1264, type A, Form A2.2, Pattern E, Class A rated to ASTM E84 and CAN/ULC-S102. 19 mm thick, wet-formed mineral fiber with acoustically transparent water-repellent membrane and factory-applied latex paint, with fine texture finish, square edge.
  - .2 Acoustic tile, 'Ultima Health Zone' by Armstrong World Industries Inc. or approved alternative by CGC Inc., Certainteed Ceilings Canada or Rockfon/Chicago Metallic
  - .3 Acoustic tile types and sizes:
    - .1 ACT-1: 610 x 610 mm.
    - .2 ACT-1A: 610 x 610 mm, complete with 50 mm thick acoustic insulation.
    - .3 ACT-2: 610 x 1220 mm.
- .10 Perimeter reveal trims:
  - .1 Trim fabricated from commercial quality extruded aluminum alloy 6063 perimeter trim.
  - .2 Factory finished in applied baked polyester paint finish, in manufacturer's standard finish and colour to match tee suspension system.
  - .3 50 mm, 'Axiom Classic Trim' by Armstrong World Industries by approved alternative by CGC Inc., Certainteed Ceilings Canada or Rockfon/Chicago Metallic.
- .11 Acoustical insulation: In accordance with Section 07 21 00.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **SUSPENSION SYSTEM**

- .1 Coordinate locations and openings of mechanical and electrical services support, and penetration through the acoustical ceilings. Coordinate field conditions, clearances, measurements, and mechanical and electrical services testing and commissioning, above the acoustical ceilings.
- .2 Install hanger wires plumb and securely anchored to the building structural framing, independent of walls, pipes, ducts, and metal deck; install additional framing and hangers to bridge interference items.
- .3 Install acoustical ceiling systems in accordance with manufacturer's written instructions, reviewed shop drawings, and ASTM C636, listed in order of precedence.
- .4 Install hanger wires at 1200 mm maximum centres along carrying channels, not less than 25 mm, and not more than 150 mm from channel ends.
- .5 Install additional hangers at lighting fixture and air distribution ductwork locations. Do not attach hanger wires to mechanical or electrical equipment. Do not support mechanical and electrical fixtures and fitting on ceiling without the ceiling manufacturer's written acceptance.
- .6 Install acoustical ceiling suspension system to a tolerance of 1:1200 of span and 0.4 mm maximum between adjacent metal members. Tolerances are not cumulative. Refer to Electrical Contract Drawings for fixture layout.
- .7 Do not bend or twist hangers as a means of levelling. Form double loops tightly and lock to prevent vertical movement or rotation within the loop.
- .8 Install edge moulding at intersection of ceiling and vertical surfaces.
- .9 Centre acoustical ceiling suspension systems on room axis; install equal border pieces. Install hangers onto the ends of main tee runners at not more than 150 mm from ends of runners, adjacent and perpendicular to walls.
- .10 Support the suspension system independently of walls, columns, ducts, pipes and conduits.

- .11 Install main runners in maximum available lengths. Layout joints in suspension members to avoid the perimeters of recessed fixtures. Lock grid members to form a rigid assembly. Install additional tee, suspension system framing around recessed fixtures, diffusers, grilles and other items for a complete assembly.

### 3.3 **ACOUSTIC LAY-IN TILES**

- .1 Install acoustic tile in grid system openings supported by bottom flanges of members. Provide special shapes and sizes to provide a complete installation by cutting tile to fit into openings. Fit tile moderately tight between upright legs of members.
- .2 Carefully cut and trim acoustic tiles to accommodate items piercing the finished ceiling plane.
- .3 Remove and replace acoustic tiles with broken edges, or damaged, marked, discoloured, soiled, or stained faces.

### 3.4 **ACOUSTIC INSULATION**

- .1 Provide acoustic insulation above full area of ceiling spaces, including integral vertical surfaces in locations indicated. Thickness as indicated.
- .2 Ensure that sound blankets are installed in accordance with manufacturers written instructions to ensure complete monolithic coverage to insulated spaces.

### 3.5 **ADJUSTMENTS AND CLEANING**

- .1 Clean soiled or discoloured surfaces of exposed work on completion of work.
- .2 Replace components which are visibly damaged, marred or uncleanable.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for resilient base work and accessories in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM F1861, Specification for Resilient Wall Base.

1.3 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
    - .2 Product transportation, storage, handling and installation requirements.
  - .2 Samples: Submit two 250 mm long samples of resilient base in accordance with the Conditions of the Contract.
  - .3 Closeout submittals: Submit maintenance and cleaning data for incorporation into Operations and Maintenance Manuals in accordance with the Conditions of the Contract.

1.4 **SITE CONDITIONS**

- .1 Maintain air temperature and structural base temperature at installation area above 20°C for 48 hr before, during and 48 hr after installation.
- .2 Store materials for 2 days prior to installation in area of work to achieve temperature stability.
- .3 Do not install base in conditions of high humidity or where exposed to cold drafts. In hot weather, protect from direct sunlight.
- .4 Provide adequate ventilation during installation.

1.5 **MAINTENANCE**

- .1 Submit extra 5% or to nearest full roll of each colour, pattern and type of base required for maintenance use. Identify each carton. Store where directed.

2 Products

2.1 **MATERIALS**

- .1 All materials under work of this Section, including but not limited to, adhesives are to have low VOC content limits.
- .2 Resilient base (RB):
  - .1 ASTM F1861, Type TV, Group 1, vinyl wall base, approximately 102 mm high x 3 mm thick, coved profile, in lengths as long as possible including premoulded end stops and inner and outer corners.
  - .2 Resilient base types and colours:
    - .1 Resilient base (RB-1) type in colour 'Dover (TB3)'.
    - .2 Resilient base (RB-2) type in colour 'Black (40)'.
  - .3 Acceptable Product: 'Johnsonite Traditional Vinyl 1/8" (Type TV)' by Tarkett or approved alternative.
- .3 Filler compound: Type as recommended by base manufacturer.
- .4 Adhesives: Low VOC, waterproof, recommended by base manufacturer for specific material on applicable substrate, above, at or below grade.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.
- .2 Defective work resulting from application to unsatisfactory surfaces will be considered the responsibility of those performing the work of this Section.

3.2 **RESILIENT BASE APPLICATION**

- .1 Install resilient base in accordance with manufacturer's written instructions.
- .2 Lay out base to keep number of joints at minimum.
- .3 Prior to installing base, fill cracks and irregularities with a filler recommended by base manufacturer.
- .4 Set base in adhesive using a 3 kg hand roller, against wall and floor surfaces.
- .5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions.

.7 Cope internal corners.

3.3 **CLEANING**

.1 Forty-eight hours after installation, clean resilient base surfaces with a mild soap solution approved by finish manufacturer.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for resilient sheet flooring work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
- .2 ASTM F1516, Standard Practice for Sealing Seams of Resilient Floor Products by the Heat Weld Method.
- .3 ASTM F1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- .4 ASTM F1913, Standard Specification for Vinyl Sheet Floor Covering Without Backing.
- .5 ASTM F 2170, Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes.

1.3 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
    - .2 Product transportation, storage, handling and installation requirements.
- .2 Shop drawings: Submit shop drawings indicating seam layout and welding procedures in accordance with the Conditions of the Contract.
- .3 Samples:
  - .1 Submit samples in accordance with the Conditions of the Contract:
    - .1 Two 250 x 200 mm samples of each type of sheet material and colour.
    - .2 Two 250 mm long samples of each accessory and colour.



- .4 Certificates and reports: Prior to proceeding with installation, submit the following:
  - .1 Manufacturer's certificate stating that moisture content of concrete subfloor is in accordance with manufacturer's requirements and is suitable for flooring installation.
  - .2 Report indicating test results of moisture content tests substantiating compliance with manufacturer's requirements.
- .5 Extended warranties: Submit extended warranties signed and registered by the manufacturer providing the warranties in the name of the Owner for the timeframe and coverage specified in this Section.
- .6 Closeout submittals: Submit maintenance and cleaning data for incorporating into Operations and Maintenance Manuals in accordance with the Conditions of the Contract.

#### 1.4 **SITE CONDITIONS**

- .1 Maintain air temperature and structural base temperature at flooring installation area above 20°C for 48 hr before, during and 48 hr after installation.
- .2 Store materials for 2 days prior to installation in area of Work to achieve temperature stability.
- .3 Do not lay flooring in conditions of high humidity or where exposed to cold drafts. In hot weather, protect from direct sunlight.
- .4 Provide adequate ventilation during installation.

#### 1.5 **EXTENDED WARRANTY**

- .1 Manufacturer's warranty: Resilient flooring; provide flooring manufacturer's warranty naming Owner as beneficiary, covering excessive wear for a period of 10 years from the date work is certified as Ready-for-Takeover.

#### 1.6 **MAINTENANCE**

- .1 Submit extra 5% or to nearest full roll of each colour, pattern and type of flooring material required for maintenance use. Identify each roll. Store where directed. Submit maintenance material in one piece and of same production run as installed materials.

2 Products

2.1 **MATERIALS**

- .1 General: All materials under work of this Section, including but not limited to, primers and adhesives are to have low VOC content limits.
- .2 Resilient vinyl sheet flooring (RSF-1):
  - .1 ASTM F1913, minimum 2 mm thick, homogeneous vinyl flooring with transparent wear layer and diamond-infused UV cured polyurethane finish, having a low gloss sheen. Colour: 'Sea Salt (H2003)'.
  - .2 Acceptable Product: 'Medintone' by Armstrong Flooring or approved alternative.
- .3 Resilient bases (RB): In accordance with Section 09 65 13.
- .4 Welding rod: type recommended by flooring manufacturer to complement flooring.
- .5 Primers and adhesives: Low VOC, waterproof, of types recommended by flooring and base manufacturer for specific material on applicable substrate, above, on or below grade.
- .6 Transition strips:
  - .1 Floor divider strip and trims: Stainless steel edge strips and trims, continuous at all exposed flooring edges, depth as required to suit flooring thickness.
  - .2 Manufactured by Schluter Systems or approved alternative.
- .7 Concrete skim coat compound: High-performance, rapid-setting cement based skim coating compound. 'Planiprep SC' by Mapei or approved alternative for filling minor voids and leveling existing substrate.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

- .2 Subfloor moisture content testing:
  - .1 Test concrete subfloor for moisture content to ensure that subfloor is suitable for flooring installation. Test methods shall be as recommended by flooring manufacturer and as specified herein.
  - .2 Ensure concrete floors meet the following minimum requirements and requirements of the flooring manufacturer. If there is a conflict between these requirements and those of the flooring manufacturer, the more stringent shall apply.
    - .1 Internal Relative Humidity Test: Perform internal relative humidity testing in accordance with ASTM F2170. Results shall not exceed 80% RH.
    - .2 Moisture Test: Moisture emissions from concrete subfloors (cured for a minimum of 28 days) must not exceed 3 lbs per 1000sf per 24 hours (1.4 kg H<sub>2</sub>O/24 hr/93 m<sup>2</sup>) for acrylic adhesive and 5lbs for polyurethane adhesive via the Calcium Chloride Test Method (ASTM F1869).
    - .3 The pH level of the subfloor surface shall not be higher than 9.9. If higher, subfloor must be neutralized.
  - .3 Obtain manufacturer's certificate of acceptance of substrate moisture content in writing and submit copy to Consultant.
  - .4 Moisture content must be below flooring manufacturer's requirements before any flooring is installed. Submit copy of test results to Consultant.
- .3 Ensure that sub-floors have been provided as specified without holes, protrusions, cracks, depressions or other major defects.
- .4 Ensure that control joints have been filled and levelled.
- .5 Defective work resulting from application to unsatisfactory surfaces will be considered the responsibility of those performing the work of this Section.

### 3.2 SUBFLOOR TREATMENT

- .1 Flooring shall be installed over subfloors conforming to ASTM F710 for concrete.
- .2 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
- .3 Apply sub-floor filler to low spots and cracks to achieve floor level to a tolerance of 1:1000, allow to cure.
- .4 Meet ASTM F710 Standard for Concrete or other monolithic floors.
- .5 Clean and remove all deleterious materials from surfaces to receive this work in accordance with the adhesive manufacturer's recommendations.
- .6 Prime concrete to flooring manufacturer's printed instructions.

### 3.3 **RESILIENT SHEET FLOORING APPLICATION**

- .1 Install resilient sheet flooring in accordance with manufacturer's written instructions.
- .2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturers instructions. Do not spread more adhesive that can be covered by flooring before initial set takes place.
- .3 Run sheets in direction of traffic. Double cut sheet joints and continuously seal according to manufacturer's printed instructions. Remove adhesive seepage of seams or surface while adhesive is still wet.
- .4 Heat weld seams in accordance with ASTM F1516 and manufacturer's printed instructions.
- .5 As installation progresses and after installation, roll flooring with minimum 45 kg roller to ensure full adhesion.
- .6 Cut flooring neatly around fixed objects.
- .7 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.
- .8 Transition strips: Install metal reducing edge strips at unprotected or exposed edges where flooring terminates or where there are two finishes of different thicknesses.

### 3.4 **RESILIENT BASE APPLICATION**

- .1 Resilient base: In accordance with Section 09 65 13. Coordinate with noted Section as required for installation of resilient base with resilient sheet flooring.

### 3.5 **CLEANING**

- .1 Forty-eight hours after installation, clean sheet flooring surfaces with a mild soap solution approved by finish manufacturer. Rinse clean and allow to dry.

### 3.6 **PROTECTION OF FINISHED WORK**

- .1 Protect floors and bases from time of final set of adhesive until accepted by Consultant.
- .2 Prohibit traffic on floor for 48 hours after installation.

- .3 Cover cleaned surfaces with fibre reinforced, clean, non-staining clean, kraft paper. Secure in position with gummed tape to prevent drifting. Remove covering when directed by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for resilient tile flooring work and accessories in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
- .2 ASTM F1066, Specification for Vinyl Composition Floor Tile.
- .3 ASTM F1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- .4 ASTM F 2170, Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes.

1.3 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract:
    - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
    - .2 Product transportation, storage, handling and installation requirements.
- .2 Samples:
  - .1 Submit following samples in accordance with the Conditions of the Contract:
    - .1 Two 250 x 200 mm samples of each type of tile material and colour.
    - .2 Two 250 mm long samples of each accessory and colour.
- .3 Certificates and reports: Prior to proceeding with installation, submit the following:
  - .1 Manufacturer's certificate stating that moisture content of concrete subfloor is in accordance with manufacturer's requirements and is suitable for flooring installation.
  - .2 Report indicating test results of moisture content tests substantiating compliance with manufacturer's requirements.
- .4 Closeout submittals: Submit maintenance and cleaning data for incorporation into Operations and Maintenance Manuals in accordance with the Conditions of the Contract.

1.4 **SITE CONDITIONS**

- .1 Maintain air temperature and structural base temperature at flooring installation area above 20°C for 48 hr before, during and 48 hr after installation.
- .2 Store materials for 2 days prior to installation in area of Work to achieve temperature stability.
- .3 Do not lay flooring in conditions of high humidity or where exposed to cold drafts. In hot weather, protect from direct sunlight.
- .4 Provide adequate ventilation during installation.

1.5 **MAINTENANCE**

- .1 Submit extra 5% or to nearest full carton of each colour, pattern and type of flooring material and base required for maintenance use. Identify each carton. Store where directed.

2 **Products**

2.1 **MATERIALS**

- .1 All materials under work of this Section, including but not limited to, primers, adhesives, sealers, and waxes are to have low VOC content limits.
- .2 Static dissipative tile (SDF-1):
  - .1 ASTM F1066, Class 2, through pattern, 300 x 300 mm x 3 mm thick, resilient static dissipative tile with ESD formulation and wear layer, 'Excelon SDT' by Armstrong or approved alternative.
  - .2 Flooring to be complete with copper grounding strips as recommended by flooring manufacturer.
  - .3 Colour: To match Armstrong colour 'Armor Gray (51951)'.
- .3 Resilient base (RB): In accordance with Section 09 65 13.
- .4 Reducing edge strips, transition strips, thresholds, etc.: Nitrile rubber plasticized vinyl, 80-95 Shore A Durometer, adhesive recommended by flooring manufacturer.
  - .1 'Finishing Accessories' by Tarkett or approved alternative.
- .5 Primers and adhesives:
  - .1 Low VOC, waterproof, recommended by flooring and base manufacturers for specific material on applicable substrate, above, at or below grade.
  - .2 Conductive adhesive: As recommended by static dissipative tile manufacturer.

- .6 Concrete skim coat compound: High-performance, rapid-setting cement based skim coating compound. 'Planiprep SC' by Mapei or approved alternative for filling minor voids and leveling existing substrate.
- .7 Sealer and wax: Type recommended by flooring manufacturer.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.
- .2 Subfloor moisture content testing:
  - .1 Test concrete subfloor for moisture content to ensure that subfloor is suitable for flooring installation. Test methods shall be as recommended by flooring manufacturer and as specified herein.
  - .2 Ensure concrete floors meet the following minimum requirements and requirements of the flooring manufacturer. If there is a conflict between these requirements and those of the flooring manufacturer, the more stringent shall apply.
    - .1 Internal Relative Humidity Test: Perform internal relative humidity testing in accordance with ASTM F2170. Results shall not exceed 80% RH.
    - .2 Moisture Test: Moisture emissions from concrete subfloors (cured for a minimum of 28 days) must not exceed 3 lbs per 1000sf per 24 hours (1.4 kg H<sub>2</sub>O/24 hr/93 m<sup>2</sup>) for acrylic adhesive and 5lbs for polyurethane adhesive via the Calcium Chloride Test Method (ASTM F1869).
    - .3 The pH level of the subfloor surface shall not be higher than 9.9. If higher, subfloor must be neutralized.
  - .3 Obtain manufacturer's certificate of acceptance of substrate moisture content in writing and submit copy to Consultant.
  - .4 Moisture content must be below flooring manufacturer's requirements before any flooring is installed. Submit copy of test results to Consultant.
- .3 Ensure that sub-floors have been provided as specified without holes, protrusions, cracks, depressions or other major defects.
- .4 Ensure that control joints have been filled and levelled.
- .5 Defective work resulting from application to unsatisfactory surfaces will be considered the responsibility of those performing the work of this Section.



### 3.2 **SUBFLOOR TREATMENT**

- .1 Flooring shall be installed over subfloors conforming to ASTM F710 for concrete.
- .2 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
- .3 Apply sub-floor filler to low spots and cracks to achieve floor level to a tolerance of 1:1000, allow to cure.
- .4 Meet ASTM F710 Standard for Concrete or other monolithic floors.
- .5 Clean and remove all deleterious materials from surfaces to receive this work in accordance with the adhesive manufacturer's recommendations.
- .6 Prime concrete to flooring manufacturer's printed instructions.

### 3.3 **RESILIENT TILE FLOORING APPLICATION**

- .1 Install resilient tile flooring and associated components in accordance with manufacturer's written instructions.
- .2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive that can be covered by flooring before initial set takes place.
- .3 Cut and install copper ground strips in accordance with manufacturer's written instructions, conforming to recommended strip coverage on floor substrate and up wall substrates.
- .4 Distribute variations in resilient tile flooring shading, colouration and grain to obtain a uniform appearance.
- .5 Lay flooring with joints straight and parallel to building lines to produce symmetrical tile pattern, starting from the room centre point to prevent uneven width, cut tiles on opposite walls. Install equal size perimeter tile on each side.
- .6 Install flooring to square grid pattern with all joints aligned.
- .7 As installation progresses, and after installation, roll flooring in 2 directions with minimum 45 kg minimum roller to ensure full adhesion.
- .8 Remove adhesive seepage at seams or surface while adhesive is still wet, in accordance with manufacturer's recommendation.
- .9 Cut tile and fit neatly around fixed objects.

- .10 Install feature strips and floor markings where indicated. Fit joints tightly.
- .11 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.
- .12 Transition strips: Install resilient reducing edge strips at unprotected or exposed edges where flooring terminates or where there are two finishes of different thicknesses.

#### 3.4 **RESILIENT BASE APPLICATION**

- .1 Resilient base: In accordance with Section 09 65 13. Coordinate with noted Section as required for installation of resilient base with resilient tile flooring.

#### 3.5 **CLEANING AND WAXING**

- .1 Forty-eight hours after installation, clean vinyl tile surfaces with a mild soap solution approved by finish manufacturer. Rinse clean, dry and apply 2 coats of wax. Polish thoroughly.

#### 3.6 **PROTECTION OF FINISHED WORK**

- .1 Protect floors from time of final set of adhesive until final waxing.
- .2 Prohibit traffic on floor for 48 hours after installation.
- .3 Cover waxed and polished surfaces with fibre reinforced, clean, non-staining kraft paper. Secure in position with gummed tape to prevent drifting. Remove covering when directed by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for epoxy terrazzo flooring work in accordance with the Contract Drawings.

1.2 **SUBMITTALS**

- .1 Product data: Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
  - .1 Characteristics, performance criteria, and limitations.
  - .2 Preparation, installation requirements and techniques, Product storage, and handling criteria.
- .2 Samples:
  - .1 Submit samples in accordance with the Conditions of the Contract of the following:
    - .1 Samples of each type and colour of epoxy terrazzo flooring mounted on 250 x 200 mm hardboard.
    - .2 Two 150 mm long samples of divider strips demonstrating material, profile, finish and colour.
- .3 Reports: Submit manufacturer's acceptance of substrate prior to installation in writing. Submit verification of moisture content of floor prior to installation.
- .4 Close-out submittals: Submit maintenance data for incorporation into Operations and Maintenance manuals in accordance with the Conditions of the Contract.

1.3 **QUALITY ASSURANCE**

- .1 Perform work of this Section by a company that has a minimum of five years proven experience in installations of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.
- .2 Mock-up:
  - .1 Construct one 1 m<sup>2</sup> mock-up of colour and texture of epoxy terrazzo flooring, in location acceptable to Consultant.
  - .2 Mock-up to demonstrate colours and the pinhole free and pit free surface of the flooring material.
  - .3 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with work.
  - .4 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
  - .5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

- .3 Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

#### 1.4 **SITE CONDITIONS**

- .1 Do not install the work of this Section outside of the following environmental ranges without Product manufacturer's written acceptance:
  - .1 Ambient air and surface temperature: 15°C to 30°C.
  - .2 Relative Humidity: In accordance with manufacturers' requirements.
  - .3 When no dust is being raised.
  - .4 In well-ventilated and broom clean areas.
- .2 Do not apply epoxy terrazzo flooring over materials that contain over 4% moisture.
- .3 Install temporary protection and facilities to maintain the Product manufacturer's, and the above specification, environmental requirements for 24 hours before, during, and 24 h after installation.
- .4 Post do not enter and appropriate warning signs at conspicuous locations.

#### 1.5 **DELIVERY, STORAGE, AND HANDLING**

- .1 Package, seal and label each epoxy terrazzo flooring material to show manufacturer's and product name, and colour.
- .2 Store materials at site in an area specifically set aside for purpose that is locked, ventilated, and maintained at a minimum temperature of 16°C.
- .3 Ensure that health and fire regulations are complied with in storage area, and during handling and application.

2 Products

2.1 **MATERIALS**

.1 General:

- .1 All materials under work of this Section, including but not limited to, applicable materials are to have low VOC content limits.
- .2 Each material used in the application of each flooring system shall be as recommended or manufactured by the supplier of the flooring system.

2. Epoxy terrazzo (TER-E):

- .1 Minimum 9.5 mm thick, low VOC, low odour, thin-set, epoxy terrazzo flooring consisting of primer, two component solvent-free epoxy resin binder, aggregate filled topping, grout coat(s) and finish coat(s).
- .2 Colours and finishes: To match colour and finish of existing terrazzo flooring and Consultant approved samples.
- .3 Acceptable Products:
  - .1 'Terroxy' by DRE Industries.
  - .2 'Sikafloor Terrazzo' by Sika Canada Inc.
- .3 Aggregate topping: Epoxy mixed with marble chips and sizes similar to existing terrazzo flooring and to match Consultant approved samples.
- .4 Sealer/finish coat: Clear impregnating sealer compatible with system, type as recommended by manufacturer and meeting TTMAC requirements.
- .5 Anti-fracture membrane: Two-component, elastomeric crack-isolation membrane, 'Sikalastic Duochem 390 Membrane' by Sika Canada Inc. or approved alternative.
- .6 Primers and moisture barriers: Types as recommended by flooring manufacturer to suit intended application area to counteract moisture content issues or where required on slab on grade applications.
- .7 Divider strips: Provide "L" shaped divider strips to required floor thickness, bronze material, unless otherwise approved, to match Consultant approved samples.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.
- .2 Verify that concrete floor has cured 28 days minimum and that substrate is acceptable to epoxy manufacturer.

- .3 Test surfaces for moisture content to ensure that they are suitable for application.
- .4 Provide moisture tolerant primers and moisture barriers as recommended by flooring manufacturer to counter instances where higher moisture contents are found in the intended substrate and where required for slab on grade applications.

### 3.2 **PREPARATION**

- .1 Prepare intended substrates in accordance with manufacturer's written instructions.
- .2 Prepare substrate using steel aggregate blast method and vacuum substrate free of debris and dust.
- .3 Fill minor cracks and voids and prime surfaces in accordance with manufacturer's recommendations.
- .4 Clean prime and seal surfaces as recommended by epoxy terrazzo manufacturer.
- .5 Protect adjacent surfaces from damage resulting from this work. Mask and/or cover adjacent surfaces, fixtures, and equipment as necessary.
- .6 Fill open control joints, and other cracks and voids with material compatible with epoxy materials.

### 3.3 **APPLICATION**

- .1 Apply epoxy terrazzo flooring in accordance with manufacturer's written instructions and TTMAC requirements. Epoxy terrazzo flooring manufacturer shall supervise application.
- .2 Stop epoxy in a straight line on each side of control joints; fill space over expansion joint with a self-levelling, non-sag polyurethane sealant.
- .3 Apply epoxy terrazzo flooring, to a minimum thickness of 9.5 mm, with care to ensure that no laps, voids, or other marks or irregularities are visible, and with an appearance of uniform colour, sheen and texture, all within limitations of materials and areas concerned.
- .4 Make clean true junctions with no visible overlap between adjoining applications of epoxy.
- .5 Prime coat: Apply primer over prepared substrate, at manufacturer's recommended spreading rate, with timing of application coordinated with subsequent application of topping mix to ensure optimum adhesion between flooring materials and substrate.
- .6 Anti-fracture membrane: Apply to entire concrete surface with a notched squeegee and roller to obtain a 20 mil wet film thickness.

- .7 Aggregate topping mix: Trowel apply aggregate topping mix over tacky primer and at spreading rates required to produce minimum thickness specified. Allow topping to harden at least 24 hours prior to initiating grinding operations.
- .8 Match colours and textures to Consultant approved samples.
- .9 Chase edge of adjacent floor systems so that epoxy finishes flush with adjacent floor systems.
- .10 Grout coat: Apply grout coat to fill any surface voids and have a pinhole free and pit free surface to meet TTMAC requirements. Allow to cure before polishing.
- .11 Sealer/finish coat: Apply manufacturer recommended clear impregnating sealer coat at spreading rate in accordance with manufacturer's written instructions.
- .12 Cove base: Apply flooring system to wall surfaces to form minimum 6 mm base with cove of radius and height as indicated. Round interior and exterior corners.
- .13 Divider strips: Provide thin-set-type divider strips parallel to wall if coved base is required and at other predetermined locations as indicated.
- .14 Joints: Where substrate is interrupted by expansion or control joints, provide joint in flooring to comply with details indicated, or if not indicated, as recommended by flooring manufacturer.

### 3.4 **REPAIR**

- .1 Touch-up and refinish minor defective work. Refinish entire coated surface areas where finish is damaged or otherwise unacceptable.

### 3.5 **CLEANING**

- .1 Clean uncured flooring materials from surfaces with solvent. Removal of cured materials requires scraping, chipping or grinding.
- .2 Leave storage and mixing areas in same condition as equivalent spaces in project.

### 3.6 **PROTECTION**

- .1 Erect barriers to prevent the entry and presence of personnel not performing work of this Section during application of epoxy terrazzo flooring, and for 48 hours following completion of application.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for precast terrazzo stair unit work in accordance with the Contract Drawings.

1.2 **REFERENCES**

- .1 TTMAC Specification Guide 09 30 00 Tile Installation Manual.
- .2 TTMAC, Maintenance Guide.

1.3 **SUBMITTALS**

- .1 Product data: Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
  - .1 Characteristics, performance criteria, and limitations.
  - .2 Preparation, installation requirements and techniques, Product storage, and handling criteria.
- .2 Shop drawings:
  - .1 Submit shop drawings in accordance with the Conditions of the Contract indicating:
    - .1 Thicknesses, perimeter conditions, junctions with dissimilar materials, and setting details.
    - .2 Details, sizes and attachment of precast epoxy terrazzo stair tread, riser and landing units.
    - .3 Connection details and erection procedure.
- .3 Samples:
  - .1 Submit samples in accordance with the Conditions of the Contract as follows:
    - .1 Submit two samples sized at 300 mm long of each type of precast terrazzo stair tread and riser demonstrating colour, pattern and finish for the Consultant's approval. Precast tread to be complete with non-slip nosing strips demonstrating material, non-slip texture and colour.
- .4 Close-out submittals: Submit maintenance data for incorporation into Operations and Maintenance manuals in accordance with the Conditions of the Contract.



**1.4 QUALITY ASSURANCE**

- .1 Perform work of this Section by a company that is a member in good standing of the Terrazzo Tile and Marble Association of Canada, has a minimum of five years proven experience in installations of a similar size and nature and that is approved by manufacturer. Submit to Consultant, installer's current certificate of approval by the material manufacturer as proof of compliance.
- .2 Mock-up:
  - .1 Construct three full stair treads and risers, complete with nosing strips in location acceptable to Consultant.
  - .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with work.
  - .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
  - .4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.
- .3 Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

**1.5 EXTENDED WARRANTY**

- .1 Submit an extended warranty for work of this Section in accordance with General Conditions, except that warranty period is extended to five (5) years from date of Ready-for-Takeover.
  - .1 Warrant against excessive wear, chipping, cracking, or similar defects.
  - .2 Coverage: Complete replacement including effected adjacent parts.

**2 Products**

**2.1 ACCEPTABLE PRODUCTS AND MANUFACTURERS**

- .1 Precast epoxy terrazzo stair units:
  - .1 Precast Terrazzo Enterprises, Inc.
  - .2 Wausau Tile.
  - .3 Or approved alternative.
- .2 Epoxy terrazzo material:
  - .1 DRE Industries.
  - .2 Sika Canada Inc.

## 2.2 MATERIALS, GENERAL

- .1 General:
  - .1 All materials under work of this Section, including but not limited to, applicable materials are to have low VOC content limits.
  - .2 Each material used in the installation of each precast stair unit shall be as recommended or manufactured by the supplier of the precast system.

## 2.3 PRECAST EPOXY TERRAZZO STAIR UNITS

- 1. Precast epoxy terrazzo (TER-C):
  - .1 Provide precast epoxy terrazzo stair treads, risers and landings in thicknesses as indicated.
  - .2 All precast components to utilize epoxy terrazzo resin products as specified for fabrication to ensure colour consistency with the poured in place terrazzo flooring.
  - .3 Comply with precast manufacturer's written instructions for fabricating precast terrazzo units in sizes and profiles indicated.
  - .4 Reinforce units as required by unit sizes, profiles, and thicknesses and as recommended by precast manufacturer.
  - .5 Finish exposed-to-view edges and reveals to match face finish.
  - .6 Ensure precast terrazzo stair units are pinhole free and have pit free surface of the material.
- 2. Epoxy terrazzo material:
  - .1 Epoxy terrazzo material consisting of two component solvent-free epoxy resin binder, aggregate filled topping, grout coat(s) and impregnating sealer/finish coat(s).
  - .2 Mixes and colours: Provide two custom mixes with colours and aggregates of precast units to match adjacent existing terrazzo floor and Consultant approved samples.
  - .3 Acceptable Products:
    - .1 'Terroxy' by DRE Industries.
    - .2 'Sikafloor Terrazzo' by Sika Canada Inc.
- .3 Precast terrazzo unit setting materials: Thick-bed mortar in type as recommended by precast terrazzo manufacturer to suit intended application.
- .4 Non-slip nosings:
  - .1 Provide adhesive applied, 0.79 mm thick, heavy duty, anti-slip carborundum strips for application to precast terrazzo stairs, 64 mm wide.
  - .2 Colour: Black/darker contrasting colour that is compatible with main mix.
  - .3 Acceptable Product: 'Carborundum Strips' by American Biltrite Flooring or approved alternative.
- .5 Divider strips: "L" shape to required tread thickness and conforming to TTMAC requirements; bronze material.

- .6 Sealant: Low VOC adhesive, type as recommended by flooring manufacturer, for use at adjacent and adjoining conditions. Colour: To match the colour of terrazzo tread.

## 2.4 **FABRICATION**

- .1 Verify dimensions of existing work before commencing fabrications and report discrepancies to Consultant.
- .2 Fabricate precast terrazzo stair units in accordance with reviewed shop drawings and manufacturer's written instructions.
- .3 Fabricate work free from defects impairing function, appearance, strength and durability.
- .4 Fabricate precast terrazzo tread complete with non-slip nosing insert.

## 3 Execution

### 3.1 **EXAMINATION**

- .1 Verify condition of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

### 3.2 **PREPARATION**

- .1 Prepare intended substrates in accordance with manufacturer's written instructions.
- .2 Protect adjacent surfaces from damage resulting from this work. Mask and/or cover adjacent surfaces, fixtures, and equipment as necessary.

### 3.3 **PRECAST EPOXY TERRAZZO STAIR UNIT INSTALLATION**

- .1 Install precast epoxy terrazzo stair units in accordance with reviewed shop drawings, manufacturer's written instructions and the TTMAC Installation Manual, with manufacturer recommended thick-bed mortar to suit intended conditions. Manufacturer's installation instructions govern over TTMAC Installation Manual.
- .2 Ensure 100% mortar contact coverage to back of precast units. Contact must be evenly distributed to give full support of the precast units.
- .3 Apply full mortar bed to substrate as shown with flat trowel and press firmly into surface, apply additional mortar using notched trowel.

- .4 Set units in place and rap or beat with a beating block as necessary to ensure a proper bond and to level surface. Align units for uniform joints and allow to set until firm. Clean excess mortar from surface of precast units with a wet cloth or sponge while mortar is fresh.
- .5 Divider strips: Provide divider strips in accordance with reviewed shop drawings demonstrating Consultant approved location plans indicating proposed divider strip locations to divide tread colours, submitted prior to start of installation.
- .6 Installation of the finished precast terrazzo stair units must be done during late stages of construction to avoid damage to precast units.
- .7 Install precast stair units without damage to shape or finish. Replace damaged units.
- .8 Fit and align precast epoxy terrazzo stair units straight, plumb, level, and square.
- .9 Do not install chipped, cracked, blemished, stained, or otherwise defective units.
- .10 Sealant work:
  - .1 Seal joints in accordance with manufacturer's written instructions and to meet general requirements of Section 07 92 00.
  - .2 Seal joints between precast terrazzo units and adjoining construction, such as but not limited guard juncture and tread/stringer juncture.
- .11 Nosing strips:
  - .1 Provide nosing strips with adhesive in accordance with manufacturer's written instructions.
  - .2 Remove adhesive seepage from surface of treads.
  - .3 Ensure full adhesion of nosing strips.

#### 3.4 **CLEANING**

- .1 Clean precast epoxy terrazzo stair units in accordance with manufacturer's written instructions.

#### 3.5 **PROTECTION**

- .1 Protect precast terrazzo stair units from damage throughout the course of the construction period.
- .2 Stairs with precast epoxy terrazzo cannot be used for construction.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for resinous flooring work in accordance with the Contract Drawings.

1.2 **SUBMITTALS**

- .1 Product data: Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
  - .1 Characteristics, performance criteria, and limitations.
  - .2 Preparation, installation requirements and techniques, Product storage, and handling criteria.
- .2 Samples: Submit duplicate samples of each type and colour of resinous flooring mounted on 250 x 200 mm hardboard in accordance with the Conditions of the Contract.
- .3 Reports: Submit manufacturer's acceptance of substrate prior to installation in writing. Submit verification of moisture content of floor prior to installation.
- .4 Close-out submittals: Submit maintenance data for incorporation into Operations and Maintenance manuals in accordance with the Conditions of the Contract.

1.3 **QUALITY ASSURANCE**

- .1 Perform work of this Section by a company that has a minimum of five years proven experience in installations of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.
- .2 Mock-up:
  - .1 Construct one 2 m<sup>2</sup> mock-up of each type and colour of resinous flooring in location acceptable to Consultant.
  - .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with work.
  - .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
  - .4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.
- .3 Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

#### 1.4 SITE CONDITIONS

- .1 Do not install the work of this Section outside of the following environmental ranges without Product manufacturer's written acceptance:
  - .1 Ambient air and surface temperature: 15°C to 30°C.
  - .2 Relative Humidity: In accordance with manufacturers' requirements.
  - .3 When no dust is being raised.
  - .4 In well-ventilated and broom clean areas.
- .2 Do not apply resinous flooring over materials that contain over 4% moisture.
- .3 Install temporary protection and facilities to maintain the Product manufacturer's, and the above specification, environmental requirements for 24 hours before, during, and 24 h after installation.
- .4 Post do not enter and appropriate warning signs at conspicuous locations.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Package, seal and label each resinous flooring material to show manufacturer's and product name, and colour.
- .2 Store materials at site in an area specifically set aside for purpose that is locked, ventilated, and maintained at a minimum temperature of 16°C.
- .3 Ensure that health and fire regulations are complied with in storage area, and during handling and application.

#### 2 Products

##### 2.1 ACCEPTABLE MANUFACTURERS

- .1 Stonhard.
- .2 Or approved alternative by Sika Canada Inc.

##### 2.2 MATERIALS

- .1 General:
  - .1 All materials under work of this Section, including but not limited to, primers and resinous flooring are to have low VOC content limits.
  - .2 Each material used in the application of each flooring system shall be as recommended or manufactured by the supplier of the flooring system.

2. Resinous flooring (EPX-1):
  - .1 5 mm thick, chemical, wear, stain and UV resistant, resinous flooring system, consisting of:
    - .1 Penetrating epoxy primer.
    - .2 Three-component, trowelled applied mortar including epoxy resin, curing agent and coloured quartz silica aggregate.
    - .3 Two-component, clear epoxy sealer.
    - .4 Two-component, clear leveling epoxy sealer.
    - .5 Two-component, clear, water-based polyurethane coating.
  - .2 Colour: To match Stonhard colour 'Black Sapphire'.
  - .3 Finish: To later selection by the Consultant and match Consultant approved sample.
  - .4 Acceptable Product: 'Stonblend GSI' by Stonhard or approved alternative by Sika Canada Inc.
3. Resinous flooring (EPX-2) and cove base:
  - .1 6 mm thick, self-priming, trowel applied flooring system with integral cove base, four component, high impact, abrasion and chemical resistant, polyurethane mortar system, consisting of urethane-urea binder, pigments and graded aggregates and polyurethane top coat.
  - .2 Colour: To match Stonhard colour 'Cool Shale'.
  - .3 Finish: To later selection by the Consultant and match Consultant approved sample.
  - .4 Acceptable Product: 'Stonclad UT' by Stonhard or approved alternative by Sika Canada Inc.
- .4 Waterproof membrane: Minimum 0.63 mm (25 mils) thick, with one coat of urethane waterproofing membrane for use in conjunction with specified resinous flooring at suspended slabs. 'StonProof ME7' by Stonhard or approved alternative by Sika Canada Inc.
- .5 Transition strips: Stainless steel edge, continuous at juncture between resinous flooring and adjoining flooring materials, depth as required to suit flooring thickness. 'Schiene-E' by Schluter Systems or approved alternative.
- .6 Resilient bases (RB): In accordance with Section 09 65 13.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.
- .2 Verify that concrete floor has cured 28 days minimum and that substrate is acceptable to resinous flooring manufacturer.
- .3 Test surfaces for moisture content to ensure that they are suitable for application.

3.2 **PREPARATION**

- .1 Prepare substrate using steel aggregate blast method and vacuum substrate free of debris and dust.
- .2 Fill minor cracks and voids and prime surfaces in accordance with manufacturer's recommendations.
- .3 Protect adjacent surfaces from damage resulting from this work. Mask and/or cover adjacent surfaces, fixtures, and equipment as necessary.
- .4 Fill open control joints, and other cracks and voids with material compatible with resinous flooring materials.
- .5 Clean prime and seal surfaces as recommended by resinous flooring manufacturer.

3.3 **APPLICATION**

- .1 Apply waterproofing membrane to thickness and requirements as indicated in written instructions from resinous flooring manufacturer.
- .2 Apply resinous flooring in accordance with manufacturer's printed instructions. Resinous flooring manufacturer shall supervise application.
- .3 Stop resinous in a straight line on each side of control joints; fill space over expansion joint with a self-levelling, non-sag polyurethane sealant.
- .4 Apply resinous flooring with care to ensure that no laps, voids, or other marks or irregularities are visible, and with an appearance of uniform colour, sheen and texture, all within limitations of materials and areas concerned.
- .5 Match colours and textures of approved samples.



- .6 Make clean true junctions with no visible overlap between adjoining applications of resinous flooring.
- .7 Chase edge of adjacent floor systems so that resinous flooring finishes flush with adjacent floor systems.
- .8 Epoxy cove base: Provide 100 mm coved base at room perimeter and at built-in fitment locations. Form cove with 25 mm radius.
- .9 Transition strips: Install metal trim to be placed under resinous flooring in locations indicated on Drawings.

#### 3.4 **SITE TOLERANCES**

- .1 Finish surfaces shall be level, or straight where sloped to drains, within a tolerance of 1.5 mm in 3 m, and shall not vary more than 0.8 mm in any running 300 mm.

#### 3.5 **REPAIR**

- .1 Touch-up and refinish minor defective work. Refinish entire coated surface areas where finish is damaged or otherwise unacceptable.

#### 3.6 **CLEANING**

- .1 Remove promptly as work progresses spilled or spattered materials from surfaces of work performed under other Sections. Clean floors on completion of work. Do not mar surfaces while removing.
- .2 Leave storage and mixing areas in same condition as equivalent spaces in project.

#### 3.7 **PROTECTION**

- .1 Erect barriers to prevent the entry and presence of personnel not performing work of this Section during application of resinous flooring, and for 48 hours following completion of application.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Design, labour, Products, equipment and services necessary for waterproof flooring work in accordance with the Contract Documents.
- .2 Waterproof flooring to be applied on suspended concrete slabs of mechanical rooms and any additional areas as indicated.

1.2 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, characteristics, limitations, preparation, and installation requirements and techniques.
    - .2 Product transportation, storage, handling and installation requirements.
- .2 Shop Drawings:
  - .1 Submit Shop Drawings in accordance with the Conditions of the Contract indicating:
    - .1 Sections, details, materials, thicknesses, finishes, joint layout and locations, and coating terminations.
- .3 Samples: Submit two 300 x 300 mm samples, on cement board, of waterproof flooring in accordance with the Conditions of the Contract.
- .4 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.
- .5 Reports/Certificates:
  - .1 Submit manufacturer's written acceptance of substrate prior to installation stating that moisture content is in accordance with manufacturer's requirements and is suitable for installation. Submit reports prior to installation indicating test results of moisture content of floor substantiating compliance with manufacturer's requirements.
  - .2 Submit applicator's current certificate of approval, for installation of waterproof flooring, by the material manufacturer as proof of compliance.
  - .3 Submit letter certifying that materials proposed for use on this project meet criteria specified, are compatible with each other, and that the manufacturer recommended the product for it's intended end use.
  - .4 Submit certification from waterproofing flooring manufacturer that installation meets specified and manufacturer's requirements.

- .6 Closeout submittals: Submit maintenance data for incorporation into Operations and Maintenance Manuals in accordance with the Conditions of the Contract.

### 1.3 **QUALITY ASSURANCE**

- .1 Installers qualifications: Perform work of this Section by a company that has a minimum of five years proven experience in waterproof flooring installations of a similar size and nature and that is approved by manufacturer.
- .2 Mock-up:
  - .1 Construct 2 m<sup>2</sup> mock-up of waterproof flooring in location acceptable to Consultant.
  - .2 Mock-up shall demonstrate the minimum standard for workmanship, material thicknesses, surface profile, flashing, and juncture details, slip resistance, and finished appearance.
  - .3 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with work.
  - .4 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
  - .5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.
- .3 Pre-installation meetings: Arrange with Consultant, manufacturer's representative, and waterproof flooring applicator to inspect substrates, and to review installation procedures 48 hours in advance of installation.

### 1.4 **DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.
- .2 Store product in location protected from freezing, damage, construction activity, precipitation, and direct sunlight, in strict accordance with manufacturer's recommendations.
- .3 Prior to application, condition products in accordance with manufacturer's recommendations.
- .4 Handle all products with appropriate precautions and care as stated on Material Safety Data Sheet.

1.5 **SITE CONDITIONS**

- .1 Do not install work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
  - .1 Ambient air and surface temperature: 10°C to 32°C
  - .2 Relative Humidity: 80%.
  - .3 Moisture content of concrete is above 4% by weight of concrete.
- .2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 48 hours before, during, and 72 hours after installation.

1.6 **EXTENDED WARRANTY**

- .1 Submit an extended warranty for work of this Section in accordance with General Conditions, except that warranty period is extended to 2 years from the date of Ready-for-Takeover, for the following:
  - .1 Warrant against leaking, failure to stay in place, deformation, and breaking of watertight seals.
  - .2 Coverage: Complete replacement including affected adjacent work at no cost to Owner.

2 **Products**

2.1 **MATERIALS**

- .1 Waterproof flooring:
  - .1 Minimum 0.762 mm thick, consisting of a flexible, liquid applied self priming unreinforced elastomeric polyurethane waterproofing membrane and an epoxy or polyurethane top wear coat with silica sand broadcast into the wear coat for slip resistance.
  - .2 Colour to be selected by Consultant from manufacturer's standard colours.
  - .3 Acceptable Products:
    - .1 'Peda-Gard M' by Neogard.
    - .2 'Sikafloor Resoclad MRW Type II' by Sika Canada Inc.
    - .3 'Vulkem 350/351' by Tremco Inc.
  - .4 Aggregate: Clean, rounded, oven dried quartz 30-40 mesh silica sand, or as recommended by waterproof floor system manufacturer.
  - .5 All primers, sealants, accessories, etc. necessary for a complete installation.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.
- .2 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance.
- .3 Verify that specified environmental conditions are ensured before commencing work.
- .4 Test substrate surfaces to ensure that moisture level and acid-alkali balance does not exceed limits recommended manufacturer. Provide one copy of tests results to Consultant prior to installation.

3.2 **PREPARATION**

- .1 Prepare intended floor substrates in accordance with manufacturer's written instructions.
- .2 Subfloor moisture content testing:
  - .1 Test concrete subfloor for moisture content to ensure that subfloor is suitable for flooring installation. Test methods shall be as recommended by flooring manufacturer.
  - .2 Obtain manufacturer's certificate of acceptance of substrate moisture content in writing and submit copy to Consultant.
  - .3 Moisture content must be below flooring manufacturer's requirements before any flooring is installed. Submit copy of test results to Consultant.
- .3 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from work of this Section.
- .4 Thoroughly clean all surfaces to receive coating by steel shotblasting or other method in accordance with manufacturer's written instructions.
- .5 Remove projections and other conditions that may affect the installation of the coating.
- .6 Fill open control joints, and other cracks and voids with material compatible with waterproof floor treatment materials.
- .7 Clean prime and seal surfaces as recommended by waterproof flooring manufacturer.

### 3.3 **INSTALLATION**

- .1 Install waterproof flooring in accordance with reviewed Shop Drawings and manufacturer's written instructions.
- .2 Stop waterproofing flooring in a straight line on each side of control/expansion joints.
- .3 Apply waterproof flooring with care to ensure that no laps, voids, or other marks or irregularities are visible, and with an appearance of uniform colour, sheen and texture, all within limitations of materials and areas concerned.
- .4 Make clean true junctions with no visible overlap between adjoining applications of waterproof flooring.
- .5 Chase edge of adjacent floor systems so that waterproof flooring finishes flush with adjacent floor systems.
- .6 Broadcast aggregate into topcoat while still wet and backroll to evenly distribute and ensure encapsulation.
- .7 At projections through floor post, pipes, vents and similar locations of potential movement, install a sealant bead and tool to form a cove and allow to cure prior to application of waterproof flooring.
- .8 Apply waterproof flooring over entire floor areas and extend up vertical surfaces such as walls, columns and curbs to a height of 100 mm.

### 3.4 **REPAIR**

- .1 Touch-up and refinish minor defective work. Refinish entire coated surface areas where finish is damaged or otherwise unacceptable.

### 3.5 **PROTECTION**

- .1 Erect barriers to prevent the entry and presence of personnel not performing work of this Section during application of waterproof flooring, and for 48 hours following completion of application.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for concrete floor sealer work in accordance with the Contract Drawings.

1.2 **SUBMITTALS**

- .1 Product data: Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
  - .1 Characteristics, performance criteria, and limitations.
  - .2 Preparation, installation requirements and techniques, Product storage, and handling criteria.
- .2 Samples: Submit samples in accordance with the Conditions of the Contract indicating coating and final concrete finish.
- .3 Reports: Submit manufacturer's acceptance of substrate prior to installation in writing. Submit verification of moisture content of floor prior to installation.
- .4 Close-out submittals: Submit maintenance data for incorporation into Operations and Maintenance manuals in accordance with the Conditions of the Contract.

1.3 **QUALITY ASSURANCE**

- .1 Perform work of this Section by a company that has a minimum of five years proven experience in installations of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.
- .2 Mock-up:
  - .1 Construct one 2 m<sup>2</sup> mock-up of floor sealer in location acceptable to Consultant.
  - .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
  - .3 Mock-up may remain as part of Work if accepted by Consultant. If sealer application is unacceptable to Consultant, rework sealer in accordance with manufacturer's recommendations to provide a sealed concrete surface acceptable to Consultant.
  - .4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.
- .3 Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review mock-up and installation procedures 48 hours in advance of installation.

1.4 **SITE CONDITIONS**

- .1 Do not install the work of this Section outside of environmental ranges as recommended by the manufacturer without Product manufacturer's written acceptance and as follows:
  - .1 Relative Humidity: In accordance with manufacturers' requirements.
  - .2 When no dust is being raised.
  - .3 In well-ventilated and broom clean areas.
- .2 Install temporary protection and facilities to maintain the Product manufacturer's, and the above specification, environmental requirements for 24 hours before, during, and 24 h after installation.
- .3 Post do not enter and appropriate warning signs at conspicuous locations.

1.5 **DELIVERY, STORAGE, AND HANDLING**

- .1 Store materials at site in an area specifically set aside for purpose that is locked, ventilated, and maintained at a minimum temperature of 16°C.
- .2 Ensure that health and fire regulations are complied with in storage area, and during handling and application.

2 Products

2.1 **MATERIALS**

- .1 All materials under work of this Section, including but not limited to, sealers and coatings are to have low VOC content limits.
- 2. Each material used in the application of each flooring system shall be as recommended or manufactured by the supplier of the flooring system.
- .3 Concrete floor sealer (SC): Alkali-silicate, water-soluble, inorganic concrete hardener and dustproof; 'Sikafloor 3S' by Sika Canada Inc. or approved alternative.



3 Execution

3.1 **EXAMINATION**

- .1 Verify condition of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.
- .2 Verify that concrete floor has cured 28 days minimum and that substrate is acceptable to sealer manufacturer.
- .3 Test surfaces for moisture content to ensure that they are suitable for application.

3.2 **PREPARATION**

- .1 Prepare substrate in accordance with manufacturer's written instructions. Diamond grind and vacuum substrate free of debris and dust.
- .2 Protect adjacent surfaces from damage resulting from work of this Section. Mask and/or cover adjacent surfaces, fixtures, and equipment as necessary.
- .3 Clean surfaces to be sealed as recommended by sealer manufacturer.

3.3 **APPLICATION**

- .1 Apply concrete floor sealer in accordance with manufacturer's written instructions. Sealer manufacturer shall supervise application.
- .2 Spray apply concrete sealer to entire surface and keep from drying for 30 minutes as recommended by manufacturer.
- .3 Sprinkle surface with water as sealer begins to penetrate (after 30 minutes).
- .4 Flush surface with water and drying begins to remove excess material. Allow to harden for 24 hours.
- .5 Lightly buff floor with a commercial floor buffer and non-aggressive pad to bring up required sheen.
- .6 Apply second coat of concrete sealer following same procedures as first layer.

3.4 **CLEANING**

- .1 Remove promptly as work progresses spilled or spattered materials from surfaces of work performed under other Sections. Clean floors on completion of work. Do not mar surfaces while removing.

**3.5 PROTECTION**

- .1 Erect barriers to prevent the entry and presence of personnel not performing work of this Section during application of floor sealer, and for 48 hours following completion of application.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for painting work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 Master Painters Institute (MPI), Painting Specification Manual.
- .2 SSPC Steel Structures Painting Council, Standards.

1.3 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
    - .2 Product transportation, storage, handling and installation requirements.
  - .2 Submit listing of manufacturer's Product types, Product codes, and Product names, number of coats, and dry film thicknesses, corresponding to each Painting Schedule code; submit listing minimum of 8 weeks before materials are required.
- .2 Samples:
  - .1 Submit following samples in accordance with the Conditions of the Contract.
    - .1 Three 300 x 150 mm draw downs of each colour minimum 4 weeks before paints are required.
    - .2 Two 300 x 300 samples demonstrating colour match with existing green tiles in corridor for Consultant's review and approval.
    - .3 Identify each sample with Contract number and title, colour reference, sheen, date, and name of applicator.
- .3 Certificates:
  - .1 Submit certification from paint manufacturer, on company letterhead, indicating each product proposed for use is Manufacture's premium grade, first line Product.
  - .2 Submit certified documentation to confirm each airless spray painter has minimum of 5 years experience on applications of similar complexity and scope.
  - .3 Submit certified documentation to confirm each worker has Provincial Tradesman Qualification certificate of proficiency.

- .4 Reports:
  - .1 Submit written field inspection and test report results after each inspection.
  - .2 Submit Field Quality Control test result reports for alkali content, substrate moisture, and dry film thickness.
  - .3 Submit electronic moisture meter manufacturer's specifications including tolerances. Submit record of latest meter calibration to meet manufacturer's recommendations.

#### 1.4 **QUALITY ASSURANCE**

- .1 Finishing work: Perform work to MPI requirements for premium grade.
- .2 Supervision: Have work supervised by a full-time qualified foreperson who has 10 years minimum experience on Contracts of similar complexity and scope.
- .3 Mock-up:
  - .1 Construct three 1 m<sup>2</sup> mock-ups of different Paint Schedule code systems, selected by Consultant, in locations acceptable to Consultant to demonstrate installation workmanship, colour, and hiding power of Products.
  - .2 Obtain Consultant's acceptance in writing before proceeding with the work of this Section.
  - .3 Mock-ups may remain as part of the Work if acceptable to Consultant and will serve as a standard for similar code systems.
  - .4 Repaint over mock-ups which do not form part of the Work.

#### 1.5 **DELIVERY, STORAGE, AND HANDLING**

- .1 Install correct, safe temporary storage for paint, thinner, solvents, and other volatile, corrosive, hazardous, and explosive materials in accordance with requirements of authorities having jurisdiction.
- .2 Post hazard warning signage in areas of storage and mixing. Install and maintain sufficient CO<sub>2</sub> fire extinguishers of minimum 9 kg capacity, accessible in each storage mixing and storage areas.
- .3 Maintain storage enclosures at minimum 10°C ambient temperature and to manufacturer's instructions.

#### 1.6 **SITE CONDITIONS**

- .1 Apply coatings under the following conditions:
  - .1 Interior coatings: 7°C minimum.
  - .2 Relative humidity: 85% maximum.
  - .3 Not in direct exposure to sun light.
- .2 Maintain temperature conditions indicated above for 24 hours before, during and 24 hours after painting.

- .3 Install clean plywood sheets to protect floors and walls in storage and mixing areas, from paint drips, spatters, and spills.
- .4 Apply sufficient masking, clean drop cloths, and protective coverings for full protection of work not being painted including, but not limited to, the following:
  - .1 Light fixtures, fire and smoke detectors.
  - .2 Data cabling and data infrastructure.
  - .3 Sprinkler heads.
  - .4 Prepainted diffusers and registers.
  - .5 Prepainted equipment.
  - .6 Fire rating labels and equipment specification plates.
  - .7 Finished surfaces.

## 1.7 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

- 1. Provide paint products meeting MPI "Green Performance Standard GPS-1-12".

## 1.8 MAINTENANCE

- 1. Deliver to Owner's place of storage on completion of work, sealed containers of each finish painting material applied, and in each colour. Label each container as for original, including mixing formula. Provide the following:
  - .1 1 L of extra materials when less than 50 L are used for Project;
  - .2 3.78 L of extra stock when 50 to 200 L are used;
  - .3 7.57 L of extra stock when over 200 L are used.

## 2 Products

### 2.1 MATERIALS

- .1 Paint:
  - .1 All materials under work of this Section, including but not limited to, primers, stains, and paints are to have low VOC content limits.
  - .2 Products in accordance with the MPI Painting Specification Manual, Exterior and Interior Systems;
    - .1 For each MPI paint code, manufacture's premium grade, first line Products is to be use.
    - .2 Uniform dispersion of pigment in a homogeneous mixture.
    - .3 Ready-mixed and tinted whenever possible.
  - .3 Products within each MPI paint system code: From single manufacturer.
  - .4 Acceptable manufacturers: Benjamin Moore or approved alternatives by:
    - .1 AkzoNobel.
    - .2 PPG Industries Inc.
    - .3 Sherwin Williams.

## 2.2 COLOUR AND GLOSS SCHEDULE

- .1 Paint types (PT):
  - .1 Provide paint types, colours and gloss sheen levels as follows:
    - .1 PT-1: To match Benjamin Moore colour 'Chantilly Lace (OC-65)', for use at walls and ceilings.
    - .2 PT-2: To match Benjamin Moore colour 'Pale Oak (OC-20)', for use at doors and frames.
    - .3 PT-3: Mid-tone grey colour to later selection by the Consultant, for exposed ceiling in clinic.
    - .4 PT-4: To match Benjamin Moore colour 'Hale Navy (HC-154)', for stair guard feature colour.
    - .5 PT-5: To match adjacent existing green tiles in intended corridor. Final colour to match Consultant approved samples.
  - .2 Where colours have not yet been selected, allow for colour selection beyond paint manufacturer's standard colour range.
  - .3 Conform to gloss reflectance definitions listed in MPI Specification Manual.

## 2.3 PAINTING AND FINISHING SCHEDULE

- .1 Refer to Table 1, MPI Painting and Finishing Schedule coded systems, comply with MPI Painting Specification Manual.

Table 1: Painting and Finishing Schedule				
INTERIOR SUBSTRATES	Typical substrates (Including but not limited to)	MPI Manual Ref.	MPI Finish System Code	Topcoat
Concrete block masonry		INT 4.2	INT 4.2D	High performance latex
Structural steel (Factory primed)		INT 5.1	INT 5.1R	High performance latex
Metal Fabrications (Factory primed)	Steel stairs and ladders	INT 5.1	INT 5.1R	High performance latex
Galvanized steel	Ducts, pipes	INT 5.3	INT 5.3A	Latex
Galvanized metal	HM doors & door frames, handrails	INT 5.3	INT 5.3M	High Performance Latex

Table 1: Painting and Finishing Schedule				
Gypsum board,	Drywall, walls, ceilings	INT 9.2	INT 9.2B	High performance latex
Gypsum board,	Wet areas	INT 9.2	INT 9.2F	Epoxy-modified latex

### 3 Execution

#### 3.1 EXAMINATION

- .1 Verify condition of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

#### 3.2 PREPARATION

- .1 General:
  - .1 Clean substrate surfaces free from, dust, grease, soiling, or extraneous matter, which are detrimental to finish.
  - .2 Patch, repair, and smoothen minor substrate defects and deficiencies e.g. machine, tool and sand paper marks, shallow gouges, marks, and nibs.
  - .3 Clean, sweep, and vacuum floors and surfaces to be painted, debris and dust-free prior to painting.
  - .4 Refer to MPI Painting Specification Manual for surface preparation requirements of substrates not listed here.
  - .5 Existing surfaces, general:
    - .1 Remove all loose paint and other deleterious matters from surface of existing surfaces which require re-painting.
    - .2 Thoroughly clean and prepare such surfaces to accept positive and permanent bond of new paint finish. If such preparation exposes bare surface, provide touch up primer.
- .2 Where finish hardware has been installed remove, store, re-install finish hardware, to accommodate painting. Do not clean hardware with solvent that will remove permanent lacquer finishes.
- .3 Alkali content tests and neutralization:
  - .1 Test for ph level using litmus paper on dampened substrate.
  - .2 Neutralize surfaces over 8.5 ph with 4% solution of Zinc Sulphate for solvent based systems and tetrapotassium pyrophosphate for latex based systems, to below 8.0 ph, and allow to dry.
  - .3 Brush-off any residual Zinc Sulphate crystals.
  - .4 Coordinate paint system primer / sealer to be alkali-resistant.

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- .4 Substrate moisture tests:
    - .1 Test for moisture content over entire surface to be painted, minimum one test/ 2 m<sup>2</sup> in field areas and one test/600 mm along inside corners including at ceiling to wall juncture.
    - .2 If any test registers above 10% allow entire substrate surfaces, within the plane, to dry further before paint system application. Install temporary drying fans if necessary.
    - .3 Re-test employing same criteria.
  - .5 Masonry (block):
    - .1 Allow 28 days cure before painting.
    - .2 Coordinate repair of protrusion-chipping and grinding, and honeycomb filling with responsible trades.
    - .3 Remove dirt, loose mortar, scale, powder, efflorescence, and other foreign matter.
    - .4 Remove form oil and grease with trisodium phosphate, rinse, and allow to dry thoroughly.
    - .5 Remove rust stains with solution of sodium metasilicate after thorough wetting; allow to dry thoroughly.
  - .6 Galvanized steel sheet:
    - .1 Z275 (Satin & Spangled Sheet): SSPC SP7 brush blast.
    - .2 ZF075 (Wiped Coat): Remove contamination, wash with Xylene solvent.
    - .3 Touch-up damaged galvanized areas with organic zinc rich primer.
  - .7 Galvanized iron and steel: Prepare galvanized and ungalvanized metal surfaces as follows:
    - .1 Unpassivated, unweathered and weathered: Remove contamination, wash with Xylene or Toluol solvent, allow to dry thoroughly. Make paint system primer/sealer an etching type primer.
    - .2 Manufacturer pre-treated (including passivated): SSPC SP7.
    - .3 Touch-up damaged galvanized areas with organic zinc rich primer.
  - .8 Structural steel and miscellaneous metal fabrications:
    - .1 Coordinate the following with the responsible trades:
      - .1 Rust, mars, mill scale, and weld-burn touch-ups.
      - .2 Oil, grease, weld flux and other residue removal.
    - .2 Prime paint items, not otherwise indicated to be primed as part of another Section.
    - .3 Touch-up damaged galvanized areas with organic zinc rich primer.
  - .9 Factory primed surfaces:
    - .1 Touch up damaged areas.
    - .2 Clean as required for top coat.



- .10 Gypsum board (existing):
  - .1 Remove dust, dirt, oil, grease, glue and all foreign material. Clean with stiff fibre brush prior to applying primer coat.
  - .2 Coordinate repairs and touch-ups with the responsible trade.
  - .3 Lightly sand surface to smooth out ridges and provide neat smooth surface.
- .11 Gypsum board:
  - .1 Apply primer/sealer paint to reveal defects and deficiencies and to equalize absorption areas.
  - .2 Coordinate repairs and touch-ups with the responsible trade.
  - .3 Re-prime repairs.
- .12 Coordinate with other trades to prevent:
  - .1 Damage, and inadvertent activation of fire and smoke detectors.
  - .2 Odour and dust distribution by permanent HVAC systems including fouling of ducts and filters.
- .13 Field-mix Products in accordance with manufacturer's written instructions.

### 3.3 **APPLICATION**

- .1 Apply painting systems in accordance with the MPI Painting Specification Manual. Apply each Product to manufacturer's recommended dry film thickness.
- .2 Painting systems listed are required minimal, apply additional coats if necessary to obtain substrate hiding acceptable to the Consultant.
- .3 Tint intermediate coats lighter than final top coats for identification of each succeeding coat and to facilitate inspections. Include only manufacturer's recommended reducing and tinting accessories. Do not add adulterants.
- .4 Primer to be specialized primer coating system as required by manufacturer for selected colour. Standard primer being tinted shall be tinted to a maximum of 1.5% by volume.
- .5 Sand lightly between coats to achieve a tooth or anchor for subsequent coats.
- .6 Apply paint uniformly in thickness, colour, texture, and gloss, as determined by the Consultant under adequate illumination and viewed at a distance of 1500 mm. Apply finishes free of defects in materials and application which, in the opinion of the Consultant, affect appearance and performance. Defects include, but are not limited to:
  - .1 Improper cleaning and preparation of surfaces.
  - .2 Entrapped dust, dirt, rust.
  - .3 Alligatoring, blisters, peeling.
  - .4 Scratches, blemishes.
  - .5 Uneven coverage, misses, drips, runs, and poor cutting in.

- .7 Do not apply coatings on substrates which are not sufficiently dry. Unless indicated otherwise, allow each painting system coat to cure dry and hard before following coats are applied.
- .8 Repaint entire areas of damaged or incompletely covered surfaces, to the nearest inside or outside corner; patching will not be permitted.
- .9 Miscellaneous painting requirements:
  - .1 Paint projecting ledges, and tops, bottoms and sides of doors both above and below sight lines to match adjacent surfaces.
  - .2 Paint door frames, access doors and frames, door grilles, prime coated butts, and prime coated door closers to match surface in which they occur.
  - .3 Paint interior columns to match walls of room.
  - .4 Unless otherwise indicated, allow for:
    - .1 2 wall colours per room, one ceiling colour per room.
    - .2 Different door colours in each functionally different area.
    - .3 Different colours on both sides of same door.
- .10 Mechanical, electrical and other painting coordination:
  - .1 Paint following items unless specified or indicated on drawings not to be painted.
  - .2 Paint mechanical services in accordance with Mechanical Identification Division 21, 22 and 23.
  - .3 Coordinate painting of pipes, ducts, and coverings with the work of Division 21, 22 and 23 to precede pipe colour banding, flow arrows, and other pipe identification labeling installation.
  - .4 Paint exposed conduit, pipes, hangers, ductwork, grilles, gratings, louvres, access panels, fire hose cabinets, registers, enclosures, and other mechanical and electrical equipment including services concealed inside cupboard and cabinet work; apply colour and sheen to match adjacent surfaces, except as noted otherwise.
  - .5 Paint portions of surfaces such as duct interiors, piping, ductwork, hangers, insulation, walls, and similar items, visible through grilles, louvres, convactor covers etc., matte black in colour.
  - .6 Remove the following to accommodate painting, carefully store, clean, then re-install on completion of each area and when dry:
    - .1 Switch and receptacle plates, fittings and fastenings, grilles, gratings, louvres, access panels, convactor covers, and enclosures.

### 3.4 FIELD QUALITY CONTROL

- .1 Dry film thickness tests:
  - .1 Test for film thickness over entire surface to be painted, minimum one test/2 m<sup>2</sup> in field areas and one test/600 mm along inside corners including at ceiling to wall juncture.
  - .2 If any test registers below specified thickness, re-apply paint to entire surface to nearest inside and outside corners.

- .3 If test registers more than 50% above specified thickness, consult with paint manufacturer, determine if problem exists, offer solutions to Consultant, and repair as directed.
- .4 Re-test employing same criteria after repair.

3.5 **CLEANING**

- .1 Remove spilled, splashed, and spattered paint promptly as work proceeds and on completion of work. Clean surfaces soiled by paint spillage and paint spatters. Repair or replace damaged work, as directed by Consultant.

3.6 **PROTECTION**

- .1 Post Wet Paint signs during drying and restrict or prevent traffic where necessary.
- .2 Post sign, after Consultant's inspection and acceptance of each room, reading:  
PAINTING COMPLETE - NO ADMITTANCE WITHOUT CONTRACTOR'S PERMISSION.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services for washroom accessories work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM A167, Specification for Stainless Steel and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM A312, Specification for Seamless and Welded Austenitic Stainless Steel Pipes.
- .3 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .4 CAN/CSA B651-M, Accessible Design for the Built Environment.

1.3 **SUBMITTALS**

- .1 Product data: Submit Product data to requirements of the Conditions of the Contract indicating each washroom accessory describing size, finish, details of function, attachment methods, hardware and locks, description of rough-in frame, and building-in details of anchors for grab bars.
- .2 Certifications: Provide manufacturer's certification that grab bars can meet Project grab bar loading requirements.
- .3 Closeout submittals:
  - .1 Submit for each Product operation and maintenance instructions for incorporating into the Operations and Maintenance Manuals in accordance with the Conditions of the Contract.
    - .1 Supply 2 keys for each lockable washroom accessory to Consultant.
    - .2 Master key washroom accessories which are keyed.
- .4 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.

1.4 **DELIVERY, STORAGE AND HANDLING**

- .1 Deliver materials in sealed cartons and containers with manufacturer's name and product description clearly marked.

1.5 **EXTENDED WARRANTY**

- .1 Submit an extended warranty for washroom accessories work in accordance with the General Conditions, except that the warranty period is extended to 10 years from the date of Ready-for-Takeover.
  - .1 Against cracked or scratched mirrors, spoiling or deterioration of silvering or backing, loosening of fastenings or adhesive
  - .2 Coverage: complete replacement including effected adjacent work.

1.6 **MAINTENANCE**

- 1. Maintenance tools: Provide special tools necessary for accessing, assembly/disassembly or removal of toilet, bath and cleaning accessories in accordance with the Conditions of the Contract.

2 **Products**

2.1 **MATERIALS**

- .1 Stainless steel:
  - .1 Sheet metal: ASTM A167, Type 304.
  - .2 Tubing: ASTM A312, Type 304.
- .2 Sheet steel: ASTM A653M, Z275; Cold rolled, commercial quality, surface preparation and pretreatment as required for applied finish.
- .3 Fasteners, screws and bolts: ASTM A167, Type 304 stainless steel, tamper-proof.

2.2 **ACCESSORIES**

- .1 Refer to drawings for quantity and location of washroom accessories.
- .2 Grab bar (GB1):
  - .1 Series B-6806-99 by Bobrick or #3800-P Series by ASI Group Canada; 38 mm diameter, 1.2 mm thick, concealed mounting with snap flange, complete with escutcheons.
  - .2 Lengths and configurations as indicated on drawings.
  - .3 Finish: Type 304 stainless steel with a satin finish and peened grip.
- .3 L-shaped grab bar (GB2):
  - .1 'Series 6898-99 - L30x30' by Bobrick Washroom Equipment or approved alternative; 38 mm diameter, 1.2 mm thick, concealed mounting with snap flange, complete with escutcheons.
  - .2 Length and configuration: 762 x 762 mm, in L-shaped configuration as shown on Contract Drawings.
  - .3 Finish: Type 304 stainless steel with a satin finish and peened grip.

- .4 Swing up/fold down grab bar (GB3):
  - .1 #3513 Swing-Up Grab Bar by ASI Group Canada or approved alternative; 38 mm diameter, 1.2 mm thick, 762 mm long in location as indicated. Installation to include anchor plate or blocking as required.
  - .2 Finish: Type 304 stainless steel with a satin finish and peened grip.
- .5 Mirror (MR): 6 mm thick, mirror quality float glass
  - .1 #B-290 Series by Bobrick or #20650 series by ASI Group Canada; mitred corners welded, and polished smooth.
  - .2 Dimensions: Sizes and locations as indicated on the Contract Drawings.
  - .3 Frame finish: Type 304 stainless steel satin finish.
- .6 Collapsible safety coat hooks (CH):
  - .1 Provide single collapsible spring loaded security coat hook where indicated.
  - .2 Hook to consist of stainless steel base and epoxy coated stainless steel hook in white colour with smooth burr free edge.
  - .3 Safety hook shall snap down when load exceeds 25 lb (11 kg) limit.
  - .4 Provide hooks with manufactured recommended tamperproof stainless steel screws.
  - .5 Acceptable Product:
    - .1 'Safety Coat Hook, Model No. 1150' by Frost Products Ltd.
    - .2 Or approved alternative.
- .7 Soap dispenser (SD):
  - .1 Touch-free, automatic soap dispenser fabricated from high impact ABS plastic, with locking mechanism and having a 1200 mL soap capacity. Colour: To be selected by the Consultant.
  - .2 Acceptable Product: 'Purell ES8 Soap Dispenser' by Gojo Industries, LLC or approved alternative.
- .8 Stainless steel shelf (SSS):
  - .1 #0692 Series by ASI Group Canada or approved alternative; shelf fabricated from 1.2 mm thick stainless steel with 13 mm return edge and front edge hemmed for safety.
  - .2 Shelf complete with brackets fabricated from 1.2 mm thick stainless steel.
  - .3 Size: 100 mm wide x 914 mm length.
  - .4 Finish: Type 304 stainless steel, satin finish.
- .9 Sanitary napkin disposal (SND):
  - .1 #B-254 by Bobrick or #0473-1A by ASI Group Canada; Surface mounted, top hung upper door with multi-staked piano hinge, surface mounted stainless steel wall box and waste receptacle, full length stainless steel hinge. Receptacle capacity: 5.7 L.
  - .2 Finish: All exposed edges Type 304 stainless steel with satin finish.

- .10 Paper towel dispenser (PTD-2):
  - .1 Touch and jam free, slim design, automatic paper towel dispenser fabricated from high impact plastic material. Colour: To be selected by the Consultant.
  - .2 Acceptable Product: 'PeakServe' by Tork or approved alternative.
- .11 Waste receptacle (WR-2):
  - .1 #B-277 by Bobrick or #0826 by ASI Group Canada; Surface mounted receptacle, drawn and beveled, one-piece, seamless front. Waste receptacle to be equipped with interior clips for securing furnished reusable vinyl liner. Minimum capacity: 45.4 L.
  - .2 Finish: Type 304 stainless steel with satin finish.
- .12 Toilet tissue dispenser (TPD):
  - .1 #B-2892 by Bobrick or approved alternative by ASI Group Canada; surface mounted, jumbo multi roll dispenser, with side by side rolls enclosed in cabinet above.
  - .2 Finish: Type 304 stainless steel with satin finish.
- .13 Adult changing station (ACS):
  - .1 Wall-mounted folding table with water containment system to direct fluids to drain, capable of withstanding 200 kg (440 lbs), complete with reversible padded comfort support.
  - .2 Table shall be fabricated from heavy duty aluminium frame with removable polyurethane foam mattress and be mounted on powder-lacquered stainless steel brackets.
  - .3 Table height to be adjustable, with range from 300 mm to 1000 mm above floor finish.
  - .4 Acceptable Product: Pressalit Care 3000 by Max-Ability or approved alternative.
- .14 Hand dryer (HD):
  - .1 Surface mounted, lightweight automatic impact resistant hand dryer in silver colour with touch-free infra-red activation, 12 second drying time and HEPA filter with anti-microbial coating.
  - .2 Electrical supply: 120-127 V AC, single phase, 60 Hz.
  - .3 Acceptable Product: 'Airblade V' by Dyson or approved alternative.

3 Execution

3.1 EXAMINATION

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

### 3.2 **INSTALLATION**

- .1 Verify and coordinate templates, inserts, and rough-in frames and verify exact location of washroom accessories for installation.
- .2 Verify there is adequate supports and/or blocking in gypsum wall assemblies prior to installation of washroom accessories and as required to meet intended loading of wall mounted grab bars and any additional accessories as shown on Contract Drawings.
- .3 Verify adequate blocking has been installed in gypsum wall assemblies for future adult change tables.
- .4 Provide fastening and mounting kits for washroom accessories.
- .5 Locate washroom accessories where indicated on Drawings and where directed by Consultant.
- .6 Install washroom accessory fixtures, accessories, and items in accordance with manufacturer's instructions and CAN/CSA B651-M. Provide exposed tamper-proof screws of stainless steel to match units.
- .7 Install washroom accessories plumb, level, and securely and rigidly anchored to substrate surfaces and framing. Adjust accessories for proper operation and verify mechanisms function smoothly.
- .8 Grab bar loads:
  - .1 Install grab bars to withstand minimum downward pull requirements as specified herein and as required by authorities having jurisdiction. Provide necessary blocking, supports and reinforcements as required.
  - .2 Straight and L-shaped grab bars (typical applications): Minimum 1.3 kN (132 kg/290 lbs).
- .9 Clean and polish exposed surfaces and fill accessories with necessary supplies prior to acceptance by Consultant.

END OF SECTION



1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for miscellaneous specialties work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 NFPA 30, Flammable and Combustible Liquids Code.
- .2 NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals.
- .3 UL1275, Flammable Liquid Storage Cabinets.

1.3 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data for each Product specified in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations.
    - .2 Product transportation, storage, handling and installation requirements.
- .2 Shop drawings: Submit shop drawings in accordance with the Conditions of the Contract indicating elevations, sections, details, dimensions, materials, gauges, and finishes.
- .3 Samples:
  - .1 Submit samples in accordance with the Conditions of the Contract of the following:
    - .1 Duplicate 300 x 300 samples of wall protection demonstrating material, colour and finish.
    - .2 Duplicate 300 mm long samples of cord cover demonstrating material and colour.
- .4 Closeout submittals: Submit cleaning and maintenance instructions for miscellaneous specialties for incorporation into Operations and Maintenance Manuals in accordance with the Conditions of the Contract.

1.4 **DELIVERY, STORAGE, AND HANDLING**

- .1 Package or crate, and brace products to prevent distortion in shipment and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings.

2 Products

2.1 MANUFACTURED UNITS

- .1 Corner guards (CG):
  - .1 38 mm x 38 mm x 90°, 2 mm thick, tape on vinyl corner guards, complete with accessories as recommended by guard manufacturer, such as tape and adhesive.
  - .2 Colour: Solid colour, to match colour of adjacent wall paint for each guard type.
  - .1 Types as follows:
    - .1 Corner guard (CG-1): Full height guard.
    - .2 Corner guard (CG-2): 914 mm high guard.
  - .2 Acceptable Product: 'Tape-On Corner Guards' by InPro Corporation or approved alternative by C/S Group.
- .3 Whiteboard (WB):
  - .1 Porcelain on steel laminated to 8 mm impregnated core with zinc coated backing sheet, with recessed tray and clear anodized aluminum perimeter trim with squared corners.
  - .2 Colour and finish: Low gloss finish in white, 'Porcelain Surface' by ASI Visual Display Products or approved alternative.
  - .3 Sizes and layout: As shown on Contract Drawings.
- .4 Wall protection (WP-1):
  - .1 High impact, rigid wall cladding, 1.0 mm thick, height as shown on Drawings. Cladding shall be applied to wall with odourless adhesive.
  - .2 Accessories: Provide colour matched wall covering accessory trim pieces: outside edge caps, joint covers, inside corner and outside corners, to suit application.
  - .3 Colour: Solid colour, in colour to match wall paint and Consultant approved samples.
  - .4 Acceptable Product:
    - .1 'Acroyvn Wall Covering' by Construction Specialties Ltd.
    - .2 Or approved alternative by Inpro Corporation, Kleerdex Company or McGill Architectural Products.
- .5 Glove dispenser: Wall mounted, stainless steel glove dispenser, 'Glove Dispenser - Double Stainless Steel' by Uline or approved alternative.
- .6 Sharps disposal unit:
  - .1 Heavy-duty, vandal resistant, wall mounted, sharps disposal stainless steel system including a steel recessed tube inlet to prevent unauthorized access, complete with a plastic disposal sharps container. Capacity: Minimum 4 L.
  - .2 Acceptable Product: 'Stainless Steel Biomedical Sharp Disposal, Model 878' by Frost Products Ltd. or approved alternative.

- .7 Safety storage (solvent) cabinets:
  - .1 Construct storage cabinets of double wall, welded sheet steel construction with double panel door with insulation core. Cabinets shall have four adjustable levelling devices to compensate for approximately 25 mm base building floor differential. Door sill shall extend 50 mm above bottom of cabinet to form a liquid-tight well. Overlap cabinet frame with hinged doors having continuous piano type hinges with three-point locking mechanism ship lapped at opening stile. Shiplap shall be provided with braided fibreglass gasket.
  - .2 Insulate walls, back, side and top of cabinet with 50 mm thick mineral fibre insulation.
  - .3 Cabinet shall have adjustable galvanized sheet steel shelves with four edges turned down 25 mm and additionally returned under 16 mm on all edges. Provide 13 mm incremental shelf adjustment.
  - .4 Provide 50 mm vents, complete with fire baffle covers on each vent, with 50 mm diameter fine metal filter.
  - .5 Provide overlaid red warning letters 50 mm high on doors reading "FLAMMABLE -- KEEP FIRE AWAY".
  - .6 Cabinets shall comply with NFPA 30 and NFPA 45 for flammable and combustible liquids. Provide grounding screw lug in accordance with Codes.
  - .7 Construct safety storage cabinets sized for under-counter and configurations as required by Drawings.
  - .8 Cabinet shall be listed and labelled to the UL1275 standard.
  - .9 Acceptable product and manufacturer: 'Insulated Solvent Storage Cabinet' by Mott Manufacturing Ltd., or approved alternative.
- .8 Paper towel dispenser (PTD-1):
  - .1 #B-262 by Bobrick; surface mounted 275 x 355 x 100 mm dispenser, equipped to dispense C-fold or multifold towels. Full length stainless steel hinge to allow door to swing down for refilling.
  - .2 Finish: Type 304 stainless steel with satin finish.
- .9 Waste receptacle (WR-1):
  - .1 #B-277 by Bobrick or #0826 by ASI Group Canada; Surface mounted receptacle, drawn and beveled, one-piece, seamless front. Waste receptacle to be equipped with interior clips for securing furnished reusable vinyl liner. Minimum capacity: 45.4 L.
  - .2 Finish: Type 304 stainless steel with satin finish.
- .10 Cord covers:
  - .1 Provide cord covers to protect and organize cords and cabling as shown on Contract Drawings.
  - .2 Two-part, rubber cord cover device, in size and type to suit intended use. Colour: To be selected by the Consultant.
  - .3 Acceptable Product: 'ChordSaver Cord Cover' by ChordSavers or approved alternative.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **PREPARATION**

- .1 Verify substrate surfaces are solid, free from surface water, dust, oil, grease, projections and other foreign matter detrimental to performance.
- .2 Items to be built-in: Provide information and templates required for installation of work of this Section, and assist or supervise, or both, the setting of anchorage devices, and construction of other work incorporated with products specified in this Section in order that they function as intended.
- .3 Verify there is adequate supports and/or blocking in gypsum wall assemblies prior to installation of miscellaneous specialty items as required.

3.3 **INSTALLATION**

- .1 Install miscellaneous specialties level and securely and rigidly anchored to substrate in accordance with authorities having jurisdiction, reviewed shop drawings, and manufacturer's written instructions.
- .2 Wall protection:
  - .1 Apply wall protection covering and manufacturer recommended adhesive to face of walls as indicated in accordance with manufacturer's written instructions.
  - .2 Ensure intended wall surfaces are clean and free from deleterious matter.
  - .3 Install wall protection covering with textured surface as the exposed finish.
  - .4 Install wall protection material with maximum 1.6 mm space between sheets and at abutting internal corners. All joints must be in alignment. No horizontal joints permitted.
  - .5 Seal joints, exposed side edges and top of wall protection in accordance with Section 07 92 00.
  - .6 Provide a continuous bead of caulking at adjoining integral resilient flooring base.
- .3 Cord covers: Ensure cover does not serve as a tripping hazard.
- .4 After installation, adjust miscellaneous specialties in accordance with manufacturer's written instructions.

3.4            **CLEANING**

- .1        Clean and polish exposed surfaces prior to acceptance by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for Owner supplied and Contractor installed item work in accordance with the Contract Documents.

1.2 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations and warranties.
    - .2 Product transportation, storage, handling and installation requirements.
  - .2 Shop drawings: Submit shop drawings in accordance with the Conditions of the Contract indicating elevations, sections, details, dimensions, materials, gauges, and finishes.
  - .3 Certificates: Submit manufacturer's certificates stating that products are in accordance with this specification.
  - .4 Closeout submittals: Submit recommended maintenance instructions and listing of recommended maintenance Products for incorporation into Operations and Maintenance Manuals in accordance with the Conditions of the Contract.

1.3 **QUALITY ASSURANCE**

- 1. Regulatory requirements: All electrical equipment shall have attached labels attesting to CSA or Electrical Safety Authority approval, and shall have magnetic starters for motors, transformers, and overload protection.

1.4 **DELIVERY, STORAGE AND HANDLING**

- 1. Package or crate, and brace products to prevent damage or distortion of equipment in shipment and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings or equivalent protection. Provide temporary skids under large or heavy units.
- 2. Do not deliver products to site until conditions are such that no damage will occur to them while in storage.
- 3. Store equipment at site in a manner to prevent damage to equipment.
- 4. Uncrate equipment only before installation.

1.5            **SCHEDULING**

1.        Provide equipment or its parts ready for installation in accordance with construction schedule. Verify required delivery date sufficiently before delivery to ensure that construction is not delayed.

2            Products

2.1          **EQUIPMENT**

1.        Provide reinforcing and anchorage for built-in products.
2.        Insulate between dissimilar metals, and metal and masonry, to prevent electrolysis.
3.        Equipment shall include all electrical components required by jurisdictional authorities, and to protect the equipment from damage during operation.
4.        Equipment shall include all components, connections, devices and controls required to make it fully and safely operable.

2.2          **FABRICATION**

1.        Fit joints and junctions between components tightly, in true planes, and to prevent entry of water to collect in component voids. Cap open ends of sections exposed to view.
2.        Fabricate work with materials and component sizes, metal gauges, reinforcing anchors, and fastenings of adequate strength to ensure that it will remain free of warping, buckling, opening of joints and seams, and distortion within limits of intended and specified use. Conceal and weld connections wherever possible.
3.        Cleanly and smoothly finish exposed edges of materials including holes and cutouts.
4.        Provide reinforcing and attached anchorage for built-in products.
5.        Provide holes and connections for work installed under other Sections.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.
2. Before installation commences, ensure that mounting devices, members and surfaces are satisfactory for fitting, and adequate for securing of work.
3. Take site measurements of construction to which work of this Section must conform, and through which access must be made, before work is delivered to site, to ensure that adaptation is not required which would result in construction delay.

3.2 **INSTALLATION**

1. Obtain from manufacturer or supplier, anchorage information, roughing-in dimensions, templates and service requirements for installation of work of this Section. Also obtain assistance from manufacturer or supplier, for the setting of anchorage devices, and construction of other work incorporated with equipment specified in this Section in order that they function as intended.
2. Install work to meet manufacturer's recommended specifications, true, tightly fitted, and level or flush to adjacent surfaces, as suitable for installation.
3. Work shall include rough hardware, fastenings and other items necessary for secure installation.
4. Use only fastenings suitable for materials. Do not use through fastening at floors or walls.
5. Install work straight, plumb, level, and secured to prevent distortion or displacement, or both. Shim as necessary with concealed shims. Where required, use grout on which iron oxide deposits will not form.
6. Secure fixed equipment to building structure or construction as required to maintain it permanently in place, and so that it functions properly with no damaging vibration to the building or itself.
7. Install equipment with connections provided as required for plumbing and electrical services.
8. Mechanical:
  - .1 Provision of mechanical services and connection of equipment to mechanical work is specified in Division 22.
  - .2 Obtain and pay for all permits and connection fees as per authorities having jurisdiction.



9. Electrical:
  - .1 Provision of electrical service and connections of equipment to the services is specified in Division 26.
  - .2 Obtain and pay for all permits and connection fees as per authorities having jurisdiction.

### 3.3 REPAIR

1. Refinish damaged or defective work so that no variation in surface appearance is discernible. Refinish work at site only if approved by Consultant.

### 3.4 ADJUSTING

1. Verify under work of this Section that installed products function properly, and adjust them accordingly to ensure satisfactory operation.
2. Lubricate equipment as specified by equipment manufacturer.

### 3.5 CLEANING

1. Clean and polish all surfaces that are exposed to view from any location on completion of installation.
2. Remove packaging materials and debris from installation from the site.

### 3.6 DEMONSTRATION

1. After start-up, adjusting and cleaning, demonstrate operation of equipment to Owner and Consultant, prior to Ready-for-Takeover. Demonstrations shall be made:
  - .1 When the Work is certified complete by the Consultant.
  - .2 When the Work is turned over to the Owner.
2. Knowledgeable representatives of the manufacturers and installers of the equipment being demonstrated shall be present at time of demonstrations.

### 3.7 SCHEDULE OF EQUIPMENT

1. Owner supplied and Contractor installed items:
  - .1 Refer to Contract Drawings for list of Owner supplied items for installation by Contractor.
  - .2 Any additional items indicated by the Consultant beyond the specified list shall be installed by the Contractor at an additional cost to the Contract.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for electrically operated window covering work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 CAN/ULC-S109, Flame Tests of Flame-resistant Fabrics and Films.

1.3 **SUBMITTALS**

- .1 Product data:
  - .1 Submit manufacturer's Product data in accordance with the Conditions of the Contract indicating:
    - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, limitations, and finishes.
    - .2 Product transportation, storage, handling and installation requirements.
- .2 Shop drawings:
  - .1 Submit shop drawings in accordance with the Conditions of the Contract indicating:
    - .1 Elevations, sections and details of opening size, clearances, handling of operating components, anchorage, dimensions, gauges, materials, and finishes.
    - .2 Complete electrical wiring diagrams including electrical schematics and sequence of operation.
- .3 Samples:
  - .1 Submit following samples in accordance with the Conditions of the Contract.
    - .1 Two 300 x 300 mm samples of fabric type.
- .4 Extended warranty: Submit extended warranty signed and registered by the manufacturer providing the warranty in the name of the Owner for the timeframe and coverage specified in this Section.
- .5 Closeout submittals:
  - .1 Submit following for each Product for incorporation into Operations and Maintenance Manuals in accordance with the Conditions of the Contract:
    - .1 Functional description detailing operation and control of components.
    - .2 Performance criteria and maintenance data.
    - .3 Operating instructions and precautions.
    - .4 Safety precautions.

1.4 **EXTENDED WARRANTY**

- .1 Manufacturer shall provide warranty that all components are free of manufacturing defects for two years from date of installation. This warranty is void if the product has been improperly installed or subjected to improper care.

2 Products

2.1 **ACCEPTABLE PRODUCTS AND MANUFACTURERS**

- .1 Motorized window shade (RS):
  - .1 Extruded aluminum hanger and closure using a linear motor, fabloc tube and necessary electrical accessories for a single switch or motor group control operated as indicated on Contract Drawings, complete with fabric type specified.
  - .2 Internal limit switches are adjusted by two hex keys to allow for exact stop positions. Solenoid activated disc brake stops and holds in any position. Asynchronous motor with built in reversible capacitor start and run, 95-125V-AC at 60Hz CSA and UL approved. Motor and related components manufactured by Somfy Canada or approved alternative.
  - .3 Acceptable Product: 'Motorized Deko Roller Shades' by Altex SunProject Inc. or approved alternative by Elite Pro Shading Systems or Solarfective (Legrand North America).

2.2 **SHADING FABRIC**

- .1 Solar shading fabric:
  - .1 Shading fabric: PVC and polyester solar shading fabric with a matte finish. Openness factor and colour to match existing clinic window shades. 'Series 10 000' by Altex Design or approved alternative.
  - .2 Flame retardance: Fabric shall be certified by an independent laboratory to pass CAN/ULC-S109.
  - .3 Fabric colour: Selected by Consultant from full colour range of any of the specified manufacturers. Shade fabric on any one floor shall be from the same dye lot.
  - .4 Fabric shall be sealed under heat and pressure to retain weave pattern, with additional heat seal at sides, to prevent fraying and to eliminate rough edges.

## 2.3 FABRICATION

- .1 Fabricate motorized window shades in accordance with reviewed shop drawings and manufacturer's written instructions.
- .2 Extruded aluminum shade tube: Manufacturer's standard extruded aluminum shade tube, suitable for motorized applications..
- .3 Fascias and soffit: Extruded aluminum cover. To cover front and rear of shade and soffit return at underside to conceal roller and hardware.
- .4 Electrical components:
  - .1 Internal limit switches: adjustable with two hex keys to allow exact setting of stop position. Micro switches to provide circuit breaking at end of run. Switch setting not to be disturbed by roller tube action.
  - .2 Brake: solenoid activated disc brake mechanism stops and holds any position, brake to disengage when motor is running.
  - .3 Motor: Built-in reversible capacitor start and run. Single phase 95-125V-AC, 60 Hz motor with thermally protected class A temperature rating.
  - .4 Gear box: Satellite gears with 3 levels for load distribution with planetary type gears machined to close tolerance of tempered steel.
  - .5 Controls: Motors will be operated by white three position rocker switch, located remotely.
- .5 Exterior hembar: Extruded aluminum in clear anodized finish with plastic end finials.
- .6 Dynamic hembar: At sill locations, in lieu of bottom channel, provide aluminum Dynamic Hembar with same finish as side channels. Upon contact with sill, it shall provide a light seal even if the sill is slightly out of level.
- .7 Colour: Exposed surfaces (excluding fabric) shall be colour selected by Consultant, and not necessarily from manufacturer's full colour range. Metal components shall be pretreated and finished with an acceptable baked enamel finish.
- .8 Fasteners: Non-corrosive metal screws for attachment to windows or curtain wall framing, concealed in completed installation.
- .9 Shade and mounting system to be designed to allow air between shade and glass.
- .10 Fabric shall hang flat, without buckling or distortion. Trimmed edges shall hang straight without curling or raveling.
- .11 Unguided vertical shades shall not drift sideways more than 3 mm in total run.
- .12 Provide stops at highest and lowest shade positions to prevent over winding and unrolling.

- .13 Design and fabricate shades so that there is a maximum 12 mm gap both sides of fabric.

### 3 Execution

#### 3.1 EXAMINATION

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

#### 3.2 INSTALLATION

- .1 Install shades in accordance with accepted shop drawings, manufacturer's written instructions and to meet requirements of authorities having jurisdiction.
- .2 Install shades in locations shown using specified fasteners, plumb, true, square, straight, and level in proper planes, complete with all fascias/soffits, trims and accessories.

#### 3.3 ADJUSTMENT AND CLEANING

- .1 The shade cloth fabric shall hang flat, without buckling or distortion. The edge, when trimmed, shall hang straight without ravelling. An unguided roller shade cloth shall roll true and straight, without shifting sideways more than 3 mm in either direction due to warp distortion, or weave design.
- .2 Adjust, correct and lubricate fabric shade as required, to provide smooth and efficient operation without binding.
- .3 Clean shade surfaces and remove all finger marks and smudges from fascias, soffits, and trim surfaces. Remove all protective films.
- .4 Leave fabric shade in raised position and in first-class condition upon completion of the work of this Section.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for radiation protection work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 Health Canada's Safety Code 30 - Radiation Protection in Dentistry.
- .2 Royal College of Dental Surgeons of Ontario Regulations.

1.3 **DESIGN REQUIREMENTS**

- .1 Design radiation protection work by a qualified Professional Engineer and who is employed or retained by the manufacturer, including lead lined gypsum wallboard, and sheet lead lining to provide a continuous protective assembly against the passage of radiation from x ray and other radiation emitting equipment.
- .2 Provide materials and workmanship, including joints and fasteners, that maintain continuity of radiation protection at all points and all directions equivalent to materials specified in thicknesses and locations indicated.
  - .1 Employ physicist knowledgeable in radiation protection for medical facilities to determine thicknesses and configurations of lead-lined materials.

1.4 **SUBMITTALS**

- .1 Submit submittals in accordance with the Conditions of the Contract.
- .2 Product Data: Manufacturer's data sheets on each product to be used, including:
  - .1 Preparation instructions and recommendations.
  - .2 Storage and handling requirements and recommendations.
  - .3 Installation methods.
- .3 Shop drawings:
  - .1 Indicate dimensions, description of materials and finishes and general construction.
  - .2 Indicate layout of radiation-protected areas.
  - .3 Indicate lead thickness or lead equivalencies of components.
  - .4 Clearly indicate each type of material, reinforcements, location of anchors and exposed fasteners, and other pertinent information.
- .4 Certificates:
  - .1 Submit installer's qualification data as proof of experience.
  - .2 Submit inspection reports and certification by manufacturer confirming that installations are in accordance with the Contract Documents and manufacturer's requirements.

1.5 **QUALITY ASSURANCE**

- .1 Retain a Professional Engineer, licensed in the Province of Ontario, with experience in work of comparable complexity and scope, to perform the following services as part of the work of this Section:
  - .1 Design radiation protection work.
  - .2 Review, stamp, and sign shop drawings.
  - .3 Conduct shop and field inspections and prepare and submit inspection reports.
- .2 Single Source Responsibility: Obtain radiation protection materials and accessories produced as standard products from single manufacturer regularly engaged in production of X-Ray shielding materials, equipment, and accessories.
- .3 Installers qualifications: Perform work of this Section by a company that has a minimum of five years proven experience in Work of similar size and nature and that is approved by manufacturer. Submit to Consultant, installer's current certificate of approval by the material manufacturer as proof of compliance.
- .4 Radiation Protection Survey: Employ registered X-Ray physicist, certified by American Board of Radiology, for testing specified radiation protective Work and to conduct radiation protection survey of facility after radiation shielding materials are installed.
  - .1 Take radiation measurements and indicate evaluation of measurements in report. Submit report to Consultant and Owner upon completion of report.
  - .2 Take radiation measurements in locations indicated by Consultant.
- .5 Radiation Protection Work: Comply with National Council of Radiation Protection (NCRP) Report No. 049 - Structural Shielding Design and Evaluation for Medical Use of X-Rays and Gamma Rays of Energies up to 10 MeV.
  - .1 Comply with requirements of local regulatory agencies where local standards and criteria exceed requirements of NCRP Report No. 049.
  - .2 Comply with requirements of Health Canada's Safety Code 30 - Radiation Protection in Dentistry.
- .6 Perform work in accordance with the Royal College of Dental Surgeons of Ontario Regulations.
- .7 Mock-up:
  - .1 Construct one mock-up of each type of radiation protection component in location acceptable to Consultant.
  - .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
  - .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
  - .4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

- .8 Pre-installation meeting: Arrange with manufacturer's representative, Contractor, and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

#### 1.6 **DELIVERY STORAGE AND HANDLING**

- .1 Comply with manufacturer's instruction for receiving, handling, storing, and protecting materials.
- .2 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- .3 Store materials in original packaging, protected from exposure to harmful environmental conditions, including static electricity, and at temperature and humidity conditions recommended by manufacturer.
- .4 Exercise care to prevent edge damaged materials.

#### 1.7 **SITE CONDITIONS**

- .1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

#### 2 **Products**

##### 2.1 **ACCEPTABLE MANUFACTURERS**

- .1 MarShield.
- .2 UltraRay Medical Products Inc.
- .3 Or approved alternative.

##### 2.2 **MATERIALS**

- .1 General:
  - .1 Provide reinforcing, fastenings, and anchorage required for building in of products.
  - .2 Products shall not have attached plates, or shall they be imprinted or labelled with manufacturer's name or trademark unless directed by Consultant.
  - .3 Specified materials are minimum acceptable quality. Manufacturer's standards exceeding specified quality will be accepted.



- .2 Lead Sheets: 99.9 percent pure un-pierced virgin lead, free from dross, oxide inclusions, scale, laminations, blisters, and cracks.
  - .1 Sheet Lead shall meet or exceed the Federal Specification QQL-201 F Grade C and ASTM B749 Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products, see NCRP reports #33, #35 and #49.
  - .2 Thickness: As determined by Radiation Protection Survey, and not less than the following:
    - .1 Minimum 1.6 mm thick lead lining.
  - .3 Variation in sheet thickness: Not to exceed 3 percent.
- .3 Gypsum board: 15.9 mm thick, gypsum board as specified in Section 09 21 16, ULC labelled fire-rated gypsum board conforming to ASTM C1396/1396M. Ends cut square, edges tapered. Gypsum board to be complete with lead laminated to backside as indicated on Contract Drawings.
- .4 Primer for touch-up: zinc rich, to CAN/CGSB 1.181. VOC limit is 100 g/L.
- .5 Reinforcing steel: to CSA-G40.20/G40.21, Type 300W.
- .6 Fasteners: standard screw type as recommended by manufacturer. Where fasteners penetrate lead shielding, fully cover heads of fasteners with lead discs.
- .7 Isolation coating: alkali resistant bituminous paint or epoxy resin solution.
- .8 Accessories: Accessories to include but not be limited to the following list of items:
  - .1 Types as recommended by manufacturer to suit intended application.
  - .2 Screw Fasteners: Type S Bugle Head, length as required.
  - .3 Lead Strips: 51 mm wide, unless indicated otherwise, by same thickness as sheet lead laminated on gypsum board.
  - .4 Lead Discs: 9.5 mm diameter lead discs for use with screw heads.
  - .5 Adhesive: Acceptable to manufacturer and capable of adhering lead sheets where required.

### **2.3 LEAD LINED GYPSUM WALLBOARD**

- .1 Lead lined gypsum wallboard shall consist of a single unpierced piece of sheet lead factory laminated under hydraulic pressure to gypsum wallboard nominal 1200 mm wide by 2135 mm high. Thickness of lead as indicated.
- .2 Unless a separate 50 mm wide lap strip of sheet lead is provided, extend sheet lead liner minimum 25 mm beyond one long edge of wallboard.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.
- .2 Do not proceed until unsatisfactory conditions have been corrected.

3.2 **INSTALLATION**

- .1 Install radiation protection in accordance with reviewed shop drawings, manufacturer's written instructions and in accordance with requirements of authorities having jurisdiction and the Royal College of Dental Surgeons of Ontario Regulations.
- .2 Take all necessary measures to fully protect tradesmen and work of this Section.
- .3 Supplier shall provide information and templates required for installation of work of this Section, and assist or supervise, or both, the setting of anchorage devices, and construction of other work incorporated with products specified in this Section in order that they function as intended.
- .4 Install Work to meet manufacturer's recommended specifications, true, tightly fitted, and level or flush to adjacent surfaces, as suitable for installation.
- .5 Provide lead sheet envelope to enclose back and sides of all items and equipment recessed in solid masonry walls. and in locations so noted. Form lead so as not to reduce the effective thickness at any location. Lead shall not be pierced for fastenings unless essential and pierced areas shall be covered with sheet lead lapped to ensure continuity of protection.
- .6 Employ only competent and qualified tradesmen thoroughly experienced in this type of work. Take all necessary measures to fully protect tradesmen and Work of this Section.
- .7 Coordinate with all applicable trades as required for Work of this Section and to maintain radiation requirements for Work of this Contract.
- .8 Lead sheet on steel stud framing:
  - .1 Metal stud framing, as well as horizontal framing at 2135 mm above floor level, will be provided under work of Section 09 21 16. Under work of this Section provide all additional framing as required to provide solid backing at all joints and openings through lead lined assembly.
  - .2 Install lead sheets with at least a 50 mm overlap between sheets on all sides and overlap shall occur over a steel stud, including horizontal joints. Use sheet lead to seal voids to provide a complete uninterrupted barrier.
  - .3 Secure lead sheet to steel studs with drywall screws at maximum 150 mm oc.

- .9 Lead backed gypsum board installation:
  - .1 Install lead backed gypsum board so there is an effective lead lap between boards on all edges. Where boards are cut, and an effective lead lap doesn't exist, use sheet lead to seal voids to provide a complete uninterrupted barrier.
  - .2 Secure lead backed gypsum board to metal studs and metal framing with screws at 200 mm centres. Each screw shall be driven through a lead disc with tab, fold tab over head of screw and depress disc and tab to take topping compound.
- .10 Take careful precautions in handling and placing sheet lead to prevent any scoring, bruising, crimping, sharp bends and puncturing.
- .11 Apply isolation coating where necessary to prevent electrolysis between dissimilar metals, or metal to masonry and concrete contact.
- .12 Where indicated provide continuous sheet lead lining to walls, other than where lead lined gypsum board is required. Secure lining in similar manner as specified above.
- .13 If desired, as an alternative to lead lined gypsum board, provide continuous sheet lead lining to walls but make arrangements with Section 09 21 16 for installation of gypsum board over the installed lead lining. Secure lining in similar manner as specified in paragraph above.
- .14 Co-operate with other trades and provide miscellaneous sheet lead for the complete shielding of electrical boxes, conduits, panels, pipes and other items which pierce lead lining.
- .15 Complete room installation shall provide a continuous uninterrupted membrane protection to heights and areas indicated and be free of holes, cracks or areas of penetration by radiation.

### 3.3 **INSTALLATION OF PENETRATING ITEMS**

- .1 At penetrations of lead linings; provide lead shields to maintain continuity of protection.
- .2 Provide lead linings, sleeves, shields, and other protection in thickness not less than that required in assembly being penetrated.
- .3 Cut wall penetration covers from lead sheet of equal or greater thickness than backing on adjacent wall panels. Cut wall penetration covers to size required to cover wall penetrations with laps 25 mm minimum wide as indicated on penetration detail drawings.
- .4 Adhesive-apply lead sheet penetration covers on penetrating boxes and raceways and return penetration covers to backside of lead-backed wall panels with 25 mm minimum laps.
  - .1 Do not use penetrating fasteners unless indicated otherwise.

- .5 Outlet Boxes and Conduit: Install between studs using steel telescoping mounting brackets. Cover or line with lead sheet lapped over adjacent lead lining at least 25 mm. Wrap conduit with lead sheet for 250 mm in from box.

### 3.4 **INSTALLATION OF WALL PENETRATION COVERS**

- .1 Duct penetrations with 8 psf or less lead sheet:
  - .1 Wrap ducts with wall penetration covers, lapping lead joints 25 mm minimum.
  - .2 Secure lead sheet in place with 25 mm minimum width steel bands spaced not more than 305 mm on center.
  - .3 Do not cut into lead sheet with tightening steel bands.
- .2 Duct penetrations with greater than 8 psf lead sheet and where duct shielding exceeds 610 mm in width:
  - .1 Laminate wall penetration covers to plywood or other similar structural panels conforming to shape of duct, lapping lead joints 25 mm minimum.
  - .2 Secure lead laminated panels to ducts with mechanical fasteners located at duct seams and corners.
  - .3 Where necessary to prevent lead laminated panels from overloading duct supports, independently suspend panels from hangers secured to overhead building structure.
  - .4 Cover fastener heads with lead sheet matching thickness of adjacent lead.
  - .5 Piping: Unless indicated otherwise, wrap piping with lead sheet for 250 mm from point of penetration.

### 3.5 **ACCESSORY INSTALLATION**

- .1 Comply with manufacturer's written instructions for the installation of accessories.
- .2 Wherever lead protection is penetrated, cut, or punctured, assure continuity of shielding by use of sheet lead, lead plugs or other approved method.
- .3 Wrap electrical outlet boxes and other penetrations through lead barrier material with sheet lead to provide radiation protection to levels indicated or levels required to match adjacent wall protection.

### 3.6 **TOUCH-UP AND REPAIR**

- .1 Refinish damaged or defective work so that no variation in surface appearance is discernible. Refinish work at site only if approved by Consultant.

**3.7 INSPECTION AND TESTING**

- .1 Arrange for inspection of radiation protection installation by manufacturer's representative. A representative of the Contractor and Consultant must be present with the manufacturer during noted site inspections. Notify Consultant 48 hours in advance of date and time of inspection.
- .2 After X-ray equipment has been installed, testing for leaks in the shielding installation will be carried out by testing laboratory designated by Owner. The Owner will initiate radiation leakage testing by Ministry of Health, X-ray Inspection Service (XRIS).
- .3 Owner will pay costs for testing as specified in Contract Documents.
- .4 If tests reveal radiation leakage, Contractor shall make all remedial repairs to ensure a leak free installation at no additional cost to the Owner.
- .5 Correct deficiencies in, or remove and replace, radiation protection that testing indicates does not comply with specified requirements, including finishes and other Work covering defective Work.

**3.8 CLEANING**

- .1 Remove excess materials from site and leave Work areas broom clean.
- .2 Leave exposed surfaces ready for site finishing.

**3.9 ADJUSTING**

- .1 Verify under work of this Section that installed products function properly, and adjust them accordingly to ensure satisfactory operation.

**3.10 PROTECTION**

- .1 Lock radiation-protected rooms once doors hardware is installed. Limit access to only those persons performing Work in radiation-protected rooms or as directed by Owner.
- .2 Tape temporary paper signs on radiation-resistant walls with the following text:
  - .1 "Do not mount equipment on this wall without covering penetrating fasteners with lead sheet of thickness required by Contract Documents".

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Supply and install the following vertical transportation equipment:
  - .1 A single passenger elevator.

1.2 **CODES, BY-LAWS, AND REGULATIONS**

- .1 Provide equipment and perform work in accordance with all local, provincial and federal codes, by-laws, and regulations.
- .2 Provide equipment and perform work in accordance with the latest edition of the B44 Safety Code for Elevators and any other code which may govern the installation.
- .3 At the time of bid submission and during the contract provide written notification of any proposed changes in codes, by-laws, or regulations which may affect the work.

1.3 **PERMITS AND CERTIFICATES OF INSPECTION**

- .1 Arrange and pay for all necessary permits, certificates, approvals, variances, and inspections.
- .2 Prior to Substantial Performance, arrange and pay for a safety inspection of the equipment by the regulatory authority.

1.4 **SHOP DRAWINGS AND SAMPLES**

- .1 Supply for approval shop drawings and samples of exposed finishes.
- .2 Supply at a minimum drawings showing the general arrangement layout, machine room layout, fixtures, entrances, and cab finishes.

1.5 **WIRING DIAGRAMS AND MANUALS**

- .1 Prior to substantial performance, supply to the Owner, three sets of manuals describing in detail the operation of the equipment and special features.
  - .1 Detail the operation for special features such as independent service, emergency power operation, special emergency service, intercommunication, and security operation.
  - .2 Supply, as part of the manual, as-built drawings.
- .2 In conjunction with the above, supply three copies and one AutoCAD disk of the as-built wiring and schematic diagrams.
- .3 Prior to substantial performance, supply to the Owner, a manual detailing proper maintenance procedures for the equipment.

1.6 **TRAINING**

- .1 At completion of the job, provide a training session for the Owner consisting of a review of the documentation and operation of the equipment and features.

1.7 **TRADEMARKS**

- .1 Arrange that none of the car or hall equipment has any trademark, company name, or logo.

1.8 **BARRIER-FREE ACCESS**

- .1 Arrange the controls and fixtures to meet barrier-free access requirements Appendix E of the B44 Safety Code for Elevators (latest edition) and any other code which may govern the installation.

1.9 **FIXTURES**

- .1 Unless indicated otherwise in the Specifications or Drawings, provide a choice of fixtures from a third party supplier and your standard products.
- .2 Provide buttons with LED illumination and metal targets.

1.10 **OPERATING CONDITIONS**

- .1 Provide equipment that will operate normally when the machine room and hoistway temperature is between 5 and 35 degrees Celsius (40 and 95 degrees Fahrenheit).
- .2 Provide equipment that will operate normally when the power supply is within 10 percent of its rated voltage.

1.11 **INSPECTION AND ACCEPTANCE**

- .1 Provide a meter and test weights (full load) along with an adjuster and helper to assist the engineer with a final acceptance inspection.

1.12 **NON-PROPRIETARY EQUIPMENT**

- .1 Provide completely generic equipment that can be maintained, adjusted, and diagnosed without the use of proprietary tools and/or information. Provide any and all required tools and information required to maintain the equipment.
- .2 Provide controllers from one of the following companies:
  - .1 GAL Manufacturing Corporation.
  - .2 Smartrise Engineering Inc.
  - .3 Automatisaion JRT Inc.
- .3 Arrange the equipment such that there are no time, date, trip, or other counters that would shut down the equipment or change its operation.

**1.13 TEST DATA FORM**

- .1 Prior to final acceptance of the elevators, submit a test data form certifying that the elevators are complete and ready for inspection.
- .2 This form is to show the operating times, door times, dwell times, and ride quality (lateral and vertical acceleration rates).
- .3 Submit with the form accelerometer recordings showing the lateral and vertical acceleration rates.
- .4 Arrange that this form is signed by the adjustor responsible for the work.

**1.14 ELEVATOR CLEAN-DOWN**

- .1 In addition to the hoistway and machine room equipment clean-down performed at TSSA inspection, perform an additional clean-down once building construction is complete.

**1.15 MAINTENANCE CONTROL PROGRAM (MCP) AND MAINTENANCE LOG SHEETS**

- .1 Provide copy of MCP as prepared and signed off by the equipment manufacturer and designer, indicating the frequency of required maintenance and the tasks required to be performed as part of long term operational maintenance, based upon ensuring optimized equipment reliability, safety and performance.
- .2 MCP shall be designed in accordance with the requirements of B44- 10 rule 8.5.1.3.
- .3 Provide log sheets for each elevating devices, designed in accordance with the requirements of B44-10 rule 8.6.1.3.1.(f).
- .4 Provide equipment call back log and record book for each elevating devices, designed in accordance with the requirements of B44-10 rule 8.6.1.4.2. and 8.6.1.4.3.

**1.16 WARRANTY PROVISIONS**

- .1 Provide a two (2) year, twenty-four (24) month warranty covering all equipment and products as installed and provided under this Contract. Any replacement of parts or repairs including call back service during the warranty period will be at no cost to the University.

Service response to a call back shall be provided 24/7/365 days as follows:

- .1 Entrapment - within 1 hour
- .2 Single elevator in a building - within 1 hour
- .3 Disruption in a building with multiple elevators - within 4 hours

The warranty date shall commence on the date of Substantial Completion for the Work.

- .2 Upon receiving notice of a defect or deficiency, the Contractor shall immediately correct, within an agreed upon time, at its expense, all work found deficient or defective or being incapacity of or unable to meet the design requirements, performance expectations or other specific operating criteria as established within the Contract Documents.



- .3 In the event that the same component, device or piece of equipment is found to fail or prove unreliable in two instances within the Warranty period, and the failure of said device cannot be attributed to faulty maintenance, misuse or unintended use, the elevator installer shall replace all such device components.
- .4 Should the Contractor delay or fail to make good items of Work as confirmed by U of T as being deficient during the warranty period, and after being given reasonable time to correct such deficiencies, U of T may arrange to have such defective or deficient work complete by another quality company or by using its own in house resources, and then back charge to the Contractor for all costs incurred to rectify deficient work.

1.17 **MAINTENANCE: 2 YEAR**

- .1 Provide maintenance of the equipment in accordance with U of T's Standard Maintenance Contract UTMFMP20180208 (attached) for a period of 2 years after Substantial Performance.

1.18 **MAINTENANCE PROVISIONS**

- .1 Maintenance provisions and requirements for the elevating devices shall be covered under a full services maintenance agreement augmented with the following special requirements as set out herein, and including all the requirements, coverage and provisions as set out in U of T's Standard Maintenance Contract UTMFMP20180208 (attached).
- .2 "Full service" coverage shall include the following requirements and provisions.
  - .1 Maintenance shall include for regular service visits, at intervals of not more than
    - .1 Once every 16 days (twice per month inspections) for overhead gearless traction elevators,
    - .2 Once every 32 days (once per month inspections) for machineroomless gearless traction elevators,
    - .3 Once every 32 days (twice per month inspections) for electric traction overhead, basement or offset geared traction elevators,
    - .4 Once every 32 days (once per month inspections) for hydraulic passenger, service elevators or dumbwaiters).
  - .2 For call backs occurring outside of normal working times, emergency call backs excepted, U of T will pay the overtime premium portion for labour, except for emergency call backs required for the release of trapped passengers, or in the event that all elevators within any one group are out of operation.
  - .3 Maintenance coverage shall also include for the following:
    - .1 Replenishment of machine bearing oil (where provided), sealing of bearings and pour spouts to ensure no oil spills over machine base or floor. In the case of geared machines, worm gear case lubricant shall be changed at least once every two years.
    - .2 Operation and control circuits shall be checked for proper operation. Specification performance settings shall be maintained, except when requested in writing by U of T to change such performances.
    - .3 Replacement of all hoist ropes, governor ropes, as well as travelling cables and other hoistway conductors.
    - .4 Adjustment of car operating performances, load weighing settings, door

performances, levelling and all other system adjustments shall be periodically checked and readjusted to maintain specified performances.

- .4 In the event the maintenance contractor fails to correct noted deficiencies within the stipulated correction time as listed by the TSSA in their periodic inspection report, or, in the event the maintenance contractor fails to submit voluntary compliant documents, or falsely indicates information or details on the voluntary compliance requires, the elevator maintenance contractor shall be responsible for all additional levies, fees and fines as imposed by the TSSA to the U of T.

## 1.19 UNION WORK

- .1 Elevator work shall be undertaken by International Union of Elevator Constructors, Local 50.

## 2 Products

### 2.1 DESCRIPTION

- .1 Provide a single passenger elevator as follows:
  - .1 Holeless-hydraulic equipment.
  - .2 A contract speed of 0.51 m/s (100 fpm) plus or minus 5.0 percent.
  - .3 A capacity of 1135 kg (2500 lb).
  - .4 Single speed side opening entrances with a width of 1070 mm (3'6") and a height of 2134 mm (7'0").
  - .5 Front opening at level L / rear openings at levels 1 and 2.
  - .6 Minimum clear inside cab dimensions of 2030 mm (6'8") wide by 1295 mm (4'3") deep.
  - .7 Overall cab height of 2440 mm (8'0").
  - .8 Hoistway, pit, overhead dimensions as per the Drawings.

### 2.2 POWER UNIT

- .1 Provide a power unit comprised of an oil tank, hydraulic pump, electric motor, control valves, oil level gauge, and oil pressure gauge.
- .2 Provide a pump and motor designed for oil hydraulic use and smooth, quiet operation.
- .3 Provide a control valve assembly containing a relief valve, a check valve, a levelling valve, and a manual lowering valve.
- .4 Provide a tank shut off valve and a gate valve between the power unit and the jack.
- .5 Enclose the power unit with steel panels and sound-deadening material.
- .6 Provide a motor with a rating of between 20 and 25 hp.
- .7 Provide a power unit rated to accommodate a minimum of 90 motor starts per hour.
- .8 Provide a hydraulic muffler in the oil line.

**2.3 OIL TEMPERATURE CONTROL**

- .1 Provide equipment to maintain the hydraulic oil at a temperature of between 32 and 43 degrees C (90 and 110 degrees F).

**2.4 SOLID STATE (REDUCED VOLTAGE) STARTING**

- .1 Provide solid state starting such that the motor starting current does not exceed twice the full load running current.

**2.5 OIL LINES**

- .1 Provide oil lines of a minimum 50 mm (2") diameter.
- .2 Run the oil lines above ground, suspended from the ceiling with isolation hangers.
- .3 Identify oil lines that are accessible outside of the elevator machine room or hoistway with the markings "Elevator Hydraulic Line" in letters that are at least 19 mm (0.75") high in a contrasting color. Ensure that the markings are visible after installation and applied at intervals not greater than 3000 mm (9'10").

**2.6 JACK: HOLELESS-HYDRAULIC**

- .1 Provide hydraulic jacks of sufficient size to lift the gross load the height specified.
- .2 Factory test the jack unit to ensure adequate strength and freedom from leakage. Do not use brittle material such as grey cast iron in the jack construction.
- .3 Provide a jack unit consisting of a plunger of heavy seamless steel tubing accurately turned and polished, a stop ring electrically welded to the plunger to prevent the plunger leaving the cylinder, an internal guide bearing, packing or seal of suitable design and quality, a drip ring around the casing top, and a cylinder made of steel pipe and provided with a pipe connection and air bleeder.
- .4 Weld brackets to the jack casing for supporting the elevator on pit channels.
- .5 Provide a second (safety) bulkhead in the lower end of the cylinder.
- .6 Provide jack units contained within the hoistway on either side of the car.

**2.7 CONTROLLER**

- .1 Provide a microprocessor based controller consisting of relays, contactors, switches, capacitors, resistors, fuses, circuit breakers, overload relays, power supplies, circuit boards, static drive units, wiring terminal strips, and related components all enclosed in a cabinet with hinged door panels.
- .2 Provide the control software on read-only memory with spare capacity to allow for future software modifications and extensions.

- .3 Provide separate regulated power supplies for each microprocessor system.
- .4 Install wiring in a neat workmanlike manner with all field wiring terminated at labelled and identified stud blocks. Do not connect more than 2 wires to any single terminal.
- .5 Label each electrical component in the controller with alpha-numeric identification that matches that shown on the as-built wiring diagrams.
- .6 Mount the identifications for plug-in components on the controller adjacent to the component. Do not mount the designation on the plug-in component.
- .7 Ensure that the elevator control system will restart after a loss of normal power.
- .8 Provide software and firmware updates over the life of the installation at no charge to the Owner.
- .9 Provide rubber sound and vibration isolation pads such that there is no direct contact between the controller cabinet and the building structure.

## 2.8 **ENTRANCES**

- .1 Provide T-style entrances consisting of doors, frames, sills, sight guards, door hangers, tracks, interlocks, door closers, gibs, and all other equipment required for a complete installation.
- .2 Provide entrances and associated hardware having a 1.5 hour fire rating.
- .3 Provide plastic insert door hanger rollers.
- .4 Design all equipment for a minimum of noise.
- .5 Provide entrances finished in brushed stainless steel.

## 2.9 **BEAMS, SHEAVES, AND ANCHORAGE**

- .1 Provide all required sheaves and supporting beams or channels along with other miscellaneous and structural steel.
- .2 Provide anchorage as required to mount to the building structure.
- .3 Do not include items shown on the Drawings such as pit ladders.

## 2.10 **PIT BUFFER EQUIPMENT**

- .1 Provide, if required to suit the pit depth, buffer extensions, platforms, and ladders.

## 2.11 **GUIDE RAILS**

- .1 Provide standard 'T' section steel guide rails for the car.
- .2 Install guide rails using brackets fastened to the building structure.

- .3 Clamp the guide rails to the bracket with clips arranged to prevent any horizontal movement of the rail.
- .4 Join the rail sections using steel backing plates.
- .5 Where required, provide channel backing to stiffen the rails.

#### 2.12 **HOISTWAY FLOOR IDENTIFICATION**

- .1 Provide identification of each floor level on the hoistway side of the hall doors using numerals or letters at least 150 mm (6") in height.

#### 2.13 **CAR GUIDES**

- .1 Provide either roller guides or slipper guides.
- .2 For roller guides, provide spring mounted roller guides of at least 82 mm (3.25") diameter located at the top and bottom of the car frame. Ensure that the rollers make good contact with the rail.
- .3 For slipper guides, provide spring mounted slipper guides located at the top and bottom of the car frame. Provide guides that are self-aligning and self lubricating with replaceable nylon liners in order to ensure smooth and quiet operation.

#### 2.14 **FLOOR DESIGNATIONS**

- .1 Provide floor designations a minimum 50 mm (2") high and raised at least 0.8 mm (0.03") with Braille on both sides of the hall door entrance jambs located with a centerline of 1525 mm (60") above the floor to identify the floor level.
- .2 Provide, on the main floor entrance frame, the elevator designation a minimum of 75 mm (3") in height.

#### 2.15 **FASCIAS**

- .1 Provide fascias from each hall sill to the entrance header below. Include express zones. Extend the fascias into the pit and the overhead.
- .2 Provide fascia the entire width of the door opening.
- .3 Construct the fascia of a minimum 1.6 mm (16 gauge) sheet steel.
- .4 Alternatively, provide an electrical-mechanical car door interlock to negate the requirement for fascia.

#### 2.16 **CAR FRAME, PLATFORM, AND CAB**

- .1 Provide a car frame constructed of steel channels and a platform constructed of steel channels with a wood or metal sub-floor.

- .2 Isolate the frame and platform from one another so that there is no metal to metal contact in order to prevent the transmission of noise and vibration.
- .3 Mount the elevator cab shell on the platform in alignment with the hoistway entrances.
- .4 Isolate the cab from the car frame and platform.

#### 2.17 CAB FINISHES

- .1 Provide cab finishes as follows:
  - .1 Brushed stainless steel car doors, return panels, and transoms.
  - .2 Raised vertical hang-on panels finished in plastic laminate (colour and pattern to be selected by the consultant) with brushed stainless steel binders, reveals, and kickplates on the side walls (2 panels each).
  - .3 Brushed stainless steel handrails 50 mm (2") x 6 mm (¼") on the side walls at a height of 915 mm (36") from the finished floor to the top of the handrail with ends returned to wall and a space of 50 mm (2") between the rails and wall.
  - .4 Brushed stainless steel six panel suspended ceiling with hairline joints and an LED down light in each panel.
  - .5 Porcelain tile or resilient sheet flooring by another trade.
- .2 Submit for approval drawings of the cab design and lists of options for fixtures, interior materials, finishes and colours.

#### 2.18 CAR DOORS

- .1 Provide car doors, jambs, headers, hangers, tracks, door closers, gibbs, electrical contacts, and all other equipment required for a complete installation.
- .2 Provide plastic insert door hanger rollers.
- .3 Design all equipment for a minimum of noise.

#### 2.19 CAR STATION

- .1 Provide one swing return car station located on the front return panel.
- .2 Incorporate in each car station floor push buttons, door open and close buttons, and other fixtures required for normal operation.
- .3 Provide for each floor button a call registered light and momentary audible tone.
- .4 Provide a Firefighters' Emergency Operation panel.
- .5 Provide below the car station a locked service cabinet containing devices other than those used for normal operation including a light switch, a fan switch, a keyed emergency stop switch, an emergency light test switch, and a 110 volt receptacle.
- .6 Locate the car station controls at a height between 890 mm (35") and 1220 mm (48") from the cab floor with the emergency controls and door operating buttons grouped together at the bottom.

- .7 Provide buttons of at least 19 mm (0.75") in their smallest direction and raised at least 1.5 mm (0.06"). Provide raised arabic numerals at least 16 mm (0.63") high and raised at least 0.8 mm (0.03") along with braille immediately to the left of the button.
- .8 Engrave the car station with the elevator capacity, identification number, government installation number, and other markings required by code.

## 2.20 CAR POSITION INDICATOR

- .1 Provide a digital (dot matrix or segmented) car position indicator located above each car station with a minimum 50 mm (2") high display.
- .2 Provide continuous indication of the elevator location.

## 2.21 CERTIFICATES AND LICENCES

- .1 Do not install any certificates or licences in the cab. Arrange and pay for a variance from the TSSA for this if required.

## 2.22 VOICE SYNTHESIZER

- .1 Provide a voice synthesizer for each elevator.
- .2 Provide a microprocessor based control unit in the machine room along with a speaker in the elevator cab.
- .3 Provide an automatic verbal announcement of each floor at which the elevator stops.
- .4 Provide a system that will handle a variety of other messages and indications as may be required by the Owner at a later date.
- .5 Set the volume at 10 decibels above ambient.
- .6 Arrange that the volume is adjustable over a range of 40 to 80 decibels.
- .7 Measure the noise levels using a sound level meter set to the "A" scale for a fast response.

## 2.23 DOOR PROTECTIVE DEVICE: 3D

- .1 Provide an infra-red multiple beam three-dimensional door protective (re-opening) device.
- .2 Arrange that if the door protective device detects an object while the doors are closing (either in the door closing path or approaching objects from the landing side), it will re-open the doors.
- .3 Protect the full width and up to 1830 mm (6') from the floor of the door opening.
- .4 Where mounted to the car door, locate the device 25 mm (1") behind from the leading

edge of the door.

- .5 If the beams or detection means are interrupted continuously for more than 30 seconds, close the doors slowly under reduced speed and force, and actuate an audible signal as a warning.
- .6 Arrange that the system is self-monitoring. After the door has fully opened and before closing has commenced, verify that the detection means is operational.

#### 2.24 **BATTERY OPERATED EMERGENCY CAB LIGHTING**

- .1 Provide battery operated emergency cab lighting.
- .2 Arrange the lighting to go on immediately in the event of a loss of normal elevator cab lighting.
- .3 Provide a charging unit that will re-charge the battery when normal power returns and keep the battery fully charged at all times.
- .4 Mount the light fixture out of view above the cab ceiling.
- .5 Provide an emergency lighting test switch in the car station service cabinet.

#### 2.25 **DOOR OPERATOR**

- .1 Provide a heavy duty closed loop door operator with direct current motor to open and close the car and hoistway doors simultaneously.
- .2 Provide either Otis Glide A, ThyssenKrupp LD16 Plus, Kone AMD 2.0, Schindler QKS, GAL MOVFE 2500 HH/HL, or Wittur AMD2.
- .3 Provide solid state control of the door operator including feedback for position, acceleration, velocity, and force. Constantly adjust the motor torque to maintain the correct door speed based on it's position and force.
- .4 Adjust the door closing speed to an average of 300 mm (12") per second and the door opening speed to an average of 600 mm (24") per second.
- .5 Design the equipment for a minimum of noise.

#### 2.26 **HANDS-FREE COMMUNICATION SYSTEM: AUDIO & VIDEO**

- .1 Provide a two-way voice and visual communication system as per article 2.27.1 of the B44-19 Safety Code for Elevators and Escalators with a lobby rescue station.
- .2 Integrate the communication system into the car station to meet barrier-free access requirements.
- .3 Provide a MAD MosaicONE Video & Messaging System or approved equal.
  - .1 Provide a car position indicator which can display digital messages from authorized personnel. Provide a MAD Matisse, CE Electronics Elite PI, or



- approved equal car position indicator.
- .2 Provide a means for passengers to respond to messages using the Door Open and Door Close buttons in the car station (ie. indicate in the message that one button is for YES and the other is for NO or engrave "YES" and "NO" directly beneath these buttons). Do not provide separate YES and NO buttons.
- .3 Provide a camera, to display video of passengers at any location on the car floor, to authorized personnel.
- .4 Provide information such that authorized personnel can access online messaging and video display.
- .4 Provide 110 volt power at the car station and car top for the communication equipment.
- .5 Provide a lobby rescue station at the Fire Alarm Panel.
  - .1 Provide a telephone handset, video monitor, and other communication equipment such that communication may be made to each individual elevator from this station.
  - .2 Finish the lobby rescue station in brushed stainless steel and engrave suitable signage and instructions for its use.
  - .3 Arrange that one lobby rescue station serves all elevators in the building. Provide, if necessary, an expansion station.
- .6 Provide and pull all wiring to interconnect the equipment including but not limited to wiring between the elevator cab and the machine room, between the machine room and the lobby rescue station, and between the lobby rescue station and any remote handsets (if provided). Conduit will be provided by another trade between the elevator hoistway at the main floor and the lobby rescue station as well as between the lobby rescue station and any remote handsets (if provided).
- .7 Provide a junction box with terminal blocks for the communication equipment mounted on the side of a controller in the elevator machine room.
- .8 Provide equipment such that all elevators can share one telephone line and network connection.
- .9 Provide to the owner or owner's monitoring company, software to access the online messaging and video along with training.

## 2.27 **ALARM**

- .1 Provide an alarm bell on top of the elevator cab.
- .2 Arrange that the alarm bell is initiated by momentary actuation of the "PHONE" button in the car station.
- .3 Provide back-up battery power for the alarm bell operation. It can be from the same source as the emergency cab lighting.

## 2.28 **CAR TOP INSPECTION STATION**

- .1 Provide an inspection station on the car top consisting of an emergency stop button, up, down and common inspection running buttons, a light with switch and guard, a

duplex receptacle, and other devices necessary for car top operation.

**2.29 CAB FAN**

- .1 Provide a two speed exhaust fan mounted in the cab top.
- .2 Arrange that when the fan is operating there is no noticeable vibration in the cab.

**2.30 CAB LIGHTING & FAN: TIMER**

- .1 Provide a timer for the cab lights and fan such that the lights and fan turn off when the elevator has been idle for more than 5 minutes and then turn on when demand for the elevator returns.

**2.31 CAB PROTECTIVE PADS**

- .1 Provide one set of cab protective pads that cover all walls and the cab return panels along with pad hooks.

**2.32 HOISTWAY ACCESS SWITCH**

- .1 Where required, provide hoistway access switches located in the entrance frame or in the hall door sight guard.

**2.33 HOISTWAY DOOR UNLOCKING DEVICES**

- .1 Provide hoistway door unlocking devices (by lunar key) on the hall doors at all floors.

**2.34 HALL PUSH BUTTON STATIONS**

- .1 Provide a single riser of hall stations.
- .2 Provide in each hall station illuminating up and down push buttons (at terminal floors, provide only one button).
- .3 Provide buttons at least 19 mm (0.75") in their smallest direction, raised at least 1.5 mm (0.06"), and located with their centerline 915 mm  $\pm$  25 mm (36"  $\pm$  1") above the floor.
- .4 Hall call buttons to illuminate green to indicate UP calls and red for DOWN.
- .5 Provide, at the main landing, a hall fixture with the riser buttons, communication failure jewel and keyswitch, FEO text, jewel and keyswitch, and emergency power jewel combined into one fixture faceplate.
- .6 Provide brushed stainless steel faceplates that install flush to the face of the wall with a maximum projection into the hall of 6.35 mm (1/4").

**2.35 COMBINATION HALL LANTERN & POSITION INDICATOR: ALL FLOORS**

- .1 Provide combination hall lanterns and hall position indicators at each entrance.

- .2 Illuminate the lantern and sound the tone (once for the up direction and twice for the down direction) when the elevator is 5 seconds from answering the hall call. Provide lanterns of at least 60 mm (2.4") in the smallest direction located with its centre-line a minimum of 1830 mm (72") above the floor.
- .3 Provide a digital (dot matrix or segmented) hall position indicator with a minimum 50 mm (2") high display. Provide continuous indication of the elevator location.
- .4 Provide brushed stainless steel faceplates that install flush to the face of the wall with a maximum projection into the hall of 6.35 mm (1/4").

#### 2.36 LOBBY PANEL

- .1 Provide, at the Fire Alarm Panel, a lobby panel for the elevators that includes car position indicator, emergency power indicator, Firefighter's Emergency Operation indicator, and remote recall switch.
- .2 Provide and pull wiring from the elevator control system to the lobby panel (conduit will be provided by another trade between the elevator hoistway at the main floor and the lobby panel).

#### 2.37 ELECTRIC WIRING

- .1 Provide copper wiring to connect the equipment.
- .2 Run the wire in metal conduit, duct or electrical metallic tubing.
- .3 Provide travelling cable between car stations and the controller in the machine room.
- .4 Provide at least six pair shielded wires and a coaxial conductor in the travelling cable.
- .5 Provide at least ten percent spare wires in each travelling cable.
- .6 Provide on one controller a separate junction box for non-elevator devices such as telephones, cameras, and security systems.
- .7 If required by code, provide auxiliary disconnect switches and wiring.

### 3 Execution

#### 3.1 MICROPROCESSOR BASED CONTROL AND DISPATCHING

- .1 Provide microprocessor based group dispatching of the elevator that operates in real time, continuously analysing the elevators' position, condition, and load.
- .2 Provide full automatic control of the elevator by means of push buttons in the car numbered to correspond with floors served and by push buttons at each hall landing.
- .3 Constantly scan the system for hall calls. When hall calls are registered, instantly

calculate the estimated time of arrival, number of floors to travel from the current position, the time it takes to travel one floor at top speed, calls assigned to a car, and car reversal time to respond to a call in the opposite direction of travel. When a car's status changes or additional hall calls are registered, re-calculate the estimated time of arrival and re-assign calls if necessary.

- .4 Provide flexibility to meet well defined patterns of traffic including up peak, down peak, and heavy inter-floor demands, and adjust for indeterminate variations in these patterns which occur in buildings.
- .5 When car call buttons are actuated, dispatch the elevator to the designated floors in the order in which the landings are reached by the elevator, irrespective of the sequence in which the buttons are pressed. Cancel the car call when the elevator arrives at the floor.
- .6 Respond to calls only in the direction that the elevator is travelling.
- .7 Cancel car calls when the elevator changes direction.

### 3.2 INDEPENDENT SERVICE

- .1 Provide independent service as follows:
  - .1 Remove the elevator from the group dispatching system such that it does not answer hall calls, the hall lanterns are disabled, and the door protective devices are disabled;
  - .2 Arrange the elevator to park with its doors open;
  - .3 Accept a car call and close the doors only when the door close button or any call button is actuated using constant pressure until the doors are fully closed and the interlock is closed. Re-open the doors if the button is released before the elevator starts to move.

### 3.3 NUDGING

- .1 If the door protective device is operated continuously for more than 30 seconds, close the doors slowly under reduced speed and force, and actuate an audible signal as a warning.

### 3.4 DOOR DWELL TIMES

- .1 When an elevator stops in response to a car call, keep the doors open for 3.0 seconds.
- .2 When an elevator stops in response to a hall call, keep the doors open for 5.0 seconds. Reduce this time to 1.0 second after the door detector beams are broken.
- .3 Arrange that these times are separately adjustable over a range of 0.5 to 12 seconds.
- .4 Close the doors immediately if a car call or door close button is actuated.

### 3.5 SOUND LEVELS

- .1 Arrange the fan so that the sound level as measured in the cab with the elevator stopped is less than 57 decibels with the fan running.

- .2 Arrange the elevator equipment so that the sound level as measured in the cab with the elevator running is less than 60 decibels.
- .3 Arrange the door equipment so that the sound level as measured in the cab is less than 62 decibels during a full door open and door close operation.
- .4 Arrange the machine equipment so that the sound level as measured in the machine room with the elevator running is less than 70 decibels.
- .5 Measure the sound levels using a sound level meter set to the "A" scale for a fast response.

### 3.6 OPERATING PERFORMANCE

- .1 Levelling - Arrange that the car stops within 6 mm ( $\frac{1}{4}$ ") of the floor level.
- .2 Acceleration - Arrange that the average acceleration is not less than 0.6 m/s/s (2.0 f/s/s) and the acceleration peaks do not exceed 1.5 m/s/s (5.0 f/s/s).
- .3 Operating time - Adjust the equipment so that the operating time is 13.0 seconds or less. Measure the operating time from the time that the doors begin to close until they are three quarters open at the next floor.
- .4 Ride quality - Arrange that the lateral acceleration (front to rear and side to side) measured during express runs is less than 150 mm per second per second (0.5 f/s/s) peak to peak.

### 3.7 FIREFIGHTERS' EMERGENCY OPERATION

- .1 Provide Firefighters' Emergency Operation.
- .2 Phase I emergency recall operation - Initiate Firefighters' Emergency Operation either manually by turning the three position (RESET/OFF/ON) key switch labelled 'FIRE RECALL' to the 'ON' position or automatically through the fire alarm system.
  - .1 When Phase I has been initiated, return the elevators non-stop to the designated level and open the doors.
  - .2 Provide visual and audible indication inside the elevator.
  - .3 Disable door protective devices that are sensitive to smoke or flame.
  - .4 Disable emergency stop switches.
  - .5 Where the designated level is not sprinklered and Phase I is initiated by a device located at the designated level, return the elevators non-stop to the alternate level (unless a 'FIRE RECALL' switch is already in the 'On' position).
- .3 Phase II emergency in-car operation - After recall of the elevators, run the elevators on Firefighters' Emergency Operation only when the three position (OFF/HOLD/ON) in-car key switch labelled 'FIRE OPERATION' is in the 'ON' position as follows:
  - .1 Allow the elevator to be controlled only from within the elevator (ie. prevent the elevator from responding to hall calls).
  - .2 Disable the door protective devices.
  - .3 Arrange that the doors can be opened only by constant pressure on the 'door

- open' button. Re-close the doors immediately if the pressure on the button is released before the doors have fully opened.
- .4 Arrange that the doors can be closed only by constant pressure on the 'door close' button. Re-open the doors immediately if the pressure on the button is released before the doors have fully closed.
  - .5 When the doors are completely closed, allow the car to travel to the car call floor and stop without opening the doors.
  - .6 When the 'CALL CANCEL' button is actuated, cancel all car calls and stop the car at or before the next available landing.
  - .7 When the doors are fully open and the 'FIRE OPERATION' switch is in the 'HOLD' position, keep the elevator at the floor, keep the doors open, disable the 'door close' button, and do not allow car calls to be registered.
  - .8 When the car is at a landing other than the designated level with the doors open and the 'FIRE OPERATION' switch in the 'OFF' position, close the doors automatically. The 'door open' button shall remain operative. If the 'FIRE OPERATION' switch is turned to the 'ON' or 'HOLD' position prior to the completion of door closing, re-open the doors.
  - .9 Remove an elevator from Phase II operation only when the 'FIRE OPERATION' switch is in the 'OFF' position and the car is at the designated level with the doors open.
- .4 Arrange that upon restoration of power following a power interruption, elevators re-establish their absolute car position and are not removed from Firefighters' Emergency Operation - Phase I or Phase II.
  - .5 Terminate Firefighters' Emergency Operation once all cars are at the designated level, the fire alarm system is in its normal status, and all key switches are in the 'OFF' position (with the 'FIRE RECALL' switch having first been turned to the 'RESET' position).

### 3.8 **FIREFIGHTERS' EMERGENCY OPERATION PANEL**


- .1 Locate the "FIRE OPERATION" switch, the "CALL CANCEL" button, the "STOP" switch, the door open and close buttons, the additional visual signal, and the operating instructions grouped together at the top of the main car operating panel behind a locked cover.
- .2 Engrave the front of the cover with the words "FIREFIGHTERS' OPERATION" in red letters at least 10 mm (0.4") high.

### 3.9 **INSTRUCTIONS: FIREFIGHTERS' EMERGENCY OPERATION**

- .1 Engrave the 'FIRE RECALL' switch at the designed level with the following wording:

<p style="text-align: center;"><b>FIREFIGHTERS' OPERATION</b></p> <p style="text-align: center;"><b>To recall elevators</b> <b>Insert fire key and turn to "ON"</b></p>
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- .2 Engrave the inside of the Firefighters' Emergency Operation panel in each car with the following wording:

FIRE OPERATION	
When	 Flashing, exit elevator
To operate car	Insert fire key and turn to "ON". Enter floor selection.
To cancel floor selection	Press "CALL CANCEL" button.
To close door	Press and hold "CLOSE" button.
To open door	Press and hold "OPEN" button.
To hold car at floor	With doors open, turn key to "HOLD".
For emergency stop	Use "STOP" switch.
To automatically return to recall floor	Turn key to "OFF".

- .3 Provide instructions in lettering not less than 3 mm (1/8") in height.

### 3.10 EMERGENCY POWER OPERATION

- .1 Provide emergency power operation of the elevator.
- .2 The emergency power system will have enough power to run the elevator and signals from the emergency power transfer switch will be provided to the elevator controller.
- .3 Upon receipt of the 'PRE-TRANSFER' signal, stop the elevator.
- .4 Upon receipt of the 'TRANSFER' signal, arrange that the elevator will run normally answering hall and car calls.
- .5 Maintain operational the normal safety devices such as the door open buttons and door detectors.

END OF SECTION