

07 92 00 - JOINT SEALANTS

Part 1 General

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

1.2 SUMMARY OF WORK

1. Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to execute sealant work, as indicated on the drawings, as specified herein and as required by job conditions and normally considered to be work covered by this Section.
2. The term "sealant" shall be interpreted as synonymous with the term "caulking" where used on the drawings and/or in the specifications.
3. Related Sections:
 - A) Section 03 30 00 - Cast-in-Place Concrete.
 - B) Section 06 41 00 - Architectural Wood Casework.
 - C) Section 06 61 13 - Solid Surface Fabrications
 - D) Section 07 21 20 - Urethane Foam Insulating Sealant.
 - E) Section 07 42 43 - Composite Metal Wall Panels.
 - F) Section 07 52 16 - SBS Modified Bituminous Roofing
 - G) Section 07 62 00 - Metal Flashing and Trim
 - H) Section 07 84 00 - Firestopping
 - I) Section 08 11 13 - Steel Doors and Frames
 - J) Section 08 11 16 - Aluminum Doors and Frames
 - K) Section 08 36 13 - Sectional Metal Overhead Doors
 - L) Section 08 42 26 - All-Glass Entrances
 - M) Section 08 44 13 - Glazed Aluminum Curtain Wall.
 - N) Section 09 21 16 - Gypsum Board Assemblies
 - O) Section 09 30 13 - Ceramic Tiling

1.3 REFERENCES

1. American Society for Testing and Materials (ASTM):
 - A) ASTM C834-17, Standard Specification for Latex Sealants.
 - B) ASTM C920-18, Standard Specification for Elastomeric Joint Sealants.
2. Health Canada/Workplace Hazardous Materials Information System (WHMIS):
 - A) Material Safety Data Sheets (MSDS)

1.4 QUALIFICATIONS

1. The work of this Section shall be executed by an independent Subcontractor whose primary business is in the application of caulking and sealants, using tradesmen skilled and trained in the techniques of caulking, and who are completely familiar with the published recommendations of the manufacturer of the caulking material being used.
2. If requested by the Consultant, provide evidence of previously completed projects of a similar nature.
3. Indication of lack of skill or defective work to be sufficient grounds for the Consultant to reject the installed caulking and to require its immediate removal and complete recaulking at no additional cost to the Owner during the warranty period.
4. Cooperate with the Consultant and/or any inspection and testing agency the Owner may appoint.

1.5 COMPATIBILITY

1. Sealants used for the various building interior assemblies shall be selected from those specified in the respective assembly Section, and shall be coordinated with the sealant being provided under other Sections. Preferably, one sealant of the same manufacturer shall be used throughout. If different sealants are selected, from those specified, it is the responsibility of the respective Section to ensure compatibility between selected sealant, substrates, and sealants of other Sections which come in contact with the selected sealant.

1.6 SUBMITTALS

1. General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.
2. Prior to commencement of the work, submit for each type of sealant, a certificate signed by the sealant manufacturer which states:
 - A) Surface preparation requirements
 - B) Priming and application procedures
 - C) Verification that sealant materials are selected for use from those specified
 - D) Verification that sealants are suitable for their locality, purposes intended and joint designs.
 - E) Verification that sealants are compatible with other materials and products with which they come in contact, including but not limited to sealants provided under other Sections, and finishes.
 - F) Verification that sealants will not stain the substrates or finished products.
 - G) Verification that sealant is suitable for temperature and humidity conditions at the time of application.
3. For each specified product, include manufacturer's material safety data sheets for the safe handling of the products, in accordance with WHMIS requirements.

1.7 ENVIRONMENTAL AND SAFETY REQUIREMENTS

1. Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and provision of material safety data sheets acceptable to Labour Canada.
2. Subject to compliance with other specification requirements, select low-odour, non-carcinogenic products in all locations for which such products are available.
3. Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
 - A) Do not apply sealants when the temperature of the sealants and the materials to which it is applied is below 5°C.
 - B) Should it become necessary to apply sealants when the temperature is below 5°C, consult the sealant manufacturer and follow his recommendations.

1.8 DELIVERY, STORAGE, AND HANDLING

1. Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact.
2. Store materials in strict accordance with the manufacturer's recommendations. Protect from freezing, moisture, water, and contact with ground or floor.

1.9 WASTE MANAGEMENT AND DISPOSAL

1. Cooperate with the Construction Manager's Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

1.10 WARRANTY

1. For the work of this Section, the 12-months warranty period prescribed in the General Conditions of the Contract is extended to 5 years.
2. In addition to the 5-year warranty specified above, provide a manufacturer's warranty for silicone sealants for a period of 20 years.
3. Warrant that caulking work will not leak, crack, crumble, melt, shrink, bubble, run, lose adhesion or stain adjacent surfaces.

Part 2 Products

2.1 MANUFACTURERS

1. This specification is based on the specific sealant products named herein.
2. Requests for substitutions will be considered in accordance with the provisions of Section 01 25 00 "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

2.2 SEALANTS

1. Sealant Types:

Application	Type	Description	Movement Capability	Standards	Acceptable Product	Comments
Around interior door frames and windows, against drywall and where acoustical sealant exposed to sight is called for.	A	Paintable, siliconized, acrylic latex sealant.		ASTM C834	Tremflex 834 Paintable Siliconized Acrylic Latex Sealant	
Exterior joint work interior and exterior masonry control joints and where extreme movement is anticipated.	B	Ultra-low-modulus, one-part, neutral-cure silicone sealant for extreme movement joints.	+ 100% -50%	ASTM C920 Type S Grade NS Class 100/50 Use T, NT, M, G, A, O	Dow Corning 790 Silicone Building Sealant	No primer read on concrete. Non-staining, good unprimed adhesion to most substrates (Fluoropolymer coatings, polyethylene faced mod.bit, membrane etc.)

Exterior joint work where not otherwise specified or indicated.	C	One-part, neutral-cure silicone sealant	+50%	ASTM C920 Type S Grade NS Class 50 Use NT, M, G, A	Dow Corning 791 Silicone Weather-proofing sealant.	Manufacturer to recommend Type C or D for specific application Note that Type C has a limited colour range.
	D	One-part, neutral-cure, medium modulus, architectural grade, silicone sealant.	+50%	ASTM C920 Type S Grade NS Class 50 Use NT, G, A, O	Dow Corning 795 Silicone Building Sealant	
Sealant for caulking counter-tops at wall, ceramic tile, plumbing fixtures, and in wet areas where not otherwise specified.	E	One-part, acetoxy-cure, mildew-resistant, silicone sealant for non-porous substrates	+25%		Dow Corning Tub, Tile & Ceramic Silicone Sealant	
Acoustical Sealant in concealed locations	F	Flexible Synthetic rubber acoustical sealant			Tremco Acoustic Sealant.	

2. Colour of sealants: selected from the manufacturer's complete colour range to match adjacent materials, to the approval of the Consultant.
3. Joint cleaner: xylol, methylethyleketon, IPA, or non-corrosive type recommended by sealant manufacturer and compatible with joint forming materials.

2.3 ACCESSORIES

1. Primer: type recommended by sealant manufacturer for each specific application.
2. Joint filler: Chemically compatible with primers and sealants, out-sized 30 to 50%, type recommended by sealant manufacture for each specific application.
3. Bond breaker: pressure sensitive plastic tape, which will not bond to sealants.

Part 3 Execution

3.1 EXAMINATION

1. Examine areas and conditions under which work is to be preformed and notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.
2. For exterior sealants, arrange for a technical representative of the manufacturer to conduct adhesion tests for each joint condition and to make recommendations with respect to sealant type, primers (if required) and joint preparation. Do not deviate from the manufacturer's recommendations without prior written approval.
3. Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfactory of the installer.

4. Commencement of the work of this Section will be construed as acceptance of the site conditions and, thereafter, the Trade Contractor shall be fully responsible for satisfactory work as specified herein.

3.2 PREPARATION

1. Remove dust, paint, loose mortar and other foreign matter. Dry joint surfaces.
2. Remove rust, mill scale and coatings from ferrous metal by wire brush, grinding or sandblasting.
3. Remove oil, grease and other coatings from non-ferrous metals with joint cleaner.
4. Prepare concrete, masonry, glazed and vitreous surfaces to sealant manufacturer's instructions.
5. Examine joint sizes and correct to achieve depth ratio 1/2 of joint width with minimum width and depth of 6 mm. Maximum width 75 mm.
6. Install joint filler to achieve correct joint depth and shape with approximately 30% compression.
7. Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
8. Apply bond breaker tape where required to manufacturer's instructions.
9. use primers where recommended by the sealant manufacturer. Prime sides of joints to sealant manufacture's instructions immediately prior to caulking.

3.3 WORKMANSHIP

1. Caulk all joints between dissimilar materials.
2. Before application of any sealant, confirm that sealant material is compatible with the materials and finishes of the surfaces to which the material is applied or is in contact with.
3. Apply sealants in strict accordance with the manufacturer's printed directions for the specific applications of the particular materials used, using a gun with proper size nozzle. Use sufficient pressure to fill voids and joints solid. Superficial pointing with skin bead is not acceptable.
4. Concrete or masonry joints shall be a minimum of 6 mm wide x 6 mm deep. Depth shall be equal to width in joints up to 12 mm wide. For joints 12 mm to 25 mm wide, depth shall be 12 mm.
5. For joints in metal, glass and other non-porous surface, sealant depth shall be a minimum of 1/2 the applied sealant width, and shall in no case exceed the applied sealant width.
6. Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities. Neatly tool surface to a slight concave joint.
7. Cure sealants in accordance with manufacturer's instructions. Do not cover up sealant until curing is complete and proper seal has been achieved.

3.4 SEALANT APPLICATION

- 1.. Apply caulking around the perimeter of every external wall opening, both sides; set exterior door thresholds in a continuous bead of sealant.
2. Apply sealant to all exposed control joints in masonry, concrete, and gypsum board walls, ceilings, and bulkheads, joints between adjacent building components.
3. Provide interior caulking in walls, floor finishes around all metal frames, door frames, access panels, built-in specialties; around pipes, ducts, grilles, outlet boxes, conduits, etc. Penetrating floors, walls and ceiling.
4. Apply siliconized acrylic latex caulking around wood trim and wipe smooth prior to painting.
5. Caulk solidly around both outside and inside of all window/wall and door/wall joints, horizontal and vertical window and door surrounds, and all other exterior trim, to provide a weather-tight seal and prevent condensation.
6. Caulk the connection between the tops of the concrete block walls and the underside of the steel deck, wherever exposed to sight.
7. Caulk around plumbing fixtures, base and rim of sinks with mildew resistant sealant.
8. Supply and install paintable sealant around all piping to sinks and lavatories where piping passes through walls.

3.5 PREFORMED FOAM SEALANT INSTALLATION

1. Install preformed foam sealant in joints where indicated, in accordance with the manufacturer's printed instructions.
2. Verify dimensions on site and take particular care to select the correct size preformed sealant for the joint.
3. Install sealant to a clean line, flush with adjacent surfaces, and filling the joint, without interruption, for its entire length.

3.6 CLEANING

1. Upon completion of the work of this Section remove from the premises all surplus material, dirt and debris caused by the work of this Section and leave the installation clean.
2. Clean any drippage or spills of sealant or primers from adjacent surfaces immediately and make good any damage caused by the work of this Section, using cleaners recommended by the manufacturer, as work progresses.
3. Remove masking tape after tooling of joints.

3.7 MANUFACTURER'S WARRANTY INSPECTION

1. Upon completion, arrange for inspection of exterior sealant work by a technical representative of the sealant manufacturer.
2. Correct any deficiencies.
3. Arrange for the issuance of the manufacturer's 20-year materials warranty for exterior sealants.

08 11 16 - ALUMINUM DOORS AND FRAMES

Part 1 General

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

1. Work Included:

A) The work of this Section includes the provision of all labour, materials, equipment and services required to fabricate and install glazed aluminum doors and frames as indicated on the drawings, as specified herein and as required for a complete project.

2. Single source responsibility: Engage a single manufacturer to assume undivided responsibility for the work of this Section and the glazed aluminum curtain wall specified in Section 08 44 13.

3. Related Sections:

- A) Section 05 50 00 - Metal Fabrications
- B) Section 07 21 20 - Urethane Foam Insulating Sealant
- C) Section 07 27 16 - Vapour-Permeable Air/Moisture Barrier.
- D) Section 07 42 43 - Composite Aluminum Wall Panels.
- E) Section 07 92 00 - Joint Sealants.
- F) Section 08 44 13 - Glazed Aluminum Curtain Wall
- G) Section 08 71 10 - Door Hardware.
- H) Section 08 80 00 - Glazing

1.3 REFERENCES

1. Aluminum Association (AA):

- A) AA-DAF-45-2003(R2009), Designation System for Aluminum Finishes, Ninth Edition.

2. American Architectural Manufacturers Association (AAMA):

- A) AAMA 1503-09, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections.

3. American Society for Testing and Materials (ASTM):

- A) ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- B) ASTM C920-18, Standard Specification for Elastomeric Joint Sealants.
- C) ASTM E283-04(2012), Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- D) ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- E) ASTM E331-00(2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference.

4. Canadian Standards Association: (CSA):

- A) CSA-G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- B) CSA-S157-17/S157.1-17, Strength Design in Aluminum/Commentary on CSA S157-17, Strength Design in Aluminum.

5. The Society for Protective Coatings (SSPC):

- A) SSPC-Paint 12 1982, Paint Specification No. 12: Cold Applied Asphalt Mastic (Extra Thick Film).

1.4 REGULATORY REQUIREMENTS

1. The work of this Section shall conform to OBC requirements and all other applicable codes and regulations, to the satisfaction of the authorities having jurisdiction.
2. Design doors and frames as part of the building envelope systems in accordance with the following Climatic Design Data for Ottawa contained in the Ontario Building Code:
 - A) Design temperature: January 1%, July 2^{1/2}%
 - B) Hourly wind pressures: 1 in 50 year occurrence.

1.5 DESIGN CRITERIA AND PERFORMANCE

1. Design frames and doors in exterior walls to accommodate expansion and contraction within an ambient temperature range of -35°C to +35°C.
2. Structural performance shall be based on CSA-S157 and a maximum deflection of 1/175 of the span.
3. Air infiltration for exterior doors and frames shall not exceed 2.78 m³/h.m for a single door or 5.56m³/h.m for a pair of double doors, when tested in accordance with ASTM E283 at a pressure differential of 75 Pa.
4. Thermally, the grid members of exterior frames shall have a condensation resistance equal to, or better than, the area along the bottom of a 25 mm sealed glass unit with standard metal spacer edge construction.

1.6 SUBMITTALS

1. General: Submit each item in this Article accordance to the Conditions of the Contract and the applicable Division 01 Specification Sections.
2. Shop Drawings:
 - A) Indicate each type of door and frame, extrusion profiles, method of assembly, section and hardware reinforcement, locations of exposed fasteners, finishes and location of manufacturer's nameplates.
 - B) Submit catalogue details for each type of door and frame illustrating profiles, dimensions and methods of assembly.
 - C) Coordinate with other Sections and ensure that shop drawings are submitted early enough in the schedule to permit review prior to the work of any trade required to build in items for this Section. For example: inserts or weld plates, for anchorage, required to be built into cast-in-place concrete work.
3. Maintenance Data: Provide maintenance data for cleaning and maintenance of aluminum finishes for incorporation into the operation and maintenance manual specified in Section 01 78 00 "Closeout Submittals".

1.7 PROTECTION

1. Apply temporary protective coating to finished surfaces. Remove coating after erection. Do not use coatings that will become hard to remove or leave residue.
2. Leave protective covering in place until final cleaning of building.

1.8 WASTE MANAGEMENT AND DISPOSAL

1. Cooperate with the Construction Manager's Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

1.9 WARRANTY

1. For the work of this Section, the 12-months warranty period prescribed in the General Conditions of the Contract, is extended to 5 years.

Part 2 Products

2.1 GENERAL

1. This specification is based on aluminium doors and frames as manufactured by Kawneer Company Canada Limited.
2. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.
3. Obtain the aluminum door and frame system, including fixed windows, through one source from a single manufacturer.

2.2 MATERIALS

1. Aluminum extrusions: Aluminum Association alloy AA6063-T5 anodizing quality.
2. Sheet aluminum: Aluminum Association alloy AA1100-H14 anodizing quality.
3. Steel reinforcement, fastening clips, etc.: to CSA-G40.21, hot dip galvanized to ASTM A123.
4. Fasteners: 300 Series stainless steel or 400 Series cadmium plated stainless steel of sufficient size and quantity to perform their intended function, finished to match adjacent material.
5. Weatherstrip: replaceable mohair metal backed wool pile.
6. Door bumpers: black neoprene.
7. Threshold: Aluminum extrusion, 12.7 mm high x extended width to cover top of foundation wall x length to suit (150 mm width unless noted otherwise). Aluminum Association alloy AA6063-T5, mill finish. Provide cadmium plated steel fasteners as required. Refer to drawings for detail.
8. Door bottom seal: Adjustable door seal of anodized extruded aluminum frame and vinyl weather seal, recessed in door bottom, closed ends.
9. Isolation coating: Alkali resistant bituminous paint to SSPC Paint-12 applied at rate of 1 l/m².
10. Glass and glazing materials: Provided by this Section in accordance with Section 08 80 00 "Glazing".
11. Sealants:
 - A) Airseal sealant: To ASTM C920. Verify compatibility with insulated glazing unit manufacturer's secondary sealant.
 - B) Frame sealant: As recommended by the aluminum door and frame manufacturer.
 - C) Refer to Section 07 92 00 "Joint Sealants".
12. Door hardware: Refer to Section 08 71 10 "Door Hardware".

2.3 FRAMED ALUMINUM DOORS

1. Framed aluminum doors: Kawneer Wide Stile 500 Series; minimum 2438 mm Roton hinge - Custom push-pull.
2. Construction:
 - A) Construct doors of porthole extrusions with minimum wall thickness of 3 mm.
 - B) Reinforce mechanically-joined corners of doors to produce sturdy door unit.
 - C) Glazing stops: interlocking snap-in type for dry glazing.
 - D) Exterior stops: tamperproof type.

2.4 ALUMINUM DOOR FRAMES

1. Exterior aluminum door frames. Curtain wall framing as specified in Section 08 44 13 "Glazed Aluminum Curtain Wall".

2.5 FINISHES

1. Aluminum surfaces:

A) Finish aluminum surfaces with electrolytically deposited clear anodic finish, designation AA-M12-C22-A41, Architectural Class I, in accordance with AA DAF-45 and to match the curtain wall finish specified in Section 08 44 13 "Glazed Aluminum Curtain Wall".

B) Prior to application of finish:

I) Notching and welding to be completely executed.

II) Exposed surfaces to be fine satin finished to ensure elimination of extrusion die marks and fabrication marks and to ensure uniformity of finish.

2. Steel clips and reinforcement: 380 g/m² zinc coating to ASTM A123.

3. Isolate aluminum from the following components by a heavy coating of bituminous coating:

A) Dissimilar metals except stainless steel, zinc or white bronze in small area.

B) Concrete, mortar and masonry.

C) Wood.

2.6 FABRICATION

1. Coordinate the aluminum doors, frames and windows with the glazed aluminum curtain wall specified in Section 08 44 13, the composite aluminum panel system specified in Section 07 42 43.

2. Coordinate aluminum frames to receive sectional overhead doors with Section 08 36 13.

3. Doors and framing to be by same manufacturer.

4. Fabricate doors and frames to profiles and maximum face sizes as shown. Provide minimum 22 mm bite for insulating glazed units.

5. Provide structural steel reinforcement as required.

6. Fit joints tightly and secure mechanically.

7. Conceal fastenings.

8. Design anchorages so that they do not interfere with other work such as floor finishes of drywall finishes to walls.

9. Mortise, reinforce, drill and tap doors, frames, and reinforcements to receive hardware using templates provided by Section 08 71 10 "Door Hardware".

10. Coordinate installation of hardware in the doors and frames to ensure proper operation of the completed installation.

11. Isolate aluminum from direct contact with dissimilar metals, concrete and masonry.

Part 3 Execution

3.1 EXAMINATION

1. Examine areas and conditions under which work is to be performed and notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.

2. Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.

3. Take field measurements to verify or supplement dimensions.

4. Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Trade Contractor shall be fully responsible for satisfactory work as specified herein.

3.2 INSTALLTION

1. Set frames plumb, square, level at correct elevation in alignment with adjacent work.

2. Anchor securely.

3. Brace frames rigidly for building-in. Install temporary horizontal wood spreaders at third points of door opening to maintain frame width. Provide vertical support at centre of head for opening over 1200mm wide. Remove temporary spreaders and supports after frames are built-in.
4. Install doors and hardware in accordance with hardware templates and manufacture's instructions.
5. Adjust operable parts for correct function.
6. Make allowances for deflection of structure to ensure that structural loads are not transmitted to frames.

3.3 GLAZING

1. Glaze aluminum doors and frames in accordance with Section 08 80 00 "Glazing" and the manufacturer's standard glazing methods and materials.
2. Install temporary glass presence markers in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

3.4 AIR/VAPOUR SEAL

1. Ensure airtight connections with adjacent construction to maintain the Airseal over the entire building envelope.
2. Coordinate with the building air/vapour barrier installer and install air/vapour barrier transition strips at the interface with adjacent construction. Refer to details.
3. Overlap the airseal transition membrane 75 mm minimum and lap in the direction of water flow.
4. Inspect the entire assembly for gaps in the air seal and make good.

3.5 CAULKING

1. Seal joints to provide weather tight seal at outside and air, vapour seal at inside.
2. Apply sealant in accordance with Section 07 92 00 "Joint Sealant". Conceal sealant within the aluminum work except where exposed use is permitted by the Consultant. Colour of exposed sealant to match finish to the approval of the Consultant.

3.6 PROTECTION

1. During and after installation, protect the work of this Section from damage. Remove all corrosive or foreign material or droppings resulting from the work of this or other trades.
2. Do not use coatings that will become hard to remove or leave residue.

3.7 FINAL CLEANING

1. Remove protective coating and clean all surfaces, using materials and methods recommended by the door and frame manufacturer.

08 44 13 - GLAZED ALUMINUM CURTAIN WALL

Part 1 General

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

1. Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to engineer, fabricate, and install glazed aluminum curtain wall and fixed windows, as indicated on the drawings, as specified herein and as required for a complete project.
2. Single source responsibility: Engage a single manufacturer to assume undivided responsibility for the work of this Section and the aluminum doors and frames specified in Section 08 11 16.
3. Related Work:
 - A) Section 05 12 23 - Structural Steel
 - B) Section 05 50 00 - Metal Fabrication
 - C) Section 07 21 20 - Urethane Foam Insulating Sealant
 - D) Section 07 27 10 - Membrane Air/Moisture Barrier.
 - E) Section 07 44 66 - Honeycomb Metal Cladding System
 - F) Section 07 92 00 - Joint Sealants
 - G) Section 08 11 16 - Aluminum Doors and Frames
 - H) Section 08 51 13 - Aluminum Windows
 - I) Section 08 80 00 - Glazing

1.3 REFERENCES

1. Aluminum Association (AA):
 - A) AA-DAF-45-2003(R2009), Designation System for Aluminum Finishes, Ninth Edition.
2. American Architectural Manufacturers Association (AAMA):
 - A) AMMA 501-15, Methods of Test for Exterior Walls
 - B) AAMA 501.1-17, Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.
 - C) AAMA 501.4-09 and 501.6-09 (combined document), Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts and Recommended Dynamic Tests for Determining the Seismic Drift Causing Glass Fallout from a Wall System.
 - D) AAMA 503-08, Voluntary Specification for Field Testing of Storefronts, Curtain Walls and Sloped Glazing Systems.
 - E) AAMA 1503-09, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
3. American Society for Testing and Materials (ASTM):
 - A) ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - B) ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - C) ASTM B221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
 - D) ASTM C864-05(2015), Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks and Spacers.
 - E) ASTM D638-14, Standard Test Method for Tensile Properties of Plastics.
 - F) ASTM D695-15, Standard Test Method for Compressive Properties of Rigid Plastics.

- G) ASTM D790-17, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- H) ASTM D953-10, Standard Test Method for Bearing Strength of Plastics.
- I) ASTM D3846-08(2015), Standard Test method for In-Plane Shear Strength of Reinforced Plastics.
- J) ASTM E90(2016), Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- K) ASTM E283-04(2012), Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- L) ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- M) ASTM E331-00(2009), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference.
- N) ASTM E783-02(2010), Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
- O) ASTM E1105-15, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights Doors and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference.
- P) ASTM E1425-14, Standard Practice for Determining the Acoustical Performance of Exterior Windows and Doors.
- Q) ASTM E2692-10 Standard Test Method for Structural Performance of Thermal Barriers in Fenestration Products.
- 4. Canadian General Standards Board (CGSB):
 - A) CAN/CGSB-19.13-M87, Sealing Compound, One Component, Elastomeric, Chemical Curing.
- 5. Canadian Standards Association (CSA):
 - A) CSA-A500-16, Building Guards
 - B) CSA-G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - C) CSA-S157-17/S157.1-17, Strength Design in Aluminum/Commentary on CSA S157-05, Strength Design in Aluminum.
- 6. Master Painters Institute (MPI):
 - A) MPI Architectural Specification Manual, 2014 (referred to herein as "MPI Manual")
 - B) MPI Approved Product List (referred to herein as "MPI APL")
- 7. The Society for Protective Coatings (SSPC):
 - A) SSPC-Paint 12 1982, Paint Specification No. 12: Cold Applied Asphalt Mastic (Extra Thick Film).

1.4 REGULATORY REQUIREMENTS

1. The work of this Section shall conform to OBC requirements and all other applicable codes and regulations, to the satisfaction of the authorities having jurisdiction.
2. Design doors and frames as part of the building envelope systems in accordance with the Climatic Design Data for Ottawa contained in the Ontario Building Code.

1.5 QUALIFICATION

1. Manufacturer:
 - A) The work of this Section shall be engineered and fabricated by a manufacturer with minimum ten years experience in the actual production of products similar to the specified products.

- B) The manufacturer shall be capable of providing structural calculations, applicable independent product test reports, installation instructions, a review of the application method, customer approval and periodic field service representation during construction.
 - C) The components of the curtain wall system shall be factory fabricated by the framing supplier, fully engineered and delivered knockdown. Windows shall be delivered per-assembled.
2. Installer: The work of this Section shall be installed by a firm experienced in performing the work of this Section who has specialized in the installation of work similar to that required for this project and who is acceptable to the product manufacturer.
3. If requested by the Consultant, provide evidence of previously completed projects of a similar nature.
4. Employ only skilled tradesmen, experienced in this work.
5. Retain a Professional Engineer licensed to practise in the Province of Ontario, with experience in exterior glazed curtain wall systems of comparable complexity and scope, to perform the following services as part of the Work of this Section.
- A) Design the exterior curtain wall system and components
 - B) Review, stamp and sign shop drawings
 - C) Conduct on-site inspections and prepare and submit inspection reports.

1.6 SUBMITTALS

1. General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.
2. Shop Drawings:
- A) Verify the actual locations of structural supports for glazed aluminum curtain walls by field measurements before fabrication and indicate measurements on the shop drawings.
 - B) Clearly indicate materials and large scale details for head, jamb, sill, transoms and mullions, profiles of components, elevations of units, anchorage details, location of isolation coating, description of related components and exposed finishes and fasteners, pressure equalization holes, methods of avoiding thermal bridging, maintenance of integrity of insulation and thermal break between sub-frame and structure, prevention of air infiltration, maintenance of the integrity of the air barrier, condensation control, caulking.
 - C) Shop drawings shall be prepared by a structural engineer licensed to practice in the province of Ontario. Each shop drawing submitted shall bear the stamp and signature of the aforesaid structural engineer.
 - D) Submit catalogue details for curtain wall illustrating profiles, dimensions and methods of assembly.
 - E) Coordinate with other Sections and ensure that shop drawings are submitted early enough in the schedule to permit review prior to the work of any trade required to build in items for this Section. For example: inserts or weld plates, for anchorage, required to be built into cast-in-place concrete work.
3. Samples: Submit a sample for each type of exposed finish in the manufacturer's standard sizes.
4. Samples: Show full range of products, finishes, textures, quality of fabrication and workmanship, including but not limited to, framing members, glazing units, anchorage, opening units, doors, and transitions to adjoining assemblies.
5. Test Reports: Submit certified test reports by an independent testing agency showing compliance with specified performance characteristics.
6. Maintenance Data:

A) Provide maintenance data for cleaning and maintenance of aluminum finishes for incorporation into the operation and maintenance manual specified in Section 01 78 00 "Closeout Submittals".

1.7 MOCK-UPS

1. Construct a minimum 10 m² mock-up of a representative sample of the curtain wall for the approval of the Consultant.
2. Locate where directed by the Consultant.
3. The accepted mock-up may be incorporated into the finished work.
4. The accepted mock-up will be the standard of acceptance for work of this Section.
5. Remove and dispose of mock-ups which do not form part of the work.

1.8 DESIGN AND PERFORMANCE CRITERIA

1. The drawings indicate the architectural intent only. The design of anchorages, fastenings, connections and reinforcement is the responsibility of the curtain wall fabricator.
2. Structural performance shall be based on CAN3-S157 and a maximum deflection of 1/175 of the span.
3. Wind-loads to be based on climatic data for the location of the site in accordance with OBC.
4. Air infiltration shall not exceed 0.03 L/s-m² when tested in accordance with ASTM E283 at a pressure differential of 300 Pa.
5. Water resistance (static): The test specimen shall be tested in accordance with ASTM E331. There shall be no leakage at a static air pressure differential of 575 Pa as defined in AAMA 501.
6. Water Resistance (dynamic): The test specimen shall be tested in accordance with AAMA 501.1. There shall be no leakage at an air pressure differential of 575 Pa as defined in AAMA 501.
7. Uniform load: A static air design load of 1915 Pa shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member at design load. At structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% if their clear spans shall occur.
8. Seismic: When tested to AAMA 501.4, the system must meet a design displacement of 0.010 x the storey height and ultimate displacement of 1.5 x the design displacement.
9. Thermal Transmittance (U-factor): When tested to AAMA 1503, the thermal transmittance (U-Factor) shall not be more than: 0.66 BthU/hr/ft²/°F. in accordance with AAMA 507.
10. Condensation Index (I): when tested to CSA-A440, the Condensation Index shall not be less than 68frame and 54frame.
11. Sound Transmission Loss: When tested to ASTM E90 and ASTM E1425, the Sound Transmission Class (STC) and Outdoor/Indoor Transmission Class (OITC) shall not be less than STC 31 or OITC 26.
12. Anchor Design:
 - A) Design anchors for system connection to the building support to accommodate all movements specified herein and to allow for a continuous building envelope, standard construction tolerances and all tolerances as specified in other Sections of these specification. In no case shall the allowances be less than 25 mm in all three directions.
 - B) Anchors shall be by approved methods. Use of tapping screws or other similar blind fasteners will not be permitted.
 - C) Design, fabricate and supply anchor embeds required for connection of the curtain wall glazing system anchors. Supply anchor embeds and embed layouts to the concrete trade contractor for placement into concrete. Supply anchor embeds clean, without primer.
 - D) Provide a horizontal telescopic deflection member at the first horizontal mullion above each floor. Design this member to absorb building movements, thermal expansion, and transfer load into the mullion above. Provide a specially-designed horizontal load transfer bar and a continuous polyvinyl chloride water deflector.

E) As the curtain wall glazing system is generally suspended from anchorage above, provide a starter track for the curtain wall glazing system to accommodate wind-load anchorage, air seal, and water deflector similar to the horizontal telescopic deflection member.

F) Curtain wall glazing system structural members shall be self-supporting between slabs. The curtain wall glazing system shall impose vertical and horizontal loads on the building structure only. No moment connections will be permitted.

13. Curtain Wall Glazing System Deflection:

A) Prevent deflection and permanent or progressive glazing displacement.

B) Restrict horizontal mullion deflection to less than $L/175$ (under uniformly distributed positive design wind load), and 19 mm maximum for heights under 4115 mm and $L/240$, and 25 mm maximum for heights over 4115 mm.

C) Restrict vertical mullion deflection to less than $L/500$ (under uniformly distributed positive design wind load).

14. Guards:

A) Design the curtain wall glazing system and connections to the substrate where the bottom of the curtain wall glazing system extends to a point below 1070 mm above finished floor level and separates a floor level from an adjacent interconnected space to withstand the required guard and handrail loads in accordance with the OBC and applicable local regulation.

B) When requested by the Consultant, provide a letter signed and sealed by a Professional Engineer certifying that the curtain wall glazing system conforms to the OBC requirements.

15. Unit Replacement:

A) Design attachments which will permit replacement of individual units during construction or in subsequent usage of the building without dismantling or disturbance to adjoining components or units.

B) Replacement shall be completed without the use of extra fasteners, splices, covers and items that would alter the original design features.

16. Reinforcement:

A) Design and supply all internal steel reinforcing necessary in mullions for horizontal and vertical members to meet load requirements in accordance with provincial and local codes.

B) Reinforcing to be engineered by a Professional Engineer.

17. Coordinate with applicable sections as required for siding and installation.

18. Design all operable windows within reach of occupants to have limiting stops to meet the requirements of the OBC.

1.9 THERMAL MOVEMENT

1. Determine the full range of temperature conditions to which the glazing will be subjected after installation.

2. Coordinate frame and glass dimensions with Section 08 80 00 "Glazing" to ensure that adequate provision is made to permit sealed thermal units to expand and contract without breakage.

3. Immediate replace sealed thermal units which crack or break as a result stresses caused by thermal movement due to temperature change, at no cost to the Owner.

1.10 DELIVERY, STORAGE, AND HANDLING

1. Packing, shipping, handling, and unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

2. Storage and protection: Store materials protected from exposure to harmful weather conditions. Handle material and components to avoid damage. Protect curtain wall material against damage from elements, construction activities, and other hazards before, during and after curtain wall installation.

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

4. Remove and replace all damaged and unsatisfactory materials which are deemed by the Consultant to be unsuitable for use, at no additional cost to the Owner.

1.11 WASTE MANAGEMENT AND DISPOSAL

1. Cooperate with the Construction Manager's Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste management Plan.

1.12 WARRANTY

1. For the work of this Section, the 12-months warranty prescribed in the General Conditions of the Contract is extended to 10 years.

Part 2 Product

2.1 MANUFACTURERS

1. This specification is based on 1600 Series curtain wall by Kawneer Company Canada Ltd.
2. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

2.2 MATERIALS

1. Aluminum extrusions:
 - A) Material: To ASTM B221, 6063-T6 alloy and temper.
 - B) Member wall thickness: Sufficient to meet the specified structural requirements.
 - C) Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of curtain wall members are nominal. Comply with AA Aluminum Standards and Data.
2. Aluminum sheet: To ASTM B209, alloy and temper to suit application.
3. Fibreglass (for pressure plates): Tested to ASTM D638, D695, D790, D953, and D3846.
4. Main frame profiles: Manufacturer's standard extruded or formed aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - A) Face width: 64 mm
 - B) Depth: As required to meet structural performance criteria.
 - C) Glazing system: 4-sided captured.
5. Pressure plate: Either aluminum or fibreglass and fastened to the mullion with stainless steel screws.
6. Cap: Aluminum extension to manufacturer's standard profile.

2.3 ACCESSORIES

1. Fasteners: Fasteners in contact with aluminum to be stainless steel 300 Series, stainless steel 400.
2. Gaskets: Glazing gaskets shall comply with ASTM C864 and be extruded of a silicone compatible EPDM rubber that provides for silicone adhesion.
3. Thermal Barrier:
 - A) Thermal barrier shall consist of 25 mm separation between the interior and exterior metal members in a typical conditions.
 - B) Minimum 6 mm thick, low thermal conductivity polymerized material.

- C) Thermal breaks in frame members, vertically aligned with glazing.
- D) Thermal barrier assembly shall be tested to the thermal cycling requirements of ASTM E2692 and show no sign of degradation following the test.

4. Perimeter Anchors: Aluminum, or galvanized steel.

- A) Steel anchors: hot dipped galvanized with 380 g/m² zinc coating to ASTM A123.
- B) When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

5. Exterior sills: Aluminum extrusions to profile as detailed and to suit job conditions; minimum 3 mm thick, complete with concealed anchoring devices. Profile to be heavy enough to withstand service loadings without deformation. Finish aluminum after fabrication to match curtain wall framing.

6. Zinc-rich coating: MPI APL #18.

7. Isolation coating: alkali resistant bituminous paint to SSPC Paint-12.

2.4 RELATED MATERIALS

- 1. Glass: Sealed double glazing units in accordance with Section 08 80 00 "Glazing".
- 2. Air barrier transition membrane: Refer to Section 07 21 10 "Membrane Air/Moisture Barrier".
- 3. Sealants: Refer to Section 07 92 00 "Joint Sealants".

2.5 FABRICATION

- 1. Fabricate components in accordance with manufacture's installation instructions and with minimum clearances and shim spacing around the perimeter of the assembly, yet enabling installation and dynamic movement of the perimeter seal.
- 2. Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.
- 3. Prepare components to receive anchor devices. Fabricate anchors.
- 4. Arrange fasteners and attachments to conceal from view and so that they do not interfere with other work, such as floor finishes or drywall finishes to walls.
- 5. Mullions to be tubular extruded members, square-cut, corner bracket construction with butyl tape joint seals.
- 6. Provide structural steel reinforcement for strength, stiffness and connections as required.
- 7. Frame sections to incorporate integral screw ports for mechanical fastening of all corners and intermediate joints with self-tapping screws or spigots. No exposed fastening devices will be permitted.
- 8. Factory-install rigid polystyrene insulation in all tubular framing members.
- 9. Provide expansion and construction joints as required.
- 10. Touch-up galvanized steel brackets with zinc-rich coating immediately following the alignment and fastening operation.
- 11. Double seal design with primary air and vapour barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to the exterior.
- 12. Design framing members to drain moisture to the exterior.
- 13. Incorporate appropriate components to accommodate entrances doors specified in Section 08 11 16 "Aluminum Doors and Frames".
- 14. Provide for field replacement of glazing from the exterior.
- 15. Fabricate curtain wall square and true with maximum tolerance of plus or minus 1.5 mm for glazing units with diagonal measurement of 1.8 m or less and plus or minus 3 mm for units with diagonal measurement over 1.8 m.
- 16. Fabricate components for assembly using a shear block system, following the manufacturer's standard installation instructions.
- 17. Make allowance for deflection of structure. Ensure that structural loads are not transmitted to glazing units.

18. After fabrication, clearly mark components to identify their location according to the shop drawings.

2.6 FINISHES

1. Aluminum surfaces:

A) Finish aluminum surfaces with electrolytically deposited clean anodic finish, designation AA-M12-C22-A41, Architectural Class I, in accordance with AA DAF-45.

B) Prior to application of finish:

I) Form or extrude aluminum shapes before finishing.

II) Notching and welding to be completely executed.

III) Exposed surfaces to be fine satin finished to ensure elimination of extrusion die marks and fabrication marks and to ensure uniformity of finish.

2. Steel clips and reinforcement: 380 g/m² zinc coating at ASTM A123.

3. Isolate aluminum from the following components by a heavy coating of bituminous coating:

A) Dissimilar metals except stainless steel, zinc or white bronze in small area.

B) Concrete, mortar and masonry.

C) Wood.

Part 3 Execution

3.1 EXAMINATION

1. Examine areas and conditions under which work is to be performed and notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.

2. Verify substrate conditions are acceptable for product installation in accordance with manufacturer's instructions.

3. Verify openings are sized to receive curtain wall system and sill plate is level in accordance with manufacturer's acceptable tolerances.

4. Field Measurements:

A) Verify actual measurements/openings by field measurements before fabrication.

B) Show recorded measurements on shop drawings.

C) Coordinate field measurements, fabrication schedule with construction progress to avoid construction delay.

5. Do not proceed with the installation until unsatisfactory conditions have been corrected to the satisfaction of the installer.

6. Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Trade Contractor shall be fully responsible for satisfactory work as specified herein.

3.2 ANCHORAGE INSERTS

1. Coordinate with the concrete installer and ensure that inserts for anchorage which are required to be installed by those Sections are supplied by this Section at the appropriate time in the construction schedule.

3.3 CURTAIN WALL INSTALLATION

1. Install curtain wall system in accordance with the reviewed and accepted shop drawings and the manufacturer's instructions.

2. Coordinate with applicable other trades as required for the work of this section.

3. Install plumb, level, and true to line, without warp or rack of frames with manufacturer's prescribed tolerances.

4. Provide support and anchor in place.

5. Attach vertical mullions to structure. Provide sliding connections as necessary to prevent structural loads from being transmitted to the curtain wall.
6. Install flashings, closures and trim pieces.
7. Install sills in maximum lengths possible. For sills over 1200 mm long, maintain a 3 mm to 6 mm space at each end.
8. Arrange components to prevent a perceptible variation in colour.
9. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.
10. Glazing:
 - A) Glass shall be outside glazed and held in place with extruded aluminum pressure plates anchored to the mullion using stainless steel fasteners spaced no greater than 9" on centre.
 - B) Refer to the drawings for glazing type locations.
 - C) Install glazing in accordance with Section 08 80 00 "Glazing".
 - D) Install temporary glass presence markers in two cross stripes extended from diagonal corners. Maintain markers until final clean-up.
11. Water Drainage: Each light of glass shall be compartmentalized using joint plugs and silicone sealant to divert water to the horizontal weep locations. Weep holes shall be located in the horizontal pressure plates and covers to divert water to the exterior of the building.

3.4 ERECTION TOLERANCES

1. Tolerances to be non-cumulative, as follows:
 - A) Maximum variation from plumb: 1.5 mm in 3 m, non-cumulative, or 12 mm in 30 mm, whichever is less.
 - B) Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.
 - C) Vertical and horizontal positions: +3 mm.
 - D) Racking of face: 6 mm; nil in elevation.
 - E) Operable components: Consistent with smooth operation and weatherproof performance.
 - F) Maximum width of perimeter sealant joint between curtain wall glazing system and adjacent construction: 13 mm.

3.5 REALTED PRODUCTS INSTALLATION REQUIREMENTS

1. Sealants (Perimeter): Refer Section 07 92 00 "Joint Sealants".
2. Glass: Refer to Section 08 80 00 "Glazing".

3.6 AIR/VAPOUR, INSULATION, AND INSULATING SEAL.

1. Ensure complete air/vapour barrier continuity within the curtain wall assembly and at the interface between the curtain wall assembly and adjacent construction. Incorporate membrane air barrier transition strips as specified in Section 07 27 10 "Membrane Air/Moisture Barrier".
2. Coordinate with Section 07 21 00 and fill voids with insulation as indicated. Where voids cannot be filled with specified batt or board insulation, inject polyurethane foam insulating sealant as specified in Section 07 21 20.

3.7 CAULKING

1. Seal the perimeter of the curtain wall framing against adjacent materials, on the interior and exterior.
2. Apply sealant in accordance with Section 07 92 00 "Joint Sealants". Conceal sealant within framing except where exposed use is permitted by the Consultant. Colour of exposed sealant to match finish, to approval of the Consultant.

3.8 FIELD QUALITY CONTROL

1. Field Tests:

A) The Consultant will select curtain wall units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured.

B) Conduct tests for air infiltration and water penetration with the manufacturer's representative present.

C) Tests not meeting specified performance requirements and units having deficiencies shall be corrected at no additional cost to the Contract.

2. Testing: Testing shall be performed in accordance with AAMA 503 by a qualified independent testing agency acceptable to the Consultant. The cost of initial inspection and testing will be paid by the Owner. The cost of re-inspection and retesting required as a result of failure to meet specification requirements on the initial inspection/test shall be paid by the Contractor.

A) Air Infiltration Tests: Conduct tests in accordance with ASTM E783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.45 Ls/m^2 , which ever is greater.

B) Water Infiltration Tests: Conduct tests in accordance with ASTM E1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 383 Pa.

3. Manufacturer's Field Services: Upon the Consultant's written request, provide periodic site visits by the manufacturer's field service representation.

3.9 PRETECTION AND CLEANING

1. During and after installation, protect the work of this Section from damage. Protect aluminum curtain wall system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

2. Remove all corrosive or foreign materials or droppings resulting from the work of this or other trades.

3. Make good damage caused by the work of this Section. Repair or replace damaged installed products.

4. Clean installed products in accordance with manufacturer's instructions prior Substantial Performance of the Contract.

5. Remove construction debris from project site and legally dispose of debris.

08 71 10 - DOOR HARDWARE

Part 1 General

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Section, apply to this Section.

1.2 SUMMARY OF WORK

1. Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to provide finish door hardware, as indicated on the drawings, as specified herein and as required for a complete project.
2. Related Sections:
 - A) Section 08 11 13 - Steel Doors and Frames.
 - B) Section 08 11 16 - Aluminum Doors and Frames.
 - C) Section 08 36 13 - Sectional Metal Overhead Door.
 - D) Section 08 42 26 - All-Glass Entrances.

1.3 REFERENCES

1. Canadian Steel Door and Frame Manufacture's Association (CSDFMA):
 - A) Standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction).
2. Door and Hardware Institute (DHI):
 - A) ANSI/DHI A115 IG-1994, Installation Guide for Doors and Hardware.

1.4 SUBMITTALS

1. General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.
2. Hardware Schedule:
 - A) Provide a complete Door Hardware Schedule for the Project.
 - B) Pay the cost of preparation of the Hardware Schedule and include in the Contract Price.
 - C) Clearly indicate hardware proposed, including make, model, material, function, finish and all other pertinent information.
 - D) The Consultant's review of the Hardware Schedule does not limit or release the Contractor from the responsibility to provide all necessary hardware and related components required for a complete installation as required by the authorities having jurisdiction.
3. Samples: If requested by the Consultant, submit samples and technical literature as necessary to fully inform the Consultant regarding new hardware items proposed.

1.5 COORFINATEION WITH OTHER TRADES

1. Submit template information to all manufacturers and trades who have finish hardware applied to their products.

1.6 WASTE MANAGEMENT AND DISPOSAL

1. Cooperate with the Construction Manager's Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of water materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

Part 2 Products

2.1 HARDWARE ITEMS

1. Products:

A) Provide complete finishing hardware as indicated on the drawing. Do not order any item until it has been approved by the Consultant. Standard of acceptance: existing door hardware.

B) Including cylinders for all locks. Refer to the article "RELATED SECTIONS" in Part 1 of this section.

2. Keys, keying: Masterkey to the Owner's approval. Provide (3) cut keys per lock. Existing lock cylinders may be used provided they conform to the Owner's masterkeying requirements. Otherwise replace or supplement existing cylinders with new.

3. Fasteners:

A) Provide manufacturer's recommended tamper-proof fasteners throughout.

B) Expansion shield shall be of double cinch anchor/type.

C) Fasteners shall be ferrous or non-ferrous to match the product being applied.

D) Length of fasteners shall be sufficient to afford adequate thread engagement.

4. Specific hardware requirements are indicated on the Door Schedule.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

1. Furnish manufacturer's instructions for proper installation of each hardware component.

3.2 INSTALLATION: GENERAL

1. Generally, the installation of door hardware is by the door installers. Refer to PART 1 GENERAL: Related Sections.

2. Install hardware in accordance with ANSI/DHI A115 IG and manufacturer's instructions.

08 80 00 - GLAZING

Part 1 General

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

1. Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to install glazing, as indicated on the drawings, as specified herein and as required for a complete project.
2. Related Sections:
 - A) Section 08 11 13 - Steel Doors and Frames
 - B) Section 08 11 16 - Aluminum Doors and Frames.
 - C) Section 08 36 13 - Section Metal Overhead Doors
 - D) Section 08 42 20 - All-Glass Entrances
 - E) Section 08 44 13 - Glazed Aluminum Curtain Wall.

1.3 REFERENCE STANDARDS

1. American National Standards Institute (ANSI):
 - A) ANSI Z97.1-2015, Glazing Materials Used in Buildings, Safety Performance, Specifications and Methods of Test.
2. American Society for Testing and Materials (ASTM):
 - A) ASTM D2240-15e1, Standard Test Method for Rubber Property - Durometer Hardness.
3. Canadian General Standards Board (CGSB):
 - A) CAN/CGSB-12.1-2017, Safety Glazing
 - B) CAN/CGSB-12.8-M97, Insulating Glass Units
 - C) CAN/CGSB-19.13-M87, Sealing Compound, One Component, Elastomeric, Chemical Curing.
4. Consumer Product Safety Commission (CPSC).
5. Canadian Standards Association (CSA):
 - A) CSA-A500-16, Building Guards.
6. Insulating Glass Manufacturers Alliance (IGMA).
7. The Society for Protective Coatings (SSPC):
 - A) SSPC-Paint 12 1982, Paint Specification No.12: Cold Applied Asphalt Mastic (Extra Thick Film).
8. Underwriters' Laboratories of Canada(ULC):
 - A) CAN/ULC-S104-15, Standard Method for Fire Tests of Doors Assemblies
 - B) CAN/ULC-S106-15, Standard Method of Fire Tests of Window and Glass Block Assemblies.

1.4 DESIGN REQUIREMENTS

1. Use a probability of breakage of 8 lights per 1000 at the first application of design load.
2. Perform stress analysis. Accommodate live, dead, lateral, wind, seismic, handling, transportation, and erection loads.
3. Perform thermal stress analysis on each IGU with Low-E, and provide heat strengthened and/or tempered units as required to prevent thermal breakage.
4. Design IGUs so as to inhibit thermal stress fracture due to heat build-up behind insulating units.
5. Single source responsibility for sealants, gaskets and other glazing accessories. For consistent quality of performance, provide all glazing sealants and seals from a single manufacturer.
6. Limit glass deflection to the flexural limit of the glass with full recovery of glazing materials.

7. Utilize the inner light of multiple-light sealed units for continuity of the air and vapour seal.
8. Glazing which function as a guard shall meet the requirements of CSA A500.

1.5 SUBMITTALS

1. General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.
2. Samples: Submit a 300 mm x 300 mm sample for each IGU or glazing type. Include a glass safety decal on each IGU sample.
3. Certification: Provide manufacturer's written certification that glass and glazing materials are compatible.
 - A) Include compatibility and adhesion test reports from the sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants.
 - B) Include the sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed for adhesion.
 - C) Include insulating glass edge sealant manufacturer's test report indicating that glass edge sealants were tested for compatibility with other glazing materials, including sealants, setting blocks, edge blocks and any other material that is in contact with or can affect the edge seal.
4. IGMA Compliance AUDIT: Submit a written certification of successful completion of a Compliance Audit within the last six months.

1.6 QUALITY ASSURANCE

1. Retain a Professional Engineer, licensed to practise in the Province of Ontario, with experience in glazing work of comparable complexity and scope, to perform the following services as part of the work of this section:
 - A) Design exterior glazing at aluminum work and glazed guards.
 - B) Review, stamp, and sign shop drawings.
 - C) Conduct on-site inspections and prepare and submit inspection reports.
2. The insulating glass unit fabricator shall be a certified member of the Insulating Glass Manufacturer's Alliance (IGMA). IGMA members must participate in the certification program and shall have successfully passed a Compliance Audit within the last six months.
3. Installers qualifications: Perform the 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.

1.7 WASTE MANAGEMENT AND DISPOSAL

1. Cooperate with the Construction Manager's Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste material generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

1.8 WARRANTY

1. For the work of this Section, the 12-months warranty period prescribed in the General Conditions of the Contract, is extended to 10 years.
2. Warranty insulating glass units against defects and malfunction under normal usage, including failure of seal of enclosed air space and deposits on inner faces of glass detrimental to vision.
3. Warranty mirrors against failure of silvering.

Part 2 Products

2.1 MANUFACTURERS

1. Acceptable glass manufacturers:

- A) Guardian Industries
- B) ABC Flat Glass
- C) Pilkington
- D) PPG Industries Ltd.
- E) Glass Safety Decal
- F) 3M Convenience Group
- G) Approved equivalent.

2. Requests for substitutions will be considered in accordance with the provisions of Section 01 25 00 "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

2.2 GLASS

1. Glass Type 1: Insulating glass units for exterior windows and curtain wall glazing: to CAN/CGSB-12.8 and IGMA requirements, as follows:

- A) Outer pane: Clear tempered float glass to CAN/CGSB-12.1. Thickness to suit in-service loads.
- B) Cavity:
 - I) 13 mm thick
 - II) Warm edge spacers, non-metallic PVC or fibreglass, gray colour.
 - III) Dual seal with a PIB primary seal and silicone secondary seal.
 - IV) Argon gas filled, argon 100% pure.
- C) Inner pane: Tempered float glass to CAN/CGSB-12.1. Thickness to suit in-service loads.
- D) Low-E coating on surface 2:
 - I) High performance pyrolytic low-E coating.
 - II) Provide insulating glass units with low-E coating edge deletion and low-E coating.
 - III) Standard of acceptance: Eclipse Advantage by Pilkington or approved equivalent.
- E) Standard of acceptance:
 - I) Super-neutral 68 on Ultra-clear glass by Guardian Glass
 - II) Energy Select 63 by AGC.

2. Glass Type 2 - Insulating glass units for exterior glazed doors and sidelights: To CAN/CGSB-12.8 and IGMA requirements, as follows:

- A) Outer pane: Clear tempered float glass to CAN/CGSB-12.1. Thickness to suit in-service loads.
- B) Cavity:
 - I) Thickness as required.
 - II) Warm edge spacers, non-metallic PVC or fibreglass, gray colour.
 - III) Dual seal with a PIB primary seal and silicone secondary seal.
 - IV) Argon gas filled, argon 100% pure thickness as required, warm edge spacers, non-metallic PVC or fibreglass, gray colour.
- C) Inner pane: Tempered float glass to CAN/CGSB-12.1. Thickness to suit in-service loads.
- D) Overall unit thickness to suit frame profile.
- E) Low-E coating on surface 2:
 - I) High performance pyrolytic low-E coating
 - II) Provide insulating glass units with low-E coating edge deletion and low-E coating.
 - III) Standard of acceptance: Eclipse Advantage by Pilkington or approved equivalent.
- F) Standard of acceptance:
 - I) Super-neutral 68 on Ultra-clear glass by Guardian Glass.
 - II) Energy Select 63 by AGC.

3. Glass Type 3 - Interior stair and balustrade guards: Minimum 19 mm clear tempered glass to CAN/CGSB-12.1.
4. Glass Type 4 - Non-fire-rated interior glazing: Clear tempered float glass to CAN/CGSB-12.1, Type 2, Class B; thickness as required by in-service loading conditions, minimum 6 mm.
5. Glass Type 5 - Fire-rated interior glazing: 5 mm thick clear glazing material composed of fire-rated glass ceramic clear glazing material with surface-applied film for use in impact safety-rated locations with fire rating requirements ranging from 20 minutes to 3 hours with required hose stream test.
 - A) Standard of acceptance: Firelite[®] NT manufactured by Nippon Electric Glass Co. Ltd. And distributed by Technical Glass Products.
 - B) Grade: Standard
 - C) Fire performance:
 - I) Classified and labeled by ULC
 - II) Tested in accordance with CAN/ULC S104 and CAN/ULC-S106.
 - III) Fire rating as indicated and in accordance with OBC requirements for each specific assembly.
 - D) Impact safety resistance: ANSI Z97.1 and CPSC 16CFR1201(Cat.I and II).
6. Glass visual safety decals: Refer to drawings for details, pattern and size.

2.3 GLAZING AND SEALING COMPOUND MATERIALS

1. Glazing and rebate primers, sealants, sealers, and cleaners: Compatible with each other. Type as recommended by the glass manufacturer.
2. Heel and toe bead: Silicone sealant as recommended by the glazing manufacturer.
3. Glazing gasket: Visionstrip by Tremco Ltd., extruded composite glazing seal, size as recommended by the system manufacturer, gray colour.
4. Glazing tape: polyshim 11 glazing tape EPDM shim. Grey colour.
5. Glazing splines: EPDM or neoprene, extruded shape to suit glazing channel retaining slot. Grey colour.
6. Setting blocks (regular): EPDM, 80 to 90 Shore A durometer hardness to ASTM D2240, sized to suit glazing method, glass unit weight and area.
7. Edge blocks: EPDM, 60-70 Shore A Durometer hardness to ASTM D2240, sized with 3 mm clearance from glass edge and spanning glass thickness(es). Capable of withstanding weight of glass unit; self adhesive on face.
8. Temporary glass presence markers: Easily removable, non-residue depositing.

2.4 ACCESSORIES

1. Screws, bolts, and fasteners: Type 304 stainless steel.
2. Isolation coating: SSPC Paint 12: Bitumastic coating, acid and alkali resistant material.

Part 3 Execution

3.1 EXAMINATION

1. Examine areas and conditions under which work is to be performed and notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.
2. 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.
3. When the temperature of glazing surface is below 4°C, obtain from the Consultant approval of glazing methods and protective measures which will be used during glazing operations.
4. Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.

5. Take field measurements to verify or supplement dimensions. Make necessary allowances for thermal movement as specified in Section 08 91 00 "Glazed Aluminum Curtain Wall".
6. Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Trade Contractor shall be fully responsible for satisfactory work as specified herein.

3.2 WORKMANSHIP

1. Provide glazing in accordance with IGMA recommendations, the reviewed and accepted shop drawings and the manufacturer's written instructions.
2. Install glazing with full contact and adhesion at the perimeter. Maintain the edge clearance recommended by glass manufacturer.
3. Clearly label each glass light with the manufacturer's name and glass type. Ensure labels are easily removable, non-residue depositing type. Do not remove labels until after Work is accepted by the Consultant.
4. Provide neat, straight sight lines, Trim excess glazing material flush with the top of stops and the fixed leg of frames.
5. Carefully make and fit details. Take special care with exposed finish Work to produce a neat and correct appearance to the Consultant's acceptance.
6. Apply glazing tape in accordance with the manufacture's instructions, including recommended corner sealant.
7. Remove protective coatings and clean contact surfaces with solvent and wipe dry.
8. Apply primer-sealer to contact surfaces.
9. Place setting blocks in accordance with the manufacturer's instructions. Use setting blocks at 1/4 points and spacers to centre the glass unit in the frame.
10. Install glass; rest on setting blocks; ensure full contact and adhesion at perimeter.
11. Install removable stops, without displacing tape of sealant.
12. Provide edge clearance of 3 mm minimum.
13. Insert spacer shims to centre glass in space. Place shims at 600 mm o.c. and keep 6 mm below sight line.
14. Do not cut abrade tempered, heat treated, or coated glass.
15. Apply a continuous heel bead of sealant around the perimeter of the inboard light of the sealed unit and the metal framing. Re-install glazing stops ensuring continuous contact and a rattle-free installation. Do not distort the glass. Trim tape protruding more than 2 mm above the stop.
16. Install glazing gaskets in accordance with the manufacturer's recommendations.
17. Install temporary glass presence markers in two crossed stripes extending from diagonal corners. Maintain markers until final clean-up.
18. Remove, dispose of, and replace broken, cut, abraded glass, and defective glass including, but not limited to production dimples, "tiger-stripping", chips, cracks, etc.
19. Glazing units with a gasket on the exterior side and glazing tape on the interior side. Seal the gap between glazing and stop with sealant to a depth equal to the bite of the frame. Apply a cap head of sealant along the void between the stop and the glazing, to a uniform line, flush with the sight-line. Tool or wipe the sealant surface smooth.
20. Work shall have smooth finished surfaces free from distortion and defects detrimental to appearance and performance.

3.3 GLAZING OF ALUMINUM ENTRANCES, DOORS, CURTAIN WALL AND WINDOWS

1. Installation by the installer to system manufacturer's recommendations. Refer to Sections 08 11 16, 08 36 12, 08 42 29, 08 44 13, and 08 51 13.

3.4 GLAZING OF HOLLOW STEEL AND WOOD DOORS AND FRAMES

1. Hollow steel doors and frames: Dry method - tape/tape as follows:

- A) Cut glazing tape to length and install against permanent stop, project 1.5 mm above sight-line.
- B) Place glazing tape on free perimeter of glass in same manner described above.
- C) Screw-fasten glazing stops, in accordance with the manufacturer's instructions.

3.5 BALUSTRADE GLAZING

- 1. Install glass balustrades to the extent, locations, sides and details shown.
- 2. Mount glass rigidly to proper spacing, level, alignment and plumb, complete with structural silicone sealant at joints between glass panels.

3.6 GLASS FILM (VISUAL SAFETY DECALS)

- 1. Install glass film with adhesive, applied in accordance with the film manufacturer's instructions.
- 2. Place without air bubbles, creases, or visible distortion.
- 3. Refer to the drawings for pattern details.

3.7 FINISHING

- 1. Immediately remove sealant and compound droppings from finished surfaces. Remove labels after work is completed.
- 2. Make good damaged to adjacent finished surfaces.

3.8 CLEANING

- 1. Immediately removed sealant and compound droppings from finished surfaces.
- 2. Remove labels, protective materials, and glass presence markers from prefinished surfaces.
- 3. Clean glass surfaces with cleaning agents and methods in accordance with the manufacturer's written instructions.
- 4. Upon completion of the work of this Section remove from the premises all surplus material, dirt, and debris caused by the work.

09 11 10 - METAL FRAMING

- 1.1 SCOPE
 - 1. Provide a complete wall framing system by an approved manufacturer including formed studs, top and bottom runner track, self-tapping screws, etc.
- 1.2 STEEL STUF FRAMING
 - 1. Non-load-bearing channel stud framing: to ASTM C645, stud sizes as indicated or as required by site conditions, minimum 0.91mm base metal thickness, hot dipped galvanized steel sheet, for screw attachment of gypsum board.
 - 2. Knock-out service holes at 400mm centers.
- 1.3 FLOOR AND CEILING TRACKS
 - 1. To ASTM C645, in widths to suit stud sizes.
 - 2. Channel flange heights 32mm bottom and 50mm top.
- 1.4 BRIDGING
 - 1. Fabricated from same material and finish as steel studs, minimum 0.9mm base metal thickness.
- 1.5 ANGLE CLIPS
 - 1. Fabricated from same material and finish as steel studs, 38 x 38 x depth of steel stud, minimum 0.9mm thick.
- 1.6 INSULATING STRIP
 - 1. Rubberized, moisture resistant thick foam strip, 3mm thick x 12.7mm wide with adhesive on one face.
- 1.7 METAL FURRING AND SUSPENSION SYSTEM
 - 1. Metal furring runners, hangers, tie wires, inserts, and anchors: to CSA A82.30 and ASTM C754, galvanized.
 - 2. Drywall furring channels: 0.61mm core thickness galvanized steel channels for secure attachment of gypsum board.
 - 3. Resilient drywall furring: 0.61mm base steel thickness galvanized steel for resilient attachment of gypsum board.
- 1.8 INSTALLATION
 - 1. Install steel studs in accordance with OBC Part 9, manufacturer's printed instructions and ASTM C754. In case of conflict the more stringent requirements shall apply.
 - 2. Install studs at spacing suitable for height and partition loading, as called for on the drawings and as recommended by the manufacturer and in accordance with installation standard.
 - 3. Install furring in accordance with CSA A82.30 and ASTM C754.
 - 4. Provide heavier gauge framing members, double studs and additional reinforcing for studs and other members at door jambs and at other wall areas with concentrated loads.
 - 5. Use two strips of self-adhesive foam tape at perimeter of acoustic insulated partitions.
- 1.9 COORDINATION
 - 1. Coordinate metal support systems with requirements of all other trades to establish openings, additional support and other special provisions required for built into or partially supported by metal support systems.

10.0 EXTERIOR COLD FORMED STEEL STUDS AND TRACKS

1. Maximum deflection under OBC specified wind load not to exceed $L/600$.
2. Steel thickness to be 18 GA minimum.
3. Provide bridging at a maximum spacing of 4'-0" o/c.
4. Connections of a studs to roof structure to permit vertical deflection of roof without loading up stud. Lateral connection to be designed for OBL specified wind and earthquake lateral loads.
5. Submit shop drawings, specific to this project, detailing the complete system, including connections and framing around openings. Shop drawings are to be sealed and signed by a qualified Professional Engineer, Licensed in Ontario.
6. Steel stud engineer to provide field review during construction and to inspect in sufficient detail to state whether the work has been carried out in conformance with the OBC and project requirements or not.

09 21 16 - GYPSUM BOARD ASSEMBLIES

Part 1 General

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

1. Work Included:

- A) The work of this Section includes the provision of all labour, materials, equipment and services required to install gypsum board wall and ceiling finishes, as indicated on the drawings, as specified herein and as required for a complete project.
- B) The work includes gypsum board exterior wall sheathing.

2. Related Work:

- A) Section 05 41 00 - Structural Metal Stud System
- B) Section 07 21 00 - Building Insulation.
- C) Section 07 92 00 - Joint Sealant.
- D) Section 09 22 16 - Non-Structural Metal Stud Systems
- E) Section 09 30 13 - Ceramic and Porcelain Tiling
- F) Section 09 51 13 - Suspended Acoustical Panel Ceilings
- G) Section 09 91 00 - Painting
- H) Division 26 - Electrical

1.3 REFERENCES

1. American Society for Testing and Materials:

- A) ASTM A641/A641M-09a(2014), Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
- B) ASTM A653/A653M-17, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- C) ASTM C11-17a, Standard Terminology Related to Gypsum and Related Building Materials and Systems.
- D) ASTM C475/C475M-17, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- E) ASTM C754-17, Standard Specification for Installation for Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- F) ASTM C840-17a, Standard Specification for Application and Finishing of Gypsum Board.
- G) ASTM C945-15, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84mm) in Thickness.
- H) ASTM C1047-14a, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- I) ASTM C1177/C1177M-17, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- J) ASTM C1178/C1178M-13, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel.
- K) ASTM C1396/C1396M-17, Standard Specification for Gypsum Board.

2. Underwriters' Laboratories Canada (ULC):

- A) Design requirements for fire resistant assemblies.

1.4 REGULATORY REQUIREMENTS

1. Fire-resistance rated assemblies incorporating gypsum board: ULC fire resistive floor/ceiling and roof/ceiling design requirements.

1.5 DESIGN CRITERIA

1. Design the suspended ceiling and bulkhead framing to be attached to and supported by the joints above. Attachment to the steel deck will not be permitted.
2. The suspension system to be capable of safely supporting the weight of all items which are designed to be supported by it, including, but not limited to:
 - A) Light fixtures
 - B) Diffusers
 - C) Other items supported by the ceiling system.
3. Be advised that light fixtures will not be provided with separate support.
4. Design the suspension system to withstand normal and seismic loads.
5. Maximum deflection: 1/360 of span to ASTM C635 deflection test.

1.6 SUBMITTALS

1. General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.
2. Shop Drawings:
 - A) Provide shop drawings for the metal framing for suspended ceilings and bulkheads.
 - B) Clearly indicate layout and dimensions, member sizes, profiles and thicknesses, connection details, fastening methods, and other pertinent information.
 - C) The ceiling and bulkhead framing, including all related connections and fastenings, shall be designed by a structural engineer permanently licensed to practise in the Province of Ontario.
3. Post-installation certification: After installation, provide written certification, signed by the Structural Engineer responsible for the shop drawings, that all applicable items have been installed in accordance with the shop drawings.

1.7 DELIVERY, STORAGE, AND HANDLING

1. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacture or supplier.
2. Store materials inside, under cover and in accordance with the manufacturer instructions.
3. Keep materials dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction, traffic, and other causes.
4. Neatly stack gypsum panels flat to prevent sagging.

1.8 PROJECT CONDITIONS

1. Environment Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.
2. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 4°C. For adhesive attachment and finishing of gypsum board, maintain not less than 10°C for 48 hours before application and continuously after until dry. Do not exceed 35°C when using temporary heat sources.
3. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts drying hot, dry weather to prevent finishing materials from drying too rapidly.

1.9 WASTE MANAGEMENT AND DISPOSAL

1. Cooperate with the Construction Manager's Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

Part 2 Products

2.1 STEEL FRAMING AND FURRING COMPONENTS

1. General: Provide components complying with ASTM C754 for conditions indicated. Fabricate sheet steel products from Galvanized steel sheet to ASTM A653M with Z 180 hot-dipped galvanized finish.
2. Anchors and Fasteners: Anchors and fastener of types suitable for the application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers, and with the capability to sustain, without failure and with a safety factor acceptable to the authorities having jurisdiction, the load imposed by ceiling construction and items supported by the ceiling.
3. Wire Ties: ASTM A641/A641M, Class 1 zinc coating, soft temper, 1.6 mm thick.
4. Hangers: As required by loading conditions and fire resistant design requirements to the satisfaction of the authorities having jurisdiction, one or more of the following:
 - A) Wire hangers: ASTM A641M, Class 1 zinc coating, soft temper, 4.1 mm diameter.
 - B) Hanger Rods: Mild steel and zinc coated.
 - C) Flat Hangers: Mild steel and zinc coated.
5. Channels: cold-rolled steel, 1.5 mm (16ga) minimum base metal (uncoated) thickness and 11 mm wide flanges. Sizes as required by loading conditions and fire resistant design requirements.
6. Steel Studs for Furring Channels: ASTM C645, 0.45 mm base metal thickness, unless otherwise indicated or required by loading conditions. Depth as indicated and as required by loading conditions.
7. Steel Furring Channels:
 - A) Rigid: ASTM C645, hat shaped, depth of 22 mm, and minimum thickness of base (uncoated) metal of 0.45 mm (26ga), unless otherwise indicated or required by loading conditions.
 - B) Resilient: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A653M or ASTM A568M to form 12 mm deep channel of single or double-leg configuration: asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 38 mm wide face connected to flanges by double-slotted or expanded-metal legs (webs).

2.2 SHAFT WALL FRAMING

1. Non-Loadbearing C-H stud framing to ASTM C645, roll-formed from 0.53 mm (25 ga) galvanized sheet, 64 mm stud size.
2. Floor and ceiling runners: J-runners to ASTM C645, widths to suit stud sizes.

2.3 GYPSUM BOARD PRODUCTS

1. General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application, thicknesses as indicated. Requirements as follows except where otherwise indicated:
 - A) Width: 1219 mm
 - B) Thicknesses: as indicated
 - C) Edges:
 - I) For surfaces to be finished with joint compound: Tapered
 - II) For unfinished surfaces: Square

- D) Ends: Square
- 2. Gypsum Board to ASTM C1396:
 - A) Standard gypsum board unless otherwise indicated.
 - B) Fire resistant gypsum board: Type X where required for fire-resistance-rated assemblies
 - C) Moisture resistant (MR) board: Provide MR board in selected rooms where indicated
- 3. Liner board for shaft-wall construction: 25 mm thick gypsum liner panels, bevelled edge, 609 mm wide, lengths as required; water-resistant green paper; indentation with UL Classification Label.
- 4. Glass-Mat, Water-Resistant Gypsum Backing Board to ASTM C1178:
 - A) Proprietary gypsum board with silicone treated core and fibreglass-mat face and back, face side surfaced with heat-cured copolymer water and vapour retardant coating, thickness as indicated, square ends and edges.
 - B) Standard of acceptance: Dens-Sheild Tile Backer by Georgia-Pacific
- 5. Glass-Mat Water-Resistant Gypsum Board Sheathing To ASTM C1177:
 - A) Silicone treated core and fibreglass-mat face and back, face side surfaced with heat-cured copolymer water and vapour retardant coating, thickness as indicated, square ends and edges. Use Firestop Type X fire-resistant board where indicated.
 - B) Standard of acceptance: Dens-Glass Gold by Georgia Pacific.
- 2.4 TRIM ACCESSORIES
 - 1. Accessories for Interior Installation: Cornerbead, edge trim, and control joints complying with ASTM C1047 and requirements indicated below:
 - A) Material: Formed steel sheet zinc coated by hot-dip or electrolytic process.
 - B) Shapes as required in accordance with ASTM C1047
 - I) LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.
 - II) L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.
 - III) Note that standard "U" bead (J-trim) is not acceptable. Use "L" bead that is concealed when taped and filled.
- 2.5 JOINT TREATMENT MATERIALS
 - 1. General: Provide joint treatment materials complying with ASTM C475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
 - 2. Joint Tape for Gypsum Board: Paper reinforcing tape as recommended by the gypsum board manufacturer.
 - 3. Joint Compound for Gypsum Board: Factory-mixed, all-purpose compound formulated for both taping and topping compound.
- 2.6 MISCELLANEOUS MATERIALS
 - 1. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.
 - 2. Laminating Adhesive: Special adhesive or joint compound recommendation for laminating gypsum panels.
 - 3. Spot Grout: ASTM C475, setting-type joint compound recommended for spot-grouting hollow metal door frames.
 - 4. Fastening Adhesive for Metal: Special adhesive recommended for laminating gypsum panels to steel framing.
 - 5. Fasteners: Steel drill screws complying with ASTM C954 for fastening gypsum board to steel members from 0.84 mm to 2.84 mm (21 ga to 12 ga) thick.

6. Acoustic sealant: Refer to Section 07 92 00 "Joint Sealants".

Part 3 Execution

3.1 COORDINATION

1. Examine the mechanical and electrical drawings and coordinate with appropriate other trades to establish openings, additional support, during out and other special provisions required for mechanical and electrical fixtures and fittings and access hatches built into the work of this Section.
2. Examine the architectural drawings and coordinate with appropriate other trades to establish openings, additional support and other special provisions required for items built into or partially supported by the work of this Section.

3.2 SUSPENDED AND FURRED CEILINGS, INTERIOR SOFFIT FRAMING

1. Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C754 except where specified otherwise.
2. Attach ceiling and soffit framing to structural steel members. Do not attach to steel deck.
3. Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm o.c. around perimeter of fixture.
4. Install work level to tolerance of 1:1200.
5. Frame with furring channels. Perimeter of openings for access panels, light fixtures, diffusers, grilles and similar items which penetrate the ceiling surface.
6. Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header tracks.
7. Frame openings to receive ceiling-mounted access doors. Coordinate with Divisions 15 and 16.

3.3 CEILING BULKHEADS

1. Frame for gypsum board faced vertical bulkheads within and at termination of ceilings.
2. Frame for complex bulkheads in accordance with the drawings.
3. Frame above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

3.4 GYPSUM BOARD APPLICATION

1. Do not apply gypsum board until bucks, anchors, blocking, electrical and mechanical work are approved.
2. Apply gypsum board to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm o.c.
3. Apply water resistant gypsum board as a backer to ceramic tile, adjacent to slop sinks, in janitors closets and in other damp or humid locations where paint finish is to be applied.
4. Conform to UL design requirements for fire resistance rated assemblies.
5. Apply a 12 mm diameter bead of acoustic sealant continuously around the periphery of each face of partitioning to seal the gypsum board/structure junction where partitions abut fixed building components. Seal the full perimeter of cut-outs around electrical boxes, ducts and any other items which penetrate one or both faces of the partition, in partitions where the perimeter is sealed with acoustic sealant.

3.5 SHAFT WALL CONSTRUCTION

1. Install C-H studs and liner panels progressively between J-runners attached to the floor and underside of the deck above.
2. Space C/H studs at 609 mm o.c. and insert gypsum board edges into studs.

3. Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.
4. Install glass fibre reinforced gypsum reflector and stepped cove panels where indicated. Fasten securely to substrate with drywall screws in accordance with the manufacturer's instructions.
5. Install cover moulding where indicated, in accordance with the drawings.

3.7 CONTROL JOINTS

1. Confirm locations of control joints with Consultant before installation.
2. Construct control joints of preformed units except where otherwise shown. At junction of partitions with bulkheads, where indicated on the drawings, use two casing beads as indicated on the drawings.
3. Set gypsum board facing in the preformed units or casing beads and support independently on both sides of joint.
4. Provide continuous dust barrier behind and across control joints.
5. Where not otherwise indicated, locate control joints at changes in substrate construction, at approximate 10 m spacing on long wall or partition runs, at approximate 15 m spacing on ceilings. Verify locations with the Consultant before installation.
6. Install control joints straight and true.

3.8 ACCESS DOORS

1. Install access doors to electrical and mechanical fixtures and electrical panel boards specified in respective Sections.
2. Rigidly secure frames to furring or framing systems.

3.9 ACOUSTICAL SEAL AT PARTITION PERIMETERS

1. Minimize gaps between gypsum board and adjacent constructions and partition perimeters. Gaps greater than 13 mm wide are unacceptable.
2. Gaps between 6 mm and 13 mm to be packed with back-up rod and caulking with acoustical sealant specified in Section 07 92 00 "Joint Sealants". Gaps below 6 mm do not require back-up rod.
3. Apply acoustical sealant to the first layer of gypsum board and arrange for review by the Consultant before application of the second layer of gypsum board.
4. Cut drywall neatly and tight around all penetrations at STC rated walls. Provide fitted drywall flanges around all mechanical penetrations. Complete drywall flange by caulking full perimeter to penetrations and adjacent gypsum board. Caulking to be reviewed by the Consultant before concealing.
5. Stagger electrical outlets or mechanical installation on opposing sides of STC rated walls. Ensure sound attenuation insulation runs behind all penetrations. All electrical outlets to have vapour hoods and cover plate gaskets.

3.10 TAPING AND FILLING

1. Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.
2. Finish corner beads, control joints, trim and joints in fibre reinforced panels as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
3. Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.
4. Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
5. Completed installation to be smooth, level or plumb, free from blemishes.

3.11 GLASS MAT GYPSUM TILE BACKER INSTALLATION

1. Install tile backer board in accordance with the manufacturer's recommendations and to the satisfaction of the ceramic tile installer.
2. Place temporary 6 mm spacer strips around the lips of plumbing fixtures.
3. Pre-cut boards to required sizes and make necessary cutouts. Fit ends and edges closely but not tightly.
4. Start by installing the boards adjacent to the spacer strips.
5. Stagger end joints in successive courses.
6. Fasten boards to steel studs and/or steel furring spaced at maximum 400 mm o.c. and to bottom plates with 342 mm steel screws at 200 mm o.c. with perimeter fasteners between 10 mm and 16 mm from the edges of the boards.
7. Prefill panel joints, and joints where panels abut other surfaces such as gypsum board, with tile setting mortar or adhesive and then immediately embed joint tape and level the joints. Coordinate with the ceramic tile installer to ensure compatibility of joint treatment material.
8. On portions of wall not to be tiled, apply tape over joints and angles and embed tape in joint compound. Trowel joint compound over the entire surface to produce a smooth surface.

3.12 GLASS MAT GYPSUM SHEATHING INSTALLATION

1. Install glass mat gypsum sheathing where indicated, in accordance with the manufacturer's recommendations.
2. Install yellow side facing out.
3. Lay out boards so that joints are centered on framing or furring members. Stagger end joints.
4. Cut boards to fit irregular shapes and to fit snugly around floor and window openings. On curved surfaces, score boards if required to maintain curves.
5. Ensure that all edges are supported continuously. Provide additional furring if necessary.
6. Butt boards together in an easy fit.
7. Fasten in accordance with the manufacturer's recommendations for the specific application. Maximum fastener spacing: 200 mm o.c
8. Locate fasteners no closer than 10 mm from the edges of the boards and drive firmly against and flush with the surface of the sheathing. Do not countersink.

09 22 16 - NON-STRUCTURAL METAL STUD SYSTEMS

Part 1 General

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the Section.

1.2 SUMMARY OF WORK

1. Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to provide and install non-structural metal stud framing, as indicated on the drawings, as specified herein and as required for a complete project.
2. Related Sections:
 - A) Section 05 41 00 - Structural Metal Stud Systems.
 - B) Section 06 10 00 - Rough Carpentry
 - C) Section 07 92 00 - Joint Sealants'
 - D) Section 09 21 16 - Gypsum Board Assemblies.

1.3 REFERENCES

1. American Society for Testing and Materials (ASTM):
 - A) ASTM C645-14, Standard Specification for Nonstructural Steel Framing Members.
2. Underwriters' Laboratories Canada or Warnock Hersey design requirements for fire resistant assemblies.

1.4 REGULATORY REQUIREMENTS

1. Fire-resistance rated floor/ceiling and roof/ceiling assemblies: Underwriters fire resistive floor/ceiling and roof/ceiling design requirements.

1.5 SUBMITTALS

1. General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

1.6 WASTE MANAGEMENT AND DISPOSAL

1. Cooperate with the Construction Manager's Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

Part 2 Products

2.1 METAL FRAMING

1. Non-loadbearing channel stud framing: to ASTM C645, stud sizes, as indicated or as required by site conditions, minimum thickness 0.51 mm (25 ga), roll formed from, hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460 mm o.c.
2. Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, Flange height 32 mm.
 - A) Bottom channel: 32 mm
 - B) Deflection channel (fixed to u/s structure): 65 mm
 - C) Top channel: 50 mm.
3. Bridging: fabricated from same material and finish as steel studs, 38 mm x 13 mm

4. Angle clips: fabricated from same material and finish as steel studs, 38 mm x 38 mm x depth of steel stud.
5. Heavier gauge framing: Provide heavier gauge framing members and/or additional reinforcing where stud length and loading conditions require. Provide additional reinforcing for members carrying a concentrated load, such as door jambs.
6. Soft joint filler:
 - A) Purpose-made, permanently elastic, ultra-high density polyurethane foam impregnated with polymer modified asphalt; density 450 g/m³; colour black, 10 mm thick x 64 mm wide, except where otherwise indicated. Standard of acceptance:
 - I) Emseal soft joint material (uncompressed) by Emseal Corp.
 - II) Wall-seal impregnated precompressed expanding foam sealant tape by Illbruck/USA.
 - B) Soft joint filler shall accept up to 60% compression of original size and retain permanent adhesion to both substrates.
 - C) Provided sizes to suit application in accordance with manufacturer's recommendations.

Part 3 Execution

3.1 ERECTION

1. Erect stud systems for walls exceeding one storey in height in strict accordance with the reviewed and accepted shop drawings.
2. Align partition tracks at floor and ceiling and secure at 600 mm o.c. maximum.
3. Place studs vertically at 400 mm o.c. and not more than 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
4. Erect metal studding to tolerance of 1:1000.
5. Extend partitions up to the underside of the deck and down to the slab below the access floor, except where noted otherwise on drawings. Maintain clearance under deck, beams and joists to avoid transmission of structural loads to studs. Use double track slip joint.
 - A) Install 50 mm deep deflection channel at top of partitions.
 - B) Nest 65 mm deep top track into deflection channel a minimum of 30 mm and a maximum of 40 mm. Do not fasten tracks together.
 - C) In STC-rated partitions, install soft joint filler to fill voids between the deflection channel and the top track.
 - D) Attach each stud to bottom track bottom and top tracks, using screws. For each stud, carefully align anchorages top and bottom.
6. Brace steel studs with horizontal internal bridging at 1520 mm o.c. maximum. Fasten bridging to steel clips fastened to steel studs.
7. Coordinate simultaneous erection of studs with installation of service lines. When erect studs ensure web openings are aligned.
8. Coordinate erection of studs with Section 08 11 13 "Steel Doors and Frames" for the installation of steel door frames.
9. Make provision for attachment of wall-mounted items:
 - A) For each item, provide one of the following, as appropriate:
 - I) 1.52 mm (16 ga) steel sheet of appropriate dimensions, screwed to the studs.
 - II) 41 mm stud or furring channel.

III) Wood blocking, secured between studs (coordinate with Section 06 10 00 "rough Carpentry") for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud walls.

B) Coordinate with the applicable other sections to ensure the correct type, size, and location of provisions for attachment and indicated on the shop drawings.

10. Provide two studs extending from floor to ceiling at each side of openings wider than stud ` centers specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.
11. Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacture's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.
12. Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.
13. Provide 40 mm stud, furring channel or wood block, secured between studs for attachments to steel stud partitions.
14. Install steel studs or furring channel between studs for attaching electrical and other boxes.
15. Install continuous insulating strips to isolate studs from insulated surfaces.
16. Install two continuous beads of acoustical sealant or insulating strip under studs and tracks around perimeter of sound control partitions.

09 25 00 - GYPSUM DRYWALL

1.1 SCOPE

1. Complete drywall installations with taper edge face boards, non-rated and fire-rated and graded as required, drywall screws, outside and inside corners, end stops, laminating compound, joint treatment and caulking by an approved manufacturer.

1.2 GYPSUM WALLBOARD

1. Standard and type X board: to ASTM C36 regular, 12.7mm thick x 1220mm wide x maximum practical length, ends square cut, edges tapered and bevelled.
2. Fibre-reinforced gypsum board: "Fibrebond" or approved equal.

1.3 SCREWS

1. Self-tapping steel drill tip screws to ASTM C954.

1.4 ACCESSORIES

1. Reglets, reveals: Softforms by Pittcon Industries or equivalent by Fry Reglet Corporation or approved equal.
2. Casing beads, corner beads, edge trim: to ASTM C1047. fill type perforated flanges, one length per location.
3. NOTE: Standard 'U' bead (J-trim) not acceptable.
4. Use 'L' bead that is concealed when taped and filled.
5. Access doors, flush type for drywall surfaces as manufactured by Acudoor model DW-5015, quantity as required for access to mechanical and electrical items.

1.5 ACOUSTIC INSULATION

1. Sound attenuation batts or blankets to ASTM C553 Type 1.

1.6 INSULATING STIP

1. Rubberized, moisture resistant thick foam strip, 3mm thick x 12.7mm wide with adhesive on one face.
2. Use two strips at perimeter of acoustic insulated partitions.

1.7 ACOUSTIC SEALANT

1. Acoustical sealant to CAN/CGSB-19.21-M87.

1.8 JOINT COMPOUND

1. All purpose taping compound to ASTM C475.

1.9 INSTALLATION

1. Install and finish gypsum wallboard in accordance with ASTM C840.
2. Install fibre-reinforced gypsum board where indicated.
3. Install acoustical insulation to maintain continuity of acoustic isolation where indicated for walls and ceilings.

4. Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation. Do not compress insulation to fit into spaces.

5. Apply acoustical sealant in continuous beads at perimeter of penetrations to maintain acoustic isolation.

2.0 COORDINATION

1. Coordinate installation of gypsum board with requirements of all other affected trades to establish openings, additional support and other special provisions required for items built into or partially supported by gypsum board walls.

09 30 13 - CERAMIC AND PORCELAIN TILING

Part 1 General

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

1. Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to install ceramic floor and wall tile, as indicated on the drawings, as specified herein and as required for a complete project.
2. Related Sections:
 - A) Section 03 30 00 - Cast-in-Place Concrete
 - B) Section 07 92 00 - Joint Sealants
 - C) Section 09 21 13 - Gypsum Board Assemblies

1.3 REFERENCES

1. American National Standards Institute (ANSI):
 - A) ANSI A108/A118/A136.1-2013, American National Specification for the Installation of Ceramic Tile.
2. Canadian General Standard Board (CGSB):
 - A) CAN/CGSB-75.1-M88, Tile, Ceramic
 - B) CGSB 71-GP-30-1979, Adhesive, Epoxy and Modified Mortar Systems, for Installation of Quarry Tile.
3. Terrazzo Tile and Marble association of Canada (TTMAC):
 - A) 2012/2014 Specification Guide 09 30 00 Tile Installation Manual.

1.4 SUBMITTALS

1. General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.
2. Samples: Submit duplicate samples of each type of tile, grout and trim proposed for use.
3. Maintenance Data:
 - A) Provide maintenance data for cleaning and maintenance of ceramic and porcelain tile floors and walls for incorporation into manual specified in Section 01 78 23 "Operation Maintenance Manual".
4. Maintenance Material:
 - A) Provide maintenance materials in accordance with Section 01 78 00 "Closeout Submittals".
 - B) Provide two (2) unopened cartons of each type and colour of tile and base required for the project, for maintenance use. Store where directed.
 - C) Maintenance material to be of same production run as installed material.
 - D) Do not use maintenance materials for the correction of deficiencies or remedial work during the warranty period.

1.5 ENVIRONMENTAL CONDITIONS

1. Maintain air temperature and structural base temperature at ceramic tile installation area above 12°C for 48 hours before, during, and 48 hours after, installation.

1.6 WASTE MANAGEMENT AND DISPOSAL

1. Cooperate with the Construction Manager's Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

Part 2 Products

2.1 MANUFACTURERS

1. The surface preparation materials, setting bed, and grout specification is based on products by Mapei Inc.
2. Subject to compliance with the specification requirements, equivalent products by the following manufacturers are acceptable alternatives:
 - A) Laticrete International Inc.
 - B) Alpha-Vico Canada Ltd.
 - C) TEC Inc., H.B. Fuller Company, distributed by Centura.
3. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

2.2 TILE

1. Floor tile: To be selected by the Consultant. Refer to Design Criteria Document - V3
2. Wall tile: To be selected by the Consultant. Refer to Design Criteria Document - V3
3. Neatly Cut and grind edges of tiles as required, at bases and at edges at exposed perimeters of tiling.
4. All cut edges shall be machine-cut and arises (edges) shall be ground and bevelled to match manufactured edges.

2.3 SURFACE PREPARATION MATERIALS

1. Spot patching and build up 13 mm or less: Ultra/Plan self-leveling cementitious underlayment compound.
2. Build-up greater than 13 mm: Planicrete 50 additive with sand/cement mortar.

2.4 SETTING MORTARS AND ADDITIVES

1. Kerabond dry set mortar.
2. Keralastic polymer additive.

2.5 GROUTS AND ADDITIVES

1. Grout: Keracolour/Wall unsanded, or Keracolour/Floor sanded, as applicable.
2. Additive: Plastijoints acrylic grout additive.
3. Colours: Refer to Design Criteria Document - V3.

Part 3 Execution

3.1 PREPARATION

1. Apply tile or backing coats to clean and sound surfaces which are true to line, plumb, level, or uniformly sloping to floor drains, as applicable.

2. Use patching and/or leveling compounds, accordance with manufacturer's instructions, to correct any defects in the substrate.
3. Ensure that floor drains are in place before installation of floor tiles.

3.2 INSTALLATION

1. Install ceramic and porcelain tile in strict accordance with the applicable TTMAC details and the manufacturer's instructions.
2. Fit tile around corners, fitments, fixtures, and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even.
3. Maximum surface tolerance 1:800.
4. Make joints between tile uniform, plumb, straight, true, even and flush with adjacent tile. Ensure sheet layout not visible after installation. Align patterns.
5. Except where otherwise indicated, lay out tiles so perimeter tiles are minimum 1/2 size.
6. Sound tiles after setting and replace hollow-sounding units to obtain full bond.
7. Make internal angels square. Make external angels with rounded bull-nosed profile.
8. Clean installed tile surface after installation and grouting cured.
9. Make control joints where indicated. Install divider strips in accordance with the manufacture's instruction.

3.3 CLEANING

1. Upon completion of the installation remove from the premises all surplus material, dirt and debris caused by the work of this Section and leave the installation clean and ready for the intended use by the Owner.
2. Clean any drippage and spills of surplus material from adjacent surfaces and make good any damage caused by the work of this Section.

09 33 00 - QUARRY TILE

1.1 SCOPE

1. Provide all labour, materials, equipment, and services necessary to install quarry tile bonded to structural slab using thin set bond coat and thin set system grout.

1.2 SAMPLES

1. Submit samples in accordance with the requirements of Section 01340.

1.3 LAYOUT DRAWINGS

1. Submit layout drawings in accordance with the requirements of Section 01340.
2. Indicate tile layout, control joints and other details.

1.4 INSPECTION

1. Examine site conditions under which work is to be performed and substrate surfaces to receive quarry tile.
2. Notify consultant in writing of conditions detrimental to the proper and timely completion of the work.
3. Substrates shall be clean, smooth and level and free of all residue from removed finishes.
4. Commencement of installation signifies acceptance of site and substrate conditions.

1.5 MATERIALS

1. Quarry tile: quarry tile 203mm x 203mm from Centura, colour, size, pattern, texture, etc, to match existing.
2. Thin set bond coat and adhesive: As recommended by manufacturer.
3. Thin set system grout: Portland cement type with additive for water and stain resistance and as recommended by manufacturer.
4. Control joints: Brass or equal.
5. Anti-slip strips: Carborundum inserts.
6. Floor sealer and protective coating; to tile and grout manufacturer's recommendations.

1.6 INSTALLATION

1. Prepare substrate and install quarry tile in accordance with TTMAC Installation Specifications Manual and Detail 200-18.
2. Floor tiles to be thin set on a leveling or topping bed as required (using a latex cement admixture) to produce a finish level equal to adjacent floors.
3. Provide 6mm control joints at 5000mm intervals and around large areas, around columns, changes of direction, changes of material and over structural joints.
4. Form all exposed ends, finished edges and external changes of direction with bullnose and/or special tiles. Set out all tile work square with axis of areas and to produce symmetrical jointing with even cutting at perimeters to match and complete existing tile pattern. Refer also to details.
5. Provide continuous aluminum L-trim at top edge of base. Detail and height to match existing.
6. Apply with adhesives and grouts as recommended by the manufacturer. Colour of grout to match existing.

1.7 PROTECTION

1. Protect finished work until handover.

1.8 MAINTENANCE MATERIALS

1. Provide quarry tile in unopened boxes in minimum quantity equal to 10% of installed tile area for each tile product installed.

09 51 00 - ACOUSTIC PANEL CEILING

1.1 SCOPE

1. Provide all labour materials, equipment and services required to install complete ceiling suspension system and acoustic panels for acoustic ceilings as indicated on drawings and specifications and as necessary for a complete and finished installation.
2. Provide new ceiling grid and panels where indicated.
3. Ceiling grid to be intermediate duty system, in accordance with ASTM C635, composed of commercial quality cold rolled sheet steel, non-fire rated, two directional exposed components.
4. System to be compatible with and match existing.

1.2 CERTIFICATION

1. Provide written certification by the suspension system manufacturer that the suspension system capable of safely supporting, within the specified deflection limits, the weight of all items designed to be supported by the suspension system.
2. Where a fire resistance rating is required by the drawings, provide a complete system bearing the appropriate ULC label. The assembly, as installed, shall be equal in every respect to the ULC tested assembly.

1.3 SAMPLES

1. Submit samples in accordance with Section 01340.

1.4 MOCK-UP

1. Construct mock-up in accordance with Section 01340.
2. Construct mock-up of 10m² minimum of ceiling system, including inside and outside corners.

1.5 MAINTENANCE MATERIALS

1. Provide minimum ten (10) percent of each type of acoustic ceiling panel in unopened containers.

1.6 MATERIALS

1. Suspension system to be standard grid.
2. Ceiling tiles for ground floor to be Armstrong Second Look II, to match existing 610 x 1219 x 19 mm, shadowline tapered (SLT) lay-in, exposed tee grid. Colour white.

1.7 HANGERS

1. Sized and spaced to support complete ceiling assembly, including but not limited to light fixtures, diffusers, grilles and similar items with a maximum deflection of 1/360 span to ASTM C635 deflection test.
2. Supply hanger inserts as necessary.

1.8 ACCESSORIES

1. Splices, clips, wire ties, retainers and reveal type wall mouldings, to complement the suspension system components, as recommended by the system manufacturer.

1.9 INSTALLATION

1. Existing ceiling grid and tiles to be cleaned and painted where indicated on the drawings.

2. Install ceiling suspension system in accordance with ASTM C636 and manufacturer's printed instructions.
3. Coordinate ceiling work to accommodate components of other sections such as light fixtures, diffusers, speakers, sprinkler heads.
4. Provide additional support for light fixtures and mechanical items. Where additional supports are not installed on the electrical fixtures in a suspended ceiling system, provide an acceptable written confirmation stating that the suspended ceiling system provides adequate support for the electrical fixtures, as required by the current bulletin of the Electrical Inspection Department of Ontario Hydro.
5. Install ceiling panels in suspension system.

09 51 13 - SUSPENDED ACOUSTICAL TILE CEILINGS

Part 1 General

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

1. Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to fabricate and install suspended acoustical panel ceilings, including suspension grids and lay-in acoustical ceiling panels, as indicated on the drawings, as specified herein and as required for a complete project.
2. Related Sections:
 - A) Section 09 21 16 - Gypsum Board Assemblies
 - B) Division 23 - Heating, Ventilating and Air Conditioning (HVAC)
 - C) Division 26 - Electrical

1.3 REFERENCES

1. American Society for Testing and Materials (ASTM)
 - A) ASTM A642/A641M-09a(2014), Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - B) ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
 - C) ASTM C423-09a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - D) ASTM C635/C635M-13a, Standard Specification for the Manufacturer, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
 - E) ASTM C636/C636M-13, Standard Practice for Installation of Metal Ceiling Suspension System for Acoustical Tile and Lay-In Panels.
 - F) ASTM E1264-14, Standard Classification for Acoustical Ceiling Products.

1.4 QUALIFICATIONS

1. The work of this Section shall be fabricated by a manufacturer with minimum five (5) years experience in the actual production of the specified products.

1.5 DESIGN CRITERIA

1. The suspension system to be capable of safely supporting the weight of all items which are designed to be supported by it, including, but not limited to:
 - A) Light fixtures
 - B) Diffusers
 - C) Other items supported by the ceiling system.
2. Be advised that light fixtures will not be provided with separate support.
3. Design the suspension system to withstand normal and seismic loads.
4. Size attachment components for five times the design load indicated in ASTM C635, Table 1, direct hung except where otherwise indicated.
5. Size hanger wire for three times the design load indicated in ASTM C635, Table 1.
6. Maximum deflection: 1/360 of span to ASTM C635 deflection test.

7. Design the suspension system to provide lateral support to the tops of partitions which are attached to it.

1.6 SUBMITTALS

1. General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.
2. Samples: Submit a sample of each type of acoustical unit.
3. Shop Drawings:
 - A) Show complete details of the suspension system.
 - B) The suspension system, including all related connections and fastenings, shall be designed by a structural engineer permanently licensed to practice in the Province of Ontario. Each shop drawing submitted shall bear the stamp and signature of the aforesaid structural engineer.
4. Post-Installation Certification: After installation, provide written certification, signed by the Structural Engineer responsible for the shop drawings, that all items have been installed in accordance with the shop drawings.
5. Maintenance Materials.
 - A) Provide 1 unopened carton of ceiling panels.
 - B) Deliver to site and store where directed.
 - C) Maintenance materials to be of the same production run as the installed materials.
 - D) Do not use maintenance materials for the correction of deficiencies or remedial work during the warranty period.

1.7 ENVIRONMENTAL CONDITIONS

1. Commence installation only after the building is enclosed, sufficient heat is provided and dust generating activities have terminated.
2. Permit wet work to dry before commencement of installation.
3. Maintain a uniform minimum temperature at 15°C and a relative humidity of 20%-40% before and during installation.
4. Store materials in the work area for not less than 48 hours prior to installation.

1.8 WASTE MANAGEMENT AND DISPOSAL

1. Cooperate with the Construction Manager's Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

Part 2 - Products

2.1 MANUFACTURERS

1. This Specification is based on suspension system and ceiling panels as manufactured by CGC Interiors.
2. Equivalent products by Armstrong World Industries Canada Limited are acceptable alternatives.
3. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

2.2 SUSPENSION SYSTEM

1. To ASTM C365, exposed tee system, as follows:

- A) Material: Double web electrogalvanized sheet steel.
 - B) Face dimension: 24 mm
 - C) Surface finish: Baked polyester paint, colour white.
 - D) Grid dimensions: To suit panel size.
 - E) Standard of Acceptance: Donn DX
2. Provide all accessories, including matching hemmed angle wall mouldings, #9 galvanized soft annealed steel hanger wire and suspension system accessories as required for a complete installation.

2.3 ACOUSTICAL CEILING PANELS

1. Type 1: To ASTM E1264, Type 2, Form 2, Pattern CD, characteristics as follows:
- A) Colour: White
 - B) Size: 609 mm x 1219 mm x 16 mm.
 - C) Edge detail: Square lay-in.
 - D) Fire performance: Class A, flame spread 25 or under (UL labeled).
 - E) NRC: 55
 - F) CAC: 35
 - G) Light reflectance: 0.82
 - H) Standard of Acceptance: CGC Fissured.
2. Type 2: To ASTM E1264, Type 2, Form 2, Pattern CD, characteristics as follows:
- A) Colour: White
 - B) Size: 609 mm x 609 mm x 16 mm
 - C) Edge detail: Bevelled tegular.
 - D) Fire performance: Class A, flame spread 25 or under (UL labeled).
 - E) NRC: 55
 - F) CAC: 33
 - G) Light reflectance: 0.82
 - H) Standard of Acceptance: CGC Fissured

2.4 ACCESSORY MATERIALS

1. Suspension system accessories: splices, clips, wire ties, retainers and wall moulding to complement the suspension system components, as recommended by the system manufacturer.
2. Hanger wire: Galvanized soft annealed steel wire to ASTM A641, Class 1, 2.6 mm diameter, prestretched.
3. Hanger inserts: purpose made.
4. Retention clips: Armstrong Product No. 414, purpose made clips to secure tile to suspension system.
5. Touch-up paint: type and colour to match acoustical units, as provided by the acoustical unit manufacturer.

Part 3 Execution

3.1 INSTALLATION: SUSPENSION SYSTEM

1. Install ceiling suspension system to ASTM C636 and in accordance with the manufacturer's printed instructions.
2. Furnish hanger clips and inserts for installation by the applicable other Sections, with instructions for their correct placement.
3. Secure hangers to the overhead structure using attachment methods acceptable to the Consultant.

4. Except where otherwise indicated, lay out the grid symmetrically with border widths not less than 50% of standard unit widths.
5. Coordinate the ceiling system with related components.
6. Hang the suspension system independently of walls, column, ducts, pipes and conduit. Provide additional hangers and carrying channels as necessary.
7. Provide additional hangers and framing as necessary to carry the weight of all the items which are designed to be supported by the suspension system.
8. Frame at openings for light fixtures, air diffusers, speakers, and at changes in ceiling height.
9. Provide additional hangers at light fixtures, air diffusers, speakers, and other ceiling-supported items within 150 mm of each corner and at maximum 600 mm o.c. around the perimeter of the fixture.
10. Attach cross members to main runners to provide a rigid assembly.
11. Install wall trim to provide correct ceiling height. Install wall trim or suitable edge moulding to match existing at the interface between the acoustic tile ceiling and other materials, for the entire length of the joint. Secure to construction. Butt joints tightly, neatly, square, and in true alignment.
12. Arrange recessed items to replace or be centred on a panel unless indicated otherwise.
13. Finished ceiling system to be square with adjoining walls and level within: 1:1000

3.2 INSTALLATION: PANELS

1. Install acoustical panels in the ceiling suspension system, in accordance with the manufacturer's instructions.
2. Fit acoustical panels in place, free from damaged edges or other defects detrimental to appearance or function.
3. Install acoustic panels level, in uniform plane and free from twist, warp, dents, damaged edges or other defects detrimental to appearance or function.
4. Cut panels to fit irregular grids and perimeter edge trim.
5. Install retention clips within 6 m of exterior doors.

09 66 00 - RESILIENT FLOORING

1.1 SCOPE

1. Provide all labour, material, equipment, and services necessary to complete all resilient flooring and bases as shown on the drawings and as specified herein.

1.2 INSPECTION

1. Examine site conditions under which work is to be performed and substrate surfaces to receive quarry tile.
2. Notify Consultant in writing of conditions detrimental to the proper and timely completion of the work.
3. Substrates shall be clean, smooth, and level.
4. Commencement of installation signifies acceptance of site and substrate conditions.

1.3 PRODUCT INFORMATION

1. Submit product literature and manufacturer's installation instructions for each material specified.

1.4 SAMPLES

1. Submit samples in accordance with the requirements of Section 01340.

1.5 MAINTENANCE MATERIALS

1. Provide minimum ten (10) percent of each type of resilient floor covering in unopened containers and full length pieces of resilient baseboard material.

1.6 MATERIALS

1. Vinyl Composite Tile:
 - A) Conform to ASTM F1066, size 300 x 300 x 3 mm, Armstrong, Excelon, Imperial texture, colour to Consultant's approval.
2. Vinyl Base:
 - A) Johnsonite base conforming to CSA:A126.5, 100 mm high x 3 mm thick, standard toe profile, c/w premanufactured outside corners. Colour to be taken from manufacturer's standard complete colour range, to Consultant's approval.
3. Metal Edge Strips:
 - A) Aluminum extrudee, smooth, mill finish with tip to extend under floor finish, shoulder flush with top of adjacent floor finish. Colour to Consultant's approval.
4. Transition strips as required and where indicated, fabricated of solid metal. Colour to Consultant's approval.
5. Sealer and wax type recommended by flooring manufacturer.

1.7 INSTALLATION

1. Prepare concrete floor to receive VCT in accordance with ASTM F710.
2. Install VCT and vinyl base at all locations indicated.
3. Installation to be in accordance with manufacturer's printed instructions and National Floor Covering Association Guide Study and Specification for Resilient Floor Covering.
4. At time of final cleaning, apply one coat of an approved wax using a mechanical buffer.

09 68 16 - CARPETING

Part 1 General

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

1. Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to supply and install carpet tiling, as indicated on the drawings, as specified herein and as required for a complete project.
2. Related Sections:
 - A) Section 03 30 00 - Cast-in-Place Concrete

1.3 REFERENCES

1. American Association of Textile Chemists and Colorists (AATCC)
 - A) AATCC 23-2015, Colourfastness to Burnt Gas Fumes
 - B) AATCC 129-2016, Colourfastness to Ozone in the Atmosphere under High Humidities
 - C) AATCC 134-2016, Electrostatic Propensity of Carpets
 - D) AATCC 175-2013, Stain Resistance: Pile Floor Coverings.
 - E) AATCC 189-2012, Fluorine Content of Carpet Fibers.
2. American Society for Testing and Materials (ASTM):
 - A) ASTM D1335-17, Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings
 - B) ASTM D3936-17, Standard Test Method for Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering.
 - C) ASTM E662-17, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - D) ASTM F1861-16, Standard Specification for Resilient Wall Base.
3. Canadian General Standards Board (CGSB):
 - A) CAN/CGSB 4.2-M2003, Textile Test Methods:
 - I) No.18.3-97/ISO 105-B02:1994(2010), Textile Test Methods - Textiles - Test for Colourfastness - Part B02: Colourfastness to Artificial Light: Xenon Arc Fading Lamp Test.
 - II) No. 27.6-2015, Flame Resistance - Methemine Tablet Test for Textile Floor Coverings.
 - III) No.77.1-94/ISO 4919-1978, Carpets - Determination of Tuft Withdrawal Force.
 - B) CAN/CGSB-4.129-93, Carpets for Commercial Use.
4. Carpet and Rug Institute (CRI) and Canadian Carpet Institute (CCI):
 - A) CRI Carpet Installation Standard 2011.
 - B) CRI Green Label Indoor Air Quality Testing Program.
5. Health Canada/Workplace Hazardous Materials Information System (WHMIS):
 - A) Material Safety Data Sheets (MSDS)
6. State of California South Coast Air Quality Management District (SCAQMD):
 - A) SCAQMD Rule 1168-2005, Adhesive and Sealant Applications
7. Underwriters' Laboratories of Canada (ULC):
 - A) CAN/ULC-S102.2-10, Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

1.4 SUBMITTALS

1. General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.
2. Product Data:
 - A) Submit manufacturer's instructions, printed product literature and data sheets for each carpet tile, adhesive, carpet protection, sub-floor patching compound.
 - B) Include product characteristics, performance criteria, physical size, finish and limitations
 - C) For adhesives, indicate VOC in g/L during application and curing.
 - D) Include manufacturer's installation and storage instructions.
 - E) Include manufacturer's material safety data sheets for the safe handling of the specified materials and products, in accordance with Workplace Hazardous Materials Information Services (WHMIS) requirements.

1.4 SUBMITTALS

1. General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.
2. Product Data:
 - A) Submit manufacturer's instructions, printed product literature and data sheets for each carpet tile, adhesive, carpet protection, sub-floor patching compound.
 - B) Include product characteristics, performance criteria, physical size, finish and limitations.
 - C) For adhesives, indicate VOC in g/L during application and curing.
 - D) Include manufacturer's installation and storage instructions.
 - E) Include manufacturer's material safety data sheets for the safe handling of the specified materials and products, in accordance with Workplace Hazardous Materials Information Service (WHMIS) requirements.
3. Shop Drawings: Indicate:
 - A) Nap: direction, open edges, special patterns
 - B) Cut-outs: show locations where cut-outs are required.
 - C) Edgings: show location of edge moulding and edge bindings
4. Samples:
 - A) Submit duplicate samples of each type and colour of carpet tile specified.
5. Certificates: submit product certificates, signed by the manufacturer, certifying materials comply with specified performance criteria and physical characteristics.
6. Test and Evaluation Reports:
 - A) Submit certified test reports showing compliance with specified performance criteria and physical properties.
7. Maintenance Materials:
 - A) Deliver a quantity equal to 5% of the installed quantity of each type and colour of carpet tile, for maintenance use.
 - B) Deliver to site in containers identified as to content and store where directed.
 - C) Maintenance materials shall be of the same production run as installed materials.
 - D) Do not use maintenance materials for the correction of deficiencies or remedial work during the warranty period.

1.5 QUALITY ASSURANCE

1. Manufacturer Qualifications: The carpet tiles shall be fabricated by a manufacturer with minimum five years experience in the actual production of the specified products.
2. Installer Qualifications:
 - A) Employ only skilled trade-persons who are experienced in this work.

B) If requested by the Consultant, provide evidence of previously completed projects of a similar nature.

1.6 DELIVERY, STORAGE AND HANDLING

1. Deliver, store and handle materials in accordance with manufacturer's written instructions.
2. Deliver materials to site in original factory packaging, labeled with manufacturer's name and address.
3. Storage and Handling Requirements.
 - A) Store materials indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated areas.
 - B) Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - C) Store and protect carpet tile and adhesive in original containers or wrapping with manufacturer's seals and labels intact.
 - D) Store carpet and adhesive at minimum temperature of 18 degrees C and relative humidity of maximum 65% for minimum of 48 hours before installation.
 - E) Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.
 - F) Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.
 - G) Replace defective or damaged materials with new.

1.7 SITE CONDITIONS

1. Ambient Conditions:
 - A) Install carpet after the space is enclosed and weatherproof, wet-work is completed and nominally dry, and work above ceilings is complete.
 - B) Ensure substrate is within moisture limits and alkalinity limits recommended by the manufacturer. Conduct test and provide reports to the Consultant.
 - C) Maintain an ambient temperature of not less than 18°C from 48 hours before, during, and at least 48 hours after installation.
 - D) Maintain relative humidity between 1-% and 65% from 48 hours before, during, and at least 48 hours after installation.
 - E) Provide continuous ventilation during and after carpet application.
 - I) Run ventilation system 24 hours per day during installation.
 - II) Provide continuous ventilation for 7 days after completion of carpet installation.
2. Do not install flooring until moisture tests and pH tests have been performed and conditions meet the manufacturer's recommendations.
 - A) Test minimum every 100 m².
 - B) Provide test results in writing to the Consultant and the carpet tile manufacturer.
 - C) Notify the Consultant immediately if any test results reveal conditions that are not complaint with the manufacturer's recommendations.
3. Avoid static loads, rolling loads, and heavy foot traffic until adhesive has thoroughly set.

1.8 WASTE MANAGEMENT AND DISPOSAL

1. Cooperate with the Construction Manager's Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

1.9 WARRANTY

1. For the work of this Section, the 12-months warranty period prescribed in the General Conditions of the Contract is extended to 5 years.
2. In addition to the 5-year warranty, provide a manufacturer's standard warranty document executed by authorized company official. The manufacturer's warranty is in addition to and does not limit other rights Owner may have under the Contract Documents.

Part 2 Products

2.1 MANUFACTURER

1. This specification is based on the specified products.
2. Requests for substitutions will be considered in accordance with the provisions of Section 01 25 00 "Substitutions Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

2.2 CARPET

1. Standard of acceptance: Refer to Design Criteria Document - V3

2.3 ACCESSORIES

1. Resilient base: to ASTM F1816, Type TP - Rubber, continuous, top set, complete with premoulded end stops and external corners. Provide standard cove profile.
 - A) Thickness: 3.2 mm
 - B) Height: 102 mm
 - C) Lengths: cut lengths minimum 2400 mm
 - D) Prefabricated Corners: Inside and outside corners at 102 mm height with 76 mm returns.
 - E) Colour(s): to be selected by the Consultant.
2. Adhesives: As recommended by manufacturer. VOC limit 50 g/L maximum to SCAQMD Rule 1168.
3. Primer: in accordance with manufacturer's recommendations for surface conditions
4. Metal Edge Strips:
 - 1) Floor flange minimum 38 mm wide, face minimum 16 mm wide.
 - 2) Finish: clear anodic coating.

Part 3 Execution

3.1 EXAMINATION

1. Examine areas and conditions under which work is to be performed and notify the Consultant in writing of conditions detrimental to the proper and timely completion of the work.
2. Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.
3. Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.
4. Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Contractor shall be fully responsible for satisfactory work as specified herein.

3.2 EXAMINATION

1. Examine areas and conditions under which work is to be performed and notify the Consultant in writing of conditions detrimental to the proper and timely completion of the work.

2. Verify the conditions of substrates are acceptable for carpet tile installation in accordance with the manufacturer's written instructions.
3. Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.
4. Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Contractor shall be fully responsible for satisfactory work as specified herein.

3.3 PREPARATION

1. Sub-floor Preparation:

- A) Inspect the concrete substrate and determine measure to be taken to make it suitable to receive the carpet tiling.
- B) Fill and level cracks 3 mm wide or protrusions over 0.8 mm with appropriate and compatible latex patching compound.
- C) Comply with manufacturer's written recommendations for maximum patch thickness.
- D) Prime large patch areas with a compatible primer.
- E) Ensure concrete substrates are cured, clean and dry.
- F) Ensure concrete substrates are free of paint, dirt, grease, oil, curing or parting agents, and other contaminants, including sealers, that interfere with the bonding of adhesive.
- G) Where powdery or porous concrete surface is encountered, apply primer compatible with the adhesive to provide a suitable surface for glue-down installation.

2. Surface Preparation: prepare surface in accordance with manufacturer's written recommendations and the CRI Carpet Installation Standard.

3. Tile Carpeting Preparation: Precondition the carpeting following the manufacturer's written instructions.

4. Resilient Base Preparation: All surfaces must be sound, free from moisture, alkali, old adhesive, dust, dirt, wax, oil, grease, loose paint or plaster, nonporous wall coverings or paints and other extraneous coatings or materials that could prevent a successful bond. Follow the manufacturer's recommendations for patching materials if required.

3.4 INSTALLATION

1. Install carpet in accordance with the manufacturer's written instructions, and the CRI Carpet Installation Standard.

2. Coordinate tile carpeting work with the work of other trades, for proper time and sequence to avoid construction delays.

3. Use material from the same dye lot. Ensure colour, pattern and texture match within visual areas.

4. Apply a thin film of pressure-sensitive adhesive according to the manufacturer's recommendations.

5. Maintain constant pile direction.

6. Make joints snug and consistent in accordance with the manufacturer's specifications. Do not trap yarn adjacent carpet edges.

7. Fit around furniture fitments, around penetrations, around perimeter of rooms into recesses, and around projections.

8. Extend carpet tiles into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

9. Protect exposed carpet tile edges at transitions to other flooring materials with suitable transition strips.

10. Finished installation to present a smooth wearing surface, free from conspicuous seams, bubbles, puckers, burring and other defects.

3.5 BASE INSTALLATION

1. Lay out base to keep number of joints at minimum.
2. Set base in adhesive tightly by using 3 kg hand roller, against wall and floor surfaces.
3. Install straight and level to variation of 1:1000
4. Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.
5. Cope internal corners. Use premoulded corner units for right angel external corners. Use formed straight base materials for external corners of other than right angle.
6. Include finished rubber bases to all cabinetwork in rooms where a rubber base is specified.

3.6 CLEANING

1. Leave the work area clean at end of each day.
2. Upon completion of the installation, remove from the premises all surplus material, dirt and debris caused by the work of this section and leave the installation clean.
3. Vacuum carpets clean immediately after completion of installation.
4. Clean any drippage and spills of surplus adhesive from adjacent surfaces.
5. Make good any damage caused by the work of this Section.

3.7 PROTECTION

1. Protect installed products and components from damage during construction.
2. Prohibit traffic on the carpet for a minimum period of 24 hours after installation and until adhesive is cured.
3. Install carpet protection to the satisfaction of the Consultant.

09 90 00 - PAINTING

1.1 SCOPE

1. Provide all labour, materials, equipment, and services required to execute all painting work, as indicated on the drawings, as specified and as reasonably infer-able from the Contract Documents.

1.2 REFERENCE STANDARDS

1. Perform painting work in accordance with CAN/CGSB-85.100-M81 Painting and CGSB 85-GP-33M Standard for Painting Interior Plaster and Wallboard.

1.3 INSPECTION

1. Examine site conditions under which work is to be performed and substrate surfaces to receive paint finish.
2. Notify consultant in writing of conditions detrimental to the proper and timely completion of the work.
3. Substrates shall be clean, smooth, and free of defects which might prevent satisfactory application signifies acceptance of site conditions and substrate conditions.
4. Commencement of installation signifies acceptance of site conditions and substrate conditions.

1.4 SAMPLES

1. Submit duplicate 300 x 200 mm sample panels of each paint type and colour specified in accordance with Section 01340.
2. use 10 mm birch plywood for wood finishes.
3. 10 mm wallboard for paint finishes over smooth surfaces.
4. 50 mm concrete block for concrete masonry.

1.5 ENVIRONMENTAL REQUIREMENTS

1. Maintain temperature in building at 18 deg. C or above during drying of plaster and drywall joint compound, and provide adequate ventilation for escape of moisture from building.
2. Once painting has commenced, provide constant temperature of 18 deg. C or above.
3. Maintain surface temperature at 2 deg. C above the dew point temperature while preparing the surface and painting, and percent variations in temperature which might result in condensation on freshly painted surfaces.
4. Do not apply paint finish in areas where dust is being generated.

1.6 MATERIALS

1. All paint to be Benjamin Moore. Remove all non-conforming paint products from site.
2. Walls: semi-gloss acrylic latex or semi-gloss alkyd enamel as indicated.
3. Accent: Semi-gloss acrylic latex
4. Door/frames: Alkyd semi-gloss enamel.
5. Colours: Refer to drawings and schedules.
6. Paint materials for each coating to be the products of a specified manufacturer. Benjamin Moore.
7. All painting materials shall bear identifying labels on the containers with the manufacturer's instructions printed thereon.
8. Paint shall arrive on the job colour-mixed except for tinting of undercoats and thinning.
9. All thinning and tinting materials shall be as recommended by the manufacturer for the particular material thinned or tinted.

1.7 PROTECTION OF ADJACENT WORK

1. Protect work at all times, and protect all adjacent work and materials by suitable covering of other method during progress of this work.
2. Remove and protect hardware, accessories, device plates, lighting fixtures, factory finished work, and similar items, or provide ample in-place protection.
3. Upon completion of each space, carefully replace all removed items.
4. Remove electrical panel box covers and doors before painting walls. Paint separately and reinstall after all paint is dry.

1.8 PREPARATION OF NEW SURFACES

1. Ensure that surfaces are clean, dry and adequately protected from dampness.
2. Ensure that surfaces are free of any foreign materials which will adversely affect adhesion or appearance of applied coating.
3. Remove mildew or extractive bleeding and neutralize the surface.
4. Remove efflorescence and neutralize the surface.

1.9 APPLICATION

1. Application may be by brush, roller or spray, subject to approval by Consultant.
2. Coverage and hiding of substrate shall be complete.
3. When colour, stain, dirt or undercoats show through final coat of paint, cover the surface by additional coats until the paint film is of uniform finish, colour, appearance and coverage acceptable to Consultant, at no additional cost to the Owner.
4. Ensure that each coat is dry to manufacturer's recommendations before applying succeeding coats.
5. Touch up all suction sports of "hot spots" in plaster and/or cement, after the application of the first coat, before the application of the second coat.
6. Sand and dust between each coat to remove defects visible from distances up to 1.5m.
7. Finish tops of cabinets and projecting ledges, both above and below sight lines as specified for surrounding surfaces.
8. Finish closets and alcoves as specified for adjoining rooms. Finish edges the same as faces.
9. Seal tops and bottoms of interior doors with the sealer only. Finish side edges of interior doors as specified for faces of these doors.
10. Interior building surfaces shall be painted unless noted otherwise.
11. Where existing surfaces, damaged or disturbed by the Work, are repainted, paint the entire surface to the nearest change of plane in each direction. Spot touch-up will not be accepted.

2.0 MECHANICAL EQUIPMENT

1. Keep sprinkler heads free of paint.
2. Paint inside of duct-work where visible with primer and one coat of matte black paint.
3. Paint disconnect switches for fire alarm system and exit light systems in red enamel.
4. Paint both sides and edges of plywood backboards for equipment before installation.
5. Leave equipment in or final finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
6. Paint primary marking bands for identification of pipes and ducts as specified in Division 15.

2.1 INTERIOR SCHEDULE

1. Stained wood doors:
 - A) 1 coat interior wood stain and 2 coats clear glat poly-urethane stain to match Waworth furniture colour and finish.

- B) Provide sample of stain and finish for Consultant approval.
- 2. Painted wood doors, frames and cabinets:
 - A) 1 coat oil based primer and 2 coats alkyd semi-gloss
- 3. Plaster, plaster board walls ceilings and bulkheads:
 - A) 1 coat latex PVA primer and 2 coats semi-gloss acrylic-latex
- 4. Metal cabinets, panels, frames, grilles, exposed pipes, and exposed structural steel:
 - a) 1 coat alkyd metal primer and 2 coats alkyd semi-gloss.
- 5. Primed ferrous metal surfaces (for primed ferrous metal surfaces apply):
 - a) 1 coat spot priming CGSB 1-GP-40M
 - b) 1 coat enamel undercoat CGSB 1-GP-38M
 - c) 2 coats semi-gloss enamel CGSB 1-GP-57M
- 6. Galvanized and zinc coated metal (for galvanized and zinc coated metal apply):
 - a) 1 coat vinyl wash primer CGSB 1-GP-121M
 - b) 1 coat enamel undercoat CGSB 1-GP-38M
 - c) 2 coats semi-gloss enamel CGSB 1-GP-57M
- 7. Concrete floors:
 - a) 1 coat enamel CGSB 1-GP-66M reduced by addition of 1 part CGSB 1-GP-70M thinner to eight parts of enamel.
 - b) 1 coat enamel CGSB 1-GP-66M

2.2 EXTERIOR SCHEDULE

- 1. Steel Handrails, Guardrails (for existing steel handrails apply):
 - a) 2 coats acrylic epoxy gloss coating, clear by Benjamin Moore & Co. To fully sandblasted, cleaned and properly prepared surfaces.
- 2. Primed ferrous metal surfaces apply:
 - a) 1 coat spot priming 1-GP-40M
 - b) 1 coat lead primer 1-GP-140M
 - c) 2 coats exterior enamel 1-GP-59M
- 3. Galvanized and zinc coated metal apply:
 - a) 1 coat vinyl wash primer 1-GP-121M
 - b) 1 coat steel primer 1-GP-40M
 - c) 2 coats exterior enamel 1-GP-59M

Part 1 General

1.1 RELATED DOCUMENTS

- .1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

- .1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to execute interior and exterior painting work, as indicated on the drawings, as specified herein and as required for a complete project.
- .2 Related Sections:
 - .1 Section 05 50 00 - Metal Fabrications
 - .2 Section 08 11 13 - Steel Doors and Frames
 - .3 Section 08 14 16 - Flush Wood Doors
 - .4 Section 09 21 16 - Gypsum Board Assemblies.

1.3 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .2 Master Painters Institute (MPI):
 - .1 MPI Architectural Specification Manual, 2014 (referred to herein as "MPI Manual")
 - .2 MPI Approved Product List, (referred to herein as "MPI APL").

1.4 SUBMITTALS

- .1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.
- .2 Product Data:
 - .1 Submit product data and instructions for each paint and coating product to be used.
 - .2 Submit product data for the use and application of paint thinner.
 - .3 Submit 2 copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) Indicate VOCs during application and curing.
 - .4 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .5 Submit manufacturer's application instructions.

1.5 STORAGE AND HANDLING

- .1 Storage and Protection:
 - .1 Provide and maintain dry, temperature controlled, secure storage.
 - .2 Store materials and supplies away from heat generating devices.
 - .3 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.

- .2 Fire Safety Requirements:
 - .1 Provide one 9 kg dry chemical fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.6 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
 - .1 Ventilate enclosed spaces.
 - .2 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.
 - .2 Test concrete, masonry and plaster surfaces for alkalinity as required.
 - .3 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.
- .3 Airborne Dust: Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

Part 2 Products

2.1 MATERIALS

- .1 Only paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
- .2 Provide paint materials for each paint system from a single manufacturer.
- .3 Conform to latest MPI requirements for all painting work including preparation and priming.
- .4 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Manual and APL.
- .5 Provide paint products meeting MPI "Environmentally Friendly" E2 rating or better, based on VOC (EPA Method 24) content levels. Where the APL lists products with E3 rating, select products from among those which have the E3 rating.

2.2 COLOURS

- .1 The Consultant provide a colour schedule after award of Contract.

- .2 Colour schedule will be based upon selection of three base colours and five accent colours.

2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written instructions. Obtain written approval from the Consultant for tinting of painting materials.
- .2 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.
- .3 Thin paint for spraying in accordance with paint manufacturer's instructions.
- .4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

- .1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

Gloss Level	Description	Gloss @ 60°	Gloss @ 85°
1	Matte or flat finish	max. 5	max. 10
2	Velvet-like finish	max. 10	10 to 35
3	Eggshell finish	10 to 25	10 to 35
4	Satin-like finish	20 to 35	min. 35
5	Traditional semi-gloss finish	35 to 70	
6	Traditional gloss finish	70 to 85	
7	High-gloss finish	> 85	

- .2 Gloss level ratings of painted surfaces as specified herein.

2.5 EXTERIOR PAINTING

- .1 Paint exterior surfaces in accordance with the following MPI Architectural Specification Manual requirements, premium Grade throughout.
- .2 For steel surfaces to receive paint finish, apply EXT 5.1D: Alkyd, G5 finish, Premium grade.
- .3 For galvanized metal surfaces (not chromate passivated) to receive paint finish, apply EXT 5.3B: Alkyd, G5 finish, Premium grade.
- .4 For dimension lumber to receive stain finish, apply EXT 6.2B: Waterborne solid colour stain finish, Premium grade.
- .5 For dressed lumber to receive paint finish, apply EXT 6.3A: Latex, G5 finish, Premium grade.

2.6 INTERIOR PAINTING

- .1 Paint interior surfaces in accordance with the following MPI Architectural Specification Manual requirements, premium Grade throughout.
- .2 For concrete vertical surfaces to receive paint finish, apply INT 3.1C: High performance architectural latex, G4 finish.
- .3 For concrete floor surfaces to receive epoxy finish, apply INT 3.2C: Epoxy.
- .4 For concrete masonry surfaces to receive paint finish, apply INT 4.2D: High performance architectural latex, G4 finish.
- .5 For wood surfaces to receive paint finish, apply INT 6.3A: High performance architectural latex, G5 finish.
- .6 For wood surfaces to receive stain finish, apply INT 6.3E: Semi-Transparent Stain, polyurethane varnish, G4 finish.
- .7 For wood surfaces to receive clear finish, apply INT 6.2H: Clear polyurethane varnish, G4 finish.
- .8 For plaster and wallboard surfaces, to receive latex paint finish, apply INT 9.2B: High performance architectural latex, gloss level as follows:
 - .1 Ceilings: G2
 - .2 Walls: G4
- .9 For miscellaneous steel (factory primed), apply INT 5.1E: Alkyd G5 finish.
- .10 For zinc-coated steel, apply INT 5.3C: Alkyd G5 finish over cementitious primer.

Part 3 Execution

3.1 GENERAL

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

3.2 EXAMINATION

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to the Construction Manager damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture

meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

3.3 PREPARATION

- .1 Protection:
 - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by the Consultant.
 - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
 - .3 Protect factory finished products and equipment.
- .2 Surface Preparation:
 - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
 - .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
 - .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of the Construction Manager.
- .3 Clean and prepare surfaces in accordance with MPI Manual specific requirements and coating manufacturer's recommendations.
- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
 - .2 Apply wood filler to nail holes and cracks.
 - .3 Tint filler to match stains for stained woodwork.
- .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.
- .8 Touch up of shop primers with primer as specified.
- .9 Do not apply paint until prepared surfaces have been accepted by the Consultant.

3.4 APPLICATION

- .1 Method of application to be as approved by the Construction Manager. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .3 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by the manufacturer.
- .4 Sand and dust between coats to remove visible defects.
- .5 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .6 Finish inside of cupboards and cabinets as specified for outside surfaces.
- .7 Finish closets and alcoves as specified for adjoining rooms.
- .8 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.5 MECHANICAL/ELECTRICAL EQUIPMENT

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

END OF SECTION

10 42 60 - ILLUMINATED SIGNS

1.1 SHOP DRAWINGS

1. Submit shop drawings in accordance with Section 01000.
2. Clearly indicate materials and large scale details, dimensions and electrical requirements.

1.2 MATERIALS

1. Sign Box to be manufactured by Signalex Inc., Type 'Signpro' single sided illuminated Sign Section or equal. Sign Section to be CSA approved. Box to be 8" deep, constructed of prefinished aluminum sections c/w hinged aluminum face frame. Backlit by H/O Fluorescent tube textures. All details and colours to match existing sign boxes. Provide all ballasts, lamps, raceways, etc. As required for a complete installation. Provide rigid 1/4" acrylic face, design and application of back sprayed, 2 colour graphics to Owner's approval.
2. Co-ordinate installation with Metal Siding installation and Electrical Contractor, Division 16.

10 65 00 - OPERABLE PARTITIONS

1. General

1.1 SECTION INCLUDES

- 1.1.1 Operable panel partitions.

1.2 RELATED SECTIONS

- 1.2.1 Section 03300 - Cast-in-Place Concrete: Partition support members.
- 1.2.2 Section 05120 - Structural Steel: Partition support members.
- 1.2.3 Section 06100 - Rough Carpentry: Partition support members.
- 1.2.4 Section 08710 - Door Hardware: Cylinder locks keyed to building keying system.
- 1.2.5 Section 09260 - Gypsum Board Assemblies: Acoustical closure above suspended ceilings.
- 1.2.6 Section 16150 - Equipment Wiring: Electrical power supply to operators.

1.3 REFERENCES

- 1.3.1 ASTM C 423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- 1.3.2 ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- 1.3.3 ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- 1.3.4 ASTM E 413 - Classification for Rating Sound Insulation.
- 1.3.5 ASTM E 557 - Standard Practice for The Installation of Operable Partitions.
- 1.3.6 FS CCC-W-408 - Wall Covering, Vinyl-Coated; Revision D.

1.4 SUBMITTALS

- 1.4.1 Submit under provisions of Section 01300.
- 1.4.2 [Product Data]: Manufacturer's data sheets on each product to be used, including:
 - 1.4.2.1 Preparation instructions and recommendations.
 - 1.4.2.2 Storage and handling requirements and recommendations.
 - 1.4.2.3 Installation instructions.
- 1.4.3 Shop Drawings: Show layout, elevations, supports and anchorage, conditions at jambs and intersections with permanent walls, hardware, joints, and connections.
 - 1.4.3.1 Operators: Show location of operator, controls, and wiring diagrams.
- 1.4.4 Selection Samples: For each partition finish specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- 1.4.5 Verification Samples: For each partition finish specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- 1.4.6 Test Reports: Certified test reports showing compliance with specified performance criteria.
- 1.4.7 Certification: Signed by manufacturer certifying that products installed comply with Contract

Documents.

- 1.4.8 Operation and Maintenance Data: Include methods of operating, troubleshooting, and maintaining the specific partitions installed, with recommended methods of cleaning, especially finishes.

1.5 QUALITY ASSURANCE

- 1.5.1 Field Measurements: Verify actual measurements of openings by field measurement prior to fabrication; show measurements on shop drawings.
- 1.5.2 STC Ratings: Calculate STC in accordance with ASTM E 413 based on ASTM E 90 test on fully assembled partition of minimum size indicated:
 - 1.5.2.1 Operable Panel Partitions: 168 inches (4267 mm) high by 111 inches (2819 mm) wide.
- 1.5.3 NRC Ratings: Substantiate by tests made in accordance with ASTM C 423.
- 1.5.4 Installer Qualifications: Experienced in performing work of the type specified.

1.6 DELIVERY, STORAGE, AND HANDLING

- 1.6.1 Deliver, handle and store products in accordance with manufacturer's recommendations.
- 1.6.2 Store products in manufacturer's unopened packaging until ready for installation.
- 1.6.3 Protect from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer.

1.7 WARRANTY

- 1.7.1 Provide manufacturer's standard 1 year warranty.

2 PRODUCTS

2.1 MANUFACTURERS

- 2.1.1 Acceptable Manufacturer: Panelfold, Inc., which is located at: 10700 N.W. 36th Ave. P. O. Box 680130; Miami, FL 33168-0130; Tel: 305-894-2227; Fax: 305-688-0185; Email: request info@panelfold.com; Web: <http://www.panelfold.com> (or approved equal)
- 2.1.2 Requests for substitutions will be considered in accordance with provisions of Section 01600.
- 2.1.3 Obtain all partitions from a single manufacturer.

2.2 OPERABLE PANEL PARTITIONS

- 2.2.1 Partitions: Operable panel partitions, top supported with track, suspension carriers, and accessories; dimensions and layout as indicated on drawings.
 - 2.2.1.1 Style: Individual panels, manually operated, that move only into preprogrammed positions on tracks (suffix PP).
 - 2.2.1.2 Final Closure(s): Jamb hinged single, bi-fold, or half panel(s)
 - 2.2.1.3 Height: As indicated on drawings.
 - 2.2.1.4 Acoustical Rating: STC as specified under panel construction, based on ASTM E 90 test on fully assembled partition 168 inches (4267 mm) high by 111 inches (2819 mm) wide.
 - 2.2.1.5 Panels: 3 inch (76 mm) thick aluminum framed construction, with interlocking vertical edges and sound seals on all 4 edges; Panelfold Series 400.
 - 2.2.1.5.1 Frames: Top frame reinforced at trolley locations.
 - 2.2.1.5.2 Faces: Gypsum panel or medium density fiberboard (MDF) laminated to frame, without face trim on vertical edges.
 - 2.2.1.5.3 Width: 49 inches (1245 mm), nominal.

- 2.2.1.5.4 STC Rating: 47; 6.5 lb/sq ft (31.7 kg/sq m) hanging weight (mass), maximum.
- 2.2.1.5.5 Hinges: Manufacturer's standard butt hinges.
- 2.2.1.5.6 Bottom Seal Height: 1-1/2 inches (38 mm).
- 2.2.1.5.7 Finish: Vinyl wall covering.
- 2.2.1.6 Sound Seals: Continuous extruded vinyl shapes.
- 2.2.1.6.1 Bottom Seals for Individual Panels: Clearance type, manually actuated at waist height on panel edges.

2.3 FINISHES

2.3.1 Vinyl Wall Covering:

- 2.3.1.1 Grade: FS CCC-W-408 Type II, medium duty.
- 2.3.1.2 Surface Burning Characteristics: Flame spread index 25 or less, smoke developed index 450 or less, when tested in accordance with ASTM E 84 (Class A).
- 2.3.1.3 Color: As selected from partition manufacturer's standard selection.

3 EXECUTION

3.1 EXAMINATION

- 3.1.1 Do not begin installation until substrates have been properly prepared.
- 3.1.2 If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- 3.2.1 Clean surfaces thoroughly prior to installation.
- 3.2.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- 3.3.1 Install in accordance with manufacturer's instructions and ASTM E 557.
- 3.3.2 Provide the services of the manufacturer's field representative to advise on proper installation procedures and inspect the finished work.
- 3.3.3 Install and adjust as required to achieve acoustical separation between adjacent areas.
- 3.3.4 Adjust locking hardware for proper operation.
- 3.3.5 Install operators and controls, make electrical connections and verify proper operation.
- 3.3.6 Clean exposed surfaces after installation.
- 3.3.7 Clean up work area and adjacent areas and dispose of debris legally off site.

3.4 DEMONSTRATION

- 3.4.1 Demonstrate operation and instruct Owner's personnel in proper operation and maintenance procedures.
- 3.4.2 Deliver keys and operation and maintenance data to Owner.

3.5 PROTECTION

- 3.5.1 Protect installed products until completion of project.
- 3.5.2 Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

12 69 00 - FLOOR MATS AND FRAMES

1.1 SCOPE

1. Supply and install aluminum construction hinged carpet tread recessed catch and hold type framed floor mat where indicated on the drawings.

1.2 SUBMITTALS

1. Submit duplicate samples of tread and rail.
2. Submit manufacturer's product data, installation specifications and shop drawings in accordance with Section 01340.

1.3 MATERIALS

1. Recessed floor mat:
 - a) C/S Pedimat model PM375RM as manufactured by Construction Specialties, Mississauga. Acceptable alternatives: Reese, Perfec clean floor mats or Ken-A-Mat by K.M Crowder.
2. Tread Rail:
 - a) 6063-T52 aluminum continuous hinge for roll up removal. Clear anodized finish.
3. Carpet:
 - a) Colourfast solution dyed 100% nylon, with antimicrobial additive, Scotchguard treated. Fusion bonded in continuous splice free lengths to rigid two ply backing. Colour to be chosen by Consultant from manufacturer's standard colour range.

1.4 INSTALLATION

1. Install frame and floor mat in accordance with manufacturer's printed specifications.
2. Install frame flush with finished floor surface.

1.5 PROTECTION

1. Protect mat from traffic with 0.15mm polyethylene. Tape all edges and joints to prevent shifting until installation is accepted by Consultant.