

## **01 79 00 - DEMONSTRATION AND TRAINING**

### **1. ADMINISTRATIVE REQUIREMENTS**

- 1.1 Demonstrate operation and maintenance of equipment and systems to the Owner's personnel two weeks prior to date of interim completion.
- 1.2 The Construction Manager will provide a list of personnel to receive instructions, and coordinate their attendance at agreed-upon times.
- 1.3 Preparation:
  - 1. Verify conditions for demonstration and instructions comply with requirements.
  - 2. Verify designated personnel are present.
  - 3. Ensure equipment has been inspected and put into operation in accordance with the requirements of the respective specification sections.
  - 4. Ensure testing, adjusting, and balance has been performed and equipment and systems are fully operational.
- 1.4 Demonstration and Instructions:
  - 1. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the equipment location.
  - 2. Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
  - 3. Review contents of manual in detail to explain aspects of operation and maintenance.
  - 4. Prepare and insert additional data in operation and maintenance manuals when needed during instructions.
  - 5. Perform training as required to fully inform the Owner's personnel regarding the correct operation and maintenance of each item of equipment.

### **2. ACTION AND INFORMATIONAL SUBMITTALS**

- 2.1 Submit schedule of the time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for the Construction Manager's approval.
- 2.2 Submit reports within one week after completion of demonstration, that demonstration and instruction have been satisfactorily completed.
- 2.3 Give time and date of each demonstration, with list of persons present.
- 2.4 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

### **3. QUALITY ASSURANCE**

- 3.1 When specified in individual Sections and/or when necessary for the proper and complete training of the Owner's personnel, arrange with the manufacturer to provide an authorized representative to demonstrate operation of equipment and systems:

1. Instruct the Owner's personnel.
2. Provide written report that demonstration and instructions have been completed.

## **01 90 00 - ALLOWANCES**

### **1. HARDWARE ALLOWANCES**

- 1.1 Provide hardware cash allowance for the preparation of an itemized hardware list for the project.
- 1.2 Provide and include the preparation of the hardware list and include review, consultation and coordination with the owner and consultants.
- 1.3 Provide shop drawings and cut sheets for review.
- 1.4 Include all doors except aluminum entry doors and frames.
- 1.5 Provide delivery and scheduling for all door hardware.

## **01 91 00 - FLOOR LEVELLING**

### **1. FLOOR LEVELLING**

- 1.1 Provide floor leveling allowances for leveling floors to receive floor tile or resilient tile flooring.
- 1.2 Allow for installation of Detra or approved equal where required to provide a level substrate.
- 1.3 Allowances to provide a cost per square meter to provide all labour and materials.



## **02 41 16 - SELECTIVE DEMOLITION**

### **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 demolish selected portions of the existing building, as necessary for the execution of the new work, as indicated on the drawings, as specified herein and as required for a complete project.

#### **1.3 REFERENCES**

1. Canadian Standards Association (CSA):
  - A) CSA-S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

#### **1.4 EXISTING CONDITIONS**

1. Should material resembling spray or trowel applied asbestos or any other designated substance be encountered in the course of demolition, stop work, take preventative measures, and notify the Consultant immediately. Do not proceed until written instructions have been received.
2. The portions of the buildings to be demolished to be based on the condition of the buildings at the time of examination prior to tendering.

#### **1.5 DEMOLITION DRAWINGS**

1. Where required by authorities having jurisdiction, submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning.
2. Submit drawings stamped and signed by qualified professional engineer registered or licensed in the Province of Ontario.

#### **1.6 PROTECTION**

1. Prevent movement, settlement or damage to parts of the existing building to remain. Provide bracing, shoring and underpinning as required. Repair damage caused by demolition as directed by the Consultant.
2. Support affected structures and, if the safety of the structure being demolished appears to be endangered, take preventative measures and then cease operations and notify the Consultant.
3. Perform all work in accordance with Section 01 35 43 "Environmental Protection."
4. Prevent debris from blocking the surface drainage system, elevators, or mechanical and electrical systems which must remain in operation.
5. Ensure that demolition work does not contribute to excess air and noise pollution.
6. Fires and burning of waste or materials is not permitted on site.
7. Do not bury waste or materials on site.
8. Do not dispose of waste or volatile materials such as mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers. Ensure proper disposal procedures are maintained throughout project.
9. Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.
10. Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.

11. Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
12. Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all roads.
13. Where the Work involves demolition of portions of the existing building immediately adjacent to other work which is designated to remain, take care to protect the adjacent work from damage during demolition.
14. Protect finished surfaces designated to remain. Where existing finishes are to be partially removed or abut other items which are to be demolished, make accurate, clean, straight cuts, true-to line, as required to facilitate the proper execution of the new work.

1.7 REGULATORY REQUIREMENTS

1. Ensure work is performed in compliance with all applicable federal and provincial regulations.

**Part 2 Products**

2.1 EQUIPMENT

1. Equipment and heavy machinery to meet or exceed all applicable emission requirements.
2. Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

**Part 3 Execution**

3.1 PREPARATION

1. Disconnect electrical and telephone service lines in the areas of the building where demolition work is to be carried out. Post warning signs on electrical lines and equipment which must remain energized during the period of demolition.
2. Disconnect and cap mechanical services where necessary.
3. Do not disrupt active or energized utilities that are designated to remain undisturbed.

3.2 SAFETY CODE

1. Do demolition work in accordance with CSA S350 governing construction/demolition safety regulations.
2. Blasting operations are not permitted during demolition.

3.3 DEMOLITION

1. Demolish parts of the structure as necessary to permit new construction work as indicated.
2. At the end of each day's work, leave the work in a safe and stable condition. Protect interiors from exterior elements at all times.
3. Demolish to minimize dusting. Where appropriate, keep materials wetted as directed by the Consultant.
4. Remove and dispose of demolished materials except where noted otherwise and as directed by the Consultant and in accordance with Section 01 74 21 "Waste Management and Disposal" and the authorities having jurisdiction.
5. Protect existing items which are designated to be removed and stockpiled for renovation and re-use or to be handed over to the Owner.

6. Remove contaminated or dangerous materials as defined by authorities having jurisdiction relating to environmental protection, from site and dispose of in a safe manner to minimize danger at the site or during disposal.
7. Use natural lighting to work by wherever possible. Shut off all lighting except those required for security purposes at the end of each day.

## **04 22 00 - CONCRETE BLOCK**

### **1.1 SCOPE**

1. Provide all labour, materials, equipment, and services required to complete concrete block repairs as indicated on the drawings and as specified.

### **1.2 MATERIALS**

1. Standard 200mm thick concrete block and scored 200x400x200mm thick concrete units classification.
2. H/15/A/M in accordance with CAN3-A165.1 Concrete Masonry Units.
3. Reinforcing rods and bars.
4. Steel angle clips and anchor bolts.

### **1.3 INSTALLATION**

1. Perform concrete masonry work in accordance with OBC and CAN/CSA-A371-94 Masonry Construction for Buildings.
2. Erect block in running bond with flush mortar jointing.
3. Coursing height: 200mm for one block and one joint.
4. Build masonry plumb, level and true to line with vertical joints in alignment.
5. Build in loose lintels over openings.
6. Install horizontal reinforcing.
7. Install lateral restraints at top of walls as necessary and in accordance with CAN/CSA-A371-94

## 05 41 00 - 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 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 steel stud systems forming part of exterior wall assemblies, as indicated on the drawings, as specified herein and as required for a complete project.
2. Related Work:
  - A) Section 05 50 00 - Metal Fabrications
  - B) Section 07 21 00 - Building Insulation.
  - C) Section 07 42 42 - Composite Aluminum Wall Panel System.
  - D) Section 07 92 00 - Joint Sealants.
  - E) Section 08 11 13 - Steel Doors and Frames.
  - F) Section 08 11 16 - Aluminum Doors and Frames.
  - G) Section 08 44 13 - Glazed Aluminum Curtain Wall.
  - H) Section 09 21 16 - Gypsum Board Assemblies.
  - I) Section 09 22 16 - Non-structural Metal Stud Systems.
  - J) Section 10 14 10 - Exterior Signage.

#### 1.3 REFERENCES

1. American Society for Testing and Materials (ASTM):
  - A) ASTM A653/A653M-17, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
2. Canadian General Standards Board (CGSB):
  - A) CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
3. Canadian Sheet Steel Building Institute (CSSBI):
  - A) CSSBI 50M-2015, Lightweight Steel Framing Manual.
4. Canadian Standards Association (CSA):
  - A) CSA-S136-12, North American Specification for the Design of Cold-Formed Steel Structural Members.
  - B) CSA-W47.1-09 (R2014), Certification of Companies for Fusion Welding of Steel.
  - C) CSA-W59-13, Welded Steel Construction (Metal Arc Welding).
5. 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").

#### 1.4 DESIGN REQUIREMENTS

1. Calculate structural strength and resistance properties in accordance with CSA-S136, based on Limit States Design principles, using factored loads and resistances, and in accordance with applicable code requirements. Compute section properties based on the nominal core thickness.
2. Design and construct the installation to resist pressure and suction of wind-loads, snow loads, snow build-up, and temperature range expected in the geographical area of this Project, in accordance with OBC climatic information for thirty (30) year probability, without any detrimental effects on appearance or performance.

3. Limit maximum deflection (inward or outward) under specified wind loads to  $L/360$ .
4. Design and construct the installation to provide for thermal expansion and contraction of components without causing buckling, failure of joint seals, undue stress on fasteners, or other effects detrimental to the appearance or performance of the work of this Section or other work attached to the work of this Section.
5. Design and construct bridging to prevent member rotation and member translation perpendicular to the minor axis. Provide for secondary stress effects due to torsion between lines of bridging. Do not use sheathing to help restrain member rotation and translation perpendicular to the minor axis.
6. Design and construct steel stud system to take into account the anchorage of other materials and to support loads and superimposed loads transferred from insulation and cladding and include for support and attachment components between other assemblies and the stud system. Responsibility for design of the system to accommodate exterior loads transferred from other envelope components is part of the work of this Section.
7. Design Components to accommodate specified erection tolerances of the structure.
8. Design wind bearing stud end connection to accommodate floor/roof deflections and creep of concrete, to ensure that loads due to movement of the primary building structure are not transferred to the studs, and to ensure that studs are not loaded axially.
9. Welding: Qualify procedures and personnel according to CSA-W47.1 and CSA-W59.
10. Fire-Test-Response Characteristics: Where metal framing is part of a fire-resistance-rated assembly, provide framing identical to that of assemblies tested and labeled for fire resistance in accordance with ULC requirements to the satisfaction of the authorities having jurisdiction.
11. CSA Specifications: Comply with CSA-S136 and the following for calculating structural characteristics of cold-formed metal framing.

#### 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. Shop Drawings:
  - A) Prepare and submit shop drawings and erection drawings which conform to the requirements of CSA-S16.1 and as specified herein. Including necessary plans, elevations and details.
  - B) Indicate design loads, member sizes, spacing, materials, design thickness exclusive of coatings, coating specifications, connection and bracing details. Indicate additional members and/or heavier gauge members and/or special reinforcing for members subject to concentrated loads. Indicate locations, dimensions, openings and requirements of related work. Provide specific details of all window and door openings, corners and any other special conditions.
  - C) For weld connections use welding symbols in compliance with AWS A2.4-93 and indicate clearly weld lengths.
  - D) Indicate provisions for wall-mounted items. Show type, size and location for each item.
  - E) The entire installation shall be designed by a structural engineer permanently licensed to practice in the Province of Ontario and who is experienced in providing engineering services of the kind indicated. Each shop drawing submitted shall bear the stamp and signature of the aforesaid structural engineer.
  - F) On request, submit design notes and details to the Consultant for review.
  - G) Review of the shop drawings by the Construction Manager, the Consultant and the Structural Engineer shall not relieve the Trade Contractor of his responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract Documents. Departures or differences from the Contract Documents shall be approved in writing by the Consultant.

3. Product Data: For each type of col-formed metal framing product and accessory indicated, submit:
  - A) "Letter of Conformance" indicating specified items selected for use in project.
  - B) Mill certificates signed by steel sheet producer or test reports from a qualified independent testing agency indicating steel sheet complies with requirements.
  - C) Welding Certificates: Copies of certificates for welding procedures and personnel.
  - D) Qualification Data: For firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
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.

#### 1.6 QUALITY ASSURANCE

##### 1. Installer Qualifications:

- A) The work of this Section shall be executed by a firm:
  - I) With minimum 5 years documented experience;
  - II) Which is thoroughly conversant with the laws, bylaws and regulations which govern the work of this Section;
  - III) Which is capable of workmanship of the best grade of modern shop and field practice known to recognized manufacturers specializing in this work; and
  - IV) Has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B) Companies engaged in welding shall be certified by the Canadian Welding Bureau to CSA W47.1 and welders qualified for the base material and procedures to be executed. Welding work shall be executed in accordance with CSA-W59.
- C) Employ only skilled tradesmen who are specially trained and experienced in this work. Have a full-time qualified senior representative at the site to supervise the work.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

1. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
2. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

#### 1.8 WASTE MANAGEMENT AND DISPOSAL

1. Cooperate with the 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 INSPECTION AND TESTING

1. The Construction Manager may engage an independent inspection and testing company to conduct inspection and testing of the work of this Section. Initial inspections and tests will be paid for by the Owner. The cost of re-inspection or retesting necessitated by failure to meet specified requirements at the initial inspection/test shall be paid by the Trade Contractor.
2. Cooperate with and provide free access for inspectors to all places where work is being done.
3. Inspection and testing may include the following:

- A) Verifying that mill test reports are properly correlated to materials.
  - B) Sampling fabrication and erection procedures for general conformity with the Contract Documents.
  - C) Verifying welding for conformity with the applicable provisions of CSA-W47 and CSA-W59.
  - D) Checking fabricated members against specified member shapes.
  - E) Visual inspection of all welded connections, including sample checking of joint preparation and fit-up.
  - F) Sample checking of screwed and bolted joints.
  - G) Sample verification that tolerances are not exceeded during fit-up and/or erection.
  - H) Additional Inspection and testing of welded connections as required by CSA-W59.
  - I) General Inspection of field cutting and alterations required by other trades.
  - J) Submission of reports to the Consultant, covering the work inspected with details of deficiencies discovered.
4. The inspection and testing provided by the Construction Manager's appointee does not relieve the Trade Contractor of this responsibility for meeting all requirements of the Contract Documents. The Trade Contractor shall implement his own supervisory and quality control procedures.

## **Part 2 Products**

### **2.1 MANUFACTUREERS**

1. This specification is based on light metal framing systems by Bailey Metal Products 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 SYSTEM DESCRIPTION**

1. Provide a complete exterior stud wall system to CSA-S136 with all components supplied by the same manufacturer, including formed studs, floor and ceiling tracks, bridging, clips and accessories, fastenings and all other components.
2. Use proper size, thickness and spacing of studs for wall height and loading as indicated on the shop drawings and as recommended by the manufacturer.
3. Include the following:
  - A) Studs.
  - B) Single bottom track.
  - C) Double top track (or deflection channel).
  - D) Horizontal bridging.
  - E) Angle reinforcement for all electrical boxes in exterior walls.
  - F) Wall studs subjected to lateral loads.
  - G) Lintel, sill and jamb members for wall openings.
  - H) Top and bottom connections to the main structure, including detailing to accommodate floor and/or roof deflections.
  - I) Cross bracing for lateral loads.

### **2.3 MATERIALS**

1. Steel: to CSA-S136, fabricated from ASTM A653 galvanized steel with Z275 coating designation. Minimum 345 MPa yield strength for 1.52 mm base metal thickness material.
2. Welding materials: to CSA W59.
3. Screws: pan head, self drilling, self tapping sheet metal screws. 0.008 mm coating of zinc or cadmium plating.



4. Anchors: Concrete expansion anchors or other suitable drilled type fasteners.
5. Bolts, nuts, washers: Corrosion-resistant, hot dipped galvanized to CSA-G164, 600 g/m<sup>2</sup> zinc coating.

## 2.4 METAL FRAMING

1. Steel Studs: to CSA-S136, fabricated from zinc coated steel, depth as indicated. Gauges as required to meet design requirements and conform to reviewed shop drawings.
2. Floor and ceiling tracks: fabricated from same material and finish as steel studs in widths to suit stud sizes. Gauges as required to meet design requirements and conform to reviewed shop drawings but no less than the gauge of the studs. Flange heights as follows:
  - A) Bottom channel: 65 mm
  - B) Deflection channel (fixed to u/s structure where applicable): 65 mm.
  - C) Top channel: 50 mm
3. Plates, bridging, gussets and clips: fabricated from same material and finish as steel studs; gauges, shapes and sizes as required to meet design requirements and conform to reviewed shop drawings.
4. Special conditions: Provide heavier gauge framing members and/or additional reinforcing and/or special connections where stud length and loading conditions require. Provide additional reinforcing for members carrying a concentrated load, such as window or door jambs.

## 2.5 ACCESSORIES

1. Fastenings:
  - A) Self-drilling, self-tapping screws, bolts, nuts and washers to be hot dip galvanized to CSA-G164, minimum zinc coating weight 457 g/m<sup>2</sup>.
  - B) Anchorage devices: Power driven, powder activated, drilled expansion bolts, or screws with sleeve, as applicable to each application.
2. Welding Materials:
  - A) Welding materials to conform to CSA-W59.
  - B) Electrodes shall have minimum 490 MPa tensile strength (Series E490XXX, E490SX).
3. Touch-Up Primer: Inorganic zinc-rich primer to MPI APL #19 or CAN/CGSB-1.181.
4. Damp-proof Course: No. 15 asphalt impregnated building paper to CGSB-51.32.
5. Insulating Strip: Rubberized, moisture resistant 3 mm thick foam strip, 12 mm wide, with self-sticking adhesive on one face, lengths as required.

## 2.6 FABRICATION

1. Fit and assemble work in the shop where possible. Execute the work in accordance with details and the reviewed shop drawings.
2. Before commencing fabrication, take field measurements to verify or supplement dimensions for work which is to fit or be connected to steel or masonry.
3. Fabricated to tolerances specified in CSSBI Manual M50, Table 2.
4. Make cuts by power saw or shear methods. Cutting by torch method will not be permitted.
5. Provide studs with one reinforced service cutout, centred in the web and with its centre-line minimum 460 mm from the bottom of the studs. In addition, provide cut-outs for internal bridging as required. All reinforced cutouts shall conform to the specified dimensional requirements and CSSBI M50, Table 1.
6. Provide prepunched cutouts in inner top track for anchor clearances so that deflection clearances are not reduced.
7. Standard thicknesses:

Thickness Designation*	Minimum Base Steel Thickness**	Design Thickness	Colour	Gauge (for reference only)
18	0.455 mm	0.478 mm		25
33	0.836 mm	0.879 mm	White	20
43	1.087 mm	1.146 mm	Yellow	18
54	1.367 mm	1.438 mm	Green	16
68	1.720 mm	1.811 mm	Orange	14
97	2.454 mm	2.583 mm	Red	12
118	2.997 mm	3.155 mm	Blue	10

\* Measured in mils - 0.001 in. (0.0254 mm)

\*\* This number represents 95% of the design thickness and is the minimum acceptable thickness of the base steel delivered to the site.

### Part 3 EXECUTION

#### 3.1 EXAMINATION/PREPARATION

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. Steel stud assemblies are infill panels which derive their support from the adjacent structural framing. Coordinate with the applicable other Sections to ensure a proper interface between structural framing and steel stud assemblies.
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 Trade Contractor shall be fully responsible for satisfactory work as specified herein.
5. Install windload-bearing steel stud systems in all exterior walls, and where shown, specified, or required elsewhere by the Contract Documents.

#### 3.2 ERECTION

1. Erect components in accordance with the manufacturer's written instructions and the reviewed shop drawings.
2. System may be installed either piece by piece (stick-built) or by prefabrication into panels (panelized) either on or off site. Handle and lift prefabricated panels in a manner that does not cause permanent distortion to any member or collateral material.
3. Prior to installation of all stud walls, apply two full beads of acoustical sealant or insulating strip to the back side of the floor, wall and ceiling track. Refer to Section 07 92 00 "Joint Sealants".
4. Accurately locate tracks at floor and anchor securely to the structure at 600 mm o.c. maximum, unless closer spacing prescribed on shop drawings. Provide a continuous damp-proof course to the underside of the bottom runner/track. Use self-drilling anchors.
5. Where applicable, align ceiling tracks at underside of roof structure with floor tracks and anchor securely to the structure at 600 mm o.c. maximum, unless closer spacing prescribed on shop drawings.
6. Erect studs, seated in top and bottom tracks, plumb, aligned, accurately located and where applicable, securely attached in accordance with the reviewed shop drawings but with not less than one No.8 screw or a welded at each side of the flange of the top and bottom tracks.

- A) Screw diameter to be equal to or greater than the diameter indicated on the shop drawings.
  - B) Screw penetration to be not less than 3 exposed threads beyond joined materials.
  - C) Thread types and drilling capability of screws to conform to the manufacturer's written recommendations to suit design requirements and specific conditions.
  - D) Screws to be covered by sheathing materials to have low-profile heads.
7. Erect studs one piece, full length. Splicing of studs is not permitted.
8. Maintain clearances under beams and structural decks and slabs 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) Attach each stud to bottom track bottom and top tracks, using screw. For each stud, carefully align anchorages top and bottom.
9. Install studs at not more than 50 mm from abutting walls, openings and at each side of corners and terminations with dissimilar materials.
10. Brace steel studs with horizontal internal bridging at 1220 mm o.o. maximum for masonry veneer and 1520 mm o.c. maximum for other materials. Arrange bridging so that one line of bridging occurs no less than 300 mm from the lower slip connectors at the top of the studs. Fasten bridging to 1.52 mm (16 ga) steel clips fastened to steel studs with four (4) No.8 screws or by welding.
11. Coordinate bracing and stud reinforcement with honeycomb perforated metal cladding system dimensions and with curtain wall mullion locations where appropriate.
12. Frame all openings in stud walls to adequately carry loads by use of additional framing members and bracing, as detailed on shop drawings.
13. Coordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned. Field-cut holes shall conform to the specified dimensional requirements.
14. Coordinate erection of studs with installation of door/window frames and special supports of anchorage for work specified in other Sections.
15. Provide two (2) studs extending from floor to ceiling at each side of openings wide than stud centers specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.
16. Construct corners with minimum three studs.
17. Erect track at head of door/window openings and sills of window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.
18. 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, secure between studs (coordinate with Section 06 10 00 "Rough Carpentry") for attachment for fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel walls.
  - B) Coordinate with the applicable other sections to ensure the correct type, size, and location of provisions for attachment and indicate on the shop drawings.
19. Perform welding work in accordance with CSA W59 and/or ANSI/AWS D1.3, whichever is applicable.
20. Touch up welds with coat of zinc rich primer.

### 3.3 ERECTION TOLERANCES

1. For the purpose of this specification, “camber” is defined as deviation from straightness of a member with respect to its major axis and “sweep” is defined as deviation from straightness of a member with respect to its minor axis.
2. Plumb (studs): not to exceed  $1/500^{\text{th}}$  of member length.
3. Camber (studs and runners/tracks): not to exceed  $1/1000^{\text{th}}$  of member length.
4. Sweep (studs): not to exceed  $1/1000^{\text{th}}$  of member length.
5. Spacing: not more than 3 mm from design spacing. Cumulative spacing error not to exceed requirements of finishing materials.
6. Gap between end of stud and runner/track web: not more than 4 mm.
7. Where a panelized method is used, align adjacent panels to provide surface continuity at the interface.

### 3.4 CUTOUTS

1. Limit unreinforced cutouts for services to the webs of the stud members, to the following dimensions: All dimensions are in millimeters.

MEMBER DEPTH	ACROSS MEMBER DEPTH	CENTRE TO CENTRE SPACING mm
92	40 max.	600 min.
102	40 max.	600 min.
152	65 max.	600 min.

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

### 3.5 FIELD QUALITY CONTROL

1. The steel stud design engineer, responsible for the preparation of shop drawings shall perform regular field reviews during construction and submit field reports to the Consultant.
2. Include the cost of field reviews in the Contract Price.
3. The steel stud design engineer shall be responsible for reviewing mill test reports, welded connections, member sizes and thickness, screwed and bolted connections, erection tolerances and general inspection of field cutting and alterations required by other trades.

## **05 50 00 - METAL FABRICATIONS**

### **1.1 SCOPE**

1. Provide all labour, materials, equipment, and services required to complete miscellaneous metal work as indicated on the drawings, as specified and as necessary for a complete and finished project.
2. Metal fabrications included.
3. Supply and install all necessary miscellaneous metalwork including lintels, angles, clips, recessed mat frame brackets, cleats, plates, beams, channels, nuts, bolts, and other such ancillary supports and fastenings as necessary for a complete and finished project.

### **1.2 SHOP DRAWINGS**

1. Provide shop drawings for each item of metalwork.
2. Indicate profiles and bends.
3. Indicate materials, core thickness, finishes, connections, joints, method of anchorage, number and spacing of anchors, supports reinforcement, details and accessories.
4. Provide stamped engineered shop drawings for handrails.

### **1.3 MATERIALS**

1. Structural Steel: to CAN/CSA-G40.21, Grade 300W
2. Welding Materials: to CSA W59

### **1.4 FABRICATION**

1. Fabricate handrails in accordance with requirements of OBC, 1997.

### **1.5 INSTALLATION**

1. Install metal work plumb, level, and true to line, rigidly set in place and anchored, with tight joints and intersections.
2. Touch up surfaces after completion of installation.
3. Provide lintels and angle clips to masons for concrete block work.

## **06 10 00 - ROUGH CARPENTRY**

### **1.1 SCOPE**

1. Examine architectural, structural, electrical, and mechanical drawings, specifications, and site conditions and provide all rough carpentry necessary for a complete and finished project.
2. Coordinate rough carpentry work with requirements of other trades and suppliers.

### **1.2 QUALITY ASSURANCE**

1. Comply with requirements of OBC 1997, Part 9.

### **1.3 CARPENTRY WORK**

1. Install base framing, furring, blocking, and plywood backerboards as required to space out and support cabinet work, fixtures, fittings, finishes, equipment, signage, and other items.
2. Supply and install wood blocking necessary to support merchandising displays as shown on furniture plans and general layout plans and in accordance with shop drawings prepared by merchandising display supplier.
3. Align and plumb faces of furring and blocking to tolerance of 1:600.
4. Frame, anchor, fasten tie and brace members as required to provide the necessary support and rigidity.
5. Countersink fasteners where necessary to provide clearance for other work.

### **1.4 MATERIALS**

1. Lumber: Spruce/Pine/Fir species, to CSA O141, S4S, moisture content 15% or less, standard construction grade or better.
2. Plywood: Douglas Fir Plywood to CSA 0121, Canadian Softwood Plywood to CSA 0151, Poplar Plywood to CSA 0152 as appropriate for application.
3. Nails, spikes, and staples - to CSA B111-1974; galvanized for interior high humidity and exterior areas; plain finish elsewhere.
4. Proprietary Fasteners: Toggle bolts, expansion shields and lag bolts, screws and lead plugs, explosive actuated fastening devices type recommended for the application by manufacturer.

## **06 20 00 - FINISH CARPENTRY**

### **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 finish carpentry work, as indicated on the drawings, as specified herein and as required for a complete project.
2. Related Sections:
  - A) Section 06 10 00 - Rough Carpentry
  - B) Section 06 41 00 - Architectural Wood Casework
  - C) Section 06 41 36 - Cabinet Hardware.
  - D) Section 08 71 10 - Door Hardware
  - E) Section 09 91 00 - Painting

#### **1.3 REFERENCES**

1. American National Standards Institute (ANSI):
  - A) ANSI A208.1-2009, Particleboard.
  - B) ANSI A208.2-2009, Medium Density Fibreboard for Interior Applications
2. 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.
3. Architectural Woodwork Manufacturers' Associations of Canada(AWMAC):
  - A) Architectural Woodwork Standards, 2<sup>nd</sup>. Edition, 2014, including Errata (referred to herein after as "AWS").
4. Canadian Standards Association (CSA):
  - A) CSA-B111-1974(R2003), Wire Nails, Spikes and Staples.
  - B) CSA-O121-17, Douglas Fir Plywood.
  - C) CSA-O141-05(R2014), Softwood Lumber.
  - D) CSA-O151-17, Canadian Softwood Plywood.

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

1. Protect materials against dampness during and after delivery.
2. Store materials in ventilated areas, protected from extreme changes of temperature or humidity.

#### **1.5 WASTE MANAGEMENT AND DISPOSAL**

1. Cooperate with the Construction Manager's Waste Management 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 LUMBER MATERIAL**

1. Softwood lumber: Pine species, to AWS Section 3, Custom grade or better for exposed work, S4S, moisture content average 7%, maximum 9% for interior work. Machine stress-rated lumber is acceptable for all purposes.
2. Hardwood lumber: Maple species to AWS Section 3, Custom grade or better for exposed work, S4S, moisture content average 7%, maximum 9% for interior work.

## 2.2 PANEL MATERIAL

1. Douglas fir plywood (DFP): to CSA )121, standard construction.
2. Medium Density Fibreboard (MDF): to ANSI 208.2., density 769 kg/m<sup>3</sup>.
3. Melamine Panels: Melamine resin impregnated decorative sheet thermal-fused to rigid particleboard substrate to the following standards:
  - A) Core: Mat-formed wood particleboard: industrial grade to ANSI A208.1 Grade R, density 449 k/m<sup>3</sup>.
  - B) Melamine finish: to NEMA LQ1, minimum 120 gram weight, thermally fired to both sides of particleboard. Colours to be selected by the Consultant.
  - C) Prepainted UV board or vinyl-faced board is not acceptable as a substitute for melamine panels specified herein.

## 2.3 ACCESSORIES

1. Nails and staples: to CSA B111; galvanized to ASTM A123 for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.
2. Wood screws: to CSA B35.4 electroplated steel, type and size to suit application.
3. Adhesives: as recommended by installer.
4. Edge banding for melamine panels: "Polyband" polyester edge banding, 60 gram print paper, fully impregnated with polyester resin, hot meltcoated. Colour to match melamine. Apply to all exposed edges.

# 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 INSTALLATION

1. Install finish carpentry to QSI Section 1700, Custom Grade, except where specified otherwise.
2. Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.
3. Form joints to conceal shrinkage.

## 3.3 CONSTRUCTION

1. Fastening:
  - A) Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.



- B) Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
  - C) Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round cleanly cut hole and plug with wood plug to match material being secured.
  - D) Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.
2. Standing and running trim:
- A) Cut right angle joints of casing and base with mitred joints.
  - B) Fit backs of casing snugly to wall surfaces to eliminate cracks at junction of casing with walls.
  - C) Install in longest possible single lengths without splicing. Install door and window trim in single lengths.
3. Shelving:
- A) 16 mm thick white melamine shelving complete with matching polyester edge banding,
  - B) Provide continuous edge support and supplemental supports to shelf and rod at maximum 900 mm o.c. Refer to Section 08 71 13 "Cabinet and Miscellaneous Hardware" for rod.
  - C) Provide painted wood ledgers, three edges.
  - D) Provide a bank of five shelves, 300 mm deep x 450 mm deep, at one end of each closet, separated from the remainder of the closet by a gable extending from the floor to a hat shelf and continuous rail in the remainder of the closet.
4. Other items: Provide other finish carpentry items as indicated and as required for a complete project.

## 06 41 00 - ARCHITECTURAL WOOD CASEWORK

### 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 this Section.

#### 1.2 SUMMARY OF WORK

1. Work Included: The work of this Section includes the provision of all labour, material, equipment and services required to fabricate and install plastic-laminate-clad casework, as indicated on the drawings, as specified herein and as required for a complete project.
2. Related Work:
  - A) Section 06 10 00 - Rough Carpentry
  - B) Section 06 20 00 - Finish Carpentry
  - C) Section 06 41 36 - Cabinet and Miscellaneous Hardware.
  - D) Section 06 61 13 - Solid Surface Fabrications
  - E) Section 07 92 00 - Joints Sealants

#### 1.3 REFERENCE STANDARDS

1. American National Standards Institute (ANSI):
  - A) ANSI A208.1-2009, Particleboard.
  - B) ANSI A208.2-2009, Medium Density Fiberboard for Interior Applications.
2. Architectural Woodwork Manufacturers' Association of Canada (AWMAC):
  - A) Architectural Woodwork Standards, 2<sup>nd</sup>. Edition, 2014, including Errata (referred to hereinafter as "AWS").
3. Canadian Standards Association (CSA):
  - A) CSA-B111-1974 (R2003), Wire Nails, Spikes and Staples.
  - B) CSA-O121-17, Douglas Fir Plywood.
4. Canadian General Specification Board (CGSB):
  - A) CAN/CGSB-71.20-M88, Adhesive, Contract, Brush-able.
5. National Electrical Manufacturers Association (NEMA):
  - A) ANSI/NEMA LD3-2005, High-Pressure Decorative Laminates (HPDL)

#### 1.4 DEFINITIONS

1. Plywood: Layers or plies of wood veneer, permanently bonded together in panels with the grain of each layer at 90° to adjacent layers. The outer plies are called face and back. The inner plies are called the "core". The term "plywood", as used in this specification, does not include assemblies manufactured with particleboard, hardboard or fibreboard cores.

#### 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. Shop Drawings: Submit shop drawings in accordance with AWS Section 1.
  - A) Shop drawings to include complete dimensioned drawings of each casework and millwork item, including locations of on-site joints in counter-tops, details of construction, profiles, jointing, fastening and other related details.
  - B) Indicate all materials, thicknesses, finishes and hardware.
  - C) Indicate locations of all service outlets in casework, typical and special installation conditions, and all connections, attachments and anchorage.

3. Samples: Submit minimum 150 mm x 150 mm samples of each type and colour of panel material.
4. Maintenance Data: Provide maintenance data for plastic laminate work for incorporation into the operation and maintenance manual specified in Section 01 78 00 "Closeout Submittals".

**1.6 PRODUCT HANDLING AND STORAGE**

1. Handle and store products in accordance with AWS Section 2.
2. Cover finished surfaces with heavy Kraft paper or put in cartons during shipment. Protect installed laminated surfaces by approved means. Do not remove protection until immediately before final inspection.

**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 materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

**1.8 WARRANTY**

1. Warrant the work of this Section in accordance with the General Conditions of the Contract but for 5 years.

**Part 2 Products**

**2.1 LUMBER MATERIALS**

1. Softwood lumber (concealed work only): Pine species, 6 to 12% moisture content, in accordance with AWS Section 3, Economy grade or better.

**2.2 PANEL MATERIALS**

1. Softwood plywood: Douglas Fir Plywood (DFP) to CSA-O121, G1S or G2S sanded grade, as applicable.
2. Mat-formed wood particleboard: industrial grade to ANSI-A208.1, Grade R, density 449 k/m<sup>3</sup>, thicknesses as indicated.
3. Medium density fibreboard (MDF) to ANSI A208.2, 769 kg/m<sup>3</sup> density, thicknesses as indicated.
4. Laminated plastic: in accordance with AWS Section 4, based on grades established by NEMA LD3, as follows:

**A) Grades**

- I) Horizontal surfaces: Grade HGS, horizontal general purpose, 1.2 mm thick.
- II) Vertical surfaces: Grade VGS, vertical general purpose, 0.7 mm thick.
- II) Cabinet liner (for semi-exposed surfaces): Grade CLS, 0.5 mm thick, white colour.
- IV) Backer: Grade BKL, 0.5 mm thick, white colour.

**B) Types, colours and textures to be selected.**

**C) Edge banding for exposed and semi-exposed edges: Self-edged with specific plastic laminate.**

**2.3 FASTENERS AND ADHESIVES**

1. Nails and staples: CSA-B111, hot dipped galvanized for exterior work, and areas subject to high humidity, plain finish elsewhere.
2. Wood screws: to CSA-B35.4, electroplated, type and size to suit application.
3. Adhesives:
  - A) Generally as recommended by the casework fabricator.

- B) Laminated plastic adhesive: contact adhesive to CAN/CGSB-71.20.
- 4. Welding materials and adhesive for stainless steel sheet: as recommended by the stainless steel countertop fabricator.
- 2.4 ACCESSORIES
  - 1. Sealer for laminated plastic: Water resistant sealer or glue acceptable to laminate manufacturer.
  - 2. Sealant caulking of back of counter-tops at wall: Refer to Section 07 92 00 "Joint Sealants".
  - 3. Cabinet hardware: Refer to Section 08 71 13 "Cabinet and Miscellaneous Hardware".
- 2.5 LAMINATED PLASTIC CASEWORK CONSTRUCTION
  - 1. Fabricate casework in accordance with AWS Section 10 to Custom grade, double-front, flush overlay type, except where otherwise indicated.
  - 2. Furring, blocking, nailing strips, grounds and rough bucks, sleepers and concealed framing: Softwood lumber, pine species.
  - 3. Base: 19 mm DFP faced with base material.
  - 4. Concealed casework framing: Pine.
  - 5. Case bodies (ends, divisions, bottoms, shelves, backs):
    - A) DFP faced with laminated plastic.
    - B) Thicknesses:
      - I) Generally: 17.5 mm
      - II) Concealed backs: 6 mm.
  - 6. Cabinet doors and applied drawer fronts:
    - A) Generally: 17.5 mm MDF faced with laminated plastic.
  - 7. Edge-band all exposed and semi-exposed edges as specified.
    - A) For extruded aluminum T-moulding, mitre corners and produce tight hairline joints
  - 8. Drawers:
    - A) Semi-exposed fronts, sides and backs: 16 mm thick DFP faced with plastic laminate.
    - B) Bottoms: 10 thick DFP faced with plastic laminate.
    - C) Edges of drawers sides and backs: Self-edged with plastic laminate.
- 2.6 LAMINATED PLASTIC COUNTERTOPS
  - 1. Laminated Plastic: Where not otherwise indicated, fabricate counter-tops with plastic laminate on specified core. Provide self-edged back-splash at counter back and ends against walls and self-edged front-edge banding as indicated.
  - 2. Core:
    - A) Counter-tops with a sink or lavatory: 19 mm DFP
    - B) Counter-tops with no sink or lavatory: 19 mm particleboard.
- 2.7 SOLID SURFACE COUNTER-TOPS
  - 1. Refer to Section 06 61 16 - "Solid Surface Fabrications".
- 2.8 CASEWORK FABRICATION
  - 1. Fabricate casework in accordance with AWS Section 10 to Custom grade, double-front, flush overlay type, except where otherwise indicated.
  - 2. Use dado construction for fixed shelves and intermediate gables. Use rabbet joint construction at top and bottom of end gables.
  - 3. Except where otherwise indicated, all cabinet shelves shall be adjustable using specified adjustable shelf hardware.
  - 4. Provide cutouts for plumbing fixtures and fittings and other fixtures.

5. Shop-assemble work for delivery to site in size easily handled and to ensure passage through buildings openings.

**2.9 LAMINDATED PLASTIC APPLICATION**

1. Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.
2. Ensure adjacent parts of continuous laminate work match in colour and pattern.
3. Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 3m. Keep joints 600 mm from lavatory or sink cutouts.
4. Where not otherwise indicated, use straight self-edging laminate strip for flat-work to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 30 degrees. Do not mitre laminate edges.
5. Apply laminate backing sheet to reverse side of core of plastic laminate work.
6. Apply laminated plastic liner sheet to interior of cabinetry and where indicated.

**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 INSTALLATION**

1. Do not install base cabinets until gypsum board behind cabinets has been painted.
2. Set and secure all materials and components in place, rigid plumb and square. Caulk counter tops to walls, scribe cabinets to walls and floors, install filler mouldings where required. Secure all cabinets to walls and floors, through back rails, top and bottom.
3. Scribe "toe kick" to floor.
4. At junction of countertop back-splash and adjacent wall finish, apply a small continuous bead of white silicone caulking. Refer to Section 07 92 00 "Joint Sealants".
5. Apply bituminous coating over wood framing members in contact with masonry or cementitious construction.
6. Fit hardware accurately and securely in accordance with manufacturer's directions, adjust operating parts for smooth, correct function. Refer to drawings.

**3.3 PROTECTION**

1. Protect installed work from damage.

**3.4 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.
2. Adjust hardware for correct function and true alignment.
3. Make good any damage caused by the work of this section.

## **06 41 36 - CABINET AND MISCELLANEOUS 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 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 cabinet hardware and miscellaneous hardware, as indicated on the drawings, as specified herein and as required for a complete project.
2. Related Sections:
  - A) Section 06 41 00 - Architectural Wood Casework

#### **1.3 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 Cabinet and Miscellaneous 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) Indicate the complete hardware requirements for each casework assembly. Show the hardware types and quantities, cross-referenced to the sub-paragraph number for each item in Part 2 of this specification.
  - E) The Construction Manager's and the Consultant's review of the Hardware Schedule does not limit or release the Trade Contractor from the responsibility to provide all necessary hardware and related components required for a complete installation.
3. Samples and Literature:
  - A) If requested by the Consultant, submit samples and technical literature as necessary to fully inform the Consultant regarding hardware items proposed.
  - B) Submit samples and literature.
4. Product Data:
  - A) Include installation instructions for each items of hardware.

#### **1.4 DEVIATION FROM THIS SPECIFICATION**

1. If any deviation from the items specified herein is proposed, submit a list of the alternative items complete with samples and technical literature.
2. Acceptance will be subject to the written approval of the Consultant.
3. Installed hardware which deviates from the specified items and has not been approved by the Consultant will be rejected and shall be replaced with the specified hardware at no additional cost to the Owner.

#### **1.5 COORDINATION WITH OTHER TRADES**

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

1.6 DELIVERY AND STORAGE

1. Store hardware in locked, clean and dry area.
2. Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

1.7 WASTE MANAGEMENT AND DISPOSAL

1. Cooperate with the Construction Manager's Waste Management Coordinate 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 cabinet hardware distributed by Quinquallerie Richelieu Ltee.
2. Except where otherwise specified, catalog numbers refer to Richelieu products.
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.
4. Use one manufacturer's product for all similar items.

2.2 HARDWARE ITEMS

1. Cabinet door hardware:
  - A) Swing doors:
    - I) Blum hinge #70T358180
    - II) Blum mounting plate #175L810180
    - II) Blum Tip-On touch latch #9561004
    - IV) Cam Lock, keyed alike for each cabinet #BP140103140
  - B) Lift-up doors (upper cabinets):
    - I) Aventos HK-S (medium duty) #20K2C00T30; OR
    - II) Aventos HK-S HD (heavy duty) #20K2E00T30
    - II) Select lift-up mechanism to suit weight of door.
  - C) Drop-down doors (display/TV wall):
    - I) Kimana #11125180 for 18 mm door thickness, with #11116180 for 16 mm door thickness.
2. Lid stays (for drop-down doors) #100T30
3. Cabinet handles: Contemporary metal pull, 814 Series, #BP814160195
4. Drawer hardware:
  - A) Blum slides:
    - I) Heavy duty: #766H5500M (60kg)
    - II) Medium duty: #760H5500M (40kg)
  - B) Blum slide bracket #T51760102 (right)
  - C) Blum slide bracket #T51760103 (left)
  - D) Accessories:
    - I) Blum Tip-On #T60L7540100 (40kg)
    - II) Blum synchronization linkage (1) #T1601125W
    - II) Blum synchronization adapter (2) #T60000D

5. Adjustable shelf hardware: Standard metal shelf pins, 6.4 mm drilling diameter, 10kg load capacity per shelf, nickel finish #2100NS. Include centre support at back of shelf.
6. Cabinet toe kicks:
  - A) ABS adjustable legs/levelers #4501090
  - B) PVC tow kick (to clip onto legs), stainless steel finish, #7208100170 SS
  - C) Toe clip #2262490.
7. Recycling Centre:
  - A) Bottom mount recycling centre #255070100
  - B) Front door bracket - recycling #55520100 by Richelieu
  - C) Soft stop mechanism - recycling #15510100 by Richelieu
8. Sliding waste bin #2270100
9. Non-slip mats #4711015011, cut to size where necessary

### 2.3 FASTENINGS

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

## Part 3 Execution

### 3.1 INSTALLATION INSTRUCTIONS

1. Provide manufacturers' instructions for proper installation of each hardware component.

### 3.2 INSTALLATION

1. Hand over hardware items for installation by Section 06 41 00 "Architectural Wood Casework".



## **06 61 16 - SOLID SURFACING FABRICATIONS**

### **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 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 solid polymer fabrications for cabinet counter-tops and washroom vanities, as indicated on the drawings, as specified herein and as required for a complete project.
2. Related Work:
  - A) Section 06 71 00 - Architectural Wood Casework.

#### **1.3 SUBMITTALS**

1. General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specifications Sections.
2. Samples:
  - A) Submit duplicate colour samples of solid plastic material for colour section.
  - B) Submit samples of joints, edging, cutouts and profiles.
3. The accepted sample shall be the standard of acceptance for the work of this Section.
4. Product Data:
  - A) Provide product data.
  - B) Include installation instructions for solid polymer fabrications.
5. Maintenance Data: Provide maintenance data for solid polymer work for incorporation into the operation and maintenance manual specified in Section 01 78 00 "Closeout Submittals".

#### **1.4 PRODUCT HANDLING**

1. Cover finished surfaces with heavy Kraft paper or put in cartons during shipment. Protect installed laminated surfaces by approved means. Do not remove until immediately before final inspection.

#### **1.5 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.

#### **1.6 WARRANTY**

1. Warranty the work of this Section in accordance with the General Conditions of the Contract but for ten (10) years.

### **Part 2 Products**

#### **2.1 MATERIALS**

1.Solid surfacing material: Mineral-filled acrylic resin formulation with methacrylate binder, homogeneous, not coated, laminated or of composite construction. Product and colour to be selected by the Consultant.

## 2.2 ACCESSORIES

1. Joint adhesive: manufacturer's standard two-part adhesive kit to create inconspicuous, non-porous joints.
2. Sealant: manufacturer's standard mildew-resistant, silicone sealant in colours matching components. Refer to Section 07 92 00 "Joints Sealants".

## 2.3 FABRICATION

1. Fabrication to be performed by the solid surface manufacturer's certified fabricator/installer.
2. Verify dimensions prior to fabrication. Coordinate with Section 06 41 00 "Architectural Wood Casework" and verify on site.
3. Wherever possible, fabricate in single piece accurately made to fit space.
4. Factory fabricate components to greatest extent practicable. Sizes and shapes to be as indicated, in accordance with the reviewed shop drawings and the manufacturer's printed instructions. Countertop and sill thickness to be 19 mm minimum with 32 mm nosing and 25 mm overhand, unless noted otherwise.
5. Form joints between components using manufacturer's standard joint adhesive. Joints shall be inconspicuous in appearance and without voids. Attach 100 mm wide solid surfacing material reinforcing strip under joints.
6. Provide factory cutouts for plumbing fittings and toilet accessories. Use templates provided by the plumbing fixture and toilet accessories manufacturers for under-mount sinks and other plumbing fixtures and counter-mounted toilet accessories.
7. Cut and finish component edges with clean, sharp returns. Rout radii and contours to template. Rout cut-outs then sand edges smooth. Repair or reject defective and inaccurate work.
8. Thermoforming: comply with product with product data from the manufacturer of the solid plastic fabrications.
  - A) Construct moulds of plywood in "male/female" sections. Construct moulds to match the component shape.
  - B) Form pieces to shape prior to seaming and jointing.
  - C) Cut pieces to finished dimensions, sand edges, remove nicks and scratches.
  - D) Heat entire component of solid surfacing materials. Material shall be uniformed between 135°C and 163°C during forming.
  - E) Prevent blistering, whitening and cracking of material during forming.
9. Coved back-splashes and down-stands:
  - A) Field-fabricate 13 mm radius cove at the intersection of counters with back-splashes and down-stands where indicated on the drawings.
  - B) Except where otherwise indicated, form back-splashes using 13 mm thick material.
10. Surfaces shall have a uniform finish.

## Part 3 Execution

### 3.1 INSTALLATION

1. Install components plumb and level, scribed to adjacent finishes, in accordance with approved shop drawings and product installation data.

2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Keep components and hands clean when making joints.
3. Adhere under-mount or top-mount sinks/bowls to countertop, using manufacturer's recommended adhesives and colour-matched sealant.
4. Provide back-splashes and side-splashes as indicated. Adhere to countertop using manufacturer's standard colour matched silicone sealant.

### 3.2 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.
2. Clean any drippage and spills of surplus adhesive or sealant from adjacent surfaces.
3. Remove adhesives, sealants and other stains. If stains cannot be removed, replace entire component.
4. Make good any damage caused by the work of this Section.

### 3.3 PROTECTION

1. Cover and protect surfaces from damage until date of Substantial Performance. Repair work or replace damaged work that cannot be repaired.

## **07 20 00 - INSULATION AND FIRESTOPPING**

### **1.1 SCOPE**

1. Insulate where indicated on or reasonably infer from the drawings and schedules, as necessary for a complete job, including but not necessarily limited to the following locations: Batt acoustic insulation in interior wall cavities, Thermal insulation in exterior wall and soft cavities, Division 15 items (see Mechanical Drawings and Specifications).

### **1.2 SUBMITTALS**

1. Submit product literature for ULC listed firestop sealant.
2. Submit product literature for sealing tape.

### **1.3 MATERIALS**

1. Thermal Insulation: mineral fibre batt insulation for thermal insulation to CSA A101, Type 1, thickness as indicated. Acceptable materials:
  - a) Fibreglas Pink friction fit batts by Fiberglas Canada Ltd.
  - b) Foxul Plus friction fits batts by Roxul Inc.
2. Acoustic Insulation: non-combustible, mineral wool insulation for acoustic insulation to CAN/ULC - S114 (ASTM-E 136). Thickness as indicated. Acceptable materials:
  - a) Roxul Acoustic Fire Batt (AFB) friction fit batts by Roxul Inc.
3. Fire Stop Batt: bonded non-combustible mineral wool insulation for fire stop installations. Thickness as required to maintain rating. Acceptable materials:
  - a) Roxul RXL SAFE batt by Roxul Inc.
  - b) A/D FIREBARRIER batt by A?D Fire Protection Systems Inc.For openings more than 3", A/D FIREBARRIER Sealant is required.

### **1.4 INSTALLATION**

1. Install mineral fibre batts to provide complete and continuous acoustic and thermal insulation as applicable.
2. Fit insulation closely around electrical boxes, pipes, ducts, frames, and other objects in or passing through insulation.
3. Do not compress insulation to fit into spaces.

### **1.5 FIRESTOPPING**

1. Install mineral fibre filler and ULC listed firestop sealant at top of walls to provide continuous fire separation and smoke seal.

## 07 21 00 - BUILDING INSULTATION

### 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 building insulation, as indicated on the drawings, as specified herein and as required for a complete project.
2. Related Work:
  - A) Section 03 30 00 - Cast-in-Place Concrete.
  - B) Section 05 41 00 - Structural Metal Stud Systems
  - C) Section 07 21 20 - Urethane Foam Insulating Sealant.
  - D) Section 07 26 00 - Sheet Vapour Retarders
  - E) Section 07 27 10 - Vapour Permeable Air/Moisture Barrier.
  - F) Section 07 52 16 - SBS Modified Bituminous Roofing
  - G) Section 09 21 16 - Gypsum Board Assemblies.
  - H) Section 09 22 16 - Non-Structural Metal Stud Systems.
  - I) Section 31 23 10 - Excavating, Trenching and Back-filling.

#### 1.3 REFERENCE STANDARDS

1. American Society for Testing and Materials (ASTM):
2. Underwriters' Laboratories of Canada (ULC):
  - A) CAN/ULC-S701-11, Standard for Mineral Fibre Thermal Insulation, Polystyrene Boards and Pipe Covering.
  - B) CAN/ULC-S702.1:2014-AMD1, Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification.
  - C) CAN/ULC-S702.2-15, Mineral Fibre Insulation for Buildings, Part 2: Application Guidelines.

#### 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: Submit manufacturer's product data, including manufacturer's literature for each insulation material and accessory, indicating compliance with specified requirements and material characteristics.
  - A) Include preparation instructions and recommendations, installation methods, and storage and handling requirements.
  - B) Include manufacturer's material safety data sheets for the handling of the specified materials and products, in accordance with Workplace Hazardous Materials Information Service (WHMIS) requirements.
3. Samples:
  - A) Submit a 300 mm x 300 mm minimum sample of each type of insulation in the thickness used on the project.
4. Test Reports: If requested by the Consultant, submit evaluation service reports or other independent testing agency reports showing compliance with specified performance characteristics and physical properties.

**1.5 QUALITY ASSURANCE**

1. Board Insulation Installer Qualifications: Minimum 5 years experience with work similar to that required for this Section.

**1.6 COORDINATION**

1. Coordinate the work of this Section with the work of other related trades for proper time and sequence to avoid construction delays.

**1.7 DELIVERY, STORAGE AND HANDLING**

1. Deliver products in original unopened packaging with legible manufacturer's identification.  
2. Store materials off ground in dry location and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

A) Store in original packaging until installed

B) Ensure insulation materials are not exposed to moisture during delivery.

C) Replace wet or damaged insulation materials.

**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 the specified products.

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 BOARD INSULATION**

1. Below grade foundation wall, under-slab, and where not otherwise indicated: Extruded polystyrene board insulation to CAN/ULC-S701, Type 4, square ends, ship-lap edges except where otherwise indicated, thickness as indicated. Minimum RSI 0.87 m<sup>2</sup>°C/W per 25 mm thickness, compressive strength 210 kPa. Standard of Acceptance: Styrofoam SM.

2. Above-grade walls and soffit: Semi-rigid board insulation made from basalt rock and steel slag, conforming to CAN/ULC-S702, Type 1, thickness as indicated. Minimum RSI 0.74 m<sup>2</sup>°C/W per 25 mm thickness. Standard of acceptance: Roxul CavityRock, as follows:

A) Monolithic density: 70 kg/m<sup>3</sup>

B) Dual density: 100 kg/m<sup>3</sup> outer layer; 65 kg/m<sup>3</sup> inner layer;

3. Roof insulation: Refer to Section 07 52 16 "SBS Modified Bituminous Roofing".

**2.3 BATT INSULATION**

1. Thermal insulation batts: Mineral wool fibre batt insulation for metal stud framing application made from basalt rock and steel slag, conforming to CAN/ULC-S702, Type 1, minimum 40% recycled content. Standard of acceptance: Roxul ComfortBatt insulation.

2. Acoustical fire batts for interior partitions where acoustical insulation is called for and where the batt insulation constitutes part of a fire resistant assembly: AFB mineral wool fibre batt insulation made from basalt rock and steel slag, conforming to CAN/ULC-S702, Type 1, minimum 40% recycled content. Standard of acceptance: Roxul AFB acoustical fire batt.

#### 2.4 ACCESSORIES

1. Provide mechanical fasteners, insulation clips, and other accessories as recommended by the insulation manufacturer to retain the insulation in position, for each specific application.

### 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 that conditions of substrate previously installed by other trades are acceptable for insulation installation in accordance with the manufacturers' written recommendations.

A) Visually inspect the substrate in the presence of the Consultant.

B) Ensure surfaces are free of snow, ice, frost, grease and other deleterious materials.

C) Where applicable, verify that the air vapour barrier is in place and undamaged and has been reviewed and accepted by the Consultant.

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 Trade Contractor shall be fully responsible for satisfactory work as specified herein.

#### 3.2 WORKMANSHIP

1. Do not install insulation until the work behind it has been reviewed and accepted by the Consultant.

2. Install insulation in strict accordance with the insulation manufacturer's written instructions , to maintain continuity of thermal, acoustical and fire protection to building elements and spaces.

3. Apply single layer of insulation to produce thickness indicated, except where multiple layers are indicated or required to make up total thickness. Offset both vertical and horizontal joints in multiple layer applications.

4. Use only insulation that is undamaged, dry, unsoiled, free from chipped or broken edges, and has not been exposed at any time to ice and snow.

5. Cut and trim insulation to a neat compression-fit in spaces. Do not compress insulation excessively to fit spaces. Butt joints tightly. Use largest possible dimensions to reduce number of joints.

6. Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation in accordance with the manufacturer's instructions.

7. Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of chimneys and vents.

8. Where necessary, retain insulation in position with mechanical fasteners recommended by the insulation manufacturer for the specific application.

9. Do not enclose insulation until it has been reviewed and acceptance by the Consultant.

#### 3.3 BELOW-GRADE FOUNDATION WALL AND UNDERSLAB INSULATION

1. Where indicated, install below grade insulation.

2. Prepare the foundation wall surface. Remove any loose material. Remove high spots to present a smooth surface.

3. Install board insulation in strict accordance with the manufacturers printed instructions, after the concrete is fully cured.
4. Install with tight shiplap joints.
5. Where necessary to hold insulation boards in place, apply adhesive (compatible with polystyrene) to the boards. Press insulation boards into position prior to skinning of adhesive.
6. Coordinate with the excavating, trenching and back-filling contractor to ensure suitable preparation of the sub-grade to receive below-grade horizontal insulation.
7. Butt adjacent insulation boards up tightly and ensure that corners are fully lapped.
8. Trim insulation boards as needed to fit around openings and projections.
9. Unless otherwise indicated, extend insulation boards from the top of the foundation wall down to the top of the footing. Install on the exterior face of the perimeter foundation wall with adhesive.
10. Provide rigid insulation below grade and above grade concrete faced "skirt" insulation at exposed locations. Install the unfaced insulation board on the exterior face of the foundation wall at the below-grade portion the foundation wall around the entire perimeter, taking care to ensure that the top shiplap edge is at the correct elevation and is arranged so as to properly interface with the concrete faced "skirt" insulation board to be installed above.
11. Where horizontal, below-grade board insulation is indicated, coordinate with the excavating, trenching and backfilling subcontractor to ensure suitable preparation of the subgrade to provide smooth, flat surface to the insulation.
12. Coordinate scheduling of the work with the excavating, trenching and back-filling subcontractor to ensure back-filling as soon as possible after the insulation has been reviewed and accepted by the Consultant.

#### 3.4 ABOVE-GRADE BOARD INSULATION INSTALLATION - WALLS

1. Install insulation, in the thickness indicated, to maintain continuity of thermal protection to building elements and spaces.
  - A) Install mineral fibre installation in accordance with CAN/ULC 5702.2 and the manufacturer's installations.
  - B) Install insulation progressively with the substructure supporting the aluminum siding and wall panels. Coordinate with Sections 07 42 43 "Composite Aluminum Wall Panels" and 07 46 16 "Preformed Aluminum Siding".
  - C) Cut and trim insulation neatly to fit spaces. Butt joints tightly. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
  - D) Cut and trim insulation neatly to fit spaces. Butt joints tightly. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
  - E) Fill voids with insulation.
  - F) Remove projections that interfere with placement.
2. Attachment:
  - A) Retain insulation firmly against the surface of the interior wythe of the masonry wall or the exterior wall sheathing, as applicable, with cavity wall insulation retaining devices, purpose-made to fit masonry tab ties.
  - B) Where the use of the insulation retaining devices is not feasible, retain insulation with spindle anchors and washers.
  - C) Locate retaining devices on a grid not to exceed 408 mm x 610 mm

#### 3.5 BATT INSULATION INSTALLTION



1. Install, batt insulation in strict accordance with the insulation manufacturer's written instructions and as specified to maintain continuity of thermal, acoustical and fire protection to building elements and spaces.

3.6 CLEANING

1. Progress Cleaning: Perform cleanup as work progresses in accordance with Section 01 74 13 "Progress and Final Cleaning".
2. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 13 "Progress and Final Cleaning".

3.7 PROTECTION

1. Protect installed products and accessories from damage during construction.
2. Repair damage to adjacent materials caused by insulation installation.

## 07 21 19 - SPRAY-APPLIED URETHANE FOAM INSULATION

### 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 foamed-in-place polyurethane foam insulation as indicated on the drawings, as specified herein and as required for a complete project.
2. Related Sections:
  - A) Sections: 07 21 20 - Urethane Foam Insulation Sealant.

#### 1.3 REFERENCES

1. American Society for Testing and Materials (ASTM):
  - A) ASTM A653/A653M-17, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
  - B) ASTM C411-17, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
  - C) ASTM C518-17, Standard Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
  - D) ASTM C1338-14, Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
  - E) ASTM D1621-16, Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
  - F) ASTM D1622/D1622M-14, Standard Test Method for Apparent Density of Rigid Cellular Plastics.
  - G) ASTM D1623-17, Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
  - H) ASTM D2126-15, Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
  - I) ASTM D2369-10 (2015) e1, Standard Test Method for Volatile Content of Coatings.
  - J) ASTM D2842-12, Standard Test Method for Water Absorption of Rigid Cellular Plastics.
  - K) ASTM D6226-15, Standard Test Method for Open Cell Content of Rigid Cellular Plastics
  - L) ASTM E96/E96M-16, Standard Test Methods for Water Vapor Transmission of Materials.
2. Health Canada/Workplace Hazardous Materials Information Systems (WHMIS):
  - A) Material Safety Data Sheets (MSDS).
3. Underwriters' Laboratories of Canada (ULC):
  - A) CAN/ULC-S102-11, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  - B) CAN/ULC-S127-14, Standard Corner Wall Method of Test for Flammability Characteristics of Non-Melting Building Materials.
  - C) CAN/ULC-S705.1-15, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Material - Specification.
  - D) CAN/ULC S705.2-05, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density -Application.

- E) CAN/ULC S770-15 - Standard Test Method for Determination of Long-term Thermal Resistance of Closed-Cell Thermal Insulation Foams.
- F) CAN/ULC S774-14, Standard Laboratory Guide for the Determination of Volatile Organic Compound Emissions from Polyurethane Foam.

#### 1.4 COORDINATION

1. Coordinate with other work having a direct bearing on work of this section.
2. Coordinate the work to ensure the timely placement of the insulation in the construction sequence.
3. Hold a preinstallation conference on week before the work of this section starts, with the following present:
  - A) Construction Manager
  - B) Consultant
  - C) Manufacturer's technical representative
  - D) Trade Contractor (Installer)
  - E) Other trade contractors affecting or affected by the work of this Section.

#### 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. Sprayed polyurethane foam (SPF) installer certificate: Submit the name of the SPF installer with a copy of a certification card verifying that the SPF installer is licensed by the source manufacturer.
3. Shop Drawings: Indicate elevations, sections, materials, details of joint conditions, including door, window, entrance framing, flashings and roof parapet connection.
4. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements as evidenced by a current CCMC Evaluation Report.
5. Applicator's Certificates:
  - A) Applicator's current certificate of approval be CUFCA/NECA or BASF Canada's training program.
  - B) Applicator's current certificate of approval from the material manufacturer.
6. Product Data:
  - A) Provide complete manufacturer's product data.
  - B) Include product description, insulation properties, preparation requirements and overcoat properties.
  - C) Include manufacturer's special installation requirements for this specific application, including conditions requiring special attention.
  - D) 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.
7. Reports:
  - A) Submit testing reports as performed by manufacturer's approved testing agency as required by CAN/ULC S705.2
  - B) Submit daily reports as required by CAN/ULC S705.2

#### 1.6 QUALITY ASSURANCE

1. Spray polyurethane foam (SPF) manufacturer qualifications: A company specializing in the manufacture of the specified products with minimum 20 years documents successful experience in the manufacture of spray-applied foam insulation.
2. Spray polyurethane foam (SPF) installer qualifications:

- A) A company specializing in performing the work of this section with minimum 5 years documented experience, licensed by the material manufacturer as an approved installer.
  - B) Employ only skilled tradesmen who have successfully completed a course of instruction provided by the material manufacturer and are experienced in this work.
  - C) If requested by the Consultant, provide evidence of previously completed projects of a similar nature.
3. Independent Testing Agency:
- A) The Construction Manager may engage an independent inspection and testing agency to verify conformance to specified requirements.
  - B) The cost of initial test/inspections will be paid by the Owner. The costs of additional test/inspections necessitated by failure to meet specification requirements on the initial test/inspection shall be paid by the Trade Contractor.
4. Provide adhesion tests on transition membranes, in accordance with the manufacturer's written instructions, at the perimeter of all openings. Adhesion tests shall be conducted on no less than 15% of the openings. Openings to be tested will be identified by the Consultant.
5. Manufacturer's Site Reviews:
- A) Arrange for a minimum of two site reviews during the installation by the product manufacturer's authorized technical representative.
  - B) Upon completion, provide a letter certifying conformity of the installation with the specified requirements, signed by the product manufacturer.
6. On-site Documentation:
- A) Maintain a copy of the manufacturer's installation guidelines and manufacturer's specific instructions for this application on site during application of polyurethane foam.
  - B) Compile Daily Reports and maintain on site during application.
- 1.7 ENVIRONMENTAL REQUIREMENTS
1. Do not install the work of this section outside the following environmental ranges without the Consultant's and the product manufacturer's written acceptance.
- A) Ambient air and surface temperature: 5°C to 40°C
  - B) Relative humidity: Above 85%
2. Supply and install temporary protection and facilities to maintain the product manufacturer's and the above specified environmental requirements for 48 hours before, during, and 48 hours after 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 GENERAL**

1. Acceptable products:

- A) Walltite ECO c.2 by BASF Canada Inc.
- B) Styrofoam Brand SPF CA by Dow.
- C) CertaSpray Closed Cell Foam Insulation by Certainteed.

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 INSULATION

1. Polyurethane foam insulation to CAN/ULC S705.1, closed cell, spray-applied rigid cellular polyurethane foam air barrier and thermal insulation, medium density, characteristics as follows:

- A) Water Vapour Permanence (ASTM E96): 42 ng/Pa-s-sq m
- B) Flame Spread Classification (CAN/ULC S102): Flame Spread <500 Smoke Developed <500
- C) Hot Surface Performance (ASTM C411): Passed when exposed to 93°C for 96 hours.
- D) Fungi Resistance (ASTM C1338): No fungal growth after 28 day incubation.
- E) Long Term Thermal Resistance (LTTR)  
(CAN/ULC S770):
  - RSI 1.95 @ 50 mm
  - RSI 3 @ 75 mm
  - RSI 4.12 @100 mm
  - RSI 1.03/25 mm above 100 mm
- F) Physical Requirements:
  - I) Density (ASTM D1622): Minimum 32 kg/m<sup>3</sup>
  - II) Compressive Strength  
(ASTM D1621): 186 kPa - 201 kPa.
  - III) Tensile Strength (ASTM D1623): 241 kPa - 325 kPa
  - IV) Open Cell Content (ASTM D2856): 6.0% - 8.0%
  - V) Water Absorption (ASTM D2842): 0.6% - 1.2% by volume

2. Primers: as recommended by the spray-applied foam insulation manufacturer.

3. Transition strip membrane:

A) Membrane: 1.0 mm thick, single ply, self-adhering, self-sealing rubberized asphalt bonded to a cross-laminated, high density polyethylene film. Standard of acceptance:

- I) Blueskin SA by Henry Co.
- II) Sopraseal Stick 1100 by Soprema
- III) Exo-Air 110 by Tremco
- IV) Air-Shield by W.R. Meadows

B) Primer: Standard of acceptance:

- I) Aquatac by Henry Co.
- II) Elastocol Stick H20 by Soprema
- III) Exo-Air WB Primer by Tremco
- IV) Mel-Primer Water Base by W.R. Meadows

C) Mastic: Standard of acceptance:

- I) Polybitume 570-05 by Henry Co
- II) Sopramastic by Soprema
- III) Acoustical Sealant by Tremco
- IV) Sealtight Pointing Mastic by W.R Meadows.

D) Fastening bar: Continuous 25 mm wide x 3 mm thick aluminum bar, pre-drilled for mechanical attachment.

E) Fasteners: As specified herein or manufacturer's recommended fastener for attaching to substrate.

4. Sheet metal closures:

- A) Sheet metal: 0.71 mm (23 ga) thick to ASTM A653, Grade A, Z275 commercial quality zinc coating.
- B) Joint sealing tape: 100% solid, cross-linked butyl, preformed sealing tape. Standard of acceptance: Tremco 440 Tape by Tremco Ltd. or approved equivalent.

C) Sealant: One=part, non-sag. Standard of acceptance:

- I) TRS 600 by Tremc Ltd.
- II) NovaLink by ChemLink
- III) Approved equivalent.

## 2.3 EQUIPMENT

1. Comply with CAN/ULC S705.2 and the equipment manufacturer's recommendations for specific type of application.

## 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 work with construction spaces or crevices is complete prior to insulation application.
3. Verify that surfaces are clean, dry, and free of matter that may inhibit adhesion.
4. Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.
5. 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 PREPARATION

1. Mask and protect adjacent surfaces from overspray or dusting. Determine if a primer is required for certain substrates.
2. Apply primer where required in accordance with manufacturer's written instructions.
3. Prime all metal and non-porous surfaces when required by polyurethane foam manufacturer's written instructions.
4. Provide ventilation in the area to receive spray-applied foam insulation, introducing fresh air and exhausting continuously during and for 24 hours after installation.
5. Provide temporary enclosures to prevent spray from contaminating air beyond the application area and to prevent damage from overspray and dusting on adjacent surfaces.

### 3.3 INSTALLATION

1. Apply insulation to CAN/ULC-S705.2 and manufacturer's written instructions.
2. Apply insulation by spray method, to a uniform monolithic density without voids, in lifts not exceeding 50 mm thickness in a single pass.
3. Apply to a minimum cured thickness indicated within a tolerance of +3 mm provide one measuring pin every 5 m<sup>2</sup>.
4. Finished surface of foam to be free of voids and embedded foreign objects. Insulation to be continuous, level, plumb and uniform thickness throughout.
5. Tie in air/vapour retarder membrane in locations indicated on the Contract Documents where spray foam meets adjacent construction assemblies and where required to provide a continuous and seamless air/vapour retarder membrane across the entire building envelope.
6. Remove masking materials and overspray from adjacent areas immediately after foam surface has hardened.
7. Repair damaged areas in accordance with SPF manufacturer's application guidelines.

### 3.4 TRANSITION STRIPS

1. Install transition strips at all joints, expansions, cracks, and other locations of movement to ensure continuity of the air/vapour retarder.
2. Mastic and primer:
  - A) Fill substrate voids, depressions, cracks, and joints with mastic until a continuous, smooth, substrate for the transition strip membrane is achieved.
  - B) Prime substrate surfaces to receive the membrane in accordance with the manufacturer's instructions, at the recommended application rate, Allow to dry. Vary coverage to suit surface porosity.
  - C) Re-prime surfaces if not covered with transition strip membrane within 4 hours.
3. Install transition strip membrane in accordance with the manufacturer's instructions in locations indicated and as required by the site conditions to maintain continuity of the insulation and air barrier.
  - A) Lap membrane ends and edges minimum 50 mm, roll membrane and laps for continuous adhesion over the entire substrate area. Use the manufacturer's recommended roller.
  - B) Extended transition strip membrane as required to connect to other components of the work.
  - C) Cut and fit the membrane as required for the passage of protrusions, ensuring continuous adherence to the substrate.
  - D) Install mastic where required to ensure the integrity of the transition strip membrane installation at protrusions and other complex details.
  - E) At the end of each day's work, trowel a mastic water cut-off along the uppermost edge of the incomplete membrane assembly to prevent loss of adhesion and damage to the transition membrane.
  - F) Fastening bars: supply and install a continuous mechanical fastening bar to clamp the transition strip membrane both sides of unfilled cracks, gaps and joints.

### 3.5 SHEET METAL CLOSURES

1. Provide sheet metal closures at all joints over 25 mm wide. Ensure surfaces receiving sealant or tape are dry, firm, straight, and free of loose material, projections, ice, frost, grease, or oil, and other detrimental material.
2. Secure sheet metal closures with self-tapping screws at 150 mm o.c. along edges of panels and 450 mm o.c at intermediate fixings.
3. At overlapping sheet metal edges, apply a continuous strip of tape; also gun-apply a continuous 6 mm bead of sealant along sheet metal edges. Liberally butter all screw fastenings penetrating the sheet metal closures or use a self-sealing EPDM washer at each screw fastener.

### 3.6 FIELD QUALITY CONTROL

1. The Construction Manager may engage a testing agency to conduct field inspection services such as building envelope testing, tomographic surveys, etc.
2. The cost of initial inspections and tests will be paid by the Owner. The cost of re-inspection and retesting necessitated by failure to meet specification requirements on the initial inspection/test shall be paid by the Trade Contractor.
3. Conduct daily visual inspection, adhesion testing and density measurements as required by CAN/ULC S705.2 and the manufacturer's application guidelines.

### 3.7 PROTECTION OF FINISHED WORK

1. Do not permit subsequent construction work to disturb applied polyurethane foam.

3.8 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.
2. Clean any drippage, spills and overspray of surplus foam insulation from adjacent surfaces.
3. Make good any damage caused by the work of this Section.



## **07 21 20 - URETHANE FOAM INSULATING SEALANT**

### **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 polyurethane foam insulating sealant, as indicated on the drawings, as specified herein and as required for a complete project.

2. Related Work:

- A) Section 07 21 00 - Building Insulation
- B) Section 07 26 00 - Sheet Vapour Retarders
- C) Section 07 21 16 - Vapour Permeable Air/Moisture Barrier
- D) Section 07 92 00 - Joint Sealants
- E) Section 08 11 13 - Steel Doors and Frames
- F) Section 08 11 16 - Aluminum Doors and Frames.
- G) Section 08 36 13 - Sectional Metal Overhead Doors
- H) Section 08 42 26 - All-Glass Entrance
- I) Section 08 44 13 - Glazed Aluminum Curtain Wall.

#### **1.3 REFERENCES**

1. Underwriter's Laboratories of Canada (ULC):
  - A) CAN/ULC-S102-10, Method of Test for Surface Burning Characteristics of Building 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.

#### **1.5 ENVIRONMENTAL REQUIREMENTS**

1. Apply insulation only when surfaces and ambient temperatures are within the manufacturer's prescribed limits.

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

1. Deliver products in original unopened packaging with legible manufacturer's identification.
2. Store materials in strict accordance with the manufacturer's recommendations.

#### **1.7 COMPATIBILITY**

1. Provide written certification, signed by the insulating sealant manufacturer, that sealant is fully compatible with the building air/vapour barrier membrane, Confirm that the membrane will not shrink and pull the membrane away from its substrate.

#### **1.8 WASTE MANAGEMENT AND DISPOSAL**

1. Cooperate with the Construction Manager's Waste Management Coordinate 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 MATERIAL**

1. Foam insulating sealant: Two-component polyurethane foam insulating sealant, ULC Class I (Flame spread of 25 or less) to CAN/ULC-S102.

## **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. Ensure that surfaces are free of dust, oil, grease and other loose debris which may impair bond.
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 Trade Contractor shall be fully responsible for satisfactory work as specified herein.

### **3.2 PROTECTION**

1. Provide suitable protective masking to adjacent exposed surfaces.

### **3.3 FOAM INSULATING SEALANT APPLICATION**

1. Apply foam insulation sealant in strict accordance with the manufacturer's printed directions, using dispensing gun from material manufacturer. Fill all voids in the exterior wall insulation with sealant.
2. Apply in all locations where required to maintain the continuity of the insulation and/or the vapour barrier, including, but not necessarily limited to the following:
  - A) Sealing voids in the exterior envelope of the building and at all locations where the continuity of the insulation is interrupted.
  - B) Sealing at junctions between materials and components which comprise the air barrier as required to maintain continuity of the air barrier.
3. Note that this material expands 2.5 times its original volume when applied. Do not overfill voids.
4. If necessary, apply in several layers, each successive layer being allowed to cure before next layer is applied.
5. Curing may be accelerated in deep cavities by slight moistening of surrounding surfaces prior to application.
6. While curing, foam to be tooled, if required.
7. If leakage occurs after curing, cut back flush with surrounding surfaces or recess to sufficient depth to provide for finishing caulking,

### **3.4 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 insulation clean.
2. Remove masking and temporary protection from adjacent surfaces.
3. Clean and make good any damage to adjacent surfaces caused by the work of this Section.

## 07 26 00 - SHEET VAPOUR RETARDERS

### 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 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 sheet vapour retarders under the concrete floor slab, to exterior steel stud walls, and elsewhere, as indicated on the drawings, as specified herein and as required for a complete project.

2. Related Work:

- A) Section 03 30 00 - Cast-In-Place Concrete: Concrete floor slab.
- B) Section 05 41 00 - Structural Metal Stud Systems
- C) Section 07 21 00 - Building Insulation
- D) Section 07 27 16 - Vapour Permeable Air/Moisture Barrier
- E) Section 07 52 16 - SBS Modified Bituminous Roofing
- F) Section 07 92 00 - Joint Sealants
- G) Section 08 80 00 - Glazing

#### 1.3 REFERENCES

1. American Concrete Institute (ACI)
  - A) ACI 302.1R-15, Guide to Concrete Floor and Slab Construction
  - B) ACI 302.2R-06, Concrete Slabs that Receive Moisture-Sensitive Flooring Materials Slab Combination Pack.
2. American Society for Testing and Materials (ASTM):
  - A) ASTM D1709-16a1, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
  - B) ASTM E96/E96M-16, Standard Test Methods for Water Vapor Transmission of Materials.
  - C) ASTM E154/E154M-08a(2013)e1, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
  - D) ASTM E1643-18, Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
  - E) ASTM E1745-17, Standard Specification for Water Vapor Retarders Used in Contract with Soil.
3. Health Canada/Workplace Hazardous Materials Information System (WHMIS):
  - A) Material Safety Data Sheets (MSDS).

#### 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 product data on sheet vapour retarder and joint tape specified, including data substantiating that materials comply with specified requirements.
  - B) Include installation instructions.
  - C) 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. Samples: Submit duplicate minimum 150 mm x 150 mm samples of each type of sheet material and minimum 1 m joint tape.

4. Compatibility: Provide written confirmation, signed by the manufacturers, that the vapour retarder materials are compatible with adjacent membranes and sealants.

**1.5 DELIVER, STORAGE AND HANDLING**

1. Deliver materials to project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacturer, and directions for storage.

2. Store materials in their original undamaged packages in a clean, dry, protected location and within the temperature range required by the material manufacturer. Protect stored materials from direct sunlight.

3. Stack material on smooth ground or wood platform to eliminate warping.

4. Protect materials during handling and application to prevent damage or contamination.

**1.6 ENVIRONMENTAL REQUIREMENTS**

1. Be advised that these products are not intended for uses subject to abuse or permanent exposure to ultra violet light.

**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 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 specified is based on the specified products.

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 MATERIALS**

1. Sheet vapour retarder for walls and roof: 0.51 mm nylon film vapour retarder, with the following minimum performance characteristics:

A) Surface burning characteristics:

I) Flame spread index: maximum 20.

II) Smoke development: maximum 55.

B) Water Vapor Transmission rate:

I) Standard dry cup method: 1 perm or less.

II) Wet cup method: 10 perms or greater.

C) Fungi Resistance: No growth.

D) Corrosion Resistance: No unusual aspect of corrosion such as pitting, cracking, and adhesive cure inhibition.

E) Standard of acceptance: MemBrain Smart Vapor Retarder by CertainTeed Corporation.

Provide in lengths and widths required for least number of seams.

2. Sheet vapour retarder/moisture barrier for concrete slab-on-grade: 0.38 mm thick polyolefin-based vapour barrier/retarder specifically formulated for use under concrete slab-on-grade, with the following minimum performance characteristics:

- A) Water vapour permanence (ASTM E96, Water Method): 0.0093 Perms
- B) Puncture resistance (ASTM D1709, Method B): >4300 Grams
- C) Tensile strength (ASTM E154, Section 9): 84 lb force/inch
- D) Water vapour permanence (after wetting out), drying out and after long term soaking (ASTM E154, Section 8 and ASTM E96, Procedure B): 0.0136 Perms
- E) Water vapour permanence, resistance to plastic flow and elevated temperature (ASTM E154, Section 11 and ASTM E96, Procedure B): 0.0121 Perms
- F) Water vapour permanence, effect of low temperature and flexibility (ASTME154, Section 12 and ASTM E96, Procedure B): 0.0140 Perms
- G) Water vapour permanence, resistance to deterioration from organisms and substances in contacting soil (ASTM E154, Section 13 and ASTM E96, Procedure B): 0.0123 Perms
- H) Material shall meet or exceed all requirements of ASTM E1745, Class A, B, and C.
- I) Material shall meet or exceed the vapour retarder/moisture barrier recommendations of ACI 302.2R.
- J) Standard of acceptance:
  - I) Permiator 15 mil by W.R. Meadows.
  - II) Stego Wrap Vapour Barrier by Stego Industries LLC.

### 2.3 ACCESSORIES

1. Seam tape: Tape with pressure sensitive adhesive, as recommended by the membrane manufacturer for each specific product:
  - A) Walls and roof: 75 mm
  - B) Under slab-on-grade: 100 mm
2. Fasteners:
  - A) Screws for wood substrate: #7 x 11 mm plated steel or stainless self-tapping or self-drilling pan, cap, or washer head screws placed at 300 mm o.c. Do not use galvanized screws.
  - B) Staple Fasteners: 6mm narrow crown staples minimum length 12 mm installed at 300 mm o.c.
3. Pointing mastic: As recommended by the membrane manufacturer.

## 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 that services are installed and have been reviewed and acceptance by the Consultant prior to installation of the vapour retarder.
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 Trade Contractor shall be fully responsible for satisfactory work as specified herein.

### 3.2 SURFACE PREPARATION

1. Installation shall be in accordance with manufacturer's instruction.

2. For under-slab-on-grade application, level, tamp, or roll earth or granular material beneath the slab base in accordance with ASTM E1643. and ACI 302.1R prior to placement of the membrane.

### 3.3 INSTALLATION -WALLS

1. Installation shall be in accordance with manufacturer's instruction.
2. Install sheet vapour retarder on the warm side of exterior building envelope assemblies prior to the installation of gypsum board to form a continuous barrier.
3. Unroll vapour retarder with the longest dimension parallel with the insulated wall.
4. Lap vapour retarder over head and sill plates.
5. Use sheets of largest practical size to minimize joints. Overlap vapour retarder joints 75 mm and seal with tape.
6. Installed vapour retarder shall form a complete and continuous envelope at exterior building elements, properly sealed at joints, fastenings and penetrations, effectively resisting moisture migration.
7. Coordinate the installation of the vapour retarder with the installation of the membrane air barrier specified in Section 07 27 16 to ensure continuity between the vapour retarder and the air barrier at door and window openings and other penetrations.
8. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapour retarders with tape of type recommended by vapour retarder manufacturer to create an air-tight seal between penetrating objects and vapour retarder.
9. Minimize wrinkles along the stud surfaces to make gypsum board installation easier.
10. Inspect sheets for continuity. Repair punctures and tears with sealing tape or another layer of vapour retarder before work is concealed. Where a vapour retarder is punctured, apply a patch with minimum of 150 mm overlap in any direction. Tape continuously around the perimeter of each patch.
11. To ensure continuity of the vapour barrier at all locations, install strips of vapour barrier material of sufficient widths at all intersecting walls, at tops of walls at joist bearings, and at all other locations where subsequent work would otherwise prevent installation of a continuous vapour retarder membrane.

### 3.4 INSTALLTION - UNDER SLAB-ON-GRADE

1. Install vapour retarder/moisture barrier membrane in accordance with the manufacturer's instructions.
2. Unroll membrane over the area where the slab is to be poured. Cut to size. The membrane must completely cover the pour area. Use sheets of largest practical size to minimize joints.
3. Overlap all joints/seams, both side and end minimum 150 and tape using 100 mm wide tape. The tape area of adhesion must be free from dust, dirt, and moisture to allow maximum adhesion of the pressure-sensitive tape.
4. Before placing concrete slab, ensure all penetrations, block outs, and damaged areas are repaired/ addressed.
5. Seal all protrusions. Cut a slit around pipes, duct-work, rebar, and wire penetrations to place the initial layer of membrane. To further protect the concrete slab from external moisture sources, use a piece of membrane and place a collar around this as well.
  - A) Cut a piece of membrane minimum 300 mm wide x  $1\frac{1}{2}$  times the pipe circumference. With a roofer's knife or scissors, cut "fingers" half the width of the film.
  - B) Wrap around and tape the collar onto the pipe and completely tape fingers to the bottom layer of membrane.
6. Inspect membrane for continuity. Repair damage to the membrane occurring during or after installation.

- A) Cut a piece of membrane large enough to cover any damage by a minimum overlap of 150 mm in all directions.
  - B) Clean all adhesion areas of dust, dirt, and moisture.
  - C) Tape down all edges using the manufacturer's recommended 100 mm wide tape.
7. Leave ready to receive concrete slab, poured directly on the vapour retarder/moisture barrier membrane.

### 3.5 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.
2. Make good any damage caused by the work of this Section.

## **07 27 16 - VAPOUR PERMEABLE AIR/MOISTURE BARRIER**

### **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 supply and install a self-adhered, vapour permeable air/moisture barrier system, as indicated on the drawings as AB-2, as specified herein and as required for a complete project.
- B) The air/moisture barrier system includes:
  - I) Adhesive/Primer
  - II) Self-Adhered Water Resistive Air Barrier
  - III) Air Barrier/Thru-wall Flashing
  - IV) Sealant
- C) The work of this Section includes:
  - I) The bridging and sealing of the following air leakage pathways and gaps:
    - 1) Connections of the walls to the roof air barrier
    - 2) Connections of the walls to the foundations.
    - 3) Seismic and expansion joints.
    - 4) Openings and penetrations of window and door frames, store front, curtain wall.
    - 5) Piping, conduit, duct, and similar penetrations.
    - 6) Masonry tie, screws, bolts and similar penetrations
    - 7) All other air leakage pathways in the building envelope.
  - II) Materials and installation methods of the primary air/vapour barrier membrane system and accessories.
  - III) Materials and installation methods of through-wall flashing membranes.

##### **2. Related Sections:**

- A) Section 05 41 00 - Structural Metal Stud Systems
- B) Sections 07 21 00 - Building Insulation
- C) Section 07 21 20 - Urethane Foam Insulating Sealant
- D) Section 07 26 00 - Sheet Vapour Retarders
- E) Section 07 42 43 - Composite Aluminum Wall Panels
- F) Section 07 52 16 - SBS Modified Bituminous Roofing
- G) Section 07 62 00 - Sheet Metal Flashing and Trim
- H) Section 07 92 00 - Joints Sealants
- 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

#### **1.3 REFERENCES**

1. American Architectural Manufacturers Association (AAMA):



A) AAMA 711-13, Voluntary Specification for Self-Adhering Flashing Used for Installation of Exterior Wall Fenestration Products

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

A) ASTM D412-16, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.

B) ASTM D882-12, Standard Test Method for Tensile Properties of Thin Plastic Sheet.

C) ASTM D1970/D1970M-17a, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for ice and Dam Protection.

D) ASTM D2247-15, Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

E) ASTM D5147/D5147M-14, Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Materials.

F) ASTM E84-17a, Standard Test Method for Surface Burning Characteristics of Building Materials.

G) ASTM E96/E96M-16, Standard Test Methods for Water Vapour Transmission of Materials.

H) 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.

I) ASTM E1106-15, 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.

J) ASTM E2112-07(2016), Standard Practice for Installation of Exterior Windows, Doors and Skylights.

K) ASTM E2178-13, Standard Test Method for Air Permeance of Building Materials.

L) ASTM E2357-17, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

3. Health Canada/Workplace Hazardous Materials Information System (WHMIS):

A) Material Safety Data Sheets (MSDS):

4. International Code Council (ICC):

A) ICC-ES AC-38, Acceptance Criteria for Water-Resistive Barriers.

B) ICC-ES AC-48, Acceptance Criteria for Self-Adhered Roof Underlayments for Use as Ice Barriers.

5. National Fire Protection Association (NFPA):

A) NFPA 285-12, Standard Test Method for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus.

#### 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: Provide the following product data:

A) Air Barrier Manufacturer's guide specification.

B) Air Barrier Manufacturer's complete set of technical data sheets for assembly.

C) Air Barrier Manufacturer's complete set of guide details for assembly.

3. Certificates:

A) Product certification confirming assembly components are supplied and warranty by a single source Air Barrier Manufacturer.

4. NFPA 285 wall assembly compliance:

A) NFPA 285 wall assembly compliance:

- I) Air Barrier Manufacturer statement that anticipated wall assembly complies with NFPA 285.
- II) Submit documentation from an independent testing agency acceptable to the Consultant certifying compliance with:
  - 1) The air leakage rates of the air barrier membrane assembly, including primary membrane, primer and sealants have been tested to meet ASTM E2357.
  - 2) Acceptance criteria prescribed in ICC-ES AC-38.
  - 3) Peel adhesion to unprimed plywood and cyclic and elongation per ICC-ES AC-48.
  - 4) Class a Flame Spread Index to ASTM E84.
- III) Submit documentation from an independent testing agency certifying the air leakage and vapour permeance rates of the air barrier membrane, including primary membrane and transition sheets, exceed OBC requirements and in accordance with ASTM E2178.
  - 1) Test report submittals shall include test results of sustained wind loads and gust load air leakage results.

5. Shop Drawings:

- A) Indicate layout, sections, details, materials, flashings, membrane terminations, membrane penetrations, control joints, and accessories.
- B) Include details for all penetrations, including penetrations not detailed on the architectural drawings.

6. Warranty:

- A) Sample warranty as specified.

1.5 QUALITY ASSURANCE

1. Single Source Responsibility:

- A) Obtain air barrier and auxiliary materials including adhesive/primer, air barrier, flashings, and sealants from a single air barrier manufacturer regularly engaged in the manufacturing and supply of the specified products.
- B) The Trade Contractor to verify product compliance with federal, provincial, and local regulations controlling use of Volatile Organic Compounds (VOC).

2. Applicator Qualifications:

- A) The work of this Section shall be executed by a company approved by the material manufacturer as an applicator, using skilled tradesmen who are fully familiar with the application of air/moisture/vapour barrier membranes and are experienced in this work.
- B) Perform the work in accordance with manufacturer's written instructions and this specification.
- C) Maintain one copy of the manufacturer's written installation instructions on site.
- D) Allow access to Work site by the air barrier membrane manufacturer's representative.

1.6 MOCK-UP

- 1. Construct a minimum 1.8 m x 1.8 m mock-up of a representative sample of the air/moisture/vapour barrier installation, for the approval of the Consultant.
- 2. Incorporate substrate materials, and adjacent materials including flashing, door frame, window frame, attachment of insulation and project specific details, showing vapour permeable water resistive air barrier application details.
- 3. Locate where directed by the Consultant.
- 4. Allow 48 hours for inspection of the mock-up by the Consultant before proceeding with air barrier work. Coordinate scheduling of the inspection of the mock-up with a scheduled site meeting.

5. Test the mock-up for air and water infiltration in accordance with ASTM E783 and ASTM E1105.
6. Remove and replace materials found unacceptable at no additional cost to the Owner.
7. Review and acceptance of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless the Consultant specifically accepts such deviations in writing.
8. The accepted mock-up may be incorporated into the finished work shall be the standard of acceptance for the work of this Section.

1.7 PRE-INSTALLATION CONFERENCE

1. The Construction Manager will convene a preinstallation conference with the following present:
  - A) Construction Manager
  - B) Consultant
  - C) Installer (Trade Contractor)
  - D) Manufacturer's technical representative
  - E) Other trade contractors whose work affects or is affected by the work of this section.
2. Ensure all contractors responsible for creating a continuous plane of air tightness are present.

1.8 DELIVERY, STORAGE AND HANDLING

1. Refer to current Product MSDS for proper storage and handling.
2. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.
3. Storage of Materials:
  - A) Store materials as recommended by the air barrier manufacturer and conforming to applicable safety regulatory agencies. Refer to all applicable data including, but not limited to, MSDS information, product data sheets, products labels, and specific instructions for personal protection.
  - B) Keep solvents away from open flame or excessive heat.
  - C) Store materials in original packaging.
  - D) Protect rolls from direct sunlight until ready for use.
  - E) Refer to air barrier manufacturer's published literature.
4. Handling: Refer to air barrier manufacturer's published literature.

1.9 SITE CONDITIONS

1. Environmental Requirements:
  - A) Perform no work during rain or inclement weather.
  - B) Perform no work on frost covered or wet surfaces.
2. Protection:
  - A) It is the responsibility of the installing Trade Contractor to protect all adjacent surfaces from overspray, including, but not limited to, windows, doors, adjacent areas, and vehicles.
  - B) Cap and protect exposed back-up walls against wet weather conditions during and after application of the membrane.
3. Ensure all preparation Work is completed prior to installing the air barrier.
4. All equipment shall be grounded during operations.

1.10 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.

### 1.11 WARRANTY

1. In addition to the 12-months warranty prescribed in the General Conditions of the Contract, provide a manufacturer's warranty against product defect for a period of 12 years from the date of substantial performance.

## Part 2 Products

### 2.1 GENERAL

1. This specification is based on Blueskin Air Barrier Membrane by Henry Company.
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. Air Barrier and auxiliary materials must be obtained as a single-source from the air barrier manufacturer to ensure total system compatibility and integrity.

### 2.2 PRIMARY AIR/MOISTURE BARRIER MEMBRANE

1. Primary Sheet-Applied, Vapour Permeable Water Resistive Air Barrier Type AB-2: Self-adhered vapour permeable, water resistive air barrier consisting of a reinforced, modified polyolefin tri-laminate film surface and patented permeable adhesive technology with split-back poly-release film.
  - A) Standard of acceptance: Blueskin VP160 by Henry Co.
  - B) The air barrier shall have the following typical physical properties:
    - I) Colour: Blue
    - II) Thickness: 0.58 mm
    - III) Water Vapour Permeance (ASTM E96): 29 perms
    - IV) Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
    - V) Air Permeance (ASTM E2178): Pass
    - VI) Nail Sealability (ASTM D1970): Pass
    - VII) Dry Tensile Strength (ASTM D882):
      - 1) 41 lbf/182N MD
      - 2) 29 lbf/129N CD
    - VIII) Surface Burning Characteristics (ASTM E84):
      - 1) Flame Spread: Class A
      - 2) Smoke Development: Class A
    - IX) Low Application Temperature: -7°C
  2. UV-resistant trough-wall flashing: Self-adhering membrane consisting of an SBS rubberized asphalt compound, integrally laminated to a glass scrim reinforced aluminum foil. Standard of acceptance: Foilskin self-adhesive weather barrier membrane by Henry Co.

### 2.3 ASSEMBLY AUXILIARY MATERIALS

1. Adhesives/Primers: One or more of the following products as recommended by the manufacturer for each specific application:
  - A) Standard VOC adhesive: Synthetic rubber based quick setting adhesive.
    - I) Standard of acceptance: Blueskin Adhesive by Henry Co.
    - II) Adhesive shall have the following typical physical properties:
      - 1) Colour: Blue
      - 2) Maximum VOC: 450 g/L
      - 3) Drying time (initial set): 30 minutes
      - 4) Low Application Temperature: -12°C
  - B) Low VOC adhesive: Synthetic rubber based quick setting adhesive with low VOC content.

- I) Standard of acceptance: Blueskin LVC Adhesive by Henry Co.
- II) Adhesive shall have the following typical physical properties:
  - 1) Colour: Blue
  - 2) Maximum VOC: <240 g/L
  - 3) Drying time (initial set): 30 minutes
  - 4) Low Application Temperature: -12°C
- C) Aerosol spray adhesive: Quick drying spray adhesive used to prepare construction surfaces for the application of flashings.
  - I) Standard of acceptance: Blueskin Spray Prep Adhesive by Henry Co.
  - II) Spray adhesive shall have the following typical physical properties:
    - A) Colour: Clear amber.
    - B) Solids by weight: 35%
    - C) Drying time (initial set): 3 minutes
    - D) Low Application Temperature: -23°C
- D) Quick setting primers:
  - I) Synthetic rubber based quick setting adhesive with low VOC content.
    - A) Standard of acceptance: Blueskin LVC Spray Primer by Henry Co.
    - B) Primer shall have the following typical physical properties:
      - 1) Colour: Blue
      - 2) Maximum VOC: 250 g/L
      - 3) Dry time: 1-3 minutes
      - 4) Low Application Temperature: 4.4°C
  - II) Polymer emulsion water based quick setting adhesive with low VOC content.
    - A) Standard of acceptance: Aquatac Primer by Henry Co.
    - B) Primer shall have the following typical physical properties:
      - 1) Colour: Aqua
      - 2) Maximum VOC: 50 g/L
      - 3) Drying time (initial set): 30 minutes
      - 4) Low Application Temperature: -4°C
- 2. Liquid-Applied Flashing: Moisture-curing single component elastomeric liquid-applied flashing using a highly advanced Silyl-terminated Polyether (STPE) polymer curing to a monolithic membrane.
  - A) Standard of acceptance: Air-Bloc LF Liquid-Applied Flashing by Henry Co.
  - B) Liquid applied flashing shall have the following typical physical properties:
    - I) Colour: Blue
    - II) Air Permeance (ASTM E2178): Pass
    - III) Water Vapour Permeance (ASTM E96): 21.8 perms @25 mils
    - IV) Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass
    - V) Water Resistance (AC212/ASTM D2247): Pass
    - VI) Nail Sealability (AAMA 711): Pass
    - VII) Surface Burning Characteristics (ASTM E84):
      - 1) Flame Spread: Class A
      - 2) Smoke Development: Class A
    - VIII) Elongation (D412): 264%
    - IX) Low Application Temperature: -7°C
- 3. Non Vapour-Permeable Self-Adhered Flashing: One or more of the following products as recommended by the manufacturer for each specific application:
  - A) Non-Vapour Permeable Flashing: non-vapour permeable, self-adhered water resistive air and vapour barrier consisting of a synthetic butyl compound integrally laminated to a white engineered polypropylene film surface.
    - I) Standard of acceptance: Blueskin Butyl Flash by Henry Co.

II) Flashing shall have the following typical physical properties:

- 1) Colour: White
- 2) Thickness: 0.36 mm
- 3) Water Vapour Permeance (ASTM E96): 0.14 perms
- 4) Nail Sealability (ASTM D1970): Pass
- 5) Elongation (ASTM D412): 825% minimum
- 6) Low Application Temperature: -4°C

B) Non-vapour permeable, self-adhered water resistive air and vapour barrier consisting of an SBS rubberized asphalt compound integrally laminated to a high strength polyethylene with surface layer of metallic aluminum film.

I) Standard of acceptance: Metal Clad Self-Adhered Water Resistive Air Barrier by Henry Co.

II) Flashing shall have the following typical physical properties:

- 1) Colour: Metallic Aluminum
- 2) Thickness: 1.14 mm
- 3) Water Vapour Permeance (ASTM E96): 0.014 perms
- 4) Nail Sealability (ASTM D1970): Pass
- 5) Elongation (ASTM D412): 85%
- 6) Low Application Temperature: -7°C

C) Non-vapour permeable, self-adhered water resistive air and vapour barrier consisting of an SBS rubberized asphalt compound intergrally laminated to a blue engineered thermoplastic film surface.

I) Standard of acceptance: Blueskin(r) SA Self-Adhered Water Resistive Air Barrier by Henry Co.

II) Flashing shall have the following typical physical properties:

- 1) Colour: Blue
- 2) Thickness: 1 mm
- 3) Water Vapour Permeance (ASTM E96): 0.86 perms
- 4) Nail Sealability (ASTM D412-modified): Pass
- 5) Elongation (ASTM D412-modified): 200% minimum
- 6) Low Application Temperature: 5°C

4. Vapour-Permeable Self-Adhered Flashing: One or more of the following products as recommended by the manufacturer for each specific application:

A) Self-Adhered water resistive vapour permeable air barrier consisting of a reinforced modified polyolefin tri-laminate film surface and patented technology with split-back poly-release film.

I) Standard of acceptance: Blueskin(r) VP160 Self-Adhered Water Resistive Air Barrier by Henry Co.

II) Flashing shall have the following typical physical properties:

- 1) Colour: Blue
- III) Thickness: 0.58 mm
- IV) Water Vapour Permeance (ASTM E96): 29 perms
- V) Nail Sealability (ASTM D1970): Pass
- VI) Low Application Temperature: -7°C

B) Low temperature non-vapour permeable, self-adhered water resistive air and vapour barrier consisting of an SBS rubberized asphalt compound integrally laminated to a blue engineered thermoplastic film surface.

I) Standard of acceptance: Blueskin(r) SALT Low Temp Self-Adhered Water Resistive Air Barrier by Henry Co.

II) Flashing shall have the following typical physical properties:

- 1) Colour: Blue
  - 2) Thickness: 1 mm
  - 3) Water Vapour Permeance (ASTM E96): 0.86 perms
  - 4) Nail Sealability (ASTM D1970): Pass
  - 5) Elongation (ASTM D412-modified): 200% minimum
  - 6) Low Application Temperature: -12°C
5. Sealants:
- A) Building Envelope Sealant: Moisture cure, medium modulus polymer modified sealing compound.
    - I) Standard of acceptance: 925 BES Sealant by Henry Co.
    - II) Sealant shall have the following typical physical properties:
      - 1) Colour: Varies
      - 2) Elongation: 450-550%
  - B) Termination Sealant: One-part high performance synthetic rubber sealant.
    - I) Standard of acceptance: 212 All Purpose Crystal Clean Sealant by Henry Co.
    - II) Sealant shall have the following typical physical properties:
      - 1) Colour: Clear
      - 2) Elongation: 200% minimum
6. Thru-Wall Flashing: Non-vapour permeable self-adhered through-wall flashing consisting of an SBS rubberized asphalt compound integrally laminated to a yellow engineered thermoplastic film surface.
- A) Standard of acceptance: Blueskin(r) TWF Thru-Wall Flashing by Henry Co.
  - B) Flashing shall have the following typical physical properties:
    - I) Colour: Yellow
    - II) Thickness: 1.0 mm
    - III) Water Vapour Permeance (ASTM E96): 0.03 perms
    - IV) High Temperature Stability - Flow Resistance (ASTM D5147): Pass
    - V) Low Application Temperature: -7°C

### Part 3 Execution

#### 3.1 EXAMINATION

1. Examine areas and conditions under which work is to be performed. Inspect all substrate surfaces and notify the Construction Manager and the Consultant in writing of conditions detrimental to the proper and timely completion of the work.
2. Verification of Conditions:
  - A) Verify substrates to receive the work and surrounding adjacent surfaces are in accordance with the air barrier manufacturer's published literature prior to installation of the air barrier assembly.
  - B) Existing substrate must be continuous and secured prior to application of air barrier.
  - C) Sheathing panels must be securely fastened and installed flush to ensure a continuous substrate in accordance with the air barrier manufacturer's published literature.
  - D) Fastener penetrations must be set flush with sheathing and fastening into solid backing.
  - E) Strike masonry joints flush.
  - F) Concrete surfaces shall be smooth and without large voids, spalled areas or sharp protrusions.
  - G) New concrete must be cured for a minimum of 14 days after forms are removed.
  - H) Curing compounds or release agents used in concrete construction must be resin based without oil, wax or pigments.
  - I) Do not install air barrier over saturated substrates.

3. Do not apply air barrier until substrate and environmental conditions are in accordance with Air Barrier Manufacturer's published literature.
4. Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.
5. 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 PREPARATION

1. All surfaces must be sound, dry, clean, and free of oil, grease, dirt, excess mortar, frost, laitance, loose and flaking particles, or other contaminants.
2. Protect adjacent surfaces not included in the work of this section to prevent spillage and overspray.
3. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane.

### 3.3 INSTALLATION

1. Ensure substrate is ready to receive air barrier in accordance with air barrier manufacturer's published literature.
2. Temperature limitation:
  - A) Primary air barrier: Substrate temperature must be above -7°C and rising.
  - B) Auxiliary products: Temperature limitations may vary. Refer to air barrier manufacturer's published literature.
3. Application of flashing:
  - A) Self-adhered flashing:
    - I) Where required install adhesive/primer recommended by Air Barrier Manufacturer continuously at rate recommended ensuring complete substrate coverage of anticipated flashing installation area.
      - 1) Allow adhesive/primer to cure to a tacky film prior to application of flashing.
      - 2) Only apply adhesive/primer to surfaces which will be covered during the same working day. Primed areas not covered by end of day must be re-primed prior to installation of flashing.
    - II) Measure and cut self-adhered flashing to ensure adequate length to achieve continuous coverage of desired installation.
    - III) Peel protective film from self-adhered flashing and align top of membrane verifying proper positioning proper to complete film removal and flashing placement.
    - IV) Press self-adhered flashing firmly into place by applying hand pressure to the middle of the membrane and working the pressure to the edges eliminating wrinkles and air bubbles.
    - V) Install self-adhered flashings in shingle fashion to eliminate reverse laps.
    - VI) Where required, prime laps at rate recommended by air barrier manufacturer to ensure complete coverage of anticipated lap installation.
    - VII) Lap adjoining edges a minimum of 50 mm.
    - VIII) Roll flashing and laps with countertop roller to obtain thorough adhesion.
    - IX) Where flashing is installed prior to the primary air barrier membrane, seal end of day exposed reverse laps of self-adhered flashing with building envelope sealant.
  - B) Liquid-applied flashing:
    - I) Apply a uniform film of aerosol spray adhesive to raw edges of gypsum sheathing at rate recommended by air barrier manufacturer to completely encapsulate cut edge of gypsum sheathing.



- II) Allow adhesive to cure to a tacky film prior to application of liquid-applied flashing.
  - III) Apply flashing in accordance with and at rate recommended by air barrier manufacturer.
  - IV) Spread flashing to achieve a monolithic membrane over substrate required flashing.
  - V) Allow flashing to cure prior to subsequent installations.
4. Detailing/Flashing:
- A) Complete detailing and flashing installation per air barrier manufacturer's published literature.
  - B) Refer to the air barrier manufacturer's guide details for further clarification and installation procedures including, but not limited to, the following:
    - I) Inside corners
    - II) Outside corners
    - III) Pipe penetrations
    - IV) Shelf angles
    - V) Wall to foundations transitions
    - VI) Rough openings:
      - 1) Install rough opening details per Window Manufacturer's published literature and in accordance with ASTM E2112.
      - 2) Wall assemblies containing a vapour retarder on the interior wall assembly: Extend flashing into rough opening to ensure sufficient membrane for connection with vapour retarder and provide a continuous air barrier assembly.
  - C) Reverse laps: Seal permanently exposed reverse laps with sealant:
    - I) Primary air barrier: termination sealant
    - II) Non-vapour permeable self-adhered flashing; choose from the following:
      - 1) Building envelope sealant
      - 2) Termination sealant
    - III) Vapour permeable self-adhered flashing: termination sealant.
  - D) Moving Joints: Contact air barrier manufacturer
  - E) Transitions: Contact the air barrier manufacturer to coordinate transition of self-adhered air barrier to adjacent areas including, but not limited to, the following:
    - I) Roof to air barrier
    - II) Air barrier to waterproofing
    - III) Fastener penetrations
5. Thru-Wall Flashing: Coordinate with Section 04 22 00 "Concrete Unit Masonry", Section 07 42 43 "Composite Aluminum Wall Panels", Section 07 44 66 "Honeycomb Metal Cladding System", and Section 07 46 19 "Performed Metal Siding".
6. Application of Primary Sheet-Applied Vapour Permeable Water Resistive Air Barrier:
- A) Where required, install adhesive/primer recommended by the air barrier manufacturer continuously and at rate recommended by the barrier manufacturer to ensure complete substrate coverage of anticipated flashing installation area.
    - I) Allow adhesive/primer to cure to a tacky film prior to application of air barrier.
    - II) Only apply adhesive/primer to surfaces which will be covered during the same working day. Primed areas not covered by the end of day must be re-primed prior to installation of air barrier membrane.
  - B) Peel protective film from primary air barrier and align top of membrane verifying proper positioning prior to complete film removal and placement.

- C) Press primary air barrier firmly into place by applying hand pressure to the middle of the membrane and working the pressure to the edges eliminating wrinkles and air bubbles.
  - D) Install primary air barrier in shingle fashion to eliminate reverse laps.
  - E) Where lap adhesion is less than desired, install low VOC adhesive continuously at rate recommended by air barrier manufacturer to ensure complete substrate coverage of anticipated flashing installation area.
    - I) Allow adhesive/primer to cure to a tacky film prior to subsequent primary air barrier installation.
  - F) Lap adjoining edges:
    - I) Horizontal seams: 50 mm minimum
    - II) Vertical seams: 75 mm minimum
  - G) Roll primary air barrier and laps with countertop roller to obtain thorough adhesion
  - H) Seal permanently exposed reverse laps of primary air barrier with termination sealant.
7. Special Considerations:
- A) Contact the air barrier manufacturer to verify product and installation requirements.
  - B) Wall assemblies identified as special conditions and requiring supplemental detailing may include, but are not limited to, any of the following:
    - I) Panelized wall assemblies.
    - II) Sloped wall assemblies
    - III) Open rain-screen cladding systems permitting permanent direct exposure to bulk water onto the primary air barrier membrane within a completed wall assembly.
    - IV) Claddings impeding drainage and/or promoting hydrostatic pressure:
      - 1) Horizontal Z-girts or furring strips installed directly onto air barrier in a manner to encourage water collection.
8. Fastener Penetrations Through Primary Air Barrier:
- A) It is the responsibility of the installer penetrating the air barrier assembly to properly install fasteners and components in accordance with the air barrier manufacturer's published literature.
  - B) Installation requirements:
    - I) Drill fasteners and components with sufficient compression to maintain continuity in the air barrier assembly.
    - II) Refer to "Self-tapping fasteners" and/or "Pre-drilled fasteners".
  - C) Supplemental sealant:
    - I) Penetrations that do not meet installation requirements require the addition of termination sealant at point of intersection through the air barrier membrane to maintain continuity in the air barrier assembly.
  - D) Self-tapping fasteners:
    - I) Fastener head must be larger in diameter than the shank.
    - II) Drill fasteners perpendicular to the substrate until flush with the air barrier.
    - III) Drill fasteners to provide a continuous compression firmly against the air barrier membrane creating a gasketing seal without damaging the membrane.
    - IV) Do not install fasteners through air barrier over unsupported areas of the substrate such as sheathing joints.
    - V) Overdriven fasteners, improperly installed fasteners, defective/broken fasteners, or fasteners not properly fastened into the building structure beyond the air barrier membrane should be removed and the vacated hole sealed with termination sealant prior to the installation of the cladding or veneer system.
  - E) Pre-drilled fastening assemblies:

- I) Fastening head or assembly component must be larger in diameter than pre-drilled hole.
- II) Fastening head or assembly component must be mounted flush with the air barrier.
- III) Fastening head or assembly component must provide a continuous compression firmly against the air barrier creating a gasketing seal without damaging the integrity of the air barrier.
- IV) Do not install fastening components through air barrier over unsupported areas of the substrate such as sheathing joints.
- V) Seal improperly drilled and/or vacated holes with termination sealant prior to the installation of the cladding or veneer system.

#### 3.4 FIELD QUALITY CONTROL

- 1. Damage to surface by other trades shall be the responsibility of the Trade Contractor causing the damage.
- 2. Final Observation and Verification:
  - A) Final inspection of sheet applied vapour permeable air barrier assembly shall be carried out by the Consultant, the Construction Manager, the Trade Contractor and the air barrier manufacturer as required by warranty.
  - B) Contact the air barrier manufacturer for warranty issuance requirements.
- 3. Sheet-applied vapour permeable water resistive air barrier assembly is not designed for permanent UV exposure. Refer to air barrier manufacturer's published literature for product limitations.

#### 3.5 CLEANING

- 1. Promptly as the Work proceeds, and upon completion, clean up and remove from the premises all rubbish and surplus materials resulting from the foregoing Work.
- 2. Clean soiled surfaces, spatters, and damage caused by Work of this Section.
- 3. Check area to ensure cleanliness and remove debris, equipment, and excess material from the site.

## 07 42 43 - COMPOSITE ALUMINUM WALL PANELS

### 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 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 a composite aluminum exterior wall panel system, as indicated on the drawings, as specified herein and as required for a complete project.
- B) The work includes:
  - I) Composite metal panels.
  - II) Engineered Z-girt and/or metal stud system for attachment of the metal siding to the building structure.
  - III) Related metal flashings and accessories.
  - IV) Joint sealants where required (specified in Section 07 92 00).
- C) The panel fabricator/installer shall assume undivided responsibility for all components of the panel assembly including, but not limited to, a metal sub-frame assembly for proper attachment of the panels to the building structure, panel to panel joinery, panel to dissimilar material joinery, metal flashings and joint seals associated with the panel system.

##### 2. Related Sections:

- A) Section 05 41 00 - Structural Metal Stud Systems
- B) Section 07 21 00 - Building Insulation.
- C) Section 07 27 16 - Vapour Permeable Air/Moisture Barrier.
- D) Section 07 62 00 - Sheet Metal Flashing and Trim
- E) Section 07 92 00 - Joint Sealants.
- F) Section 08 11 16 - Aluminum Doors and Frames
- G) Section 08 36 12 - Sectional Metal Overhead Doors
- H) Section 08 42 26 - All-Glass Entrances
- I) Section 08 44 13 - Glazed Aluminum Curtain Wall
- J) Section 08 51 13 - Aluminum Windows
- K) Section 09 21 16 - Gypsum Board Assemblies

#### 1.3 REFERENCE STANDARDS

1. American Architectural Manufacturers' Association (AAMA):
  - A) AAMA Metal Curtain Wall, Window, Storefront, and Entrance Guide Specifications Manual.
  - B) AAMA CW-10-15, Care and Handling of Architectural Aluminum from Shop to Site.
2. American Society for Testing and Materials (ASTM):
  - A) ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - B) ASTM D1781-98(2012), Standard Test Method for Climbing Drum Peel for Adhesives.
  - C) ASTM D4214-07(2015), Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
  - D) ASTM E283-04(2012), Standard Test Method for Determining Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Difference Across the Specimen.

E) ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

F) ASTM E331-00(2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference.

3. The Society for Protective Coatings (SSPC):

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

1.4 QUALIFICATIONS

1. The work of this Section shall be fabricated by a manufacturer with minimum five years experience in the actual production of the specified products.
2. The work of this Section shall be executed by a company licensed by the material manufacturer as an approved installer.
3. Employ only skilled tradesmen who are experienced in this work.
4. If requested by the Consultant, provide evidence of previously completed projects of a similar nature.

1.5 QUALITY ASSURANCE

1. Take field measurements prior to the completion of shop fabrication. Indicate field dimensions on shop drawings.
2. Do as much work as possible under controlled shop conditions. Keep field fabrication to an absolute minimum.
3. Obtain all components from a single manufacturer.
4. Retain a Professional Engineer, licensed in the Province of Ontario, with experience in work of comparable complexity and scope to perform the following services as part of the Work of this Section:
  - A) Design the complete cladding system, including supports and attachment system to different substrates as required.
  - B) Review, stamp, and sign all shop drawings.

1.6 DESIGN AND PERFORMANCE REQUIREMENTS

1. Provide a watertight and structurally sound panel system that allows no uncontrolled water penetration, on the inside face of the panel as determined by ASTM E331.
2. Provide a wall assembly that has been tested and certified to conform to the following criteria:
  - A) Air Leakage: not more than 0.003 (L/s)mG, when tested at 0.075 kPa in accordance with ATSM E283.
  - B) Water Penetration: No water infiltration under static pressure when tested in accordance with ASTM E331 at a differential of 10% of inward acting design load, 0.299 kPa minimum, after 15 minutes.
    - I) Water penetration is defined as the appearance of uncontrolled water in the wall.
    - II) The wall design shall feature provisions to drawn to the exterior face of the wall any leakage of water at joints and any condensation that may occur within the construction.
3. Design, fabricate and erect wall panel system to meet the following requirements:
  - A) Rain penetration: Prevent rain penetration through wall system. Design system based on "Rain Screen Principle" by the National Research Council. Incorporate means of draining to the exterior space between wall panel and insulation.

- B) Wind load: Design wall system to resist wind loads, positive and negative, expected in this geographical region (OBC climatic date, 100 year probability) without causing rattling, vibration or excessive deflection of panels, over-stressing of fasteners, clips and other detrimental effects on the wall system.
  - C) Structural and thermal movement: Accommodate movement of supporting structural framing and movement caused by thermal expansion and contraction of system component parts without causing bowing, buckling, delamination, oil canning, failure of joint seals, excessive stress on fasteners or any other detrimental effects.
  - D) Air barrier: Shall be continuous and sealed at joints, laps, terminations and penetrations to prevent air infiltration and ex-filtration and to effectively retard moisture vapour migration through system.
4. Panel Flatness Tolerance: Fabricate panels not exceeding the following tolerances:
- A) Applying to even rises and falls across panel; local bumps and depressions will not be accepted:
    - I) 1.5 mm in a convex direction, measured perpendicularly to normal plane.
    - II) 1.5 mm in a concave direction, measured perpendicularly to normal plane.
  - B) Maximum deviation from vertical and horizontal alignment of erected panels: 6 mm in 6 m.
5. Panel Removal: System shall be non-progressive, allowing removal of any individual panel without necessitating removal of adjacent work. Design panel mounting to be resistant against unauthorized removal of panels,
6. Structural Performance: Provide systems that have been tested in accordance with ASTM E330 at a design pressure of 3.12 kPa and have been certified to be without permanent deformation or failure of structural members.

#### 1.7 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) Submit shop drawings showing panel layout and elevations, profiles, dimensions, panel thickness, fastening and anchoring methods, detail and locations of joints, sealants, and gaskets, including joints necessary to accommodate thermal movement, trim, flashing, accessories, and other pertinent information.
  - B) Shop how the work of this section interfaces with adjacent cladding materials and assembly types.
  - C) Indicate attachment clips, joint extrusion system, angles, z-bars, channels, insulation, non-permeable air/moisture/vapour barrier and installation details.
  - D) Show fastening and anchoring details of panels and accessories.
  - E) The composite aluminum panel system, including supporting girts and/or metal studs and all related connections and fastenings, shall be designed by a Professional Engineer licensed to practise in the Province of Ontario. Each shop drawing submitted shall bear the stamp and signature of the aforesaid Professional Engineer.
3. Product Data: Submit two copies of manufacturer's literature for the panel material. These documents shall include, but not be limited to:
- A) Appropriate evaluation reports and/or test reports.
  - B) Product transportation, storage, handling and installation requirements.
4. Samples: Submit a minimum 150 mm x 150 mm sample of the composite metal panels for each selected colour, fabricated from actual materials and finishes to be used in the finished work.
5. Quality Assurance/Control Submittals:

- A) Certificates: Manufacturer's certificate that products meet or exceed specified requirements.
- B) If requested by the Consultant, submit laboratory test reports certifying compliance of the wall panel system with specification requirements.
- C) Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
- 6. Post-installation certification: After installation, provide written certification, signed by the Professional Engineer responsible for the shop drawings, that all items have been installed in accordance with the shop drawings.
- 7. Warranty: Submit 3 copies of the manufacturer's warranty specified herein in accordance with Section 01 78 36 "Warranties".
- 8. Maintenance Data:
  - A) Provide maintenance instructions for the wall panel system for incorporation into the operation and maintenance manual specified in Section 01 78 00 "Closeout Submittals".
- 1.8 MOCK-UPS
  - 1 Construct a minimum 12 m<sup>2</sup> long x 1.6 m high mock-up panel of a representative sample of the composite aluminum wall panel assembly, for review and acceptance by the Consultant.
  - 2. Locate where directed by the Consultant.
  - 3. Include all components of the wall assembly including, but not limited to, air/vapour barrier insulation, cladding and support/anchoring systems.
  - 4. Do not proceed with the panel system installation until the mock-ups have been reviewed and accepted by the Consultant.
  - 5. The accepted mock-ups may be incorporated into the finished work and shall be the standard of acceptance for the work of this Section. Remove and dispose of any mock-ups which do not form part of the work.
- 1.9 DELIVERY, STORAGE AND HANDLING
  - 1. Protect finish and edges in accordance with panel manufacturer's recommendations.
  - 2. Handle prefabricated composite aluminum panel work in accordance with the panel manufacturer's recommendations and AAMA CW-10.
  - 3. Protect prefabricated aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
- 1.10 INSPECTION AND TESTING
  - 1. The Owner will engage an independent inspection and testing company to verify that the sub-framing support system and anchoring installation complies with the specified requirements.
  - 2. Submit inspection and testing reports to the Consultant, as soon as inspection and testing is completed.
  - 3. The cost of the initial inspection and testing will be paid by the Owner. The cost of re-testing/re-inspection necessitated by failure to meet specification requirements on the initial inspection/test shall be paid by the Trade Contractor.
  - 4. Inspection and testing procedures shall be completed and all deficiencies rectified prior to commencing installation of the remainder of the composite aluminum panel assembly.
- 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 period prescribed in the General Conditions of the Contract is extended to 3 years from the date of Substantial Performance.
2. In addition to the 3-year warranty, provide a panel manufacturer's written warranty covering failure of the factory-applied exterior finish on the composite metal panels.
  - A) Warrant the finish per ASTM D4214 for chalking not in excess of 8 NBS Units and for fade not in excess of 5 NBS Units.
  - B) Warranty period for finish: 20 years from the date of Substantial Performance.

### Part 2 Products

#### 2.1 ACCEPTABLE PRODUCTS

1. This specification is based on Alucobond composite aluminum panel systems by Alusuisse Composites Inc. and distributed by Sobotec Ltd.
2. Subject to compliance with specification requirements, the following products are acceptable alternatives:
  - A) ACM panels by Larson distributed by Alucoil.
  - B) ACM panels by Alubond distributed by Mulk Holdings
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.
4. Obtain all components of the system from a single manufacturer.

#### 2.2 PANELS

1. Composition: Two sheets of aluminum sandwiching a core of extruded thermoplastic material formed in a continuous process without the use of glues or adhesives between dissimilar materials; bond integrity testing to conform to ASTM D1781. Product characteristics as follows:
  - A) Aluminum Face Sheets:
    - I) Thickness: 0.50 mm
    - II) Alloy: AA3003
  - B) Panel Thickness: 4 mm
  - C) Panel Weight: 5.47 kg/m<sup>2</sup>
  - D) Tolerances:
    - I) Panel Bow: Maximum 0.8% of panel dimension in width and length.
    - II) Panel Dimensions: Field fabrication shall be allowed where necessary, but shall be kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible. Field fabrication will be subject to review and may be rejected and replaced with shop -fabricated components at no additional cost to the Owner.
    - III) Panel lines, breaks, and angles shall be sharp, true, and surfaces free from warp and buckle.
    - IV) Maximum deviation from panel flatness shall be 3 mm in 1500 mm on panel in any direction for assembled units. (Non-accumulative).
  - E) Finished and colours: Kynar two/three coat, coil-coated baked enamel finish, containing Kynar 500 polyvinylidene fluoride resin. Colours:

EF-1) PMS-286 Blue	EF-3) Gray/Silver ACM Finish (TBD)
EF-2) PMS-186 Red	EF-4) White ACM Finish (TBD)



2. System Characteristics: Material/performance shall conform to the following minimum standards:

- A) System shall provide a dry joint with maximum 10 mm reveal.
- B) The system shall be designed to perform in accordance with the NRC "Rainscreen" principle.
- C) The system shall have no visible fasteners, telegraphing or fastening on the panel faces nor any other compromise of a neat and flat appearance.
- D) The system shall comply with the applicable provisions of the AAMA Metal Curtain Wall, Window, Storefront, and Entrance Guide Specifications Manual.
- E) Fabricate the panel system to dimensions, sizes, and profiles indicated on site. Include full continuous joint reveals within the system.
- F) Fabricate the panel system so that no restraints can be placed on the panel which might result in compressive skin stresses. The installation detailing shall be such that the panels remain flat regardless of temperature changes and at all times remain airtight and watertight.
- G) The finish side of the panel shall have a removable plastic film applied prior to fabrication which shall remain on the panel during fabrication, shipping, and erection to protect the surface from damage.

2.3 ACCESSORIES

1. Panel Accessories:

- A) Exposed trim, closures, caps, flashings and other elements using same material as panels as required for complete installation.
- B) Provide proprietary aluminum extrusions, compatible with panel edges, to manufacturer's standard profiles, including vertical and horizontal joint closures and perimeter trim and caps as required for a complete installation. Include gaskets as required for tight joints.
- C) Fasteners: As recommended by the panel manufacturer, concealed, stainless steel, fully adjustable and compatible in profile with closures.

2. Joint extrusions and joint extrusion clips for attaching panels to the sub-structure: Purpose made aluminum.

- A) PVC shims, 1.6 mm thick, shall be used as thermal separator between extrusions and sub-girts.

3. Joint filler strip: Same material and colour as panels.

4. Adjustable angles, z-bars and channel sub-girts: Manufactured from Z275 galvanized steel and designed to accommodate expansion and contraction, dynamic movements and design load requirements.

5. Insulation clips: Impale type, perforated 50 mm x 50 mm cold rolled steel, adhesive back, spindle of length to suit 76 mm thickness of insulation, with speed washers.

6. Air Barrier: Refer to Section 07 27 16 "Vapour Permeable Air/Moisture Barrier" for material and application over exterior sheathing.

7. Membrane Flashings: Material compatible with membrane air/membrane barrier.

8. Window sills and metal flashings: Purpose made extruded aluminum to match adjacent panels.

9. Shop-fabricate accessory and trim components ready for installation.

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

**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. Surfaces to receive panels shall be even, smooth, sound, clean, dry and free from defects detrimental to work.
3. Surfaces to receive panels shall be structurally sound as determined by a registered structural engineer.
4. Do not proceed with erection until unsatisfactory conditions have been corrected.
5. 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 SUPPORT FRAMING INSTALLATION

1. Install panel system framing as required. Install framing in accordance with the applicable requirements of CSA-16.1 and CSA-S136.
2. Install framing progressively with the thermal insulation. Coordinate with Section 07 21 00 "Building Insulation".
3. Install sub-girts and miscellaneous system framing as required to provide proper support for the panel system. Fasten to supporting structure. Provide additional framing at terminations, openings and penetrations.
4. Touch up damaged galvanized surfaces with zinc-rich primer.

### 3.3 INSTALLATION

1. After review and acceptance by the Consultant of the support framing and insulation installation, install wall panels in accordance with the manufacturer's instructions and the reviewed shop drawings.
2. Erect panels plumb, level, and true, in accordance with reviewed shop drawings and manufacturer's instructions. Ensure panel alignment with established lines shown on elevation. Report any misalignment to the Consultant before proceeding.
3. Thermal movement:
  - A) Attachment system shall allow for the free and noiseless vertical and horizontal thermal movement due to expansion and contraction for a material temperature range of -30°C to +80°C.
  - B) Buckling of panels, opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement will not be permitted.
  - C) Fabrication, assembly, and erection procedure shall account for the ambient temperature at the time of the respective operation.
4. Anchor panels securely in accordance with manufacturer's engineering recommendations and in accordance with reviewed and accepted shop drawings to allow for necessary thermal movement and structural support.
5. Conform to panel fabricator's instructions for installation of concealed fasteners.
6. Do not install component parts which are observed to be defective, including; warped, bowed, dented, abraded, and broken members,
7. Do not cut, trim, weld, or braze component parts during erection in a manner which would damage the finish, decrease strength, or result in a visual imperfection or a failure in performance. Return component parts which require alteration to shop for refabrication, if possible, or for replacement for new parts.
8. Separate dissimilar metals and use gasketed fasteners where needed to eliminate the possibility of corrosive or electrolytic action between metals.
9. Protect metal surfaces in contact with concrete or other cementitious surfaces, and aluminum in contact with steel with isolation coating.
10. Erect panels and joint extrusions in accordance with the system manufacturer's details and instructions and to meet specified design and performance requirements.

11. Secure finished work securely anchored, free of distortion and surface imperfections, uniform in colour and gloss.
12. Ensure all penetrations of the installed air barrier membrane are sealed and repair any breeches in accordance with the air barrier system manufacturer's recommendations.
13. Supply and install extruded aluminum sills with drip edge under all windows and louvre frames, colour of sills to match adjacent panels.
14. Where indicated on the drawings or as required for a complete installation, supply and install closures, caps, fascias, covers and trim with colour to match adjacent finish where exposed.
15. Provide openings required in the composite aluminum panel system. Provide flashings around penetrations through panels.
16. Seal around all openings and all other locations indicated or required to provide a weather-tight and watertight seal.

#### 3.4 ADJUSTING AND CLEANING

1. Repair panels with minor damage. Remove and replace panels damaged beyond repair.
2. Remove protective film as soon as possible after installation.
3. Provide additional protection, after installation, as necessary to protect the installation from damage by other trades.
4. Make sure weep holes and drainage channels are unobstructed and free of dirt and sealants.
5. Conduct Final Cleaning in accordance with the manufacturer's instructions and Section 01 74 13 "Progress and Final Cleaning".
6. Remove from the premises all surplus material, dirt and debris caused by the work of this Section and leave the installation clean.
7. Make good any damage to other work caused by the work of this Section.

## 07 52 16 - SBS MODIFIED BITUMINOUS ROOFING

### 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 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 a modified bituminous sheet membrane roofing system, as indicated on the drawings, as specified herein and as required for a complete project.

##### 2. Related Work:

- A) Section 05 31 00 - Steel Deck
- B) Section 06 10 00 - Rough Carpentry
- C) Section 07 21 20 - Urethane Foam Insulating Sealant
- D) Section 07 27 16 - Vapour Permeable Air/Vapour Barrier
- E) Section 07 62 00 - Sheet Metal Flashing and Trim
- F) Section 07 92 00 - Joint Sealants.
- G) Division 22 Plumbing.

#### 1.3 REFERENCE STANDARDS

1. American Society for Testing and Materials (ASTM):
  - A) ASTM C1177/C1177M-17, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  - B) ASTM F1667-17, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
2. Canadian General Standards Board (CGSB):
  - A) CGSB 37-GP-56M-1980+Amdt. Dec.85, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
3. Canadian Roofing Contractors' Association (CRCA)
4. Canadian Standards Association (CSA):
  - A) CSA-A123.3-05(R2015), Asphalt Saturated Organic Roofing Felt.
  - B) CSA-A123.4-04(R2013), Asphalt for Construction Built-Up Roof Coverings and Waterproofing Systems.
  - C) CSA-A231.1-14/A231.2-14, Precast Concrete Paving Slabs/Precast Concrete Pavers.
5. Ontario Industrial Roofing Contractors Association (OIRCA)
6. Underwriters' Laboratories of Canada (ULC):
  - A) CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene Boards and Pipe Covering.
  - B) CAN/ULC-S704-11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
  - C) CAN/ULC-S706-09, Standard for Wood Fibre Thermal Insulation for Buildings.

#### 1.4 QUALIFICATIONS

1. The work of this Section shall be carried out by a Roofing Contractor who is certified by the roofing material manufacturer, as an approved installer and who is a member in good standing of the OIRCA.
2. Roofing work shall be performed only by skilled applicators, employed by a company operating all adequate and necessary equipment required to execute such work.

#### 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. Source Quality Control:
  - A) Upon request from the Consultant, the roofing membrane manufacturer shall supply, at his expense, the results of mechanical and chemical testing performed on the materials supplied.
  - B) The tests shall be performed to certify compliance with CGSB 37-GP-56M.
3. Product Data:
  - A) Provide installation instructions for the roofing materials specified.
  - B) Include manufacturer's material safety data sheets for the safe handling of the specified materials and products, in accordance with WHMIS requirements.

#### 1.6 WARRANTY

1. Membrane manufacturer's warranty: In addition to the 12 months warranty prescribed by General Conditions of the Contract, provide a written warranty, signed and issued in the name of the Owner, stating that the membrane manufacturer will guarantee to repair at his own expense any leaks in the roofing membrane of flashing membrane resulting from defects in the manufacturer of the membrane and/or from fault workmanship for a period of ten (10) years from the date of the Certificate of Substantial Performance of the Contract.
2. In addition to the membrane manufacturer's warranty, provide a OIRCA 10 year Guarantee Certificate.
3. Roofing Contractor's warranty: In addition to the 12 months warranty prescribed by the General Conditions of the Contract, provide a written warranty, signed and issued in the name of the Owner, stating that the Roofing Contractor will guarantee to repair at his own expense any leaks in the roofing membrane of flashing membrane resulting from faulty workmanship, in accordance with the General Conditions of the Contract but for a period of two (2) years from the date of the Certificate of Substantial Performance of the Contract.

#### 1.7 MANUFACTURER'S REPRESENTATIVE

1. The work shall be carried out under the general supervision of a representative of the roofing material manufacturer.
2. At all times, the Roofing Contractor shall permit and facilitate access to the work site by the said manufacturer's representative.

#### 1.8 FIELD QUALITY CONTROL

1. Roofing Inspector:
  - A) The Construction Manager will engage and the Owner will pay for an independent inspection and testing firm approved by CRCA to conduct site inspections and tests to verify compliance with the Contract Documents. Tests shall include flood tests.
  - B) Cooperate with the Roofing Inspector. Provide at least 48 hours notice of commencement of each phase of the work. Provide the Inspector with unlimited access to the Work.
  - C) The cost of re-inspection and re-testing necessitated by failure to meet specification requirements on the initial inspection/test shall be paid by the Roofing Contractor.
2. Preinstallation Meeting: within 72 hours before the commencement of roofing operations, convene a preinstallation meeting. The following parties shall be in attendance:
  - A) Construction Manager
  - B) Consultant
  - C) Roofing Contractor
  - D) Roofing Inspector

E) Roof membrane manufacturer's representative

3. Subsequently, give two (2) working days prior notice to the Construction Manager of the commencement of each phase of the work, and provide the Consultant with materials and installation information as required.
4. On completion of each portion of the roof, conduct, in the presence of and under the direction of the Construction Manager and the Consultant, a flood test of the portion. Ensure that the entire roof area has been subjected to a flood test when the installation is complete.
5. Cooperate with the Construction Manager and the Consultant and afford all facilities necessary to permit full inspection of the work and testing of materials prior to and during their use and during the warranty period. Act immediately on instructions given by the Consultant.

1.9 DELIVERY AND STORAGE

1. All materials shall be delivered and stored in their original packaging, bearing the manufacturer's name, related standards and any other specification or reference accepted as standard.
2. Adequately protect and permanently store all materials in a dry, well ventilated and weatherproof location. Remove from this location only materials to be used the same day. During winter, store materials in a heated location with a 10°C minimum temperature. Remove only as needed for immediate use. Keep materials away from open flame or welding sparks.
3. Carefully store materials delivered in rolls on end, with salvage edges up. Store metal flashings in such a way as to prevent wrinkling, twisting, scratches and other damage.
4. Avoid stockpiling materials on decks in a way which could cause overloading.

1.10 PROTECTION

1. Protect from the elements all roofing material in transit, storage and when applied.
2. During roofing work, protect exposed surfaces of finished walls with tarps in order to prevent damage. Assume full responsibility for damage to other work caused by the work of this Section.

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.

**Part 2 Products**

2.1 GENERAL

1. This specification is based on modified bituminous sheet membrane roofing as manufactured by Soprema Inc.
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 DECK SHEATHING

1. Non-structural, glass mat faced, gypsum panel with water-resistant core to ASTM C1177, 1219 mm wide x 2438 mm long x 13 mm thick, ends and edges square. Standard of acceptance: Dens-Deck by G-P Gypsum Corp.
2. Sheathing adhesive as recommended by the sheathing manufacturer.
3. Fasteners: Size and type in accordance with FM requirements and the membrane manufacturer's recommendations.

2.3 ASPHALT PRIMER

1. Black bituminous varnish comprising asphalt modified bitumen with thermoplastic polymers and volatile solvents. Standard of acceptance: Elasocol 500 or Sopradere as recommended by the roofing material manufacturer.
2. Apply primer to all surfaces to be covered with membrane.

2.4 BITUMEN

1. Type II asphalt to CSA-A123.4 bitumen with thermoplastic polymers and volatile solvents.

2.5 VAPOUR RETARDER

1. Thermofusible elastomeric bitumen (SBS modified bitumen) reinforced with a glass fibre reinforcement, top face lightly sanded, underside with a silicone release plastic film protecting the self-adhesive under-face; conforming to CBSB 37-GP-56M, Type 2, Class P, Grade 1 Thickness 3.0 mm. Standard of acceptance: Soprema Sopralene Stick Adhesive.

A) Apply membrane by self-adhesion on primed substrate.

B) Components:

I) Reinforcement: Glass fibre 130 g/m<sup>2</sup>.

II) Modified bitumen: Mix of selected bitumen and SBS thermoplastic polymer.

2.6 ROOF MEMBRANE MATERIALS

1. Base Sheet: Thermofusible elastomeric bitumen (SBS modified bitumen) reinforced with a non-woven polyester reinforcement, top face covered with a Thermofusible plastic film, under face lightly sanded; conforming to CGCB 37-GP-56M, Type 2, Class C, Grade 2. Thickness 2.2 mm (2.0 mm min.). Standard of acceptance: Soprema Elastophene 180 PS.

A) Apply membrane by bonding with hot asphalt

B) Components:

I) Reinforcement: Non-woven polyester 180 g/m<sup>2</sup>

II) Modified bitumen: Mix of selected bitumen and SBS thermoplastic polymer.

2. Base Sheet Stripping (flashing): Thermofusible elastomeric bitumen (SBS modified bitumen) reinforced with a glass fibre reinforcement, top face covered with a Thermofusible plastic film, underside covered with a silicone release plastic film protecting the self-adhesive under-face; conforming to CGSB 37-GP-56M, Type 2, Class P, Grade 1. Thickness 2.6 mm. Standard of acceptance: Soprema Sopraflash Flam Stick.

A) Apply membrane by self-adhesion on primed substrate.

B) Components:

I) Reinforcement: Non-woven polyester 130 g/m<sup>2</sup>

II) Modified bitumen: Mix of selected bitumen and SBS thermoplastic polymer.

C) Primer: As recommend by the system manufacturer. Standard of acceptance: Elastocol Stick Primer.

3. Cap Sheet and cap sheet stripping (flashing): Thermofusible elastomeric bitumen (SBS modified bitumen) reinforced with a non-woven polyester reinforcement, topside self-protected with highly reflective mineral granules, underside protected by thermo-fusible plastic film, conforming to CGSB 37-GP-56M, Class C, Type 2, Grade 2. Approximate nominal average thickness 4.0 mm. Standard of acceptance: Soprema Sopralene Flam 250 GR.

A) Components:

I) Apply membrane by torching only.

II) Components:

1) Reinforcement: Non-woven polyester 250 g/m<sup>2</sup>.

2) Modified bitumen: Mix of selected bitumen and SBS thermoplastic polymer.

## 2.7 INSULATION

### 1. Board Insulation:

A) Closed-cell Polyisocyanurate foam insulation board, integrally laminated to inorganic/organic felt facers, to CAN/ULC-S704, Type 1 with facing 4, CFC-free and conforming to Environment Canada Ozone-Depleting Substances regulations, minimum RSI 1.04 M<sup>2</sup>C/W per 25 mm thickness, maximum board size 1219 mm x 1219 mm; generally two layers, each 63 mm thick.

B) Provide minimum RSI 5.22 thermal resistance over the entire area of the roof.

2. Tapered Insulation: Polyisocyanurate foam insulation board as specified above, tapered to provide a minimum finished roof slope 1:50.

3. Protection Board: Multi-ply, semi-rigid asphaltic roofing substrate board composed of a mineral-fortified asphaltic core formed between two asphaltic saturated fibreglass liners, 3.2 mm thick.

Standard of acceptance: Soprema Sopraboard.

## 2.8 ACCESSORIES

### 1. Mechanical fasteners:

A) Round to cap nails, 25 or 38 mm or equivalent stainless steel or galvanized fastenings as recommended by material manufacturers or as required for the purpose.

B) In compliance with ASTM F1667, nails shall be long enough to penetrate the substrate by at least 20 mm on flashings and parapet walls.

C) Use FM approved screws to fasten insulation screws to penetrate deck, minimum 20 mm (maximum 20 mm where deck is exposed in building interior). Frequency and pattern to meet FM 160 windstorm requirements, including additional quantities at corners and at perimeter.

2. Isolation pads under sleepers and concrete paving slabs: Extruded expanded polystyrene board to CAN/ULC-S701, Type IV, thickness 25 mm except where otherwise indicated, compressive strength 210 kPa. Standard of Acceptance: Styrofoam SM.

### 3. Walkways:

A) Mats: Recycled rubber mat, purpose-made for protecting roof membranes from excessive foot traffic, top face embossed with a hexagonal pattern, underside grooved at 25 mm o.c. for drainage. Size: 1219 mm x 1829 mm x 19 mm thick. Standard of acceptance: Soprema Sopramat.

B) Adhesive: As recommended by the mat manufacturer. Standard of acceptance: IC Sealant.

4. Paving slabs: Precast concrete paving slabs to CSA-A231.1 Size and pattern to be selected by the Consultant.

5. Metal flashings, vents and pipe sleeves: Refer to Section 07 62 00 "Metal Flashing and Trim".

6. Roof drains: Refer to Division 22 "Plumbing".

7. Post supports for rooftop screen: Refer to Section 08 92 00 "Louvred Rooftop Equipment Enclosure".

## Part 3 Execution

### 3.1 SHEATHING INSTALLATION

1. Install gypsum board sheathing to the steel deck, as indicated on the drawings and in accordance with the manufacturer's recommendations.

2. Install sheathing boards over steel deck with long side perpendicular to deck flutes.

3. Provide continuous support at ends of boards. Use galvanized sheet steel strip, spanning the deck flutes.



4. Lay boards in parallel courses, butted together in moderate contact, without gaps and with staggered end joints.
5. Cut and trim boards to provide plain butt joints at perimeter, parapets, curbs, etc.
6. Fastening: Follow sheathing manufacturer's recommendations for Factory Mutual approved fastener spacing. Minimum requirements to be FM-190.
7. Coordinate the installation of the sheathing with the installation of roof drains and other mechanical and electrical penetrations by Divisions 22, 23, and 26.

### 3.2 SHEATHING SURFACE INSPECTION AND PREPARATION

1. Before commencing the roofing installation, conduct an inspection of the entire substrate with the Roofing Inspector and the Roofing Contractor to approve the condition of the substrate. Notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.
2. Ensure that the deck and all parts of the structure that are to be covered with roofing membrane possess a smooth surface with an even finish, free of excessive moisture, ridges, hollows and sharp corners.
3. Verify that roof drains, stack vents, vent outlets, building joints and all other work by other trades has been properly completed.
4. Before commencing work, ensure that all surface are smooth, dry, clean, and free of ice and debris. The deck must be free of contamination by materials which could affect the adhesion of the roofing or the physical integrity of the membrane itself. No salt or calcium shall be used to remove ice or snow.
5. Ensure that there is a proper slope to roof drains and that no ponding will occur.
6. Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.
7. Commencement of roofing installation shall be construed as acceptance of the substrate, and thereafter the Roofing Contractor shall be fully responsible for satisfactory work as required herein.

### 3.3 INSTALLATION

1. Do not install materials under conditions of rain, snow, or fog.
2. Install roofing elements on clean and dry surfaces, in accordance with the manufacturer's requirements and recommendations.
3. Perform work on a continuous basis as surface and weather conditions allow.
4. Protect adjoining surfaces against any damage that could result from the roofing installation.

### 3.4 EQUIPMENT

1. Maintain all equipment and tools in good working order.
2. Use torch types recommended by the membrane manufacturer.

### 3.5 ASPHALT PRIMER APPLICATION

1. Treat all surfaces to be roofed, with primer to improve adhesion. Apply by brush or roller at a rate of 350 g/m<sup>2</sup>.
2. Note that the drying time of the primer is related to the ambient temperature and may vary from a few hours to a whole day. Do not proceed until the primer is dry.

### 3.6 VAPOUR RETARDER INSTALLATION

1. Install the self-adhesive vapour retarder, in accordance with the manufacturer's instructions.
2. Install parallel to the long side of the underlying insulation cap sheet.
3. Roll the entire surface to make sure the membrane is properly adhered, without air pockets, wrinkles, fish-mounts or tears.

4. After installation of the membrane, check all lap seams by running a trowel along the seam.
5. Maintain continuity with the building air/vapour barrier system as indicated on the drawings.

### 3.7 INSULATION INSTALLATION

1. Install insulation boards in two layers of the thickness indicated on the drawings.
2. Stagger all joints in the boards and set into a full mop coating of asphalt.
3. Provide tight flush joints between adjacent boards.
4. Install sloped insulation set in a full mop coating of bitumen. Provide sloped insulation at the following locations:
  - A) On the up-slope side of HVAC equipment curbs to direct run-off from accumulating behind the units.
  - B) At link roof.
  - C) At garbage enclosure roof.
  - D) At other locations where indicated or where required to maintain slope of roof to roof surface drains.
5. Install protection board over the entire surface of the insulation. Set in a full mop coating of bitumen.

### 3.8 BASE MEMBRANE APPLICATION

1. Commencing at the lowest point of the roof, embed the base sheet in a full mop coat of approximately 1.2 kg/m<sup>2</sup> of asphalt. Apply base sheet with 75 mm side laps and 150 mm end laps. Extend the base sheet up vertical surfaces, as indicated on the drawings, in a full mop of asphalt.
2. Ensure the base sheet is unrolled to enable the membrane to relax prior to installation. The time required for relaxation will vary according to weather conditions.
3. Torch-weld all lap joints by heat softening the membrane and pressing the edge of the membrane firmly with a roofing trowel.
4. Apply asphalt not more than 1.5 m ahead of the membrane as it is being applied, while ensuring complete boning.
5. Ensure the base sheet membrane is installed parallel to the long side of the underlying insulation cap sheet.
6. After installation of the membrane, check all lap seams on the cap sheet by running a trowel along the seam.

### 3.9 BASE SHEET STRIPPING (FLASHING) MEMBRANE APPLICATION

1. Ensure that primer coating is dry before application of the base sheet stripping.
2. Lay base sheet stripping in strips 1 metre wide to the vertical surfaces, extending on to the flat surface of the roof a minimum of 100 mm. Side laps shall be 75 mm and shall be staggered a minimum of 100 mm with the laps of the base sheet.
3. Install the self-adhesive base sheet stripping, in accordance with the manufacturer's instructions.
4. Roll the entire surface to make sure the membrane is properly adhered, without air pockets, wrinkles, fish-mouths, or tears.
5. After installation of the membrane, check all lap seams by running a trowel along the seam.
6. Nail the base sheet top edge to the substrate at 300 mm o.c. in accordance with the manufacturer's recommendations.

### 3.10 CAP SHEET INSTALLATION

1. Ensure that base membrane and reinforcement membrane are in place and without defects.
2. Unroll the cap sheet membrane, starting from a low point of the roof. Re-roll from both ends prior to torching. Take care to ensure good alignment of the first roll, parallel with the edge of the roof. Stagger joints at least 300 mm relative to reinforcement membrane and to base sheet membrane.

3. Torch-weld membrane to the base sheet in accordance with the membrane manufacturer's recommendations. During this application, melt the under surfaces forming an asphalt bead that is pushed out in front of the base sheet as the work proceeds.
4. Take care not to burn the membrane and its respective reinforcements.
5. Lap sides 75 mm and ends 150 mm. Stagger end laps so as to avoid 4 overlaps. Stagger laps at least 300 mm relative to laps in base membrane and in reinforcement membrane.
6. Avoid asphalt seepage at the seams greater than 5 mm.
7. Heat the surface granules on laps and imbed into the liquid bitumen prior to installation of following sheets.
8. Make sure the membrane is properly welded, without air pockets, wrinkles, fish-mouths or tears.
9. After installation of the membrane, check all lap seams on the cap sheet by running a trowel along the seam.

#### 3.11 CAP SHEET STRIPPING (FLASHING) INSTALLATION

1. Torch weld cap flashing membrane in place.
2. Lay membrane in strips one metre wide. Side laps to be 75 mm, staggered at least 300 mm relative to the cap sheet.
3. At parapets and curbs, membrane to extend 150 mm out onto the roof, up the back face of the parapet, over the top of the parapet and terminate 50 mm down the outer face of the parapet unless indicated otherwise.
4. At other vertical surfaces membrane to extend 150 mm out onto the roof, up the back face of the parapet to the elevation indicated or where required for a complete, watertight installation.
5. Torch-weld reinforcement stripping directly onto its support from bottom to top. Torch-welding shall soften the underside of the reinforcement stripping without overheating, resulting in a uniform adhesion over the entire surface.
6. Take care not to burn the membrane and its respective reinforcements.
7. Make sure the membrane is properly welded, without air pockets, wrinkles, fish-mouths, or tears.
8. During installation, avoid asphalt seepage greater than 5 mm at seams.
9. Nail the top edge as per manufacturer's recommendations.
10. After installation of the membrane, check all lap seams by running a trowel along the seam.

#### 3.12 ROOF DRAINS

1. Coordinate with Division 22 to ensure proper seals to roof drains.
2. Prime all flanges with roof mastic prior to roofing installation. Install membrane and felts continuously over drain then cut out and trim neatly to interior facing. Coat membrane with bitumen and set and secure clamping ring in a bed of mastic as required by the drain design. Ensure that roof screens are secured in place with a mechanical device acceptable to the Consultant before leaving the site.

#### 3.13 WALKWAYS

1. Install walkways where indicated on the drawings.
2. Adhere walkway mats to the roof surface using 5-13 mm wide strips of sealant per mat at 300 mm o.c, parallel to the long side of the mat so as not to obstruct the drainage grooves.
3. Where indicated, install concrete paving slabs. Isolate slabs from roofing surface with specified polystyrene pads.

#### 3.14 PLUMBING VENTS, STACKS AND SLEEVES

1. Make all roof penetrations watertight.
2. Trim membrane as required. Set and coat flanges with mastic on top of roof membrane.
3. Insulate sleeves and soil pipes with glass fibre insulation.

4. Set caps or collars, seal with caulking to provide watertight seal.

3.15 CURBS AND SLEEPERS

1. Provide curbs and sleepers for mechanical equipment as indicated and as required. Carpentry work by Section 06 10 00 "Rough Carpentry".
2. On curbs, install flashing membranes as specified above.
3. Construct sleepers as follows:
  - A) Soften roofing membrane surface in the area of the membrane protection and embed granules.
  - B) Apply primer and membrane protection.
  - C) Membrane protection to consist of 250 g granule surfaced membrane as specified for the cap sheet membrane.
  - D) Install a rigid polyurethane foam installation pad projecting 50 mm all round beyond the sleeper.
  - E) Loose lay sleepers on the insulation. Refer to mechanical drawings for locations and sizes of sleepers.

3.16 METAL FLASHINGS

1. Install metal flashings as indicated on the drawings, as specified in Section 07 62 00 "Sheet Metal Flashing and Trim".

3.17 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 and spills of surplus material from adjacent surfaces and make good any damage caused by the work of this Section.

## **07 84 00 - FIRESTOPPING AND SMOKE SEALS**

### **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 fire-stopping and smoke seal materials, 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 09 21 16 - Gypsum Board Assemblies.
  - C) Division 22 - Plumbing
  - D) Division 23 - Heating, Ventilating and Air Conditioning (HVAC)
  - E) Division 26 - Electrical
3. Fire stopping and smoke seals within mechanical assemblies (I.e inside ducts, dampers) and electrical assemblies (I.e. inside cable trays) are by the mechanical and electrical trades.

#### **1.3 REFERENCES**

1. Underwriters' Laboratories Canada (ULC):
  - A) CAN/ULC-S115-11, Standard Method of Fire Tests of Firestop Systems.

#### **1.4 REGULATORY REQUIREMENTS**

1. The work of this Section shall conform to OBC requirements, latest revision, to ULC design requirements for each assembly and to all other applicable codes and regulations, to the satisfaction of the authorities having jurisdiction.

#### **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 samples of each material or combination of materials proposed for use.
3. Source Quality Control: Submit laboratory test reports certifying compliance of each proposed material or combination of materials with the specification requirements.
4. Product Data:
  - A) Include installation instructions for each material.
  - B) 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.
5. Documentation for Approval by Authorities: For each firestopping and smoke-seal assembly, submit sufficient documentation to satisfy the authorities having jurisdiction that the assembly meets OBC requirements. Include ULC Approval Numbers where applicable.

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

1. Deliver products in original unopened packaging with legible manufacturer's identification.
2. Store materials in strict accordance with the manufacturer's recommendations.

#### **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 materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

## **Part 2 Products**

### **2.1 MATERIALS**

1. Fire stopping and smoke seal systems: in accordance with CAN/ULC-S115, asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN/ULC-S115 and not to exceed opening sizes for which they are intended.
2. Service penetration assemblies: certified by ULC in accordance with CAN/ULC-S115 and listed in ULC Guide No. 40 U19.
3. Service penetration firestop components: certified by ULC in accordance with CAN/ULC-S115 and listed in ULC Guide No. U19. 13 and ULC Guide No. 40 U19.15 under the Label Service of ULC.
4. Fire-resistance rating of installed fire stopping assembly shall not be less than the fire-resistance rating of the surrounding floor and wall assembly.
5. Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
6. Fire stopping and smoke seals at openings around penetrations for pipes, duct-work and other mechanical items requiring sound and vibration control: elastomeric seal.
7. Primers: to manufacturer's recommendation for specific material, substrate, and end use.
8. Water (if applicable): potable, clean, and free from injurious amount and deleterious substances.
9. Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and on accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
10. Sealants for vertical joints: non-sagging.

## **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. Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry, and frost free.
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 Trade Contractor shall be fully responsible for satisfactory work as specified herein.

### **3.2 PREPARATION**

1. Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
2. Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
3. Mask where necessary to avoid spillage and over coating onto adjoining surfaces.

### 3.3 INSTALLTION

1. Install fire stopping and smoke seals at service penetrations through fire resistive construction and at all locations where the continuity of fire resistive construction is interrupted, as indicated on the drawings, as specified herein and as required for a complete project.
2. Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.
3. Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
4. Provide temporary foaming as required and remove forming only after materials have gained sufficient strength and after initial curing.
5. Tool or trowel exposed surfaces to a neat finish.
6. Remove excess compound promptly as work progresses and upon completion.

### 3.4 REVIEW

1. Notify the Consultant when ready for review and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

### 3.5 SCHEDULE

1. Firestop and smoke seal at:
  - A) Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
  - B) Top of fire-resistance rated masonry and gypsum board partitions.
  - C) Intersection of fire-resistance rated masonry and gypsum board partitions.
  - D) Control joints in fire-resistance rated masonry and gypsum board partitions and walls.
  - E) Penetrations through fire-resistance rated floors, ceilings, and roofs.
  - F) Around mechanical and electrical assemblies penetration fire separations.
  - G) Rigid ducts: greater than 129 cm<sup>2</sup>, fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
  - H) Between edge of floor slab and exterior wall assembly at building perimeter.
  - I) In other locations where the continuity of a fire-resistant element is interrupted.

### 3.6 CLEANING

1. As work progresses, remove excess materials and clean adjacent surfaces immediately after application.
2. Remove temporary dams after initial set of fire stopping and smoke seal materials.
3. Upon completion of the work of this Section:
  - A) Remove masking and temporary protection from adjacent surfaces.
  - B) Remove stains on adjacent surfaces and make good damage to adjacent surfaces caused by the work of this Section.
4. Remove temporary dams after initial set of fire stopping and smoke.