SECTION 07 16 17

CAPILLARY WATERPROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Comply with Division 1, General Requirements.

B. Definition: Dry space means interior areas not used for containing water.

1.2 SUBMITTALS

A. Manufacturer's instructions: Submit three copies of waterproofing material Manufacturer's preparation and application instructions.

B. Manufacturer's Field Reports:
1. Engage material Manufacturer's Representative for inspection service before application to examine suitability of substrate.
2. Ensure during and after application that specified products are being used, proper amount of waterproofing is being applied and finishing procedures are being implemented.
3. Submit three copies of inspection reports by Manufacturer's Representative.

1.3 QUALITY ASSURANCE

A. Qualifications: Applicators shall be trained in application procedures and approved by membrane Manufacturer.

B. Perform work of this Section by an applicator of recognized standing having not less than five years proven experience on work of similar size and scope.

C. Arrange for Manufacturer’s review of preparation for and application of waterproofing system.

D. Pre-Installation Meeting:
1. Arrange a Site visit prior to commencement of waterproofing to review with installer, Manufacturer's technical representative and Contract Administrator, installation procedures to be adopted, and conditions under which work will be carried out.
2. Review weather conditions under which work will be done, substrate conditions, applicable procedures and protection of completed work.

1.4 DELIVERY, STORAGE AND HANDLING

A. Provide materials in original packaging with labels and seals intact.

B. Store and protect materials in a dry enclosed area.

1.5 SITE CONDITIONS

A. Comply with Manufacturer's requirements regarding surface and ambient temperatures before, during and 48 hours after application.

B. Protect surrounding surfaces from damage.

1.6 SEQUENCING AND SCHEDULING

A. Apply waterproofing within duration after concrete pour recommended by Manufacturer.

1.7 WARRANTY

A. Submit a two year warranty for the work of this Section against defects in workmanship and materials including but not limited to deterioration and leakage.

PART 2 PRODUCTS

2.1 MATERIALS

A. Waterproofing system:
   1. Products and Manufacturers:
      a. Permaquik 200 Crystalline Waterproofing by Tremco Commercial Sealants & Waterproofing.
      b. Krystol Broadcast by Kryton International Inc.
      c. Xypex Concentrate DS-1 by Xypex Chemical Corporation.

PART 3 EXECUTION

3.1 APPLICATION - GENERAL

A. Comply with Manufacturer's requirements regarding surface and ambient temperatures before, during and after application.

B. Apply waterproofing system in accordance with Manufacturer's printed instructions and in manner to ensure treated surfaces are waterproof.

C. Do not apply waterproofing to during snow or rain.

3.2 APPLICATION - HORIZONTAL CONCRETE SURFACES

A. Dry sprinkle waterproofing on concrete surfaces prior to initial set at the rate of 1.3 kg/m². Power trowel or wood float surface to uniform coverage and specified finish.

3.3 SCHEDULE OF APPLICATION

A. Apply waterproofing in locations shown on Drawings and Details.

3.4 PROTECTION

A. Protect freshly treated surfaces from rain for at least 24 hours.

B. Do not expose treated surfaces to liquid media for minimum period of one week.

END OF SECTION

SECTION 07 18 10

TRAFFIC TOPPING (VULKEM)

PART 1 GENERAL

1.1 SUMMARY

A. Comply with Division 1, General Requirements.

1.2 SUBMITTALS

A. Submit two 300 by 300 mm samples of traffic topping system(s) on smooth faced cement board showing colour, texture and finish.

B. Submit two copies of Manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

A. Minimum five years proven experience in this type of work and approved by the Manufacturer of system.

1.4 WARRANTY

A. Submit a two-year warranty for work of this Section against defects in materials and workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Vulkem: by Tremco Inc.

B. Kelmar FWC: by Technical Barrier Systems.

C. Qualideck: by Advanced Coatings.

2.2 MATERIALS

A. Products by Tremco Inc. have been specified as the standard of quality expected. Approved equal in accordance with B8, built-up systems and products of the same generic type may be submitted for Contract Administrator’s approval providing the product submitted for use meets or exceeds the performance criteria of the coatings specified.

B. Request for substitution shall include Manufacturer’s literature for the described product giving the name, generic type, descriptive information, solids by volume, recommended dry film thickness and independent certified test reports showing the product meets all of the specification requirements stated herein.

C. The Contractor shall provide case histories of five years or longer in similar service. No materials that would decrease film thickness or cause a change in the generic type of coating will be considered. No alternate product will be considered for approval during tendering period.

D. Traffic Topping: Polyurethane built-up coating system Vulkem by Tremco Inc., consisting of the following:
   1. Vulkem 360NF for horizontal, sloping and vertical surfaces.
   2. Vulkem 951NF, polyurethane coat wear course, two coats. Colour to later selection.
   3. Non-slip Aggregate: 30-40 mesh aluminum oxide.
   4. Primer: Vulkem 191LV or Tremprime Multi Surface Urethane primer.
   5. Sealant: Vulkem 45SSL, Vulkem 116, Dymeric 240FC as required.
   6. Joint backing as recommended by Manufacturer of topping system
   7. Cleaning material as recommended by Manufacturer of topping system

PART 3 EXECUTION

3.1 EXAMINATION

A. Quality of Substrate: Minimum 28 days old concrete, sound, clean with expansion joints sharply formed.

B. Examine substrates to receive traffic topping and report unacceptable substrate conditions.

C. Commence application after unsatisfactory conditions are corrected.

3.2 PREPARATION

A. For cracks 1.6mm or greater, rout out cracks and construction joints and fill with sealant. For smaller cracks apply a 30 mil (.75mm) thick detail coat, minimum 150mm wide centered over joint.

B. Create 45 degree cove 25 mm wide with sealant fillet at juncture of horizontal and vertical surfaces and at inside corners.

3.3 APPLICATION

A. Apply topping system in accordance with Manufacturer's printed instructions to a uniform appearance.

B. At outside and inside corners apply additional vertical and horizontal coat of base coat elastic membrane 150 mm wide minimum or as required.

C. Traffic Topping: Built-up Vehicular Traffic Topping

1 coat Vulkem 360NF	0.750 mm
1 coat Vulkem 951NF	0.375 mm
1 topcoat Vulkem 951NF	0.375 mm
Total	1.500 mm

D. Mask off adjacent surfaces not to receive coating system.

E. Apply primer in accordance with Manufacturer's recommendations.

F. Apply base coat uniformly and allow to cure.

G. Apply topcoat and broadcast non-slip aggregate into wet material to achieve uniform coverage. Back roll to completely encapsulate aggregate.

H. Apply non-slip aggregate at 0.5 kg/L (15-18 lbs. per 100 sq. ft.). When applying a second top coat, allow the first course to cure a minimum of 6 hours before applying the second coat.

I. Extend topping vertically down basement walls minimum 150 mm below grade. Terminate in reglet and seal with sealant where indicated.

J. Extend topping vertically up the height of curb and terminate as detailed.

3.4 INSTALLATION – CONSTRUCTION AND EXPANSION JOINTS

A. Seal construction and expansion joints, including joints between hollow-core precast concrete slabs, in surfaces covered with traffic topping.

B. Clean out joint and fill space deeper than 13 mm with joint backing material packed tightly in place to within 10 mm of finished surface. Fill remaining space to within 1.5 mm of surface with sealant.

C. Execution:
1. Clean existing membrane and surfaces scheduled to receive seal system to Manufacturer's acceptance. After cleaning, prime existing area to be coated using either Tremco Vulkem 191LV or Tremco Multi Surface Urethane Primer. Allow primer to cure prior to application of Vulkem 360NF.
2. Pack around penetration using joint backing and apply sealant. Tool sealant to form 45degree cant 25 mm wide. Allow sealant to cure prior to applying membrane.
3. Apply .750 mm thick membrane base coat 150 mm onto existing membrane and 150 mm up onto penetration and allow material to cure a minimum of 6 hours prior to application of top coat.
4. Apply 0.375 mm thick finish coat over entire seal system.
5. Protect seal system with protection board, until ready for use.

END OF SECTION

SECTION 07 21 00

THERMAL INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Comply with Division 1, General Requirements.

1.2 REFERENCES

A. Comply with the latest edition of the following statutes codes and standards and all amendments thereto.
   1. ASTM C165 Standard Test Method for Measuring Compressive Properties of Thermal Insulations
   2. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
   3. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials
   4. CAN/CGSB 51.34 Vapour Barrier, Polyethylene Sheet for Use in Building Construction
   5. CAN/ULC S701 Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering
   6. CAN/ULC S702 Standard for Thermal Insulation Mineral Fibre for Buildings
   7. CGSB 71-GP-24M Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation

1.3 SUBMITTALS

A. Submit two samples 300 mm square of insulation materials and fasteners.

1.4 DESIGN

A. Exterior cladding is based on design principle of "Rain Screen" as recommended by the Institute for Research in Construction (National Research Council of Canada). This principle requires that the construction behind cladding act as an air and vapour barrier to prevent passage of moisture-laden air and diffusion of water vapour. To ensure the continuity of air vapour and barrier within construction specified and with adjacent barrier construction is part of the work of this Section.

1.5 QUALITY ASSURANCE

A. Perform work of this Section by an insulation applicator of recognized standing having not fewer than five years, continuous proven experience on projects of similar size and scope.

B. Employ only skilled mechanics having experience and an understanding of design principles of thermal, air and vapour barriers.

1.6 DELIVERY, STORAGE, AND HANDLING

A. In cold weather, provide warm storage for adhesives such that their consistency is suitable for application.

1.7 SITE CONDITIONS

A. Protect surfaces, and in particular the building cladding finishes, from being marred or contaminated by the materials. Examine the work of other Sections where such work is closely associated with the work of this Section and report any damage done to the work of this Section.

B. Protect work of this Section from damage due to high velocity winds until building cladding or other permanent protection is in place.

C. Maintain surface and ambient temperatures constantly between 10 degrees C and 38 degrees C during application and curing of adhesive except as permitted otherwise by the Contract Administrator in writing.

1.8 WARRANTY

A. Submit a two year warranty for the Work of this Section against defects in materials, and workmanship including but not limited to integrity and continuity of the thermal, air and vapour barriers.

PART 2 PRODUCTS

2.1 MATERIALS

A. Polystyrene Insulation (Type 1): CAN/ULC S701, Type 4, rigid, expanded, extruded polystyrene board insulation, RSI=0.87 per 25 mm thickness and a minimum compressive strength of 240 kPa at 10 percent deformation or yield; shiplapped edges.

B. Glass Fibre Insulation (Type 2): OF1-48 by Ottawa Fibre Inc.; AF530 by Owens Corning Canada Inc.. Insulation "k" factor of 0.036 W/(m x °C) (0.25 BTU/hr./sq.ft./°F/1" thickness), at a mean temperature of 24 degrees C, and a nominal density of 48 kg/cu.m. Deformation of glass fibre rigid board: Exceed 10 percent when tested at 1.2 kPa in accordance with ASTM C165.

C. Aluminum Faced Insulation (Type 3): Glass Fibre insulation OFI-48 by Ottawa Fibre Inc.; AF 530 by Owens Corning Canada Inc. Insulation: "k" factor of 0.036 W/(m x °C) (0.250 BTU/hr.sq.ft./°F/1" thickness) at a mean temperature of 23 degrees C, and a nominal density of 48 kg/cu.m. Deformation of fibrous glass rigid board less than 10 percent when tested at 1.2 kPa in accordance with ASTM C165.
   1. Insulation Facing: Laminated aluminum foil-fiberglass scrim/flame-resistant kraft paper barrier applied with fire retardant adhesive; aluminum foil thickness minimum 0.635 mm; vapour barrier effect: 1.72 ng/(Pa x s x sq.m), (0.03 perms) maximum.

2. Tape: Laminated aluminum foil-glassfibre scrim/fire resistant kraft paper type, 50 mm minimum wide, and with a perm rating of 1.7 ng, (0.03 perms).

D. Glass Fibre Insulation (Type 4): Baseclad EBWI by Owens Corning Canada Inc. Thickness as indicated.

E. Cavity Wall Insulation: Mineral Wool Insulation (Type 5): Cavity Rock by Roxul Inc.

F. Concrete Faced Insulation CFI (Cement Faced Perimeter Insulation) (Type-6): 50 mm thick 610 by 1220 mm panels, styrofoam insulation with factory applied 8 mm thick latex-modified concrete facing. Acceptable Manufacturers:
   1. T. Clear Corp.
   2. Tech-Crete.

G. Roof Insulation:
   1. Refer to Section 07 52 16, SBS Modified Bituminous Membrane Roofing.
   2. Refer to Section 07 55 50, Protected Membrane Roofing.

H. Insulation Adhesive
   1. (Type 2): Fire retardant vapour barrier type compatible with polystyrene and glass fibre, Bakor 260-08 by Bakor Inc. Stanguard Foamastick by Stanchem Division of PPG Industries Canada Ltd., Borden's Foam Insulation Adhesive C-64-86 by the Borden Chemical Company (Canada) Ltd., 3M Insulation Adhesive #37 by the 3M Canada Inc.
   2. Insulation Adhesive (Type 3): Bakor 230-21 by Bakor Inc., solvent type, rapid cure for adhering polystyrene, glass fiber, mineral fiber, or urethane insulation.
   3. Primer for Adhesives: Recommended by the adhesive Manufacturer for the particular substrate and the materials to be adhered.

I. Vapour Barrier
   1. Vapour Barrier: 0.51 mm thick reinforced vinyl sheet, FR40 by Lexsuco Canada Ltd. Mechanical fastening strip for vinyl sheet: 25 by 3 mm thick securement strip by Hydrotech Membrane Corp.
   2. Adhesive for Vinyl Sheet: As recommended by the vinyl sheet Manufacturer and compatible with materials.

J. Air Barrier
   1. Air Barrier: Perm-A-Barrier by W.R. Grace Construction Products, Colphene 180 by Soprema Waterproofing Inc. or 1.0 mm thick minimum Blue Skin SA by Bakor Inc. Primer as recommended by barrier Manufacturer.

K. Air Seal at Expansion Joint: Thermofusible membrane of elastomeric bitumen reinforced with polyester mesh, 1.5 mm thick Blue Skin SA by Bakor Inc. or Soprajoint Soprema Waterproofing Inc. Primer: As recommended by Manufacturer of membrane.

L. Dampproof Flashing: Stainless Steel Dampproofing: Type 304 and as indicated and detailed.

M. Powder Actuated Fastener: Hilti Type DN by Hilti Limited. Size to suit application.

N. Insulation Fasteners: UCAN MJP Series, minimum 25 mm longer than thickness of insulation.

O. Mechanical Fastening System: Bailey Retainer Tee 48 mm wide, 0.63 mm thick, zinc coated steel furring channel, predrilled at 150 mm o.c., complete with fasteners, by Dow Chemical Canada Inc. Size fasteners to allow minimum embedment 25 mm in concrete or masonry wall.

P. Z-section Strapping: Roll-formed from minimum 0.63 mm electro-galvanized steel sheet and having a 32 mm minimum wide flanges and web depth to suit insulation thickness; flanges knurled to facilitate acceptance of screws, rolled lips at outer edges.

Q. Sheet Metal: Galvanized steel sheet, minimum 0.85 mm thick, formed to shapes indicated and required.

R. Pegs: 6 mm diameter, 200 mm long hardwood skewers.

S. Vapour Retardant: CAN/CGSB-51.34M, 0.15 mm polyethylene sheet.

T. Splash Pads: Of size and shape indicated, hydraulically pressed concrete minimum strength 55 MPa, natural colour, by Brooklin Concrete Products Ltd.

U. Metal Clip: 0.61 mm thick galvanized steel, continuous moulding of shape indicated, pre-drilled 300 mm o.c. for fastening to wall.

V. Fasteners: Stainless steel, powder activated, complete with washers, type and size to suit applicable condition.

PART 3 EXECUTION

3.1 EXAMINATION

A. Ensure that surfaces to receive adhesive or insulation are dry, suitable for bond, and free from loose material, projections, ice, frost, grease, oil or other matter detrimental to bond of the adhesive or uniform bedding of the insulation.

B. Examine substrate and report unacceptable conditions. Commencing work will imply acceptance of substrate conditions.

3.2 INSTALLATION - GENERAL

A. Install materials in accordance with the Manufacturers' printed instructions and as specified.

B. In construction separating interior from exterior, locate air and vapour barrier on the warm-in-winter side of the insulation.

C. Ensure a uniform, continuous thermal and air and vapour barrier effect. Where insulation and air and vapour barriers are to be provided under other Sections, co-ordinate the work such that thermal and air and vapour barrier continuity is achieved. At perimeter provide sheet metal or butyl sheet to seal air and vapour barrier to adjacent system.

D. Pay the cost of repair to the acceptance of the Contract Administrator of concrete and masonry chipped, spalled or otherwise damaged by the use of power-activated or pneumatic fixings in connection with the work of this Section and for resulting delays. The Contract Administrator reserves the right to restrict the use of such fixings where substrates are damaged. Where accepted use low-velocity type powder activated fixing devices having a double guidance system.

E. Where hangers, anchors, and supports pass through insulation and vapour barrier construction, butter apertures with vapour barrier adhesive and ensure continuity of thermal and air and vapour barrier provisions.

F. Provide 50 mm thick polystyrene insulation at bottom of air shafts. Provide 600 mm by 600 mm standard 38 mm thick concrete pavers over.

G. Fit each board against adjacent boards. Stagger joints. Fit board neatly with tight joints around pipes, ducts, obstructions, openings and corners.

H. Do not enclose insulation permanently until installation has been accepted. Coordinate installation of insulation with scheduling for enclosing materials.

I. Provide appropriate protection to maintain integrity of installed insulation until facing materials are in place.

3.3 INSTALLATION - INSULATION FASTENERS

A. Install insulation fasteners for attachment of insulation. Apply to concrete or on underside of structural slab substrate using drilled pilot holes. Install insulation fasteners 25 mm from end and edge of board at 600 mm o.c. and at the rate of one per square metre (one/10 ft^2) for remainder of board.

B. Where insulation adhesive is to form a vapour barrier, arrange fasteners generally at 300 mm centres both ways. Do not support insulation on clips until adhesive has set. Mechanical fasteners applied to steel air and vapour barriers, remove primer paint and use welded insulation clips.

3.4 INSTALLATION - AIR AND VAPOUR BARRIER

A. Install membrane air and vapour-barrier full surface of concrete block walls on the warm-in-winter side of insulation.

B. Verify that surfaces to receive air and vapour barrier membrane are dry, firm, suitable for bond, and free from loose material, projections or other matter detrimental to bond of the air and vapour barrier membrane or uniform bedding of the insulation.

C. Apply primer and air and vapour barrier membrane to masonry substrates, according to Manufacturer's instructions.

D. Apply a continuous air and vapour barrier.

E. Lap joints in membrane minimum of 50 mm and seal.

F. Cut and tightly seal membrane around penetrations and protrusions to provide a continuous air and vapour barrier.

G. Extend air and vapour barrier membrane at the peripheries of the installation as required to join and seal to air and vapour barriers provided in adjacent construction.

H. Extend applied air and vapour barrier membrane onto adjacent concrete substrates which are indicated to have no applied air and vapour barrier 300 mm minimum.

3.5 INSTALLATION - AIR AND VAPOUR BARRIER ADHESIVE

A. Apply adhesive to the entire surface of the substrate using notched trowel of the type recommended by the adhesive Manufacturer.

B. Verify that surfaces to receive air and vapour barrier membrane are dry, firm, suitable for bond, and free from loose material, projections or other matter detrimental to bond of the air and vapour barrier membrane or uniform bedding of the insulation.

C. Where insulation adhesive is to act as an air and vapour barrier, trowel apply a continuous layer of adhesive at a uniform, minimum thickness of 3 mm to the substrate and to insulation board edges.
   1. Tape joints in substrates receiving adhesive.
   2. Apply adhesive layer over tape before embedding insulation.
   3. Extend adhesive 100 mm minimum at the peripheries of the installation to facilitate taping and sealing of the vapour barriers provided in adjacent construction.
   4. Extend adhesive layer over mechanical fasteners.
   5. Where heating cables are scheduled coordinate installation with the work of Division 26, Electrical.

3.6 INSTALLATION - INSULATION

A. Butt insulation boards tightly and stagger joints. Set insulation into adhesive.
   1. Cut insulation and fit tightly to strapping, pipes, ducts, obstructions, openings and corners.
   2. Bevel board edges abutting sloping surfaces.
   3. Cut out back of board insulation as required to accommodate substrate irregularities and build up over cut out areas on the other side as required to ensure thermal barrier uniformity.

3.7 INSTALLATION - FOIL FACED INSULATION

A. Provide aluminum sheet edge trim set in a continuous sealant bead and mechanically fastened to adjacent construction to provide connection between air and vapour barrier and adjacent work.

B. Where board insulation has an integral air and vapour barrier facing, tape board facing joints and the junctions of board facings with adjacent construction.

1. Lap joints in tape 100 mm and seal with adhesive.

3.8 INSTALLATION - STEEL SHEET AIR AND VAPOUR BARRIER

A. Provide 0.7 mm galvanized steel sheet air and vapour barrier and insulation at soffit locations. Seal barrier air and vapour tight at internal joints and to adjacent air and vapour barrier.

3.9 MISCELLANEOUS BUILDING CAVITIES

A. Pack batt insulation tightly into miscellaneous building cavities as required to ensure a continuous thermal barrier.

3.10 INSTALLATION - PERIMETER INSULATION

A. Install perimeter insulation to inside face of exterior walls below slabs on grade. Extend insulation 3000 mm minimum below finished exterior grade. Return 450 mm minimum along intersecting walls. Laminate insulation to vertical walls by applying 50 mm diameter adhesive daubs at 600 mm o.c. Butt boards tightly.

3.11 INSTALLATION - AIR AND VAPOUR BARRIER AT EXPANSION JOINTS AND CONTROL JOINTS

A. Where expansion joints and control joints occur in thermal and air and vapour barrier construction, install 150 mm wide vinyl sheet looped into joint to provide for movement. Set flanges of the sheet in full, continuous beds of adhesive. Supplement adhesive attachment with pneumatic securement of fastening strip at each edge. Secure strip to substrate at 200 mm o.c. maximum. Shingle-lap sheet joints 25 mm and field vulcanize full width. Pack expansion joints with low-density fibrous glass insulation unless shown otherwise.

3.12 INSTALLATION - RIGID INSULATION ON GRADE

A. Place insulation horizontally on compacted bed and secure in position with two pegs per board below slab in extent indicated.

3.13 INSTALLATION – CONCRETE FACED INSULATION (CEMENT FACED PERIMETER INSULATION)

A. Install tongue and groove panels in accordance with Manufacturer’s recommendations.

B. Install panels with Manufacturer’s concealed starter and securement clips. Trim openings and exposed edges with preformed 1.21 mm thick stainless steel metal trim.

3.14 INSTALLATION - AIR SEAL AND DAMPPROOF FLASHING

A. Prime surface and install flat without expansion loop, membrane strip of width indicated continuously over:
   1. expansion joints on outside face of backing wythe in exterior perimeter walls from bottom edge of insulation below grade to top of roof parapet.
   2. horizontal and vertical construction and control joints on outside face of backing wythe in exterior walls.

B. Install membrane at exterior walls over steel lintels, shelf angles, concrete ledge and other locations indicated. Cut membrane 6 mm back from edge of support.

3.15 INSTALLATION – SPLASH PADS

A. Install Splash Pad at each downspout. Refer to Mechanical Drawings for locations of drain pipes and downspout points.

3.16 PATCHING

A. Perform cutting and patching necessary to accommodate irregularities in the work of this Section caused by appurtenances of the work of other Sections including piping, ductwork and electrical conduit projecting through the thermal or air and vapour barriers.

B. Ensure the continuity of the thermal and vapour barriers where such items project through the barriers. Allow for expansion and contraction and linear movement of these items.

C. Where there is a possibility of heat loss through ductwork or conduit which passes through the thermal and air and vapour barrier, extend insulation around the duct or conduit a distance of 300 mm minimum on both sides of the barrier unless otherwise shown on the Drawings.

D. After installation under other Sections of heating equipment and other construction adjacent to the work of this Section, inspect the work of this Section and perform such reasonable taping and patching of vapour barriers and replacing of insulation as necessitated by unavoidable minor damage caused in the course of the work of the other Sections.

3.17 CLEANING

A. Clean surfaces marred or otherwise damaged to Contract Administrator acceptance, including steam cleaning. Pay the cost of replacing finishes or materials that cannot be cleaned.

3.18 SCHEDULE OF INSULATION SYSTEMS

A. Where insulation is applied to the exterior face of concrete block: Apply the insulation in a 3 mm thick bed of trowelled-on vapour barrier adhesive.

B. Concrete Faced Insulation (CFI): Install 50 mm thick below veneer stone or metal siding carried down to 100mm below grade.

C. Foundation wall Perimeter Insulation: Install polystyrene insulation (Type 1) using adhesive daubs at the rate of one per 0.2 sq.m. Carried down to 3000mm below grade. Thickness 75mm thick unless indicated otherwise.

D. Air shafts: Install polystyrene insulation (Type 1) at bottom including precast concrete pavers.

E. Exposed exterior Concrete walls at Air Void/Plenum area or Concrete Block: Install Aluminum Faced Insulation (Type 3) using air and vapour barrier adhesive and mechanical fasteners. Thickness 125 mm minimum.

F. Interior of Concrete surfaces at Grit tanks Building and where indicated on Drawings: Install Aluminum Faced Insulation (Type 3): using adhesive, mechanical fasteners and foil laminate taping. Thickness 125mm minimum. Miscellaneous Building Cavities: Batt insulation Type 6 in various sections.

G. Exterior Wall Insulation: Mineral Wool Insulation (Type 5): Cavity Rock by Roxul Inc for the work of Section 04 43 30, Stone Masonry Units.

H. Preformed Metal Roofing for the work of Section 07 41 10: Mineral Wool Insulation (Type 5): Cavity Rock by Roxul Inc

I. Roof Insulation:
   1. Refer to Section 07 52 16, SBS Modified Bituminous Membrane Roofing.
   2. Refer to Section 07 55 50, Protected Membrane Roofing.

END OF SECTION

SECTION 07 41 10

PREFORMED METAL ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Comply with Division 1, General Requirements.

1.2 REFERENCES

A. Manitoba Building Code (MBC).

B. ASTM-A446M Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.

C. ASTM-A525M General Requirements for Steel Sheet Zinc-Coated (Galvanized) by the Hot-Dip Process.

D. ASTM-792M Steel Sheet, Aluminum-Zinc Alloy Coated by the Hot-Dip Process, General Requirements.

E. CAN/CGSB-1.108-M Bituminous Solvent Type Paint.

F. CAN/CGSB-19.24-M Multicomponent, Chemical-Curing Sealing Compound.

G. CAN/CGSB-51.20-M Thermal Insulation, Polystyrene, Boards and Pipe Covering.

H. CAN/CSA-A82.27-M Gypsum Board Products.

I. CSA A101-M Thermal Insulation, Mineral Fibre, for Buildings.

J. CAN/CSA S16.1-M Limit States Design of Steel Structures.

K. CAN/CSA-O80 Series-M Wood Preservation.

1.3 DESIGN REQUIREMENTS

A. Design metal roofing panels, anchors, fastenings and secondary support system to withstand applicable loads established by the Manitoba Building Code and applicable local regulations for the locality. Deflection of profile sheets: Maximum 1/180th of span at this loading. Reference velocity pressure: Based on hourly wind pressures for the locality.

B. Design work of this Section, which will support other items or will be required to support structural loads of any nature, by a Professional Engineer licensed in the Province of Manitoba. Affix professional seal and signature to Shop Drawings for such items.

C. Design metal roofing system to comply with CAN/CSA S16.1.

D. Design metal roofing system to allow for thermal movement of components caused by ambient temperature range without causing deterioration of system.

E. Design metal roofing system using concealed fastening details.

F. Design system for drainage for condensation within system.

G. Design components to resist vibration when subjected to the effects of wind.

1.4 SUBMITTALS

A. Shop Drawings:
   1. Submit Shop Drawings indicating material being supplied, thickness, metal finishing specifications, layout of panels and battens, special shapes and girts, connections, attachments, anchorage and location of fastenings, flashings and closure flashings and sealing.
   2. Indicate design loads and spans, sheet lengths and lap locations.
   3. Indicate provision for structural and thermal movement between metal roofing and adjacent materials.

B. At time of Shop Drawing submittals, submit written certification from Professional Engineer licensed in the Province of Manitoba, stating that support system, anchorage and equipment have been designed according to requirements of the OBC, Division B, Part 4, article 4.1.8.17 for post-disaster structures. Submit two 300 mm long samples of profile specified, showing material, thickness, finish and colour.

C. Submit metal finishers certificate that coating system provided meets the specifications.

D. Submit Manufacturer's instructions for installation of materials and manufactured units as required.

1.5 QUALITY ASSURANCE

A. Qualifications: Perform the work of this Section by a company in good standing of the Canadian Sheet Steel Building Institute and the Canadian Institute of Steel Construction.

B. Minimum five years proven acceptable experience installing metal roofing on projects of comparable size and scope.

C. Prior to commencement of metal roofing construction, submit list of project names, owners, contacts, dates completed and construction costs.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Package materials to protect finished surfaces from staining and marring.

B. Store roofing panels flat at Site under protection to prevent staining from the ground or from collection of water on material and secured against wind damage.

C. Deliver materials to job Site storage compound in such a manner to prevent in-transit damage. These measures include, but are not limited to crating, polyethylene wrapping system, and similar items.

1.7 WARRANTY

A. Submit a two year warranty for the work of this Section against defects in materials and workmanship.

B. Warranty Period: Commencing with start of Guaranteed Maintenance Period.

PART 2 PRODUCTS

2.1 MATERIALS

A. Steel Sheet: ASTM A446M, Grade A, Structural (physical) quality, 0.76 mm, 0.91 mm minimum, zinc-coated (galvanized) to ASTM A525M coating class Z275 (ASTM A525 coating class G90).

B. Steel Sheet: ASTM A792M, Structural (physical) quality 0.76 mm, 0.91 mm minimum, aluminum-zinc coated (Galvalume) to AZ150 designation (ASTM A792 designation AZ 50).

C. Metal Coating System (Type 2): Coil-coated, baked-on, 70 percent Kynar 500 polyvinylidene fluoride, dry film thickness of 22.5 micron plus or minus 5 micron 10000 Series by Stelco Inc. or Dofasco Inc. on exposed surfaces. Pretreat and prime surfaces prior to application of coating. Prime and wash coat finish unexposed surfaces.

D. Closures, Flashings, Coping Flashings, Trim: Same material and finish used for roofing panels and battens, 0.61 mm thickness.

E. Closure (Ends): Galvanized steel minimum 1.22 mm thick channels or girts located at top and bottom of each roof, sized to suit thickness of insulation.

F. Clips: Gusset reinforced galvanized steel minimum 1.89 mm thick, sized to suit insulation thickness.

G. Concealed Clips: Thermal clip, slotted galvanized steel angles minimum 0.61 mm with separate stainless steel lock tab.

H. Auxiliary Supports: Galvanized steel minimum 1.22 mm thick to ASTM A525M coating class Z275 (G90).

I. Concealed Fasteners (Roofing Panels): Stainless steel for aluminum panels or galvanized steel for steel panels.

J. Cavity Wall Insulation: Mineral Wool Insulation (Type 5): Cavity Rock by Roxul Inc.

K. Snow Fence: Stainless steel, strips and rods in Manufacturer's standard configuration.

L. Snow Fence Subgirt: Galvanized steel minimum 1.89 mm thick to support snow fence bracket.

M. Ice deflector: Same material, thickness and finish used for roofing panels and battens.

N. Eavestrough and Downspout: Same material, 0.76 mm thickness and finish used for roofing panels and battens. Fabricate to profiles indicated. Fabricate prefinished support straps as required.

O. Splash Pads: Of size and shape indicated, hydraulically pressed concrete minimum strength 55 MPa, natural colour, by Brooklin Concrete Products Ltd.

P. Soffit: Same material, 0.76 mm thickness, and finish used for roofing panels and battens. Fabricate perforated vented panels as required.

Q. Plywood: CSA O121-M, 19 mm thick Douglas fir plywood, preservative treated to CAN/CSA-O80.

R. Roofing Underlayment: Ice and Water Shield by W.R. Grace Co. of Canada Ltd., Eaveguard by Bakor Inc.

S. Sealant (Shop Applied): One-part elastomer, TRS 600 by Tremco (Canada) Ltd., Bakor Inc.

T. Sealant (Site Applied): CAN/CGSB-19.24-M, Dymeric 240 by Tremco (Canada) Ltd. Colour to match predominant material to which sealant is applied. Primer as approved by sealant Manufacturer.

U. Isolation Coating: CAN/CGSB-1.108-M, Quick drying asphalt utility enamel.

V. Zinc Rich Primer: Sealtight Galvafroid SB by W.R. Meadows Ltd.

2.2 FABRICATION

A. Metal Roofing System: Steel Insulclad MRT-LB 400, System by Peerless Enterprises Div. of Tectum Ltd.; Marquis System 450, by VicWest Steel Inc., with snap-on batten cover and concealed spring lock retention clip system.
   1. Panel Face Profile: Plain.

B. Metal Roofing: 610 mm wide panel, three rib profile, steel 36 mm high, P1512 HF by Peerless Enterprises Div. by VicWest Steel Inc.

C. Start fabrication of roofing panels from accepted Shop Drawings and Site measurements.

D. Take Site measurements to ensure fabrications fit structure, surrounding construction, around obstructions and projections in place and to suit locations of services.

E. Form roofing panels to profiles indicated and in accordance with Manufacturer's directions without face damage or distortion.

F. Fabricate panels one piece full length.

G. Fabricate securement members required for anchorage and attachment of panels to structural framing members for support of roofing system.

H. Fabricate trim and closures at openings to match panel finish.

I. Fabricate eavestrough and downspout profiles to Manufacturer's Shop Drawing details.

J. Fabricate soffit panel profiles to Manufacturer's Shop Drawing details. Fabricate vented panels as required.

K. Fabricate snow fences and ice deflectors to Manufacturer's Shop Drawing details.

L. Finish exposed surfaces of metal with Metal Coating System Type 2.

M. Finish concealed surfaces of metal sheet with Metal Coating System Type 2.

PART 3 EXECUTION

3.1 EXAMINATION

A. Ensure that backup construction is aligned for proper installation of preformed metal roofing before commencing erection.

B. Examine surfaces of structural roof deck and report conditions which would adversely affect metal roofing.

C. Commence work after unsatisfactory conditions are corrected. Commencement of work implies acceptance of project conditions.

3.2 PREPARATION

A. Install and clean steel roof deck before application of roofing system. Close ends of roof deck flutes.

B. Coat metal surfaces in contact with concrete, masonry, or other cementitious materials with one coat of 1 mm thick isolation coating.

C. Touch-up field welds in galvanized steel with two coats zinc chromate primer.

3.3 INSTALLATION - UNDERLAYMENT

A. Install roofing underlayment in accordance with Manufacturer's printed instructions. Lap underlayment in shingle fashion. Prime gypsum board at the rate of 350 g/m² to receive

roofing underlayment. Roll membrane to substrate for continuous bond. Lap joints 50 mm. Make roofing underlayment air and vapour tight.

B. Seal roof underlayment to air and vapour barrier of wall system.

C. Install steel girts and other auxiliary supports required, secure to structural steel deck.

D. Install roofing system closures, gusset reinforced clips and concealed clips.

E. Drain roofing underlayment to exterior.

F. Install concealed clip system fastened through roofing underlayment and gypsum board plywood to the Manufacturer's recommended spacing to suit design requirements and wind loads.

3.4 INSTALLATION - METAL ROOFING

A. Install roofing panels as shown on Shop Drawings and accepted by Contract Administrator. Install prefinished roof panels on panel support clips using Manufacturer's construction procedure.

B. Form seams with an electric seaming machine to ensure weather tightness.

C. Install metal roofing plumb and straight and true to adjacent work, with ribs equidistant from adjoining roof parapets.

D. Install battens at 400 mm o.c. Ensure batten is positively locked for full length of roof.

E. Form and install closures, crickets flashings and trim required to maintain wind and rain tightness.

F. Form and install coping flashings contiguous with preformed metal roofing [as detailed]. Install continuous metal drips, cleats, clips and starter strips.

G. Provide ridge, hip, valley, vents, skylights, access hatch and vertical wall flashings. Use preformed flashings for vents and similar protrusions.

H. Provide flashings at skylights and hatches to prevent standing water.

I. Provide girt centred under ice fence. Provide ice fence using aluminum angle secured through roofing into girt at 600 mm o.c. max. Locate ice fence 300 mm from bottom edge of roofing.

J. Raw metal edges exposed at metal panels terminating at eaves and valleys are not acceptable. Fold panel ends for concealed fastening.

K. Install flashings with S locks for concealed fastening.

L. Install continuously vented ridge with concealed fastening. No raw edges permitted.

M. Raw metal edges exposed of metal panels terminating at eaves and valleys are acceptable. Secure panels with face fasteners.

N. Lap flashing ends and install with face fasteners.

O. Install snow fences along eaves spaced maximum 900 mm from eave. Fasten snow fence baseplates back down to snow fence subgirt in accordance with Manufacturer's recommendations. Isolate snow fence baseplates from metal roofing with neoprene pads.

P. Secure ice deflectors at eaves below line of snow fences.

Q. Install trim required for soffit panels. Install soffit panels in direction perpendicular to wall with concealed fastening.

R. Install eavestroughs and downspouts as indicated. Secure with support straps at 2500 mm o.c. maximum. Install splashpad centred on downspout outlet on crushed gravel sloping away from building. Seal eavestrough watertight.

S. Touch up minor paint abrasions with air dry touch up paint of formulation to match factory finish.

3.5 INSTALLATION - SEALANT

A. Seal joints between metal roofing panels, and between roofing panels and adjacent surfaces.

B. Seal roofing system air and watertight.

C. Before application of sealant, clean and dry joint surfaces. Apply primer and sealant in accordance with Manufacturer's printed instructions. Tool sealant to concave profile.

3.6 CLEANING

A. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable by sealant Manufacturer and metal fabricator.

B. Where accumulation of dirt does not respond to cleaning required, refer condition to Contract Administrator, with recommendations as to remedial action required; do not undertake any cleaning procedure of a severe nature without written acceptance.

END OF SECTION

SECTION 07 42 10

PREFORMED METAL PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Comply with Division 1, General Requirements.

B. Products supplied but not installed under the Work of this Section:
   1. Metal coping flashings for roof parapets contiguous with metal wall panels.

1.2 REFERENCES

A. National Building Code (NBC).

B. Comply with the latest edition of the following statutes codes and standards and all amendments thereto.
   1. ASTM-A643/A653M, General Requirements for Steel Sheet Zinc Coated (Galvanized) by the Hot Dip Process.
   2. ASTM D1187, Bituminous Coating.
   3. CAN/ULC S702, Standard for Thermal Insulation, Mineral Fibre for Buildings.
   4. CAN/CSA-G40.21-M, Structural Quality Steels.
   5. CSA/G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles.
   6. CAN/CSA S16.01-M, Limit States Design of Steel Structures.

1.3 DESIGN REQUIREMENTS

A. Design metal panels, anchors, fastenings and secondary support system to withstand applicable loads established by the National Building Code of Canada and applicable local regulations for the locality. Deflection of profile sheets: Maximum 1/180th of span at this loading. Reference velocity pressure: Based on hourly wind pressures for the locality.

B. Design work of this Section, which will support other items or will be required to support structural loads of any nature, by a Professional Engineer licensed in the Province of Manitoba. Affix professional seal and signature to Shop Drawings for such items.

C. Design system to comply with CAN/CSA S16.1.

D. Design panel system to allow for thermal movement of components caused by ambient temperature range without causing deterioration of system.

E. Design metal panel system using concealed fastening details.

F. Design panel system to achieve curved cladding shown with uniform radius.

G. Design components to resist vibration when subjected to the effects of wind.

H. Provide for positive drainage of condensation occurring within wall construction and water entering at joints, to exterior face of wall.

I. Design wall system to accommodate erection tolerances of structure.

1.4 SUBMITTALS

A. Shop Drawings
   1. Submit Shop Drawings indicating type of metal wall panels, thicknesses of metal components, size, spacing and location of supports and girts, connections, type and locations of fastenings, sealing, finish and colour.
   2. Indicate design loads and spans, sheet lengths and lap locations.
   3. Indicate provision for structural and thermal movement between metal cladding and adjacent materials.
   4. At time of Shop Drawing submittals, Submit written certification from Professional Engineer licensed in the Province of Manitoba stating that support system, anchorage and equipment have been designed according to requirements of the NBC, Division B, Part 4, article 4.1.8.17 for post-disaster structures.
   5. Show joint location where panels are not one piece full height.

B. Submit two 300 mm long samples of profiles specified, showing material, thickness, finish and colour.

C. Submit metal finishers certificate that coating system provided meets the Specifications.

D. Submit manufacturer's instructions for installation of materials as required.

1.5 QUALITY ASSURANCE

A. Qualifications: Membership in good standing of the Canadian Sheet Steel Building Institute and the Canadian Institute of Steel Construction.

B. Minimum five years proven acceptable experience installing preformed metal panel work on projects of comparable size and scope.
   1. Prior to commencement of metal panel construction, submit list of project names, Owners, contacts, dates completed and construction costs.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect finished surfaces from damage.

1.7 WARRANTY

A. Submit a two-year warranty for the work of this Section against defects in materials and workmanship.

PART 2 PRODUCTS

2.1 MATERIALS

A. Steel Sheet (Exterior Walls): Commercial quality 0.76 mm, minimum, zinc coated (galvanized) to ASTM A653/A653M coating class Z275.

B. Miscellaneous Shapes: CAN/CSA-G40.21-M; galvanized steel, galvanized to CAN/CSA A164-M, hot-dip galvanizing of 610 g/m² zinc coating.

C. Coping counterflashing, flashing closures of same material and finish as metal panels. Supply coil stock material to Section 07 62 00, Sheet Metal Flashing.
   1. Counterflashing, flashing, closure: 0.61 mm galvanized steel sheet.
   2. Coping: 0.8 mm galvanized steel sheet.

D. Girts, Angles, Clips and Other Auxiliary Supports: Fabricated from minimum 1.22 mm thick galvanized steel sheet.

E. Concealed Fasteners: Stainless steel for aluminum wall panels, galvanized carbon steel for steel wall panels.

F. Exposed Fasteners: Stainless steel for wall panels, with colour matching nylon heads, Colourmate by Northwest Screw Products Ltd., Prisma by Construction Fasteners Inc.

G. Air and Vapour Barrier

H. Insulation: Refer to Section 07 21 00, Thermal Insulation.

I. Isolation Coating: ASTM D1187 Bituminous Coating.

J. Touch-up Primer: Sealtight Galvafroid Zinc Rich Coating by W.R. Meadows of Canada Ltd.

K. Flexible Seals: 1.0 mm thick EPDM or Neoprene sheet and adhesive.

L. Shop Applied Sealant: One part elastomer, TRS 600 by Tremco (Canada) Ltd.

M. Sealant for On-Site Sealing: Dymeric 240 by Tremco (Canada) Ltd. Primer: As recommended by sealant manufacturer. Colour of sealant: Of colour similar to predominant material to which sealant is applied and subject to review by the Contract Administrator.

N. Joint backing: Closed cell, polyethylene, compatible with sealant minimum 25 percent oversized.

2.2 FABRICATION

A. Metal Panel Types:
   1. Provide wall panel type 1 and 2 from one manufacturer
   2. Metal Wall Panel (Type 1):
      a. Vicwest Supervic profile, nominal 762 mm panel width.

b. Agway 6-150 NF wall panel profile, nominal 762 mm panel width.

3. Metal Wall Panel (Type 2):
   a. Vicwest FD, HB, CL 306 Corrigated profile, nominal 609 mm panel width.
   b. Agway 4-300 Corrigated profile, nominal 600 mm panel width.

B. Start fabrication of metal panels from accepted Shop Drawings and Site measurements.

C. Take Site measurements to ensure that fabrications fit structure, surrounding construction, around obstructions and projections in place and to suit locations of service.

D. Form metal panels to profiles indicated and in accordance with manufacturer's directions without face damage or distortion.

E. Fabricate panels one piece full height. Fabricate corners brake formed to required angle.

F. Fabricate securement members required for anchorage and attachment of panels to structural framing members for support of panel system.

G. Fabricate trim and closures at doors, windows, louvres and similar openings to match panels finish.

2.3 FINISHES

A. Metal Coating System (Type 1): Coil-coated, baked-on, silicone modified polyester, dry film thickness of 25 micron plus or minus 5 micron 5000 Series by Stelco Inc. or Dofasco Inc. on exposed surfaces. Pretreat and prime surfaces prior to application of coating. Prime and wash coat finish unexposed surfaces.

B. Metal Coating System (Type 2): Coil-coated, baked-on, 70 percent Kynar 500 polyvinylidene fluoride, dry film thickness of 22.5 micron plus or minus 5 micron 10000 Series by Stelco Inc. or Dofasco Inc. on exposed surfaces. Pretreat and prime surfaces prior to application of coating. Prime and wash coat finish unexposed surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine structural frame and structure and report unacceptable Site conditions.

B. Commencement of work implies acceptance of Site conditions.

3.2 PREPARATION

A. Coat metal surfaces in contact with concrete, masonry, or dissimilar metals other cementitious materials with one coat of 1 mm thick DFT minimum, isolation coating.

B. Touch up field welds in galvanized steel with two coats zinc chromate primer. 50 micron thick DFT, minimum.

C. Provide auxiliary supports and framing as required by substrate conditions.

3.3 INSTALLATION

A. Install steel girts and auxiliary supports required. Secure to structural building frame.

B. Commence installation of preformed metal panels after building frame is completed and permanent bracing and roof and floor diaphragms are in place; and concrete structure has acquired minimum 75 percent of design strength.

C. Install metal wall panels in accordance with manufacturer's instructions and as specified.

D. Provide clip angle anchors at 600 mm o.c. maximum. Lock fasteners after setting.

E. Install metal closures, trim, and flashings required to maintain wind and rain tightness of metal wall panels.

F. Supply and erect members required for support and anchorage of wall panel system. Install panels level, flat, plumb and true to line.

G. Provide jointing in accordance with accepted Shop Drawings.

H. Provide trim, and closures and flashing as required.

I. Install metal panels with concealed [exposed] fastening system.

3.4 INSTALLATION - TOLERANCES

A. Allow for structural building frame deviations and erect systems, plumb, level, and true in correct relation to work of other Sections. Erection tolerances for assemblies are related to structural frame of building and apply to each individual assembly.
   1. Vertical position; plus or minus 3 mm.
   2. Horizontal position; plus or minus 3 mm.
   3. Deviation from plumb; 3 mm maximum each plane.
   4. Racking of face; 6 mm maximum.
   5. Racking in elevation; nil.

3.5 INSTALLATION - AIR AND VAPOUR BARRIER AND INSULATION

A. To be installed as per manufacturer’s recommendations.

3.6 INSTALLATION - SEALANTS

A. Install flexible seals, tapes and gaskets at locations required to provide water, air and vapour tight system. Seal at end joints between lengths of material.

B. Seal joints between metal wall panels and adjacent surfaces.

C. Before application of sealant, clean and dry joints surfaces to be free from extraneous matter which may affect bond. Prime surfaces.

D. Apply sealant in accordance with manufacturer's printed instructions.

E. Pack joints over 6 mm wide with joint backing. Maintain 2:1 sealant bead width to depth ratio. Mask surfaces where required. Fill joints and tool to concave profile. Clean adjacent materials which have been soiled.

3.7 CLEANING

A. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable by sealant manufacturer and metal fabricator.

B. Where accumulation of dirt does not respond to cleaning required, refer condition to Contract Administrator, with recommendations as to remedial action required; do not undertake any cleaning procedure without written acceptance.

3.8 ALTERATIONS AND MAKING GOOD

A. Do cutting and fitting required to connect to existing work and where alterations have to be made to existing metal panels and insulation.

B. Install reclaimed components in extent and in locations indicated.

C. Provide new clips and fasteners for reclaimed metal panels as required.

D. Reinforce perimeter of cut-outs.

E. Cut out openings for connections indicated and to accommodate extension of structures. Provide new closures as required.

F. Make good existing metal wall panels disturbed by alterations.

END OF SECTION

SECTION 07 52 16

SBS-MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Comply with Division 1, General Requirements.

1.2 REFERENCES

A. Comply with the latest edition of the following statutes codes and standards and all amendments thereto.
   1. ASTM A167 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
   2. ASTM B209-M Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
   3. CGSB-37GP-9 Ma Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
   4. CAN/ULC S704 Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced.
   5. CAN/CGSB-51.31-M Thermal Insulation, Mineral Fibre Board for Above Roof Decks.
   6. CSA HA Series-M CSA Standards for Aluminum and Aluminum Alloys.
   7. CSA A123.4-M Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems.
   8. Canadian Roofing Contractor’s Association (CRCA).

1.3 SUBMITTALS

A. Shop Drawings:
   1. Project-specific details of roof edges and penetrations.
   2. Layout drawings for tapered insulation, showing slopes and thicknesses.
   3. List of materials proposed for use including roofing materials, insulation, composition flashing, and fasteners.
   4. Description of complete system, from deck up, proposed for use.

B. Quality Control Submittals:
   1. Manufacturer’s installation instructions.
   2. A letter from roofing materials Manufacturer stating roofer is approved by Manufacturer to apply roof.
   3. Sample copy of special warranty to be provided.
   4. Record of Pre-roofing Conference.

1.4 QUALITY ASSURANCE

A. Qualification: Membership in good standing of Canadian Roofing Contractor's Association and approved by membrane Manufacturer.

B. Perform work of this Section by a roofing applicator of recognized standing approved by membrane Manufacturer, having not less than five years proven experience on work of similar size and scope.

C. Arrange for membrane Manufacturer's review of preparation for and application of roofing system.

D. All components used in a roofing system shall be furnished by, or approved by, Manufacturer whose roofing system is selected for use.

E. Pre-roofing Conference:
   1. Attendees: Conduct pre-roofing conference with Contract Administrator, roof deck installer, roofing system materials Manufacturer’s Representative, roofer and Contractor.
   2. Arrange a Site visit prior to commencement of roofing to review with installer and Contract Administrator, installation procedures to be adopted, conditions under which work will be carried out, and inspect surfaces requiring roofing.
   3. Review weather conditions under which work will be done, substrate conditions, preparation of existing surfaces, applicable procedures, protection of completed work, and sample of sealed seam to determine acceptable workmanship.
   4. Record: Discussions and agreements and furnish copy to each participant and entity invited.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in Manufacturer's original, unopened containers and rolls with labels intact and legible. Labels on bitumen shall show composition.

B. Store materials in heated location to minimum 10 degrees C during winter.

C. Protect materials against direct sunlight, wetting, moisture absorption, mud, dust, sand, oil, grease, dirt, and construction traffic.

D. Store material rolls on end with selvage edges up.

E. Avoid stockpiling of materials on roof.

1.6 SITE CONDITIONS

A. Protect adjacent surfaces which are not to be roofed from soiling in connection with the work of this Section.

B. Protect roofed areas.

C. Do not expose insulation longer than recommended by Manufacturer.

D. Ambient and surface temperatures: at least 10 degrees C for a period of 48 hours before, during and after membrane application.

1.7 WARRANTY

A. Submit a 25 year warranty for the work of this Section against defects in materials and workmanship, including but not limited to bond failure, deterioration, seam failure, leakage for entire roofing system except as the result of structural failure of the concrete substrate.

B. Cracks up to 1.6 mm wide arising from normal shrinkage and expansion of concrete will not be considered as structural failure.

PART 2 PRODUCTS

2.1 MATERIALS

A. Primer: Approved by membrane Manufacturer.

B. Asphalt: CSA A123.4M Type 2.

C. Securement Bar: ASTM B209-M aluminum or ASTM A167, 304 alloy stainless steel 3 mm thick by 25 mm wide, galvanized concrete fasteners, 25 mm diameter galvanized washers.

D. Joint Backing: Closed cell, heat resistant, crosslinked polyolefin foam filler as recommended by Manufacturer of sealant. Minimum 25 percent oversized. Bond breaker strip as recommended by Manufacturer.

E. Cant: Asphalt impregnated, compatible, standard roofing cant.

F. Vapour Retardant: Minimum 2.0 mm thick, elastomeric asphalt with glass fibre mat reinforcement 95 g/m², sanded both sides. Elastophene by Soprema Waterproofing Inc., Vedaflex G100 S/S by Monsey Bakor Inc.

G. Base Sheet and Base Sheet Flashing: Minimum 2.0 mm thick, thermo-fusible elastomeric asphalt with glass fibre mat reinforcement 95 g/m². Elastophene PS by Soprema Waterproofing Inc., Vedaflex G100 P/S by Monsey Bakor Inc.

H. Reinforcing Sheet: 3.0 mm thermo-fusible elastomeric asphalt with non-woven polyester reinforcement faced with 0.025 mm clear polyethylene or polypropylene both sides. Sopralene Flam 180 by Soprema Waterproofing Inc., Vedaflex NP180 P/P by Monsey Bakor Inc.

I. Cap Sheet and Cap Sheet Flashing: 4.0 mm thermo-fusible elastomeric asphalt with non-woven polyester reinforcement faced with 0.025 mm clear polyethylene or polypropylene on one side and mineral, coloured granules on other side 250 g/m². Sopralene Flam 250 GR by Soprema Waterproofing Inc. or Vedaflex NP250G T4 by Monsey Bakor Inc. Colour to later selection.

J. Parapet Wall Insulation.

K. Roof Insulation:
   1. Rigid Roof Insulation: Polyisocyanurate Foam Board: CAN/ULC S704, Type II, with minimum size 610 mm by 1220 mm. Thickness as shown on Drawings.
   2. Tapered Insulation: Polyisocyanurate Foam Board with torchable facing, Atlas Roofing Corp., AC Foam II.
   3. Manufacturers:
      a. Atlas Roofing Corp.; AC Foam II.
      b. GAF; Energy Guard.
      c. Johns Manville; E'NRG'Y 2.

L. Metal Flashing: As specified in Specification Section 07 62 00, Sheet Metal Flashing and Trim.

M. Mechanical Fasteners: As recommended by Manufacturer.

N. Flexible Flashing: 2 layers of polyester reinforced sheet.

O. Sealant: As recommended by membrane Manufacturer.

P. Fall Arrest Anchors: Refer to Section 07 72 50, Fall Arrest Anchors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive membrane roofing. Report defects which would impair performance of roofing. Do not proceed until substrate is acceptable. Check that concrete moisture content is less than 15 percent.

B. Examine existing Cap sheet installed as vapour retardant at some roofing areas. Report defects which would impair performance of roofing. Repair, replace and existing make good prior to commencement of installation of roofing assembly. Proceed with the work of roofing only if defects have been removed and existing substrate is acceptable to receive roofing assembly components.

C. Ensure that substrates have cured at least 28 days.

D. Verify elevation of roof drains, do not commence work until unacceptable conditions have been corrected. Make insulation thickness at drain 25 mm minimum. Slope insulation uniformly to drain.

3.2 PREPARATION

A. Refer to Division 3 for removal of existing roofing and preparation of concrete deck.

B. Check that completed roof deck for proper levels and slope before roofing is commended.

C. Do not apply membrane in inclement weather.

D. Free surfaces from materials detrimental to the bond of the membrane materials. Employ light sand blasting or steam cleaning where necessary to remove form oil.

E. Grind edges and corners bullnose with minimum radius of 38 mm. Fill inside corners with fillets or cants compatible with membrane.

3.3 INSTALLATION – MANUFACTURED UNITS AND ROOFING ACCESSORIES

A. Install factory assembled units in accordance with Manufacturer's printed instructions.

B. Set curb flange in continuous bed of sealant and anchor in place.

3.4 INSTALLATION - VAPOUR RETARDANT AND INSULATION

A. Prime the concrete substrate at rate recommended by membrane Manufacturer for particular surface porosity, and generally at 1000 to 1500 g/m² minimum.

B. Install vapour retardant in a mopping of asphalt applied at the rate of 1000 to 1500 g/m² where shown. Install tapered and rigid insulation in designed sequence over vapour retardant. Lay insulation in parallel course. Stagger joints between pieces. Trim insulation to provide plain butt joints. Level the edges of the insulation at fillets and cants.

3.5 INSTALLATION - MEMBRANE

A. Install membrane roofing in accordance with Manufacturer's printed instructions and as specified.

B. Horizontal Surface - Base Sheet:
   1. Apply base sheet membrane mopping of 1000 to 1500 g/m² of asphalt. Provide 75 mm side laps and 150 mm end laps.
   2. Take base sheet to top of cant or to edge of horizontal surface.

C. Torch welding: soften the inner side of sheet without overheating, with even heat until the coating flows, resulting in uniform adhesion over the entire surface. Do not damage membrane or reinforcement.

D. Provide reinforcing strip 200 mm wide at changes in plane centred over edge of plane.

E. Vertical Surfaces – Cap Sheet and Cap Sheet Flashing Sheet:
   1. Apply cap sheet in strips of 900 mm to the vertical surfaces, extending onto the flat surface a minimum of 100 mm. Provide 75 mm side laps and 150 mm end laps. Stagger laps a minimum of 100 mm from the laps of the granular polyester reinforced sheet on horizontal surfaces to avoid excessive thickness.
   2. Torch weld granular cap sheet directly on its substrate from bottom to top.
   3. Secure top edge of sheet membrane using continuous securement bar fastened on 300 mm o.c.

F. On vertical surfaces where membrane is covered with metal flashing, provide polyester reinforced sheet.

G. Horizontal Surfaces - Cap Sheet:
   1. Over base sheet torch weld cap sheet. Unroll granular cap sheet starting from low points. Take care to ensure good alignment of the first strip parallel with the edge of the area.
   2. Stagger base sheet and cap seams a minimum of 300 mm.
   3. Provide 75 mm side laps and 150 mm end laps. Remove granules on 150 mm end laps before torch application.
   4. After installation of the cap sheet, check lap seams.
   5. During installation keep asphalt seepage at seams to 6 mm maximum. Over joints apply matching granules and sweep off excess.

H. Ensure that sheets have been continuously welded, without air pockets, wrinkles, fishmouth or tears.

I. Bar completed area from traffic until membrane protection is installed.

3.6 INSTALLATION - ROOF DRAINS

A. Inspect roof drain setting and ensure that drain outlet will not be above the general level of completed roof membrane.

B. Cut back insulation at drains to form drain well.

C. Extend membrane into the upper surface of the drain base and ensure a watertight seal between membrane and drain and seal with clamping ring.

3.7 INSTALLATION - ROOF WALKWAYS

A. Prime walkway area. Torch apply granular cap sheet of grey colour to layout shown. Butt ends of sheets. At edges and joints of sheet, sprinkle granules into asphalt.

3.8 INSTALLATION - MISCELLANEOUS ROOF OPENINGS

A. Supply and install flashings and sleeves around mechanical and electrical openings, ducts, pipes and other projections through roofs. Seal flexible flashing with adhesive and stainless steel clamps.

B. Fabricate metal sleeves around vent pipes and other similar items from 0.95 mm stainless steel.

C. Dress down metal counterflashings supplied by the Section providing the item passing through the roof and seal and make good the completed installation with sealant.

3.9 APPLICATION - SEALING

A. General:
   1. Apply sealant into reglets upon completion of flashing.
   2. Ensure that surfaces to be sealed are free from contaminants which may adversely affect the performance of the sealing materials.
   3. Clean joint surfaces and mask adjacent areas. Remove masking promptly after sealing is completed.
   4. Prime joints immediately before installation of sealant.
   5. Mix sealants to a uniform colour and free from unmixed material.
   6. Before commencing sealing, test the materials for indications of staining or proof adhesion.
   7. Maintain correct sealant depth. Make installation free from air pockets and embedded impurities and having smooth surfaces, free from ridges, wrinkles, sags, air pockets and imbedded impurities.
   8. Immediately clean adjacent surfaces.

3.10 MANUFACTURER’S FIELD SERVICES

A. Provide Manufacturer’s Representative at Site for installation assistance, inspection and certification of proper installation and training of the City’s personnel for maintaining specified system.

3.11 CLEANING

A. Clean and make good to the Contract Administrator's acceptance surfaces soiled or otherwise damaged in connection with the work of this Section. Pay the cost of replacing any finishes or materials that cannot be cleaned.

B. On completion of the work, check roof drains and ensure their cleanliness and proper function.

END OF SECTION

SECTION 07 55 50

PROTECTED MEMBRANE ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Comply with Division 1, General Requirements.

1.2 REFERENCES

A. ASTM A167-89a Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

B. ASTM B 221M-91 Specification for Aluminum- Alloy Extruded Bars, Rod, Wire.

C. ASTM D297-81 Methods for Rubber Products - Chemical Analysis.

D. ASTM D412-87 Test Methods for Rubber Properties in Tension.

E. ASTM D2240-86 Test Method for Rubber Property - Durometer Hardness.

F. ASTM D4637-87 Specification for Vulcanized Rubber Sheet Used In Single Ply Roof Membrane.

G. ASTM E96-80 Test Methods for Water Vapour Transmission of Materials.

H. Roofing Specification Manual - published by Canadian Roofing Contractors Association (CRCA).

I. CAN/CGSB-51.20-M87 Thermal Insulation, Polystyrene Boards and Pipe Covering.

J. CAN/CGSB-51.31-M84 Thermal Insulating, Mineral Fibre Board for Above Roof Decks.

1.3 DESIGN REQUIREMENTS

A. Incorporate layout of strapping and method and pattern of mechanical fastenings on sloped roofs.

1.4 SUBMITTALS

A. Submit Shop Drawings with the following:
   1. Indicate layout of membrane sheets, joints to be made on site, details at expansion joints, termination of membrane at perimeter, at curbs and at projections through roof.
   2. Indicate layout and installation sequence for tapered insulation blocks.

B. Submit three copies of the roofing material Manufacturer's preparation and application instructions.

C. Submit three copies of the roofing material Manufacturer's detailed drawings and specifications.

D. Submit Shop Drawings for manufactured units and supports. Submit design calculations upon request.

1.5 QUALITY ASSURANCE

A. Qualification: Membership in good standing of Canadian Roofing Contractors Association and approved by membrane Manufacturer.

B. Perform work of this Section by an applicator of recognized standing having not less than five years proven experience on work of similar size and scope.

C. Pre-Installation Meeting:
   1. Arrange a site visit prior to commencement of roofing to review with installer, Manufacturer's technical representatives and Contract Administrator, installation procedures to be adopted, conditions under which work will be carried out, and inspect surfaces requiring roofing.
   2. Review weather conditions under which work will be done, substrate conditions, preparation of existing surfaces, applicable procedures, protection of completed work, and sample of sealed seam to determine acceptable workmanship.

D. Arrange for Manufacturer's review of preparation for and application of roofing system.

E. Certification and approval for installation of roofing materials by Manufacturer.

F. Certification and approval for installation of cellular concrete Manufacturer.

1.6 WARRANTY

A. Submit a five year warranty for the work of this Section against defects in materials and workmanship, including but not limited to seam failure, deterioration and leakage.

B. Submit Manufacturer's ,20 year written warranty on membrane material.

PART 2 PRODUCTS

2.1 MATERIALS

A. Roofing Membrane System:
   1. Primer: Approved by membrane Manufacturer.
   2. Asphalt: CSA A123.4M Type 2.
   3. Vapour Retardant: Minimum 2.0 mm thick, elastomeric asphalt with glass fibre mat reinforcement 95 g/m², sanded both sides. Elastophene by Soprema Waterproofing Inc., Vedaflex G100 S/S by Monsey Bakor Inc.

4. Base Sheet and Base Sheet Flashing: Minimum 5.0 mm thick, thermo-fusible elastomeric asphalt with glass fibre mat reinforcement 95 g/m². Elastophene PS by Soprema Waterproofing Inc., Vedaflex G100 P/S by Monsey Bakor Inc.
5. Reinforcing Sheet: 3.0 mm thermo-fusible elastomeric asphalt with non-woven polyester reinforcement faced with 0.025 mm clear polyethylene or polypropylene both sides. Sopralene Flam 180 by Soprema Waterproofing Inc., Vedaflex NP180 P/P by Monsey Bakor Inc.

B. Protection Mat: PD-500 by Lexcan Ltd. 2.45 mm polypropylene fabric; Sure-Seal HP Recovery Board by Carlisle Syntec Systems, 13 mm.

C. Roofing Membrane Accessories: Flashing membrane, bonding adhesive, splicing adhesive, lap sealant, prefabricated pipe flashings, stainless steel pipe clamps and other accessories of the system as required.

D. Securement Bar: ASTM B221 aluminum or ASTM A167, 304 alloy stainless steel 3 mm thick by 25 mm wide, galvanized concrete fasteners, 25 mm diameter washers, galvanized.

E. Insulation:
1. CAN/CGSB-51.20-M, polystyrene board, compressive strength 240 kPa. Thickness as indicated.
2. Geofoam insulation, 300 mm thick, where indicated on Drawings.

F. Filter Fabric: Permeable woven polyolefin Fabrene AMB by DuPont Canada Inc., Fabroc 400 by Hydrotech Membrane Corp.

G. Concrete wearing slab, thickness as indicated on Drawings. Refer to section 03 30 00 Cast-in-Place Concrete.

H. Splash Pads: Of size and shape indicated, hydraulically pressed concrete minimum strength 55 MPa, natural colour, by Brooklin Concrete Products Ltd.

I. Expansion Joint Flashing: Lexsuco LP by Lexsuco Canada Ltd.

J. Breathers: Aluminum hooded, insulated sleeve, RV-2A by Thaler Roofing Specialties Products Inc.

2.2 ACCESSORIES

A. Linear Metal Curb: Fabricated of 1.99 mm thick galvanized steel of height indicated.

B. Gypsum Board Sheathing: CSA A82.27-M, 2400 by 1200 by 12.7 mm thick gypsum board sheathing.

C. Sealant for Roof Penetration Flashing: Dymeric 240 by Tremco (Canada) Inc.

D. Air Seal and Expansion Joint Flashing: EPDM membrane used for roofing, 150 mm wide.

2.3 FABRICATION

A. Factory vulcanize membrane seams designed.

B. Form largest sheet sizes possible to accommodate site conditions.

C. Prefabricate corner sections and pipe seals as required.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive membrane roofing. Report defects which would impair performance of roofing. Do not proceed until substrate is acceptable. Check that concrete moisture content is less than 15 percent.

B. Examine existing Cap sheet installed as vapour retardant at some roofing areas. Report defects which would impair performance of roofing. Repair, replace and existing make good prior to commencement of installation of roofing assembly. Proceed with the work of roofing only if defects have been removed and esisting substrate is acceptable to receive roofing assembly components.

C. Ensure that substrates have cured at least 28 days.

D. Ensure that penetrations through roof have been installed.

E. Verify elevation of roof drains, do not commence work until unacceptable conditions have been corrected.

3.2 PREPARATION

A. Before commencement of work clean roof deck surfaces.

B. Install metal curbs with mechanical fasteners.

C. Install air seal and joint filler. Adhere at perimeter to wall with adhesive.

D. Supply inserts, reglets and accessories to be built into the work. Assist in setting such items.

E. Establish procedures to ensure watertight junctions at roof drains, vents and other items passing through roof.

F. Tape joints between precast concrete roof slabs using 150 mm wide strips of material and adhesive specified.

G. Over concrete deck apply one layer of protection mat with joints lapped 50 mm.

3.3 INSTALLATION - VAPOUR RETARDANT AND TAPERED INSULATION

A. Prime roof deck. Install vapour retardant. Mop over with bitumen into which, while hot, roll two plies of No. 15 felt. Use side laps of 1/2 width of sheet plus 25 mm and end laps of 150 mm.

3.4 INSTALLATION - MEMBRANE

A. Install membrane roofing in accordance with Manufacturer's printed instructions and as specified.

B. Horizontal Surface - Base Sheet:

C. Apply base sheet membrane mopping of 1000 to 1500 g/m² of asphalt. Provide 75 mm side laps and 150 mm end laps.

D. Take base sheet to top of cant or to edge of horizontal surface.

E. Torch welding: soften the inner side of sheet without overheating, with even heat until the coating flows, resulting in uniform adhesion over the entire surface. Do not damage membrane or reinforcement.

F. Provide reinforcing strip 200 mm wide at changes in plane centred over edge of plane.

G. Vertical Surfaces – Base Sheet and Flashing Sheet:

H. Apply base sheet in strips of 900 mm to the vertical surfaces, extending onto the flat surface a minimum of 100 mm. Provide 75 mm side laps and 150 mm end laps. Stagger laps a minimum of 100 mm from the laps of the granular polyester reinforced sheet on horizontal surfaces to avoid excessive thickness.

I. Torch weld granular cap sheet directly on its substrate from bottom to top.

J. Secure top edge of sheet membrane using continuous securement bar fastened on 300 mm o.c.

K. On vertical surfaces where membrane is covered with metal flashing, provide polyester reinforced sheet.

L. Horizontal Surfaces:

M. Over base sheet torch weld cap sheet. Unroll granular cap sheet starting from low points. Take care to ensure good alignment of the first strip parallel with the edge of the area.

N. Stagger base sheet and cap seams a minimum of 300 mm.

O. Provide 75 mm side laps and 150 mm end laps. Remove granules on 150 mm end laps before torch application.

P. After installation of the cap sheet, check lap seams.

Q. During installation keep asphalt seepage at seams to 6 mm maximum. Over joints apply matching granules and sweep off excess.

R. Ensure that sheets have been continuously welded, without air pockets, wrinkles, fishmouth or tears.

S. Bar completed area from traffic until membrane protection is installed.

3.5 INSTALLATION - ROOF INSULATION

A. Before laying any insulation, repair damage to roofing membrane.

B. Lay insulation in parallel course. Stagger joints between pieces. Trim insulation to provide plain butt joints. Level the edges of the insulation at fillets and cants.

C. Lay insulation boards in moderate contact. Cut and fit as required around peripheries and items passing through the insulation. Protect insulation from damage until after cloth, pavers and ballast is applied over. Ensure uniform and continuous thermal barrier and co-ordinate this barrier with insulation work provided under other Sections.

3.6 INSTALLATION - FABRIC

A. Apply fabric directly over insulation. Lap joints between fabric sheets minimum 100 mm. Make installation free of wrinkles and fishmouths. Turn fabric up vertical surfaces 75 mm.

B. Provide pavers to act as runways for window washing equipment on roofs. Butt joints hand tight.

3.7 INSTALLATION – CONCRETE WEARING SLAB

A. Cast-in-place concrete wearing slabs over insulation.

3.8 FIELD QUALITY CONTROL

A. After the membrane is installed, but before the insulation is in place, provide temporary water retainers, block drains if any, fill roofed area with 75 mm depth of water, leave for 72 hours and then check for leakage. Submit proposal for review by the Contract Administrator of methods for remedial work should water loss by evident. Make good all leaks and repeat the water test and repeat the procedure until roofing is found watertight. On completion, unblock drains.

B. The City may engage the services of an independent inspection and testing company approved by the Contract Administrator to carry out inspection and testing of materials.

C. The cost of inspection and testing will be paid by the City.

3.9 CLEANING

A. Clean and make good to the Contract Administrator's acceptance surfaces soiled or otherwise damaged in connection with the work of this Section. Pay the cost of replacing any finishes or materials that cannot be cleaned.

B. On completion of the work, check roof drains and ensure their cleanliness and proper function.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

A. Comply with Division 1, General Requirements.

B. Products installed but not supplied under the work of this Section

C. Coilstock material for coping flashings on roof parapets contiguous with metal cladding Section 07 42 10, Preformed Metal Panels.

1.2 REFERENCES

A. Comply with the latest edition of the following statutes codes and standards and all amendments thereto.
   1. ASTM A167 Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
   2. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-(Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
   3. ASTM B32 Standard Specification for Solder Metal.
   4. ASTM B370 Standard Specification for Copper Sheet and Strip for Building Construction.
   5. ASTM D1187 Bituminous Coating.
   6. CAN/CGSB-19.13 M Sealing Compound, One Component, Elastomeric, Chemical Curing.
   7. CSA B111 Wire Nails, Spikes and Staples.

1.3 SUBMITTALS

A. Submit two samples 300 mm long of perimeter coping, 300 by 300 mm samples of flashings, showing material and finish.

B. Submit coating applicator's certificate that sheet metal products received coating system specified.

1.4 QUALITY ASSURANCE

A. Membership in good standing of Canadian Roofing Contractors Association.

B. Minimum five years proven satisfactory experience installing sheet metal work on projects of comparable scope.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack material in manner to prevent twisting, bending and to provide protection for prefinished surfaces.

B. Prevent contact of dissimilar metals during storage and protect from acids, flux and other corrosive materials and elements.

1.6 WARRANTY

A. Submit a two-year warranty for work of this Section against defects in materials and workmanship.

B. Warrant prepainted aluminum flashings against defects including but not limited to excessive fading, non-uniformity of colour, cracking, peeling or corrosion for a period of five years.

PART 2 PRODUCTS

2.1 MATERIALS

A. Steel Sheet: A653/A653M coating class, galvanized steel sheet.
   1. Finish: 10 000 series by Stelco 22 micron or Duranar XL 40 microns thick DFT minimum.
   2. Colour: To later selection from Manufacturer's standard range.

B. Stainless Steel: ASTM A167, Type 300 Series.

C. Coping flashings, cap flashings, counter flashings and gravel stops, rain water leader, scuppers: 0.8 mm thick galvanized steel sheet plain mill steel.

D. Counter flashings in other locations: 0.70 mm thick galvanized base steel, nominal thickness, plain mill steel.

E. Locking strip: 1.3 mm thick galvanized base steel sheet.

F. Accessories: As required, compatible with materials used.

G. Fastenings: Same finish as sheet being fastened, sized to suit site conditions, galvanized steel. For eavestrough aluminum spikes, CSA B111.

H. Sealant: CAN/CGSB-19.13-M, one component DC795 by Dow Corning Inc. Primer as recommended by sealant Manufacturer. Colour to match flashing finish colour.

I. Backpaint: ASTM D1187 Bituminous Paint.

J. Reglet: Galvanized steel or aluminum, recess filled with removable material. Recessed or surface mounted. Cushion-Lok Type A prefilled by Dayton Superior Ltd.

K. Precast concrete splash pad: Splash Pad by Brooklin Concrete Products Ltd., Splash Block by Powestone Plus Inc., Cambridge, Ont. 55 MPa concrete compressive strength at 28 days.

PART 3 EXECUTION

3.1 INSTALLATION - METAL FLASHINGS

A. Do not install metal flashing until insulation has been inspected and accepted.

B. Fabricate and install metal coping, counterflashing and flashings from coilstock material supplied by Section 07 42 10, Preformed Metal Panels, for roof parapets contiguous with metal cladding.

C. Provide continuous metal drips, cleats, clips and starter strips to hold flashing in true planes without deformation. Secure at 300 mm maximum.

D. Counterflash membrane flashings, lock end joints and seal with sealant. Reinforce by cross-checking where counterflashing is more than 600 mm high.

E. Terminate counterflashing in reglet. Secure with wedges 600 mm o.c. and seal with sealant.

F. Form and install other metal flashings and sheet metal roofing as detailed and as required. Turn back flashing edges, no raw edges permitted.

G. Make joints in metal flashings slip-seam type with extended leg for concealed fastening and allow for expansion and contraction. Install flashings with corners square and surfaces straight and in true planes, and free from oil-canning or other defects. Face nailing is not acceptable.

H. Assemble coping for round shaped parapets from curved sections minimum 2000 mm long, as detailed. Facetted front fascia is not acceptable.

I. Do not fasten metal counterflashings on top of cant strips to the cant strip and do not fasten on the face with nails or screws.

J. Extend flashings out onto surface of insulation.

K. Provide roof edge flashing where indicated, with flexible flashing portion lapped on top of roof membrane and sealed as recommended by Manufacturer. Ensure compatibility of roof edge flashing with roof membrane.

L. Provide sealant between work of this Section and dissimilar materials. Prepare and prime surfaces as recommended by Manufacturer. Seal joints watertight. Comply with the requirements of Section 07 92 00, Joint Sealants.

M. Backpaint contact surfaces dissimilar metal or metal to concrete with 0.10 mm thick DFT backpaint.

3.2 RECONSTRUCTION, ALTERATIONS AND MAKING GOOD

A. Do cutting and fitting required to make satisfactory connections to existing work and where alterations to existing flashings are scheduled.

B. Make good metal flashings disturbed or damaged and leave installation complete and watertight.

C. Unlock existing copper flashings and store in protected area. Clean and prepare areas for resoldering. Resolder as required.

D. Install copper flashings using reclaimed and new material as required. Replace damaged or unusable portion of existing flashing with new copper sheet.

E. Repair existing metal flashings to match existing.

END OF SECTION

SECTION 07 70 01

ROOF SPECIALTIES AND ACCESSORIES

PART 1 GENERAL

1.1 REFERENCES

A. Comply with the latest edition of the following statutes codes and standards and all amendments thereto.
   1. ASTM International (ASTM):
      a. D1187, Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
      b. D4586, Standard Specification for Asphalt Roof Cement, Asbestos-Free.
   2. Underwriters Laboratories of Canada Inc. (ULC).
   3. CGSB 1-GP-88M Enamel, Alkyd, Air Drying and Baking, Gloss.
   4. CAN/CGSB-1.108-M Bituminous Solvent Type Paint.
   5. CAN/CSA G40.21-M General Requirements for Rolled or Welded Structural Quality Steel.
   6. CSA W59 Welded Steel Construction (Metal Welding).

1.2 SUBMITTALS

A. Action Submittals:
   1. Shop Drawings of each item specified showing materials, details, flashing, anchorage, and relation to adjacent structure.
   2. Catalog cuts of each item specified item.

1.3 SEQUENCING AND SCHEDULING

A. Coordination: Schedule and coordinate work of this section with work of Section 07 52 16, SBS-Modified Bitumen Membrane Roofing, Section 22 40 00, Plumbing Fixtures, Section 23 77 00, Air Handling Units, and Section 07 62 00, Sheet Metal Flashing and Trim.

PART 2 PRODUCTS

2.1 ROOF CURBS

A. Prefabricated Galvanized Steel: Minimum 457 mm curb with treated wood nailer, liner panel, and factory installed insulation.

B. Metal Gauge and Reinforcement: To suit imposed loads of equipment to be supported.

C. Fabricate curbs to fit roof slope.

D. Manufacturers and Products:
   1. Pate Co.; PC-2.
   2. Thy Curb; Model TC-3.
   3. RPS Corporation; RC-2A.

2.2 ROOF SUPPORTS

A. Design roof fall arrest anchors ARS-305-4, pipe supports MERS-600 Series, complete with through-deck anchorage and back plates as required.

B. Design window washing anchor supports, duct support, A/C unit supports, light post, stair support, ladder support complete with anchorage to structural support members, refer to Structural Drawings for location and size.

C. Schedule of loads for support of:

Description	Cat. No.	P (kN)	Y (kN)	Height Above Deck
A/C Unit	Mer-920 (Conc Deck)	4 (900 lb)	1 (225 lb)	457mm
Duct	Mer-850	4 (450 lb)	4	457mm
Ladder	ARS 500 Series	2 (450 lb)	4	457mm
Pipe	Mer-850	4 (450 lb)	4	457mm
Note: indicated models are for installation on concrete decks. Provide support models relevant and suitable for application on structural steel deck and precast concrete slabs.				

D. At each support: P is axial load, Y is the lateral load at top of support

E. Manufactured by Thaler Metal Industries Inc. or approved equal in accordance with B8.

2.3 EXPANSION ROOF AND WALL CURBS

A. Prefabricated Galvanized Steel: Minimum 457 mm high curb with treated wood nailer, factory installed insulation, inside and outside corners, sloping end sections, spreader clips, and connector clips, as required.

B. Fabricate curbs to fit roof slope.

C. Manufacturers and Products:
   1. Pate Co.; EJ-2.
   2. Thy Curb; Model TJX-3.
   3. RPS Corporation; EC-2A.

2.4 EXPANSION JOINT COVER

A. Flexible Bellows: 0.45 mm stainless steel flanges with factory formed joints, intersections, transitions, and fasteners as indicated or required.

B. Manufacturers and Products:
   1. Building Materials Corp. of America; Metalastic.
   2. Johns Manville; Expand-O-Flash.

2.5 ROOF DRAINS – SEE SPECIFICATION SECTION 22 40 00, PLUMBING FIXTURES

2.6 ANCILLARY MATERIALS

A. Sealer Tape: Polyisobutylene sealer tape specifically manufactured for setting flanges on bituminous roofing.

B. Isolation Paint: As specified in Section 09 90 00, Painting and Coating.

C. Coat aluminum surfaces in contact with concrete or dissimilar metals as specified in Section 09 90 00, Painting and Coating.

D. Isolation Tape: Butyl or polyisobutylene, internally reinforced, or 20-mil thick minimum polyester.

E. Plastic Roof Cement: ASTM D4586, Type II.

F. Fasteners: Stainless steel of type required.

PART 3 EXECUTION

3.1 PREPARATION

A. Examine surfaces and structures to receive the Work of this section.

B. Take measurements at Site and fabricate work to suit. No changes shall be made in supporting structure to accommodate this Work.

3.2 INSTALLATION

A. General:
   1. Install roof specialties and accessories as detailed in approved Shop Drawings and in conformance with Manufacturer’s instructions, recommendations, and standards.
   2. Use appropriate pipe curb assembly, pipe seal, or vent pipe flashing where pipe, conduit, or cable, etc., penetrate roofing membrane.
   3. Factory Finished Units: Place colour variations in pieces so no extremes are next to each other.

4. Make Work weathertight and free of expansion and contraction noise.
5. Maintain separation between aluminum surfaces and concrete or dissimilar metals with isolation paint.

END OF SECTION

SECTION 07 72 50

FALL ARREST ANCHORS

PART 1 GENERAL

1.1 SUMMARY

A. Comply with Division 1, General Requirements.

1.2 SUMMARY OF WORK

A. Design and install fall Arrest Anchors where indicated on Drawings.

B. In addition to the work indicated on Drawings, provide a provision to design and install Fall Arrest Anchors as follows:

1. Design and Install Fall Arrest anchors at the roof of the Bioreactor Tanks. Provide a provision of a minimum of twenty five units of above deck steel framing achors. Location of anchors will be determined by the Contract Adminstrator.
2. Design and Install Fall Arrest anchors at roofs throughout the plant. Provide a provision of a minimum of fourty units of concrete/precast roof deck.type anchors.Location of anchors will be determined by the Contract Adminstrator.
3. Design and Install Fall Arrest anchors at roofs thoughout the plant. Provide a provision of a minimum of twenty units of steel roof deck.type anchors.Location of anchors will be determined by the Contract Adminstrator.

1.3 QUALITY ASSURANCE

A. Installation and Design Responsibility: Work of this Section to be executed by a firm thoroughly conversant with the applicable laws, by-laws and regulations which govern the Work, and are capable of workmanship of best modern shop and field practice known to recognized manufacturers specializing in this type of work.

B. Have the Work of this Section engineered by a Professional Engineer licensed in the Province of Mantoba. Design work to comply with Manitoba Ministry of Labour requirements for fall arrest systems. Contractor to be responsible for:
1. Layouts and quantities, to the requirements of the Authorities Having Jurisdiction, and CAN/CSA-Z91/CSA-Z91.
2. Co-ordination and ensuring compatibility with building structure.

C. Obtain all necessary permits and approvals from the Ministry of Labour and Local Building Department.

D. Installer Qualifications: Trained and approved by the manufacturer and having a minimum three years experience in the installation of the type of work described in this Section and capable of providing evidence of satisfactory completion of projects of similar size, scope and

type. If requested, the Contractor to provide letter of certification from the manufacturer stating that the installer is a certified applicator of its Products, and is familiar with proper procedures and installation requirements required by the manufacturer.

E. Maintenance Seminars: Engage a factory authorized service representative to train the City maintenance personnel on proper procedures and schedules for adjusting, operating, servicing, and maintaining the Work.

F. Pre-Installation Meeting: Ten (10) Working Days prior to commencing any roofing Work, arrange for the manufacturer's technical representative to visit the Site and review the preparatory and installation procedures to be followed, conditions under which the Work will be done, and inspect the surfaces to receive the Work of this Section. Advise the Contract Administrator of the date and time of the meeting.

G. Manufacturer’s Site Inspection: Have the manufacturer’s technical representative inspect the Work at suitable intervals during application and at conclusion of the Work of this Section, to ensure that the Work is correctly installed. Submit the manufacturer’s inspection reports and verification that the Work of this Section is correctly installed.

H. Source Limitations: Obtain all fall arrest anchors from a single manufacturer.

1.4 SUBMITTALS

A. Shop Drawings: Bearing the professional seal and signature of a Professional Engineer, registered in manitoba, responsible for the engineering design of the Work of this Section. Show anchor profile, layout, materials, construction, and securement method to building structure.

B. Samples: Duplicate full size samples of each anchor type.

C. Maintenance Manuals: Include complete written and illustrated instruction manuals relative to the care, adjustment and operation of all parts of the equipment, a complete description and listing of components, with recommended frequency of service and maintenance to ensure maximum efficiency, reliability and long life of the equipment.

D. Fall Arrest Anchor Reports: Include an approved roof layout plan, anchor details, test reports, special liability insurance certificate, warranty certificate, and an authorized Letter of Acceptance from the Ministry of Labour.

1.5 PROTECTION

A. Protect the structure and its finishes from damage due to installation, testing and operation of the Work of this Section.

B. Make good components or surfaces soiled or otherwise damaged in connection with the Work of this Section.

1.6 MAINTENANCE INSPECTIONS

A. Provide three (3) years of anchor maintenance inspections as part of the Contract, from the date of Substantial Performance of the Work, at no additional cost to the City. Maintenance inspections shall include, but not be limited to, pull tests, flashing inspection and weld inspections.

1.7 CERTIFICATION OF COMPETENCY

A. The Contractor shall provide, as part of the required anchor report, a currently dated and duly authorized certificate, indicating that the Subcontractor performing the Work of this Section is competent to undertake the fabrication and installation of the Work of this Section.

1.8 WARRANTY

A. Provide a written and signed warranty in the name of the City, that the anchor system shall be free of defects in materials, workmanship and installation for a period of twenty (20) years from the date of Substantial Performance of the Work.

B. Defects shall include, but not be limited to:
   1. Flashing failure.
   2. Weld failure.
   3. Excessive deformation of anchors or part of anchors while under imposed loading.
   4. Metal fatigue.

PART 2 PRODUCTS

2.1 ACCEPTABLE PRODUCTS

A. Fall Arrest Roof Anchors: Urethane insulated, hollow galvanized steel post with base plate, stainless steel flashing sleeve, and stainless steel U-bolt assembly, by Thaler Metal Industries Ltd or approved equal in accordance with B8 to the Contract Administrator.
   1. Concrete Roof Slab: Fara-12 SS (Stainless Steel), Fara-131/41 SS (Stainless Steel).
   2. Precast Hollow Core Roof: Fara-17 SS (stainless steel) Core.
   3. Precast Double-Tee Roof: Fara-41 SS (stainless steel) Core.
   4. Metal Deck and Steel Beam: Fara 14 SS (Welded) or Fara 13 SS (Around Beam).
   5. Concrtet Walls: Fara-82 SS (Stainless Steel),
   6. Steel Colums and Beams (above roof deck): Fara-83/84 (Welded) or Fara 13 SS (Around Column or Beam).

2.2 MATERIALS

A. Stainless Steel Plates, Round Bars and Flat Bars: Structural quality with Fy = 350 MPa.

B. Stainless Steel Sheet: 18 gauge AISI type 304 stainless steel with "No.4 finish".

C. Stainless Steel Plates: New stock (not weathered or rusted), to CAN/CSA-G40.21, Grade 350W. Hot-dip galvanize steel plates after fabrication to CAN/CSA-G164.

D. Galvanized Steel Sheet: Commercial quality, stretcher leveled, 6 mm thick to ASTM A446 with minimized spangle zinc coating Z275 to ASTM A526.

E. Stainless Steel Welding Materials: To CAN/CSA-W59-1989. Use electrodes compatible with and of the same properties as the stainless steel.

F. Bituminous Paint: ASTM A1187 Bituminous Coating.

G. Stainless Steel Lock Washers and Hex Nuts: High strength AISI 300 or 400 Series austenitic grade stainless steel types.

PART 3 EXECUTION

3.1 PREPARATION

A. Examine the Work of other Sections where such Work influences the Work of this Section and report unsuitable conditions to the Contract Administrator.

B. Supply anchors, inserts, rough-in dimensions and templates required to be built-in by other Sections, in adequate time so as not to delay the Work.

C. Have a senior, qualified manufacturer's representative on Site to direct and supervise the installation of materials which are installed by Subcontractors and other Contractors.

3.2 INSTALLATION - EQUIPMENT

A. The Work is to be installed by the manufacturer or its authorized representative.

B. Isolate dissimilar metals with two coats of bituminous paint.

C. Perform a pull test on one out of four fasteners, in accordance with the requirements of the Ministry of Labour and Local Building Department

D. Replace defective equipment at no cost to the City.

E. Adjust operating parts to ensure smooth, efficient operation.

F. Co-ordinate with roofing installation to provide continuous waterproof protection.

G. Ensure anchor eye is minimum 230 mm above finished roof surface.

3.3 FIELD QUALITY CONTROL

A. Upon completion of project provide the City with Roof Plan indicating layout of anchor locations.

B. Securely install copies of Roof Plan in clear acrylic covers and at all roof access locations, in accordance with the requirements of the Ministry of Labour and Local Building Department.

C. Provide Contract Administrators Certificate of Acceptance certifying system is acceptable for intended service.

END OF SECTION

SECTION 07 84 00

FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

A. Comply with Division 1, General Requirements.

1.2 REFERENCES

A. Comply with the latest edition of the following statutes codes and standards and all amendments thereto.
   1. ASTM E814 Standard Test Method for Fire Tests of Penetration Firestop Systems.
   2. CAN/ULC S101 Standard Methods of Fire Endurance Tests of Building Construction and Materials.
   3. CAN/CGSB 19.13 Sealing Compound, One-Component, Elastomeric, Chemical Curing.
   4. CAN/ULC S102 Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.
   5. CAN/ULC S115 Standard Method of Fire Tests of Firestop Systems.
   6. Underwriters Laboratories of Canada (ULC) Firestop Systems and Components
   7. ULC Guide No. 40U19 Firestop Systems.
   8. ULC Guide No. 40U18 Fire Resistance Ratings.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements: Provide firestop systems with materials that have been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage, or failure.

B. Provide fire stopping and smoke seal materials and systems to provide closures to fire and smoke at openings around penetrations, at unpenetrated openings, at projecting or recessed items, and at openings and joints within fire separations and assemblies having a fire-resistance rating, including openings and spaces at perimeter edge conditions.
   1. Provide seals to form draft tight barriers to retard the passage of gas, flame and smoke, and, except where specified otherwise, firefighter's hose stream and the passage of liquids.
   2. Seal openings to provide and maintain the fire resistance rating of the adjacent floor, wall or other fire separation assembly to the requirements of and acceptable to the authorities having jurisdiction and the Contract Administrator.

C. Fire stopping and smoke seals within mechanical (inside ducts, dampers) and electrical assemblies (inside bus ducts) will be provided as part of the work of Divisions 23 and 26 respectively. Fire stopping and smoke seals around the outside of such mechanical and electrical assemblies where they penetrate rated fire separations are part of the work of this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Experienced in performing the Work of this section and specializing in the installation of work similar to that required for this project.

B. Preinstallation Meetings: Conduct preinstallation meeting to identify where seals are required and verify project requirements, substrate conditions, manufacturer’s installation instructions, and manufacturer’s warranty requirements.

C. Conform to both the temperature and flame ratings of CAN/ULC S115 and, where applicable, to ASTM E814, and other requirements of authorities having jurisdiction for fire stopping and smoke seal materials.

1.5 SUBMITTALS

A. Submit Shop Drawings indicating the ULC assembly number and diagram of ULC approved assembly of each condition. Submit drawings indicating layout, profiles, product components, required temperature rise and flame rating, thickness, installation methods and materials of fire stopping and smoke seals, damming materials, anchorages and fastenings, size of opening, adjacent materials and number of penetrations.

B. Submit manufacturer's product data for materials and prefabricated devices, providing descriptions sufficient for identification at the Project Site. Include manufacturer's printed instructions for installation.

C. Submit samples of each type of fire stopping and seal material.

D. Submit manufacturer's certification that installed fire stopping and smoke seal materials comply with specified requirements.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver and store materials in original wrappings and containers with manufacturer's seals and labels intact. Protect materials from damage and environmental conditions in accordance with manufacturer's instructions.

1.7 SITE CONDITIONS

A. Comply with manufacturer's instructions for temperature, relative humidity, and substrate moisture content during application and curing of materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. A/D Fire Protection Systems Inc.

B. 3M Canada Canada Inc.

C. Hilti Canada Inc.

D. Tremco Ltd.

2.2 MATERIALS

A. General:
1. Fire stopping and smoke seals: Certified and listed by ULC in accordance with CAN/ULC S115 and bearing ULC label, asbestos free materials and systems complying with standards specified herein, by one or more of the specified acceptable manufacturers, installed in accordance with tested assemblies acceptable to authorities having jurisdiction to provide an effective barrier against the passage of flame, smoke and gases, and to provide a flame and temperature rating in accordance with the requirements off the applicable building code for openings in the respective fire resistance rated floor, wall or other assembly.
2. Service penetration assemblies: Certified by ULC and listed in ULC Guide No. 40 U19.
3. Service penetration firestop components: Certified by ULC and listed in ULC Guide No. 40 U19.13 under the Label Service of ULC.
4. Flame, temperature, hose stream (FTH) ratings: To requirements of authorities having jurisdiction.
5. Cable density within cable trays: Listed for a minimum of 38 percent actual and 100 percent visual.
6. Cementitious matrices: Minimum 2758 kPa compressive strength when cured, to retard cable tray warping within the fire stop seal.
7. Fire stopping and smoke seals at openings intended for ease of re-entry: An elastomeric or re-enterable cementitious matrix or putty seal. Do not use a non re-enterable cementitious seal at such locations.
8. Fire stopping and smoke seals at openings around penetrations for electrical bus ducts, pipes, ductwork and other electrical and mechanical items requiring sound and vibration control or allowance for expansion, contraction and other movement: An elastomeric seal. Do not use a cementitious or rigid seal at such locations.
9. Primers: To manufacturer's recommendation for specific material, substrate, and end use.
10. Damming and backup materials, supports and anchoring devices: To manufacturer's recommendations, and in accordance with the tested assembly.
11. Packing Material: Batts or blankets, of material, thickness, density and compression required for the listed assembly.
12. Pipe and duct insulation and wrappings: Compatible with fire stopping systems.
13. Intumescent pads: Permanently pliable type.
14. Sealants and putty for vertical and overhead joints: Non-sagging.
15. Sealants and fluid seals at floors: Self-levelling.

B. Fire Stopping and Smoke Seal System 1
1. Fire stopping: Non-combustible, semi-rigid mineral wool batts, sized in accordance with ULC test requirements.
2. Smoke seal: One component silicone base chemical curing sealant complying with CAN/CGSB 19.13-M, gun grade, non sag consistency or fire stopping silicone sealant.

C. Fire Stopping and Smoke Seal System 2: Re-enterable cementitious grout matrix.

D. Firestopping and Smoke Seal System 3: Flame, gas, fluid and hose stream resistant foam penetration, elastomeric sealant, having elastic characteristics where used at openings subject to movement.

E. Fire Stopping and Smoke Seal System 4:
   1. Fire stopping: Fire dampers specified under Division 40, Process Integration.
   2. Smoke Seal: One component silicone base chemical curing sealant complying with CAN/CGSB 19.13-M, gun grade, non sag consistency or fire stopping silicone sealant.

F. Firestopping and Smoke Seal System 5: Firestop Block CFS-BL by Hilti Canada, ASTM E84, ASTM E814, UL 1479, CAN/ULC-S115, ASTM G21, Intumescent flexible block complete with firestop putty and/or intumescent fire stop sealant.

G. Firestop Collars system 6: Firestop Collar CP-643 N/CP-644 by Hilti Canada, UL 1479, ASTM E814, CAN/ULC-S115, ASTM E84, ASTM G21, with firestop wrap strips.

H. Firestopping and Smoke Seal System 7: Intumascent Firestop Composte Sheet/Panels, CS-195+ by 3M, Spec Seal Composite Sheet by Anixter. ASTM E814, UL 1479, ASTM E84, ASTM E814, UL 1479, CAN/ULC-S115. Rigid firestop panel consisting of intumescent layer bonded to galvanized steel and reinforced with steel mesh, complete with required studs and framing system.

PART 3 EXECUTION

3.1 PREPARATION

A. Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are dry and frost free.

B. Clean bonding surfaces to remove deleterious substances including dust, paint, rust, oil, grease and other foreign matter which may otherwise impair effective bonding.

C. Do not apply fire stopping and smoke seals to substrates and surfaces previously painted or treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

D. Ensure that pipe and duct insulation and wrappings occurring within openings to receive fire stopping and smoke seal under this Section are installed prior to work of this Section and that the insulation and wrapping within fire seals is a ULC listed component of the system to be installed under this Section, unless ULC certified assembly permits such other insulation and wrapping to remain within the assembly. Co-ordinate the work of this Section with the work of Division 40, Process Integration. Ensure the continuity and integrity of thermal and vapour barriers where such are removed, altered, or replaced, to the acceptance of Division 40, Process Integration and the Contract Administrator.

E. Prepare surfaces and prime in accordance with manufacturer's directions.

F. Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2 PENETRATION SIZING

A. Sizing of service penetrations to be fire stopped, other than for fire dampered openings:
   1. Single, circular penetration are sleeved under work of Division 40, Process Integration and Division 26, Electrical.
   2. Multiple penetrations of circular elements are defined as more than one circular penetration having a maximum space of 100 mm between closest faces of such penetrating elements. Forming of such multiple penetrations is responsibility of respective trades whose service penetrates the rated assembly, and such formed opening to be a square or rectangular frame around a group of penetrations in which maximum clearance between outer penetration element and face of opening to be 25 mm.
   3. Singular and multiple rectangular penetrations to be created in same manner as the above-mentioned multiple circular penetrations, but the edge clearance may be increased to maximum 50 mm.
   4. At fire dampers, make clearances as required by testing authorities.

3.3 MIXING

A. Mix components in a mixer, clean and free of used and set materials and surface contaminants.

B. Thoroughly mix components in accurate proportions.

C. Apply mixed materials within time limit recommended by the manufacturer.

3.4 APPLICATION

A. General:
   1. Apply fire stopping and smoke seals in accordance with manufacturer's instructions and tested designs to provide the required temperature and flame rated seal, and to prevent the passage of smoke and liquids.
   2. Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
   3. Completely fill and seal voids with fire stopping and smoke seal materials.
   4. Tool or trowel exposed surfaces except where self-levelling products make this unnecessary.
   5. Remove excess products promptly as work progresses and upon completion.
   6. Allow materials to cure. Do not cover up materials until full curing has taken place.
   7. Notify Contract Administrator when completed installations are ready for inspection and prior to concealing or enclosing fire stopping and smoke seals.

B. System 1:
   1. Compress mineral wool fire stopping and fill joint or void full, to ensure complete fire stopping seal in accordance with ULC listing except leaving 13 mm space at each exposed face to receive sealant smoke seal.
   2. Provide continuous sealant smoke stop at each face of fire separation to a minimum depth of 13 mm for full width of joint.

3. Use this system at top of masonry and gypsum board fire rated partitions and separations between the partition and structure, between the partition and other adjacent construction, at control joints within the partition, at other openings and penetrations through such partitions or separations, and at openings and penetrations through fire rated concrete partitions and separations, except as otherwise specified or required.

C. System 2:
1. Install in accordance with ULC listed tests for locations where a re-enterable cementitious matrix is acceptable as a seal for mechanical and electrical penetrations in accordance with performance requirements specified herein.
2. Use this system at cable and cable tray penetrations.
3. Use this system at openings and sleeves installed for future use through concrete and masonry fire resistance rated separations or, alternatively, for locations concealed in the finished work, use single component putty as specified.

D. System 3:
1. Install in accordance with ULC listed tests for locations where an elastomeric seal is required for mechanical and electrical penetrations in accordance with performance requirements specified herein.
2. Use this system as an alternative to System 1 at mechanical and electrical penetrations where an elastomeric seal is required. Do not use this system at cable and cable tray penetrations.

E. System 4:
1. At fire damper perimeters, apply a 6 mm to 10 mm bead of service penetration fire stop sealant as a smoke seal at interface of retaining angles around fire dampers where retaining angles meet fire rated walls/floors/ceilings or membranes thereof as well as at the interface of retaining angles and duct or fire damper. Provide two sealant beads per side, four beads per damper at wall dampers. Seal top side only at floor dampers.

F. Firestopping and Smoke Seal System 5:
1. Install for multiple or grouped pipes/conduits square/reqtanglar opening through fire rated assemblies.

G. Firestop Collars System 6:
1. Install for penetration through existing fire rated assemblies.

H. Firestopping and Smoke Seal System 7:
1. Install for multiple or group of HVAC ducts through square/reqtanglar opening through fire rated assemblies.

3.5 CLEAN UP

A. Remove excess materials and debris and clean adjacent surfaces immediately after application.

B. Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

A. Requirements for the 66 kV Substation, refer to Section 07 92 10, Joint Sealing.

B. Comply with Division 1, General Requirements.

1.2 REFERENCES

A. Comply with the latest edition of the following statutes codes and standards and all amendments thereto.
   1. CAN/CGSB-19.13Sealing Compound, One Component, Elastomeric, Chemical Curing.
   2. CAN/CGSB-19.24Multicomponent, Chemical Curing Sealing Compound.
   3. CAN/ULC S115 Standard Method of Fire Tests of Firestop Systems.
   4. NSF/ANSI 61 Drinking Water System Components – Health Effects

1.3 QUALITY ASSURANCE

A. Pre-Installation Meeting
   1. Arrange for sealant manufacturer's technical representative to visit Site prior to commencement of sealing, to review with Contractor, installer and Contract Administrator, installation procedures to be adopted, conditions under which work will be carried out, and inspect surfaces and joints to be sealed.
   2. Review weather conditions under which work will be done, anticipated frequency of joint movement, shape factor of the joint, durometer hardness, slump, and curing characteristics of materials specified, joint characteristics as built, sample of sealed joint to determine acceptable workmanship.
   3. Submit review comments in writing to Contract Administrator.

B. Submit certification that sealants in contact with potable water are suitable and approved for intended use.

1.4 SEQUENCING

A. Install sealant and backing material after applied finishes are completed.

1.5 WARRANTY

A. Submit a two-year warranty for the work of this Section against defects in materials and workmanship.

PART 2 PRODUCTS

2.1 MATERIALS

A. Sealant Type A: CAN/CGSB 19.24 Type II, Class B, Dymeric 240/240FC, by Tremco (Canada) Ltd., multi-component polyurethane.

B. Sealant Type B: CAN/CGSB 19.24, Sikaflex 2C-NS/SL, by Sika Canada Inc., multi-component polyurethane based sealant for horizontal and vertical surfaces.

C. Sealant Type C: Sikaflex 1A, by Sika Canada Inc., one component polyurethane based, non-sag, elastomeric sealant, NSF/ANSI 61 approved for contact with potable water.

D. Sealant Type D: Duoflex-SL, by Sika Canada Inc., two component polysulphide sealant for interior and exterior locations.

E. Sealant Type F: DC 786 by Dow Corning Inc., one component silicone.

F. Sealant Type G: CAN/CGSB-19.13, DC 795 by Dow Corning Inc., one component silicone sealant.

G. Colour of sealant: From manufacturer's standard colour range matching predominant material to which sealant is applied and to review by the Contract Administrator.

H. Primer: Where required and of type recommended by manufacturer of sealant and compatible with material used in the same joint as joint filler.

I. Joint backing: Closed-cell, plastic foam filler as recommended by manufacturer of sealant. Minimum 25 percent oversized. Bond breaker strip as recommended by manufacturer.

J. Cleaning material: As recommended by manufacturer of sealant.

K. Steel deck closure strips: Continuous closed cell neoprene strips R-411-N fabricated by Rubatex Corporation.
   1. Profile strips: 38 mm wide, 6 mm valley thickness with ribs to suit type of steel deck used.
   2. Flat strips: Minimum 38 mm wide of thickness to suit the joint.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean surfaces of joints and spaces to be sealed with solvent or cleaner. Ensure that surfaces are structurally sound, free from dust, grease, other contaminants, or laitance which may adversely affect adhesion of sealing materials. Use dry clean compressed air stream if necessary to clean out the joint.

B. Test materials for indications of staining or poor adhesion.

C. Prime joints to prevent staining, to assist bond, and to stabilize porous surfaces. Apply two coats of primer at base of aluminum handrail posts and other porous surfaces.

D. Conform to manufacturer's printed instructions for mixing, work life, and other characteristics of sealant to be used.

E. Where necessary to prevent contamination or marring surface of adjacent materials, mask area adjacent to joints with masking tape. Remove tape immediately after joint has been completed and initial set achieved.

3.2 INSTALLATION

A. Install sealant with equipment recommended by manufacturer. Install sealant and primer when surfaces are prepared, and when ambient temperature and weather conditions are consistent with manufacturer's recommendations.

B. Install joint backing material, and bond breaker type material.

C. Ensure that correct sealant depth is maintained or provide width-to-depth ratios for specified sealant:

JOINT WIDTH	JOINT DEPTH	
	Minimum	Maximum
6 mm	3 mm	
6 mm - 25 mm	One half width	Equal to width
Over 25 mm	As accepted in writing	

D. Tool joint sealant to produce smooth full bead, free from ridges, wrinkles, sags, air pockets and embedded impurities.

E. Remove droppings and excess sealant as work progresses, before material achieves initial set.

F. Install closure strips where indicated and as required under metal deck to provide continuous closure along perimeter of rooms.

3.3 SCHEDULE

A. Where mechanical compression type seals are provided under the work of other Sections (at pipe penetrations), sealant is not required.

B. Sealant Type A:
   1. Seal vertical, construction and expansion joints in concrete. Do not seal joints which will be immersed.
   2. Seal control and expansion joints in unit masonry.
   3. Seal joints at top of non-load bearing masonry walls to underside concrete slab except fire rated walls.
   4. Seal both sides at perimeter of openings between frame and wall/partition.
   5. Seal both sides around frames of exterior doors and entrances.

6. Seal both sides around frames of exterior windows and skylights.
7. Seal both sides of frames of translucent panels and skylights.
8. Seal control joints in gypsum board.
9. Seal around louvers and blank-off panels.
10. Seal at thresholds.
11. Except where indicated otherwise, seal around pipes, ducts, cables, conduits and other penetrations through walls, floor and ceiling slabs, which are not designated fire separations.
12. Seal around grouted-in railing posts.
13. Seal underside of joints in concrete slabs.

C. Sealant Type B:
1. Seal joints between structural precast slabs.
2. Seal control and expansion joints in monolithic flooring.
3. Seal control and expansion joints in ceramic tile.

D. Sealant Type C:
1. Seal expansion and control joints in concrete surfaces and joints between concrete and other surfaces which will be immersed.

E. Sealant Type D:
1. Seal control joints in saw cut concrete slab.

F. Sealant Type F:
1. Seal vanity, lavatory, water closet, urinals and other metal protrusions to tile.
2. Seal junction between horizontal and vertical tile.
3. Seal junction between tile and special coatings.

G. Sealant Type G:
1. Seal metal flashings.

END OF SECTION

SECTION 07 92 10

JOINT SEALING

PART 1 GENERAL

1.1 GENERAL

A. Requirements of this Section apply only for the 66 kV Substation.

1.2 SECTION INCLUDES

A. Requirements specified within this section apply to all sections in Division 07 Thermal and Moisture Protection that are applicable to the 66 kV Substation. This section supplements requirements of other Divisions.

1.3 REFERENCES

A. Work shall be in accordance with the National Building Code of Canada 2010 and as revised by the Manitoba Buildings and Mobile Homes Act (C.C.S.M c. B93), MR 118/214, Regulation 31/2011' as amended. This is the Manitoba Building Code. References shall be the current document specified including documents referenced therein. References stipulated in the Manitoba Building Code shall be the issue of the document stipulated, including documents referenced therein.

B. Manitoba Building Code (MBC).

C. American Society for Testing and Materials International, (ASTM).
   1. ASTM C919, Standard Practice for Use of Sealants in Acoustical Applications.

D. Canadian General Standards Board (CGSB)
   1. CAN/CGSB-19.13, Sealing Compound, One-component, Elastomeric, Chemical Curing.

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

1.4 SUBMITTALS

A. Submit product data in accordance with Section 01 33 00, Submittal Procedures

B. Manufacturer's product to describe.
   1. Caulking compound.
   2. Primers.
   3. Joint sealing compound, each type, including compatibility when different sealants are in contact with each other.

C. Submit manufacturer's instructions in accordance with Section 01 33 00, Submittal Procedures.
   1. Instructions to include installation instructions for each product used.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, store and protect materials in accordance with manufacturer’s printed instructions.

B. Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.6 WASTE MANAGEMENT AND DISPOSAL

A. Separate waste materials for recycling.

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

C. Collect and separate for recycling in accordance with Waste Management Plan.

D. Place materials defined as hazardous or toxic in designated containers.

E. Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

F. Unused material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

G. Divert unused joint sealing material from landfill to official hazardous material collections site approved by Contract Administrator.

H. Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.

I. Fold up metal banding, flatten, and place in designated area for recycling.

1.7 PROJECT CONDITIONS

A. Environmental Limitations:
   1. Do not proceed with installation of joint sealants under following conditions:
      a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.
      b. When joint substrates are wet.

B. Joint-Width Conditions:
   1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions:
   1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 ENVIRONMENTAL REQUIREMENTS

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

B. Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

PART 2 PRODUCTS

2.1 SEALANT MATERIALS

A. Do not use caulking that emits strong odours, or contains toxic chemicals.

B. When low toxicity caulks are not possible, confine usage to areas which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.

C. Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

A. Polyurethanes Two Part.
   1. Self-Leveling to CAN/CGSB-19.24, Type 1, Class B, colour grey.
   2. Bond Breaker Tape.
      a. Polyethylene bond breaker tape which will not bond to sealant.

B. Polyurethanes One Part.
   1. Self-Leveling to CAN/CGSB-19.13, Type 1, colour grey.
   2. Bond Breaker Tape.
      a. Polyethylene bond breaker tape which will not bond to sealant.

2.3 JOINT CLEANER

A. Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

B. Primer: as recommended by manufacturer.

PART 3 EXECUTION

3.1 PROTECTION

A. Protect installed Work of other trades from staining or contamination.

3.2 SURFACE PREPARATION

A. Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

B. Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

C. Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

D. Ensure joint surfaces are dry and frost free.

E. Prepare surfaces in accordance with manufacturer's directions or as shown in the Construction Documents.

3.3 PRIMING

A. Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

B. Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 MIXING

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

3.5 APPLICATION

A. Sealant:
   1. Apply sealant in accordance with manufacturer's written instructions.
   2. Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
   3. Provide bond breaking surface as required.
   4. Apply sealant in continuous beads.
   5. Apply sealant using gun with proper size nozzle.
   6. Use sufficient pressure to fill voids and joints solid.
   7. Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
   8. Tool exposed surfaces before skinning begins to give slightly concave shape.
   9. Remove excess compound promptly as work progresses and upon completion.

B. Curing.
   1. Cure sealants in accordance with sealant manufacturer's instructions.
   2. Do not cover up sealants until proper curing has taken place.

C. Cleanup.
   1. Clean adjacent surfaces immediately and leave Work neat and clean.
   2. Remove excess and droppings, using recommended cleaners as work progresses.
   3. Remove masking tape after initial set of sealant.

END OF SECTION

SECTION 07 95 13

EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Comply with Division 1, General Requirements.

1.2 SUBMITTALS

A. Shop Drawings:
   1. Manufacturer's Literature Clearly Indicating:
      a. Contract Administrator's identification mark, size, and description of components.
      b. Base material with surface finish.
      c. Details of blockout and anchorage required.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Ship aluminum pieces with protective film covering.

B. Deliver and store products in original containers at not less than 20 degrees C ambient temperature for not less than 24 hours immediately before installation.

PART 2 PRODUCTS

2.1 EXPANSION JOINT COVERS

A. Manufacturer and Model: C-S Group "Thinline Series".

B. Model GFT 200 for floors
   Model FWF 200 for walls
   Model FCF 200 for ceilings

   Acceptable alternate manufacturer:

   Watson Bowman Acme
   MM Systems Corporation

2.2 FLOOR JOINT COVERS

A. Material: Heavy duty extruded aluminum construction, mill finish, with replaceable elastomeric gasket, and complete with anchors.

B. Color of Gasket: Greige.

C. Rated where shown on Drawings.

2.3 WALL AND CEILING JOINT COVERS

A. Material: Extruded aluminum construction, clear anodized finish, with replaceable elastomeric gasket, and complete with anchors.

B. Color of Gasket: White.

C. Rated where shown on Drawings.

PART 3 EXECUTION

3.1 PREPARATION

A. Examine surfaces and structures to receive work of this Section.

B. Take measurements at Site and fabricate work to suit. No changes will be made to the structure to accommodate this work.

3.2 INSTALLATION

A. Install floor, wall, and ceiling expansion joint covers in accordance with manufacturer's instructions and recommendations.

B. Securely anchor covers in their proper locations, plumb and level and without distortion. Adhere and seal, watertight, cross joints in covers.

C. Make fire-rated assemblies continuous between floor, wall, and ceiling joints.

END OF SECTION