

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 06 08 99 – Rough Carpentry for Minor Works.
- .2 Section 07 21 00 – Thermal Insulation.
- .3 Section 07 27 00.01 – Air Barrier – Descriptive.
- .4 Section 07 61 00 – Sheet Metal Roofing.
- .5 Section 07 62 00 – Sheet Metal Flashing and Trim.
- .6 Section 26 41 13 – Lighting Protection for Structures.

1.02 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .2 CSA O118.1-08, Western Red Cedar Shakes and Shingles.
- .2 Cedar Shake and Shingle Bureau (CSSB)
 - .1 CSSB, Cedar Shake and Shingle Grading Rules.
 - .2 CSSB New Roof Construction Manual for Roof Application Details.
- .3 National Building Code of Canada (NBC)
- .4 Roofing Contractors Association of British Columbia (RCABC) Standards publications and technical updates, including the Roofing Practices Manual (RPM).

1.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for wood shingles, underlayment, eave and valley protection, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit duplicate full size shingles of each finish, profile and pattern specified.
- .4 Shop drawings:
 - .1 Provide shop drawings for temporary protection at doors and windows indicating method of installation.
- .5 Photographic Documentation:
 - .1 Submit photographs of existing conditions, prior to commencing work, in accordance with Section 02 41 13 – Selective Site Demolition.
 - .2 Submit photographs for each of the following stage of the work, for site and shop work, with separate submittals at each stage:
 - .1 Prior to deck preparation.

- .2 Substrate prior and after barrier installation.
- .3 During installation.
- .3 Submit photographs for each of the aforementioned stage of the work, for mock-ups, with separate submittals for each mock-up.

1.04 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Carry out wood shingle work of this section using skilled tradespersons trained and experienced installation of wood shingles as per Pre-qualification requirements.
 - .2 Competent workers: equipped with tools and equipment necessary to carry out work in a traditional manner.
 - .3 Contractor's Field Supervision and Crew Qualifications: maintain full-time supervisor/foreperson on job site during times work is in progress. Supervisor must have wood shingles installation training and experience in wood shingles installation similar in nature and scope to specified work as per Pre-qualification requirements.
 - .4 Only workers accepted by Departmental Representative during mock-ups will be authorized to perform Work of this section.
- .2 Mock-ups:
 - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct 1200 x 1200 mm panel of each shingle pattern including eave, ridge, hip, gable rake, valley details.
 - .3 Allow 72 hours for inspection of mock-up by Departmental Representative before proceeding with shingle work.
 - .4 When accepted, mock-up will demonstrate minimum standard of quality required for this work.
 - .1 Remove mock-up when directed.

1.05 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Exercise care to avoid damage during unloading and storing.
 - .2 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area. Provide a platform to prevent bundles or loose shingles coming in contact with ground.
 - .3 Store and protect shingles from nicks, scratches, and blemishes.
 - .4 Cover with tarpaulin and use boards to cover top of pile to keep out rain and prevent over-drying of bundles or loose shingles in top layer.
 - .5 Replace defective or damaged materials with new.

- .6 Remove only in quantities required for same day use.
- .4 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 00 10 - General Instructions, Waste Management and applicable regulations.

1.06 EXTENDED WARRANTY

- .1 For the work of this Section, the 12 month warranty period is extended to 120 months.
- .2 Perform detailed warranty inspections during year 3 and year 9 in presence of Departmental Representative.
 - .1 Perform corrective work as required for adequate performance of work included in this and related sections.

1.07 COOPERATION

- .1 The Departmental Representative may employ and pay for the services of an independent roofing inspection and testing agency.
 - .1 Contractor shall cooperate and coordinate with the agency to facilitate the execution of its required services.
 - .2 Employment of the agency shall in no way relieve the Contractor's obligations to perform the work of the Contract.

PART 2 PRODUCTS

2.01 MATERIALS

- .1 Western red cedar shingles, 400 mm length, 75 to 250 mm wide, 100% clear, 100% quarter cut, 100% heart wood, No. 1 Grade Blue Label (Fivex).
 - .1 Conforming to CSA O118.1.
 - .2 CAN/CSA-Z809 or FSC or SFI certified.
- .2 Tilting fillets, wooden rolls (for flashing), miscellaneous blocking gable rakes to be western red cedar and C Select grade.
- .3 Ridge cap: to be western red cedar and C Select grade.
- .4 Vented batten system: in accordance with Section 06 08 99 – Rough Carpentry for Minor Works.
- .5 Fasteners
 - .1 Nails: to CSA B111 and CSA O118.1, Appendix E
 - .1 Shingles: 38mm long, spiral, and stainless steel, type 304 or 316.
 - .2 Screws for fastening ridge caps: 75mm long stainless steel, type 304 or 316.
- .6 Membrane: In accordance with Section 07 62 00 – Sheet Metal Flashing and Trim.
- .7 Air barrier: In accordance with Section 07 27 00.01 Air Barrier – Descriptive.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.02 REMOVAL OF EXISTING FINISHES

- .1 Remove all existing roof finishes, flashings and underlay, and replace decking of roof in accordance with Section 02 41 13 – Selective Site Demolition and Section 06 08 99 – Rough Carpentry for Minor Works.
- .2 Withdraw existing shingle and flashing nails, setting those nails which break off. Leave surfaces free from dirt and loose material.
- .3 Report to Departmental Representative unforeseen deficiencies and deterioration. Repair as directed.

3.03 ROOF DECK PREPARATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections are acceptable in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Validate that decking is straight and plumb.
 - .3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .4 Proceed with installation only after unacceptable conditions have been remedied.

3.04 APPLICATION

- .1 Perform wood shingle work in accordance with NBC and CSA O118.1, Appendix C, except where specified otherwise.
- .2 Install shingles over dry and clean substrate.
- .3 Space shingles with 6mm between each other.
- .4 Stagger joints minimum of 40 mm in succeeding courses. Offset joints in alternating courses by minimum 13mm. Ensure that in any 3 courses no two joints are in alignment.
- .5 Nailing:
 - .1 Use two nails per shingle. Space nails 20 mm from edge and 40 mm above butt line of following course.
 - .2 Provide extra nailing to final course of shingles at ridge, 25 mm down from ridge from point of sawing off.
 - .3 Drive nails flush but do not crush shingles.

3.05 SHINGLE ROOFING

- .1 Install air barrier over decking and additionally install a membrane as eave, valley, ridge, and hips protection in accordance with Section 07 62 00 – Sheet Metal Flashing and Trim.

- .2 Vented Batten System
 - .1 Install plywood strapping (spacers) from ridge to eave.
 - .2 Install nailers with a double starter course.
 - .3 Seal penetrations of fasteners through barrier as per Section 07 27 00.01 – Air Barrier – Descriptive.
- .3 Shingle starter course:
 - .1 Double shingles at eaves.
 - .2 Block up starter course sufficient to bring high points of all shingle courses into alignment.
 - .3 Project butts 25 mm from leading edge of drip edge.
- .4 Typical course:
 - .1 Install shingles with 127 mm weather exposure and having triple thickness of shingles at any given point.
 - .2 Lay shingles with grain perpendicular to eaves.
 - .3 Keep shingles 25 mm clear of any vertical flashing.
 - .4 Assume that eaves and ridges are not parallel. Adjust for this gradually over a few courses mid-way up the roof by slightly decreasing the exposure as required so that the last few courses at the ridge appear parallel.
- .5 Finishing gable rake:
 - .1 Place 200 mm tilting fillet of cedar bevel siding full length of each gable and with thick edge flush with decking edge. Place drip edge as per drawings.
 - .2 Butts of shingles which rest on tilting fillet to be cut back to produce slight slant.
 - .3 Upper corner of edge shingles to be clipped off.
 - .4 Edge protection of shingles over end rafters or barge boards and mouldings to be from 25-40 mm.
- .6 Finishing open valleys:
 - .1 Decking to be blocked out at base of valley where and as indicated.
 - .2 Metal cant strips, sheet metal in accordance with Section 07 62 00 - Sheet Metal Flashing and Trim, to run along both sides of all valleys.
 - .3 Do not lay shingles with grain parallel to centre line of valleys.
 - .4 Cut to proper mitre shingles extending into valleys.
 - .5 Joints shall not be broken into valleys.
 - .6 Line up at least 25 mm farther back from centre line of valley on lower slope side, shingles extending into valleys formed by roofs of unequal pitch.
 - .7 Open portion of valley should be at least 100 mm tapered from width of at least 50 mm where it starts to wider width as it descends terminating at 250 mm for the main roof, 200 mm for gables and 150 mm for dormers..
- .7 Finishing the hips:
 - .1 Cut shingles selected for finishing hip, so that grain of wood runs parallel with line of hip.

- .2 Run shingle ends over alternately at centre line of hip and dress to bevel of opposite side of roof.
- .8 Finishing the ridge caps:
 - .1 Butts of shingles comprising top courses, either side of ridge, to be placed against guide strip or chalk line down from centre line of ridge.
 - .2 Feather ends of shingles on leeward side to be cut flush with top of ridge.
 - .3 Install wood blocking, flashing, and insect and bird screens as shown on drawings.
 - .4 Install ridge cap with stainless steel screws. Screws to be placed on either side of the ridge cap at maximum spacing of 406mm with a minimum of 4 screws per element.
- .9 Soak shingles in potable water for 24 hours prior to installation on bellcast eave. Space shingles with 3mm between each other, as opposed to 6 mm in other locations.

3.06 CLEANING

- .1 Progress Cleaning: leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.07 DAMAGE PROTECTION

- .1 Protect installed and existing products and components from damage during construction.
 - .1 Protect all windows and doors openings below roof slopes being worked on are with plywood panels from the time work on the slope above begins until it is complete. Do not fasten protective panels directly to building.
 - .2 Tarp unfinished areas at days end or when rain threatens and weight the tarps to avoid lifting.
- .2 Strip and re-roof in manageable sections.
- .3 Do not impose concentrated loads to the roof deck.
- .4 Repair damage to adjacent materials caused by wood shingle installation.

END OF SECTION

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 02 41 13 – Selective Site Demolition.
- .2 Section 06 03 40 – Historic - Wood Repair.
- .3 Section 06 08 99 – Rough Carpentry for Minor Works.
- .4 Section 07 21 00 – Thermal Insulation.
- .5 Section 07 27 00.01 – Air barrier – Descriptive.
- .6 Section 07 62 00 – Sheet Metal Flashing and Trim.
- .7 Section 09 03 91 – Historic - Painting.
- .8 Section 26 41 13 – Lightning Protection for Structures.

1.02 REFERENCES

- .1 CSA International
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .2 CSA O121-08, Douglas Fir Plywood.
 - .3 CSA O151-09, Canadian Softwood Plywood.
 - .4 CAN/CSA-Z809-08, Sustainable Forest Management.
- .2 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .3 National Lumber Grading Authority (NLGA)
 - .1 NLGA Standard Grading Rules for Canadian Lumber 2010.
- .4 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2010-2014 Standard.
- .5 National Building Code of Canada (NBC)

1.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for wood siding and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit shop drawings for each type of woodwork including but not limited to trim, corner boards, v-joint tongue and groove for panelling, horizontal running mouldings, etc.

- .2 Indicate materials and details, including assemblies, in large-scale for each woodwork type, full-size profiles of components, elevations of unit, description of related components and exposed finishes, and fasteners.
- .3 Indicate layout, pattern and installation of finish material; for cladding, include coursing, exposure, spacing and nailing pattern.
- .4 Prior to preparation of shop drawings, take field measurements as material is removed to confirm dimensions and details.
- .4 Samples:
 - .1 Submit duplicate 300 mm length of each clapboard profile and finish specified.
 - .2 Submit duplicate full size shingles of each finish, profile and pattern specified.
 - .3 Submit 300 mm samples of all new finished wood work along with 300 mm of the original pieces that they are intended to match.
 - .1 Each new element is to match exactly the size and profile of the item to be replaced.
 - .2 Revise and resubmit as directed by Departmental Representative.
- .5 Photographic Documentation:
 - .1 Submit photographs of existing conditions, prior to commencing work, in accordance with Section 02 41 13 – Selective Site Demolition.
 - .2 Submit photographs for each of the following stage of the work, for site and shop work, with separate submittals at each stage:
 - .1 Post disassembly.
 - .2 Restored wood elements post paint removal.
 - .3 Restored wood elements during repairs.
 - .4 Substrate prior and after barrier installation.
 - .5 During installation.
 - .6 Post installation but prior to painting.
 - .3 Submit photographs for each of the aforementioned stage of the work, for mock-ups, with separate submittals for each mock-up.
- .6 Wood Certification: submit Chain-of-Custody Certificate number for CAN/CSA-Z809 or FSC or SFI certified wood.

1.04 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Carry out wood siding work of this section using skilled tradespersons trained and experienced installation of wood siding as per Pre-qualification requirements.
 - .2 Competent workers: equipped with tools and equipment necessary to carry out work in a traditional manner.
 - .3 Contractor's Field Supervision and Crew Qualifications: maintain full-time supervisor/foreperson on job site during times work is in progress. Supervisor must have wood siding installation training and experience in wood siding installation similar in nature and scope to specified work as per Pre-qualification requirements.

- .4 Only workers accepted by Departmental Representative during mock-ups will be authorized to perform Work of this section.
- .2 Mock-ups:
 - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
 - .2 Where directed by Departmental Representative execute mock ups to illustrate the following:
 - .1 Strap a portion of wall 3000 mm in length and the height of a band as required to install clapboard.
 - .2 Strap and install nailers on a portion of wall 3000 mm in length and the height of a band as required to install shingle siding.
 - .3 Strap a portion of wall as required to install restored original wood work in gable.
 - .4 Install one corner board and apron and a portion of clapboard 4000 mm in length and four pieces high – leave nails proud until approved by Departmental Representative.
 - .5 Install a portion of plain wall shingles 1500 mm in length and 6 courses high.
 - .6 Install a portion of decorative wall shingles 1500 mm in length and 6 courses high.
 - .3 Allow 72 hours for inspection of mock-up by Departmental Representative before proceeding with wood siding work.
 - .4 When accepted, mock-up will demonstrate minimum standard of quality required for this work.
 - .1 Remove mock-up when directed.

1.05 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
 - .4 Remove only in quantities required for same day use.
- .4 Packaging Waste Management: remove for reuse by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 00 10 – General Instructions, Waste Management and applicable regulations.

1.06 EXTENDED WARRANTY

- .1 For the work of this Section, the 12 month warranty period is extended to 60 months.

- .2 Perform a detailed warranty inspection during year 3 in presence of Departmental Representative.
 - .1 Perform corrective work as required for adequate performance of work included in this and related sections.

PART 2 PRODUCTS

2.01 WOOD CLADDING AND TRIM

- .1 Salvaged woodwork in accordance with Section 02 41 13 – Selective Site Demolition.
- .2 Species for all exterior finished wood work to be Douglas Fir, 'C' Select, 10% maximum moisture content, quarter cut with edge grain to the weather.
 - .1 Material for shingles to be totally free of knots.
- .3 Laminated or finger jointed material will not be accepted, unless laminations are clearly noted on drawings.
- .4 Trim sizes are not modern standard dimensioned lumber sizes. For example, thicknesses may range from 22 mm to 23 mm and widths may be a full 102 mm or a full 152 mm. This will require custom cutters and oversized stock by present industry standards.
- .5 New replacement clapboard to be 140 mm wide, 13 mm thick at the butt, and 3 mm thick at the top, lengths to match existing joint pattern, overlap to be 38 mm with a maximum of 100 mm exposure.
- .6 All trim, corner boards, v-joint tongue and groove for soffits and dormer cheeks, horizontal running mouldings etc., to match cross sectional size and profile of existing.
- .7 Exact size of decorative wall octagonal edged shingles to be determined after representative samples are removed and stripped, as described below. Assume shingles are 100 mm wide, 305 mm long, 8 mm thick at butt, 3 mm thick at top. Decorative pattern to be cut into shingles prior to priming and painting.
- .8 Plain straight edged wall shingles to be 305 mm long, 8 mm thick at the butt, 3 mm thick at the top, and to range in width from a minimum of 100 mm to a maximum of 203 mm.
- .9 All profiles are custom and will require the fabrication of custom cutters to match the original profiles exactly. Wall shingles and clapboard also require custom fabrication.
- .10 Vented batten system: in accordance with Section 06 08 99 – Rough Carpentry for Minor Works.

2.02 FASTENERS

- .1 Clapboard and wall shingles fasteners: 38 mm hot dipped galvanized spiral nails.
- .2 Screws for fastening replacement sheathing: 63 mm stainless steel 300 series deck screws.
- .3 Screws for fastening plywood strapping to sheathing: 50 mm stainless steel 300 series deck screws.
- .4 Screws for fastening nailers to plywood strapping: 50 mm stainless steel 300 series deck screws.

- .5 Nails for general finished wood work: stainless steel 300 series finishing nails, length to be the thickness of the piece being finished plus 1.5 that length again to penetrate back up material.
- .6 Assume need to counter sink and fill any visible fasteners.

2.03 FILLER

- .1 Filler for counter sunk nails: linseed oil based putty by same manufacturer as linseed oil based paint system.

PART 3 EXECUTION

3.01 DISMANTLING OF HISTORIC WOODWORK TO BE RESTORED

- .1 Exterior trim to be salvage for shop restoration or to be left in place for in-situ restoration are identified in Section 02 41 13 Selective Site Demolition.
- .2 Exterior finished trim identified on drawings to be restored shall be carefully removed and reinstalled to facilitate restoration and paint removal. Refer to Section 06 03 40 – Historic – Wood Repair and Section 09 03 91 – Historic - Painting.
- .3 Carefully remove a minimum of 12 representative examples of shaped wall shingles for further study as directed by Departmental Representative.
- .4 Handling: assume all paint layers and wood substrate contain dangerous levels of lead.
- .5 Labeling and recording
 - .1 Each and every individual component being removed is to be labeled before disassembly begins.
 - .2 Labeling system to be developed with and approved by Departmental Representative before work begins.
 - .3 Labels shall consist of gasket paper, marked with a waterproof marker, and securely stapled to the component. Where the component is greater than 900 mm in length a tag shall be placed at each end. Once the component is removed from the building it is to have an additional tag added to the back unpainted face.
 - .4 Smaller components may be stored in sealed clear plastic bags with the label visible within the bag.
 - .5 Departmental Representative to approve placement of labels before disassembly begins. Install more labels as directed by Departmental Representative.
 - .6 Prior to disassembly take overall digital photographs of all components with the labels clearly visible. Departmental Representative to approve photographs before disassembly begins. Take additional photos as directed by Departmental Representative.
 - .7 During disassembly, label and photograph unexpected components or details. Recording work shall be reviewed daily by Departmental Representative. Adjust approach as directed by Departmental Representative.
- .6 Disassembly
 - .1 All required dismantling shall be done with extreme care, taking appropriate precautions not to damage adjacent material or components themselves.

- .2 Use fine sharp pry bars intended for delicate work.
- .3 Where components may be “glued” by paint carefully and neatly cut the joint with a sharp chisel or knife to avoid tear out.
- .4 Take care with tools to avoid marring, crushing or splitting components.
- .5 Remove all protruding nails without driving them back through the face.
 - .1 Wrought iron cut nails to be snapped off on the back side or pulled through from the back side.
 - .2 Wire nails to be either cut off on the back side or pulled through from the back side.
- .6 During disassembly, bundle and store components in such a way that they are protected from the weather and are accessible for easy reference throughout the job. Store objects in logical groups to prevent any object from being misplaced or lost.
- .7 Appropriately stack, pad and support all components to prevent deterioration, warping, abrasion or other forms of damage.
- .8 Should any original wood work be split or separated, immediately photograph it with the label showing, and then securely bound with duct tape.
- .9 Transport disassembled material to a storage facility provided by Departmental Representative.
- .7 Refer to Section 02 41 13 – Selective Site Demolition for assumed quantities of salvaged woodwork:
- .8 Assume that 20% of salvaged woodwork will require epoxy repairs as per Section 06 03 40 – Historic – Wood Repair.

3.02 DEMOLITION OF COMPONENTS BEING DISCARDED

- .1 Retain representative samples of decorative wall shingles as directed by Departmental Representative, see above.
- .2 Components being removed and discarded include, but are not limited to, the shingles and clapboard, and modern tongue and groove sheathing behind along with any building paper as indicated on drawings.

3.03 EXAMINATION

- .1 Verification of Conditions: verify that conditions of existing substrate are acceptable in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Validate that sheathing is straight and plumb.
- .2 Assume the need to remove and replace 20% of decayed original wall sheathing. Replace only the components identified by the Departmental Representative.
 - .1 Replace cut out portions of sheathing boards with boards of equal sectional dimensions, of specified grade.
 - .2 Sheathing salvaged from the roof to be favored over new sheathing provided it is free of defects. Elements affected by fungal decay or that are split or otherwise structurally unsound cannot be re-used.

- .3 If decayed material is discovered above and beyond 20%, inform the Departmental Representative immediately.
- .4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.04 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.05 INSTALLATION

- .1 Install flashings, insect screens and bird control mesh in accordance with Section 07 62 00 – Sheet Metal Flashing and Trim.
- .2 Do not begin work until selective removals and demolition is completed to satisfaction of Departmental Representative.
- .3 Install rough sawn sheathing to replace the decayed original material – screw to existing framing. Add backing where required by screwing additional pieces to existing framing to provide full support for ends of sheathing board.
- .4 Install air barrier in accordance with Section 07 27 00.01 – Air Barrier – Descriptive.
- .5 Layout the locations for the horizontal mouldings which define the various bands on each elevation.
- .6 Install strapping for the bands receiving clapboard and strapping and nailers for the bands receiving shingles as shown in drawings.
- .7 Install restored and reproduction trim such as, but not limited to, corner boards, window and door casings, horizontal mouldings, the flared skirt at the building base.
- .8 Prior to installing any wood work thoroughly sand “all six sides” of each piece with 120 grit sandpaper. Prime “all six sides” with linseed oil and primer in accordance with Section 09 03 91 – Historic - Painting.
- .9 End joints in clapboard to be a similar pattern to existing and not to exceed frequency of joints. Use whole boards.
- .10 Joint patterns in siding and trim shall be tight so that after finishing they are only visible from close inspection.
- .11 Courses in clapboard and shingles shall be gauged so that the courses in each band are equal in their exposure and in terms of how they relate to the tops and bottoms of door and window casings and horizontal mouldings.
- .12 Assume that the various mouldings and bands are not parallel, that their relative position varies between locations, and that some elements restored in situ such as sills do not align. Notify the Departmental Representative of any significant misalignment. Adjust exposure of clapboard and shingles by decreasing only over a few courses to adjust for areas that may not be parallel.
- .13 First courses of shingles to be doubled with joints staggered by 38 mm.
- .14 Nails in clapboard and finished wood work to be lightly counter sunk and filled with putty. Allow to set before painting.

- .15 Space shingles 3 mm apart, offset joints in adjacent course by a minimum of 38 mm and offset joints in alternate courses by a minimum of 13 mm.
- .16 Use two nails per shingle. Space nails 19 mm from edge and 38 mm above butt line of the course to follow.
- .17 Drive nails flush but do not crush surface of shingle.
- .18 At the outside corners of shingled bands alternate the way shingles butt in each course.
- .19 Cut off and fill tongues and grooves as required.

3.06 CLEANING

- .1 Progress Cleaning: leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.07 DAMAGE PROTECTION

- .1 Once an elevation is stripped protect entire wall with breathable water proof tarpaulins to eliminate risk of moisture infiltration.
 - .1 Fasten tarpaulins with battens to avoid lifting.
 - .2 Reinstall tarpaulins at the end of each work day.
 - .3 Maintain protection throughout job and until final painting is completed.
- .2 Protect window and door openings with temporary plywood panels prior to commencing work and maintain protection until work is complete. Do not fasten protections directly to building.
- .3 Protect installed products and components from damage during construction.
- .4 Repair damage to adjacent materials caused by wood siding installation.

END OF SECTION

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 06 08 99 – Rough Carpentry for Minor Works.
- .2 Section 08 03 12 – Historic – Doors.
- .3 Section 08 03 52.71 – Historic – Wood Window Rehabilitation.
- .4 Section 08 03 52 81 – Historic – Wood Window Replacement.
- .5 Section 23 37 20 – Louvres, Intakes and Vents.

1.02 REFERENCES

- .1 ASTM International
 - .1 ASTM C 665-12, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - .2 ASTM C 1289-14, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - .3 ASTM C 1320-10, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S101-07, Standard Methods of Fire Tests of Building Construction and Materials.
 - .2 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .3 CAN/ULC-S704-11, Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for insulation products and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Certificates:
 - .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Test Reports:
 - .1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.

- .5 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.04 QUALITY ASSURANCE

- .1 Health and Safety Requirements: worker protection - sprayed insulation:
 - .1 Protect workers as recommended manufacturer's recommendations:
 - .2 Workers must wear protective clothing as per applicable regulations and manufacturer's recommendations when applying foam insulation.
 - .3 Workers must not eat, drink or smoke while applying foam insulation.

1.05 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect specified materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 00 10 – General Instructions, Waste Management.
- .5 Packaging Waste Management: remove for reuse and return pallets, crates, padding, and packaging materials in accordance with Section 01 00 10 General Instructions, Waste Management.

1.06 SITE CONDITIONS – SPRAYED INSULATION

- .1 Ventilate area in accordance with Section 01 51 00 - Temporary Utilities and manufacturer's instructions.
- .2 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hour after application to maintain non-toxic, unpolluted, safe working conditions.
- .3 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.
- .4 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.
- .5 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

PART 2 PRODUCTS

2.01 INSULATION MATERIAL DESIGNATIONS

- .1 Type A: Blanket mineral fibre: to ASTM C 665.
 - .1 Type: 1.
 - .2 Thickness: as indicated.
- .2 Type B: Rigid Cellular Polyisocyanurate:
 - .1 Faced: to ASTM C 1289 and CAN/ULC-S704.
 - .1 Polyisocyanurate core.
 - .2 Surfaces: Back: reflective foil facer on one side and non-reflective foil facer on the other side.
 - .3 Shape: flat.
 - .4 Thickness: 89 mm unless otherwise indicated.
 - .5 RSI-value: minimum $3.9 \text{ }^{\circ}\text{K}\cdot\text{m}^2/\text{W}$ for an 89 mm thickness.
- .3 Type C: Sprayed insulation: Flexible, low-expansion single-component polyurethane foam.

2.02 INSULATION SELECTION

- .1 Type A and B: as indicated on drawings.
- .2 Type C:
 - .1 Perimeters of doors, windows, and louver frames.
 - .2 Narrow cracks and gaps at roof junctions that cannot be filled or accessed with blanket or rigid insulation.

2.03 ACCESSORIES

- .1 Insulation clips:
 - .1 Impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back; spindle of 2.5 mm diameter annealed steel, length to suit insulation; 25 mm diameter washers of self-locking type.
- .2 Nails: galvanized steel, length to suit insulation plus 25 mm, to CSA B111.
- .3 Staples: 12 mm minimum leg.
- .4 Tape: as recommended by manufacturer.
- .5 Foam applicator gun.
- .6 Utility knife.

PART 3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for insulation application in accordance with manufacturer's written instructions.
- .2 Visually inspect substrate in presence of Departmental Representative.
- .3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.02 INSULATION INSTALLATION

- .1 Install as per manufacturer's recommendations.
- .2 Install insulation after building substrate materials are dry.
- .3 Install insulation to maintain continuity of thermal protection to building elements and spaces
- .4 Install insulation with vapour permeable membrane facing cold side as detailed. Lap ends and side flanges of membrane over framing members. Retain in position as recommended by manufacturer. Tape seal butt ends and lapped side flanges. Do not tear or cut vapour barrier.
- .5 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .6 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of chimneys and vents.
- .7 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.03 BLANKET INSULATION INSTALLATION

- .1 Install blanket insulation in accordance to ASTM C 1320.
- .2 Do not compress insulation to fit into spaces.

3.04 RIGID INSULATION INSTALLATION

- .1 Cut and trim neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .2 Offset both vertical and horizontal joints in multiple layer applications.
- .3 Use maximum board sizes to minimize the number of joints.
- .4 Orient the reflective side of the board to the exterior and the nonreflective white side, to the interior.

3.05 SPRAY FOAM INSULATION APPLICATION

- .1 Apply as per manufacturer's recommendation to fully fill gaps and openings without creating pressure to adjacent frames or other components.
- .2 Cured foam can be sanded or trimmed with a sharp knife.

3.06 CLEANING

- .1 Clean tools and adjacent surfaces from uncured spray foam residue immediately. Cured foam is extremely difficult to remove.
- .2 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 07 03 32 – Historic – Wood Shingles and Shakes Roofing.
- .2 Section 07 03 46 – Historic - Wood Siding.
- .3 Section 07 21 00 – Thermal Insulation.
- .4 Section 07 61 00 – Sheet Metal Roofing.
- .5 Section 07 62 00 – Sheet Metal Flashing and Trim

1.02 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM C920; Standard Specification for Elastomeric Joint Sealants
 - .2 ASTM C1193; Standard Guide for Use of Joint Sealants
 - .3 ASTM E96; Standard Test Method for Water Vapor Transmission of Materials
 - .4 ASTM E2178; Standard Test Method for Air Permeance of Building Materials
- .2 Air Barrier Association of America (ABAA)
 - .1 ABAA 2012, Water-resistive Barrier Installation Guideline.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit WHMIS MSDS - Material Safety Data.
- .3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.04 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Applicator: company specializing in performing work of this section with experience with installation of air/vapour barrier systems.
 - .1 Completed installation must be approved by the material manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .3 Deliver products in manufacturer's original, unopened packaging, labeled with manufacturer's information, product name, and date of manufacture.
- .4 Protect stored materials from direct sunlight and UV exposure.
- .5 Avoid spillage: immediately notify Departmental Representative if spillage occurs and start clean up procedures.
- .6 Clean spills and leave area as it was prior to spill.

1.06 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 00 10 General Instructions, Waste Management.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.07 AMBIENT CONDITIONS

- .1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.
- .2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
- .3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

1.08 SEQUENCING

- .1 Sequence work in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM).
- .2 Sequence work to permit installation of materials in conjunction with related materials and seals.

1.09 EXTENDED WARRANTY

- .1 For the work of this Section, the 12 month warranty period is extended to 120 months in accordance to Section – 07 03 32 – Historic – Wood Shingles and Shakes Roofing and Section 07 03 46 – Historic – Wood Siding.
- .2 Warranty: include coverage of installed sealant and sheet materials which:
 - .1 Fail to achieve air tight and watertight seal.
 - .2 Exhibit loss of adhesion or cohesion.
 - .3 Do not cure.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- .1 Air barrier: Vapour permeable air and water-resistive barrier.
 - .1 Three layer water-resistive barrier and air barrier. Its two outer layers are made of a high strength spun-bonded polypropylene fabric thermally bonded to a highly vapor permeable, watertight polymeric middle layer. The fabric layer on the lower side protects the barrier against damage
 - .2 Water Vapor Transmission: To ASTM E96 (Procedure A), 472 g/m²/24 hr, (Procedure B) 820 g/m²/24 hr.
 - .3 Vapor Permeance: To ASTM E96 (Procedure A) 69 perms, (Procedure B) 120 perms.
 - .4 Elongation at Break: To ASTM D5034, MD 44.6 %, CD 74.1 % minimum.
 - .5 Tear Resistance: To ASTM D1922-06a, MD 1078g, CD 1588g minimum.
 - .6 Resistance to Puncture: pass to TAPPI-T803.
 - .7 Water Penetration resistance: Meets requirements of AC38 for 60 minute Grade D water-resistive barrier.
 - .8 Air Permeance: To ASTM E2178, < 0.02 l/(s x m²) @ 75 Pa.
 - .9 Linear Dimensional Change: To ASTM D1204, pass < 3%.

2.02 ACCESSORIES

- .1 Manufacturer's recommended sealants/adhesives.
- .2 Fasteners: #4 nails with 25.4 mm diameter plastic caps.
- .3 Seam Tape: Air-barrier manufacturer's recommended materials for sealing seams.
- .4 Self-adhering flashing membrane: Air- barrier manufacturer's recommended membrane materials for sealing penetrations.
- .5 Primers: Membrane manufacturer's recommended primer to assist in adhesion between substrate and flashing.
- .6 Adhesive tape: Self-adhesive tape with impregnation for an effective seal over fastener penetrations, compatible with air barrier, 50 mm wide.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 EXAMINATION

- .1 Verify that surfaces and conditions are ready to accept work of this section.
- .2 Prepare roof deck in accordance to Section 07 03 32 – Historic – Wood Single and Shakes Roofing and Section 07 61 00 – Sheet Metal Roofing.

- .3 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.
- .4 Report unsatisfactory conditions to Departmental Representative in writing.
- .5 Do not start work until deficiencies have been corrected.
- .1 Beginning of Work implies acceptance of conditions.

3.03 PREPARATION

- .1 Remove loose or foreign matter, which might impair adhesion of materials.
- .2 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions.
- .3 Ensure substrates are free of surface moisture prior to application air barrier.
- .4 Ensure metal closures are free of sharp edges and burrs.
- .5 Prime substrate surfaces to receive adhesive and sealants in accordance with manufacturer's instructions.

3.04 INSTALLATION

- .1 Install materials in accordance with manufacturer's written recommendations.
- .2 Do installation in accordance with ABAA written recommendations for installation of air barriers.
- .3 Use the largest possible sheets such as to reduce the number of seams.
- .4 Start barrier installation at a building corner, leaving 150 mm – 300 mm of air barrier extended beyond corner to overlap.
- .5 Install air barrier in a horizontal manner starting at the lower portion of the wall or roof surface with subsequent layers installed in a shingling manner to overlap lower layers in a water-shedding fashion. Maintain air barrier plumb and level.
- .6 Window and Door Openings:
 - .1 Existing windows and doors: wedge air barrier between the existing frame and sheathing on the opening's perimeter under continuous furs.
 - .2 New windows and doors: Seal air barrier on perimeter using self-adhesive flashing prior to window or door installation as per air barrier manufacturer's recommendations.
- .7 Overlap air barrier
 - .1 Exterior Corners: minimum 300 mm minimum.
 - .2 Vertical Seams: minimum 150 mm minimum.
 - .3 Horizontal Seams: minimum 100 mm minimum.
 - .4 Other seams, joints or at protrusions and penetrations: 150 mm minimum.
- .8 Air Barrier Attachment:
 - .1 Attach air barrier to sheathing. Fasten with sufficient fasteners nails to hold it in place until roofing material or wall siding are applied. Do not install fasteners within 225 mm of a window or door head.
 - .2 Apply a layer of adhesive tape under strapping to seal fastener penetration through barrier. Fasten nailers to strapping without penetrating barrier.

- .9 Seal seams of air barrier with approved seam tape at all vertical and horizontal overlapping seams. Seal any tears or cuts as recommended by air barrier manufacturer.

3.05 CLEANING

- .1 Progress Cleaning: leave Work area clean at end of each day.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.06 PROTECTION OF WORK

- .1 Protect finished work in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Do not permit adjacent work to damage work of this section.
- .3 Ensure finished work is protected from climatic conditions.

END OF SECTION

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 06 08 99 - Rough Carpentry for Minor Works.
- .2 Section 07 03 46 – Historic – Wood Siding,
- .3 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .4 Section 07 92 10 - Joint Sealants.
- .5 Section 07 27 00.01 – Air barrier – Descriptive.

1.02 REFERENCES

- .1 Reference Standards:
 - .1 ASTM International
 - .1 ASTM A 240/A 240M-07e1, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - .2 ASTM A 568/A 568M-11b, Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.
 - .3 ASTM B 32-08, Standard Specification for Solder Metal.
 - .2 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual, latest edition.
 - .3 CSA International
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
 - .5 Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
 - .1 SMACNA Architectural Sheet Metal Manual, 7th Edition, 2012.

1.03 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sheet metal roofing and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Shop Drawings: Indicate arrangements of sheets and joints, types and locations of fasteners and special shapes and relationship of panels to structural frame. Indicate locations of any new sheets. Indicate types and locations of materials including proposed methods and sequences of installation.

- .4 Samples: Submit duplicate 800 x 300 mm samples of each type of sheet metal material and finish. Illustrate method of joining sheets. Include samples of accessory materials.
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures. Photographic Documentation: In accordance with Section 07 03 32 – Wood Shingles and Shakes Roofing.
- .1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Departmental Representative in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM) to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
- .2 Qualifications:
 - .1 Carry out sheet metal roofing work of this section using skilled tradespersons trained and experienced fabrication and installation of sheet metal roofing as per Pre-qualification requirements.
 - .2 Competent worker: equipped with tools and equipment necessary to carry out work in a traditional manner.
 - .3 Contractor's Field Supervision and Crew Qualifications: maintain full-time supervisor/foreperson on job site during times work is in progress. Supervisor must have experience in sheet metal roofing fabrication and installation similar in nature and scope to specified work as per Pre-qualification requirements.
 - .1 Shop crew makeup: trade qualified journeyman tinsmith and registered apprentices in the ratio of no more than one to one (at least one journeyman to one apprentice).
 - .4 Only workers accepted by Departmental Representative during mock-ups will be authorized to perform Work of this section.

1.05 MOCK-UPS

- .1 Submit mock-ups in accordance with Section 01 45 00 - Quality Control.
- .2 Fabricate 1000 x 1200 mm mock-up of each roofing type using identical project materials and methods to illustrate typical roofing conditions: typical seams and transverse seams, ridges, valleys, eaves and junctions with adjacent materials.
- .3 Install mock-ups where directed.
- .4 Mock-ups will be used to judge workmanship, substrate preparation, operation of equipment, types of material and application.
- .5 Allow 72 hours for inspection of mock-ups by Departmental Representative before proceeding with work.
- .6 Reconstruct mock-up at Departmental Representative's discretion until required quality of Work is achieved.

- .7 When accepted, Mock Up will demonstrate minimum standard of quality required for this Work.

- .1 Remove mock-up when directed.

1.06 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store roofing materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect roofing materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 00 10 – General Instructions, Waste Management.

1.07 EXTENDED WARRANTY

- .1 For the work of this Section, the 12 month warranty period is extended to 120 months.
- .2 Perform detailed warranty inspections during year 3 and year 9 in presence of Departmental Representative.
 - .1 Provide means of access to perform a tactile review of all roof surfaces.
 - .2 Perform corrective work as required for adequate performance of work included in this and related sections.

PART 2 PRODUCTS

2.01 MATERIALS

2.02 SHEET METAL MATERIALS

- .1 Stainless steel sheet: ASTM A 240, Type 316L with a non-directional, uniformly textured, matt finish.
 - .1 Surface roughness Ra typical: 2,5 µm (100 micro-inches).
- .2 Thickness: 0.5 mm.

2.03 ACCESSORIES

- .1 Strapping and Battens: as specified in Section 06 08 99 - Rough Carpentry for minor works.
 - .1 Fasteners for anchoring strapping to existing deck as specified in Section 06 08 99 – Rough Carpentry for Minor Works.
- .2 Slip sheet:

- .1 Rosin-sized, building paper 0.195 kg/m minimum.
- .2 Air barrier in accordance with Section 07 27 00.01 – Air barrier – Descriptive.
- .3 Fasteners, washers, solder, flux: In accordance with Section 07 62 00 – Sheet Metal Flashing and Trim.
- .4 Cleaner: as per manufacturer's recommendations.
- .5 Membrane: In accordance with Section 07 62 00 – Sheet Metal Flashing and Trim.
- .6 Flashing and Counterflashing: In accordance with Section 07 62 00 – Sheet Metal Flashing and Trim.
- .7 Isolation coating: alkali resistant bituminous paint.
- .8 Plastic cement: to CAN/CGSB-37.5.
- .9 Rubber-asphalt sealing compound: to CAN/CGSB-37.29.
- .10 Sealant: as specified in Section 07 92 10 - Joint Sealants.

2.04 FABRICATION

- .1 Fabricate metal roofing sheet work to match approved mock-up, and in accordance with applicable recommendations and details of CRCA Roofing Specifications, Copper in Architecture Handbook by CDA, and methods of approved submittals and mock-ups.
- .2 Form individual pieces in 2400 mm maximum lengths. Make allowances for expansion at joints.
- .3 Form individual pieces in sizes, profiles and with details to match approved mock-up. Make allowances for expansion at joints.
- .4 Hem exposed edges on underside 12 mm. Mitre and weld at corners.
- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .6 Apply minimum 0.2 mm dry film thickness coat of plastic cement to both faces of dissimilar metals in contact.
- .7 Tin edges of metal sheets to be soldered for width of 40 mm both sides with solder.
- .8 Fabricate elements to maintain orientation of the original sheet alignment.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.02 ROOF DECK PREPARATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections are acceptable in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Validate that sheathing is straight and plumb.

- .3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .2 Proceed with installation only after unacceptable conditions have been remedied.

3.03 PROTECTION OF IN-PLACE CONDITIONS

- .1 Be responsible for repair and restitution of damage to building caused by the work of this Section.
- .2 Maintain roof and walls leak proof and weather tight as the work progresses.

3.04 INSTALLATION

- .1 Install sheet metal work to applicable recommendations and details of CRCA Roofing Specifications using materials and methods of approved submittals and mock-ups.
- .2 Form to shapes and dimensions shown, free from defects which impair strength or mar appearance.
- .3 Form planes and lines to true alignment.
- .4 Install plane surfaces and seams without waves, warps, buckles, fastening stresses or distortion, allowing fully for expansion and contraction.
- .5 Use concealed fastenings except where approved by Departmental Representative prior to installation.
- .6 Install sheet metal roof panels using cleats unless approved otherwise by Departmental Representative.
- .7 Stagger transverse seams in adjacent panels.
- .8 Form seams in direction of water-flow and make watertight.
- .9 Flash roof penetrations with material matching roof panels, and make watertight by soldering.
- .10 Manipulate stainless steel wearing cotton gloves. Avoid contact with skin, boots, or any other surface or product that could leave traces on the material surface. Coordinate with other trades that could perform work on or nearby stainless steel.
- .11 Avoid formation of extraneous rust caused by staining or contamination stainless steel during fabrication, installation and after installation.
 - .1 Avoid rusting items or debris being left on stainless steel.
 - .2 Use dedicated stainless steel tools to avoid any risk of cross contamination. Tools should be free of rust and other extraneous metallic particles.
 - .3 Do not work with other metals adjacent to stainless steel, which could cause contamination as a result of projections.
 - .4 Avoid the use of metallic pads or wire wool including powder based abrasives.
 - .5 Coordinate with other trades that could perform work on or nearby stainless steel.
- .12 Removal of extraneous rust: clean as per manufacturer's recommendations.
- .13 Promptly remove protective plastic covering to prevent adhesive residue from remaining on the stainless steel finish.

3.05 UNDERLAYMENT

- .1 Apply self-adhesive membrane in accordance with manufacturer recommendations.
- .2 Install self-adhesive membrane on clean, dry and continuous deck.
- .3 Prime substrate as per manufacturer recommendations.
- .4 Apply membrane in accordance with Manufacturer's instructions.
- .5 Install membrane directly to top surface of decking as follows:
 - .1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
 - .2 Unroll and install base sheet taking care not to damage membrane or its reinforcement or substrate.
 - .3 Install and lap joints in direction of water flow. Lap sheets 90 mm minimum for side and 150 mm minimum for end laps.
 - .4 Application to be free of blisters, wrinkles and fishmouths.

3.06 SLIP SHEETS

- .1 Install slip sheets over underlayment as work progresses, and secure with minimum anchorage.
- .2 Lap joints 51 mm minimum, and install in direction of water-flow.

3.07 CLEATS AND ANCHORS

- .1 Fix cleats to roof, where it prevent the sheet to raise at joints, unless otherwise indicated, at maximum spacing of 300 mm oc. Manufacture fasteners in the workshop to 50 mm wide, with pre-drilled holes, with a fold of 13 mm long. Secure cleats with two fasteners each and cover with cleat tabs.
- .2 All joints specified "cleat joint" or "cleat and soldered joint" must have hidden cleats at maximum spacing of 300 mm oc., unless otherwise indicated.
- .3 Horizontal joints between batten joints or standing seams must be folded with 2 cleats arranged at the thirds of the joint.
- .4 Cleats must be screwed into the wood with stainless steel screws. At the junctions of two sheets, cleat is always fixed before the second installed sheet, in order to crochet the first already in place. Provide a clearance of 4 mm in lock picking. Put the screws closest to the fold of the cleat. Well hammer the full run of the fold on the screw heads.
- .5 Snap a panel of sheet metal to the preceding in folds of 13 mm with a clearance of 4 mm to allow contraction of the metal.
- .6 When a particular cleat is specified "continuous" on the drawings, produce it according to the specific profile required on the length of the Panel to retain, and attach it to 450 mm oc. unless otherwise indicated.

3.08 BATTENS ROOFING

- .1 The horizontal start line of battens on a roof corresponds to the upper limit of sheet metal apron at roof edge.
- .2 Use straight wood, where knots are sound and without cavities.

- .3 Prepare wood in the workshop, including the angled cuts of the batten ends. Only square cuts may be made at the site.
- .4 Pre-drill battens in the workshop diagonally, at 400 mm oc. staggered on each side, starting 50 mm from the ends as shown in the drawings. Countersink heads of holes to ensure the screw heads penetrate 3mm into the surface of the wood.
- .5 Battens to be tapered so that their base is 1.5mm narrower on each side than at the top.
- .6 Screw battens over the membranes into the decking with wood screws; ensure that the head is driven minimum 3 mm into wood. Avoid over tightening that might crack the wood; remove cracked components.
- .7 Respect an equidistance, alignment and rigorously accurate abutment of the battens.
- .8 Coordinate installation with that of the sheet metal cleats to wedge underneath.
- .9 Layout the rows of battens on the roof surface starting at the ridges and distribute towards the valleys.
- .10 Bevel the bottom end of the battens.

3.09 STANDING SEAM ROOFING

- .1 Lay prepared pans, fabricated from with shorter dimension parallel to eaves.
- .2 Respect an equidistance, alignment and rigorously accurate abutment of the seams.
- .3 Coordinate installation with that of the sheet metal cleats to wedge underneath.
- .4 Pan method:
 - .1 Hook 20 mm fold on lower end of upper pan into turned up top edge of underlying pan to give a 4-ply common lock with capillary break, 50 mm minimum width cross seam.
 - .2 Hook 20 mm fold on lower end of upper pan into locking strip.
 - .3 Place next row of pans in position, allowing 2 mm minimum distance between rows, with specially formed 44 mm flange hooking over 38 mm flange already in position.
 - .4 Complete bending as indicated in Contract Drawings to form 5-ply double locked standing seam with 25 mm finish height.

3.10 SOLDERING

- .1 Follow sheet metal manufacturer's recommendations for soldering procedures.
- .2 Thoroughly clean welding iron prior to soldering.
- .3 Make rough the smooth surfaces to be welded with sandpaper or sandblasted. Apply flux remover on surfaces to be welded, before folding. Use of chlorine or fluorine based flux is prohibited.
- .4 Respect configuration of assemblies shown on drawings for all elements of the roof and flashings, including localization of the joints.
- .5 Flat surfaces must have no distortion, ripple, torsion, warping or other visible defect.
- .6 Welding only for the purpose of filling and it will not rely on welding for the purpose of mechanical resistance.

- .7 The finished work must be completely sealed under any condition. Shape the joints in the direction of flow of the water.
- .8 After folding parts together, make a continuous solder joint with one or more repetitive operations. Perform soldering with well heated metals, heat seam thoroughly and sweat solder through its full width.
- .9 As work progresses, neutralize excess flux with 5% to 10% washing soda solution, and thoroughly rinse. Leave work clean and free of stains.
- .10 Rinse with fresh water immediately after soldering and dry using clean rag.
- .11 Remove heat tint from welding operations without damaging the stainless steel surface finish.

3.11 CLEANING

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 07 03 32 – Historic – Wood Shingles and Shakes Roofing
- .2 Section 07 03 46 – Historic – Wood Siding
- .3 Section 07 27 00.01 – Air barrier – Descriptive.
- .4 Section 07 61 00 – Sheet Metal Roofing
- .5 Section 07 92 00 – Joint Sealants

1.02 REFERENCES

- .1 Reference Standards:
 - .1 ASTM International
 - .1 ASTM A 240/A 240M-07e1, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - .2 ASTM A 568/A 568M-11b, Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.
 - .3 ASTM B 32-08, Standard Specification for Solder Metal.
 - .2 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual, latest edition.
 - .3 CSA International
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
 - .5 Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
 - .1 SMACNA Architectural Sheet Metal Manual, 7th Edition, 2012.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Shop drawings: Indicate arrangements of flashings and trim, joints, types and locations of fasteners and special shapes. Indicate types and locations of materials including proposed methods and sequences of installation.

- .4 Samples: Submit duplicate 800 x 300 mm samples of each type of sheet metal material and finish. Illustrate method of joining sheets. Include samples of accessory materials.
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.
- .6 Photographic Documentation: In accordance with Section 07 03 32 – Wood Shingles and Shakes Roofing.

1.04 QUALITY ASSURANCE

- .1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Departmental Representative in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM) to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
- .2 Qualifications:
 - .1 Carry out sheet metal flashing and trim work of this section using skilled tradespersons trained and experienced fabrication and installation of sheet metal flashing and trim as per Pre-qualification requirements.
 - .2 Competent worker: equipped with tools and equipment necessary to carry out work in a traditional manner.
 - .3 Contractor's Field Supervision and Crew Qualifications: maintain full-time supervisor/foreperson on job site during times work is in progress. Supervisor must have sheet metal flashing and trim fabrication and installation training and experience in sheet metal flashing and trim fabrication and installation similar in nature and scope to specified work as per Pre-qualification requirements.
 - .1 Shop crew makeup: trade qualified journeyman tinsmith and registered apprentices in the ratio of no more than one to one (at least one journeyman to one apprentice).
 - .4 Only workers accepted by Departmental Representative during mock-ups will be authorized to perform Work of this section.

1.05 MOCK-UPS

- .1 Submit mock-ups in accordance with Section 01 45 00 - Quality Control.
- .2 Install one linear meter of each type of gutters and downspouts formed with stainless steel sheet metal flashing including junction to adjacent materials.
- .3 Install mock-up to illustrate typical stainless steel flashing. Indicate all joints, fixings and cover flashings.
- .4 Install additional mock-ups as specified in Section 07 61 00 - Sheet Metal Roofing.
- .5 Allow 72 hours for inspection of Mock Up by Departmental Representative before proceeding with sealant work.

- .6 Reconstruct mock-up at Departmental Representative's discretion until required quality of Work is achieved.
- .7 When accepted, Mock Up will demonstrate minimum standard of quality required for this Work.
 - .1 Remove mock-up when directed.

1.06 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store flashing materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect flashing materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 00 10 – General Instructions, waste management.

1.07 EXTENDED WARRANTY

- .1 For the work of this Section, the 12 month warranty period is extended to 120 months in accordance with Section – 07 03 32 – Historic – Wood Shingles and Shakes Roofing and Section 07 61 00 – Sheet Metal Roofing.

PART 2 PRODUCTS

2.01 SHEET METAL MATERIALS

- .1 Stainless steel sheet: ASTM A 240, Type 316L with a non-directional, uniformly textured matt finish.
 - .1 Surface roughness Ra typical: 2,5 µm (100 micro inches).
- .2 Thickness: 0.5 mm.

2.02 ACCESSORIES

- .1 Sealant: as specified in Section 07 92 10 - Joint Sealants.
- .2 Isolation coating: alkali resistant bituminous paint.
- .3 Plastic cement: to CAN/CGSB 37.5.
- .4 Neoprene pads, size and dimensions as per drawings.
- .5 Stainless steel 316 plates, size and dimensions as per drawings.
- .6 Slip sheet:
 - .1 Rosin-sized, building paper 0.195 kg/m minimum.

- .2 Air barrier in accordance with Section 07 27 00.01 – Air barrier – Descriptive.
- .7 Fasteners: of same material as sheet metal, to CSA B111
 - .1 Ring thread flat head roofing nails of length and thickness suitable for metal flashing application.
 - .2 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.
 - .3 Screws for metalwork: 32 mm stainless steel pan head screws and washers.
 - .4 Screws for masonry: 38 mm stainless steel pan head screws and washers secured into light duty plastic masonry plugs of appropriate type and size.
- .8 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .9 Lead wool: to ASTM B-29.
- .10 Solder: to ASTM B 32, alloy composition designation to suit intended use and as per sheet metal manufacturer's recommendations.
- .11 Flux: orthophosphoric based acid compatible with the stainless steel.
- .12 Cleaner: as per manufacturer's recommendations.
- .13 Screens:
 - .1 Insect screens: 0.3 mm diameter stainless steel wire, 300 series, 18 x 14 mesh with 60% free area, fastened with stainless steel staples 300 series at 100 mm spacing maximum.
 - .2 Bird screens: intercrimped stainless steel wire, 300 series, cloth secured to 2 mm thick, 6 x 6 mm size mesh, 1.5 mm diameter wire with minimum 50% free area, fastened with stainless steel brackets at 100 mm spacing maximum.
- .14 Roof drainage mat: Flexible three-dimensional mat made of continuous monofilaments fused at their intersection with an open structure type.
 - .1 Thickness: 11.43 mm.
 - .2 Tensile strength: MD 2.3 kN/m and CD 1.2 kN/m (ASTM D5035).
 - .3 Fire rating: NFPA Class A (ASTM E84).
 - .4 Flame spread: 25 (ASTM E84).
 - .5 Smoke density: 30 (ASTM E84).
- .15 Membrane:
 - .1 Self-adhesive roofing underlayment composed of a butyl rubber based adhesive backed by a layer of high density cross laminated polyethylene formulated to resist temperatures up to 148°C.
 - .1 Thickness: 0.76 mm.
 - .2 Membrane tensile strength: 1720 kN/m² (ASTM D412, Die C modified).
 - .3 Membrane elongation: 250% (ASTM D412, Die C modified).
 - .4 Meeting ASTM D1970.
 - .2 Primer: as per self-adhesive membrane Manufacturer's recommendation.

2.03 FABRICATION

- .1 Fabricate metal roofing sheet work to match approved mock-up, and in accordance with applicable recommendations and details of CRCA Roofing Specifications, Copper in Architecture Handbook by CDA, and methods of approved submittals and mock-ups.
- .2 Form individual pieces in 2400 mm maximum lengths. Make allowances for expansion at joints.
- .3 Form individual pieces in sizes, profiles and with details to match approved mock-up. Make allowances for expansion at joints.
- .4 Hem exposed edges on underside 12 mm. Mitre and weld corners.
- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .6 Apply minimum 0.2 mm dry film thickness coat of plastic cement to both faces of dissimilar metals in contact.
- .7 Tin edges of metal sheets to be soldered for width of 40 mm both sides with solder.
- .8 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.
- .9 Fabricate elements to maintain orientation of the original sheet alignment.
- .10 Form flashings, copings, fascias, scuppers, eaves troughs and downpipes to sizes and profiles indicated.
- .11 Eaves troughs and downpipes: provide goosenecks/swan necks, outlets, strainer baskets and necessary fastenings.
- .12 Provide necessary fastening.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 INSTALLATION

- .1 Eave, valley, ridge, and hips protection:
 - .1 Apply self-adhesive membrane in accordance with manufacturer recommendations.
 - .2 Install self-adhesive membrane on clean, dry and continuous deck.
 - .3 Prime substrate as per manufacturer recommendations.
 - .4 Apply waterproofing membrane in accordance with Manufacturer's instructions.
 - .5 Install membrane directly to top surface of decking as follows:
 - .1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
 - .2 Unroll and install base sheet taking care not to damage membrane or its reinforcement or substrate.

- .3 Install and lap joints in direction of water flow. Lap sheets 90 mm minimum for side and 150 mm minimum for end laps.
- .4 Application to be free of blisters, wrinkles and fishmouths.
- .2 Install continuously in the following locations and extents, and as indicated in drawings:
 - .1 From the edge of roof eaves up roof surface 900 mm.
 - .2 From the top edge of a hip or inverted hip extend the membrane an additional 400 mm up the roof surface as indicated.
 - .3 Extend membrane 600 mm up either side of a valley or as indicated.
- .3 Install sheet metal work to applicable recommendations and details of CRCA Roofing Specifications using materials and methods of approved submittals and mock-ups.
- .4 Use concealed fastenings except where approved before installation.
- .5 Lock end joints and caulk with sealant.
- .6 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedged flashing securely and seal continuously with sealant according to section 07 92 00 – Joint Sealants.
- .7 Install pans, where shown around items projecting through roof membrane.
- .8 Isolate all metalwork from masonry with a continuous underlay / slip sheet.
- .9 Where shown, reglets are to be caulked by Section 07 92 10 - Joint Sealants.
- .10 Install insect and bird screens at soffits, ridge vent, at ends of vented batten systems, etc. as indicated on drawings.
- .11 Manipulate stainless steel wearing cotton gloves. Avoid contact with skin, boots, or any other surface or product that could leave traces on the material surface. Coordinate with other trades that could perform work on or nearby stainless steel.
- .12 Avoid formation of extraneous rust caused by staining or contamination stainless steel during fabrication, installation and after installation.
 - .1 Avoid rusting items or debris being left on stainless steel.
 - .2 Use dedicated stainless steel tools to avoid any risk of cross contamination. Tools should be free of rust and other extraneous metallic particles.
 - .3 Do not work with other metals adjacent to stainless steel, which could cause contamination as a result of projections.
 - .4 Avoid the use of metallic pads or wire wool including powder based abrasives.
 - .5 Coordinate with other trades that could perform work on or nearby stainless steel.
- .13 Removal of extraneous rust: clean as per manufacturer's recommendations.
- .14 Promptly remove protective plastic covering to prevent adhesive residue from remaining on the stainless steel finish.

3.03 SOLDERING

- .1 Follow sheet metal manufacturer's recommendations for soldering procedures.
- .2 Thoroughly clean welding iron prior to soldering.

- .3 Make rough the smooth surfaces to be welded with sandpaper or sandblasted. Apply flux remover on surfaces to be welded, before folding. Use of chlorine or fluorine based flux is prohibited.
- .4 Respect configuration of assemblies shown on drawings for all elements of the roof and flashings, including localization of the joints.
- .5 Flat surfaces must have no distortion, ripple, torsion, warping or other visible defect.
- .6 Welding only for the purpose of filling and it will not rely on welding for the purpose of mechanical resistance.
- .7 The finished work must be completely sealed under any condition. Shape the joints in the direction of flow of the water.
- .8 After folding parts together, make a continuous solder joint with one or more repetitive operations. Perform soldering with well heated metals, heat seam thoroughly and sweat solder through its full width.
- .9 As work progresses, neutralize excess flux with 5% to 10% washing soda solution, and thoroughly rinse. Leave work clean and free of stains.
- .10 Rinse with fresh water immediately after soldering and dry using clean rag.
- .11 Remove heat tint from welding operations without damaging the stainless steel surface finish.

3.04 EAVES TROUGHS AND DOWNPIPES

- .1 Install eaves troughs and secure to building with eaves trough brackets.
 - .1 Slope eaves troughs to downpipes as indicated.
 - .2 Solder joints watertight.
- .2 Install downpipes and provide goosenecks/swan necks back to wall.
 - .1 Secure downpipes to wall with straps at 1800 maximum mm on centre; minimum three straps per downpipe.

3.05 CLEANING

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 07 61 00 – Sheet Metal Roofing.
- .2 Section 07 62 00 – Sheet Metal Flashing and Trim.
- .3 Section 08 03 12 – Historic - Doors.
- .4 Section 08 03 52.71 – Historic - Wood Window Rehabilitation.
- .5 Section 08 03 52.81 – Historic - Wood Window Replacement.

1.02 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM C834-10. Standard Specification for Latex Sealants.
 - .2 ASTM C920-11. Standard Specification for Elastomeric Joint Sealants.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
 - .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
 - .3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
 - .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Manufacturer's product to describe:
 - .1 Each type of sealing compound specified.
 - .2 Primers.
 - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
 - .3 Submit copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .2 Samples:
 - .1 Submit 3 samples of each type of material and colour.

- .2 Cured samples of exposed sealants for each colour.
- .3 Manufacturer's Instructions:
 - .1 Submit instructions to include installation instructions for each product used.
- .4 Photographic Documentation:
 - .1 Submit photographs of existing conditions, prior to commencing work, in accordance with Section 02 41 13 – Selective Site Demolition.

1.04 QUALITY ASSURANCE

- .1 Mock-ups:
 - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct a full-size mock-up for the preparation and application, and for each sealant and substrate type.
 - .3 Notify Departmental Representative 5 working days in advance of mock-up preparation.
 - .4 Mock-up will be used:
 - .1 To judge quality of work, substrate preparation and material application.
 - .5 When accepted, mock-up demonstrates minimum standard for this work.
 - .6 Mock-up may remain as part of finished work.

1.05 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.06 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, and packaging materials in accordance with Section 01 00 10 – General Instructions, Waste Management.

1.07 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Proceed with installation of joint sealants only when:
 - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.

- .2 Joint substrates are dry.
- .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 Joint-Width Conditions:
 - .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
 - .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.08 ENVIRONMENTAL REQUIREMENTS

- .1 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 Health Canada.
- .2 Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.

PART 2 PRODUCTS

2.01 SEALANT MATERIALS

- .1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
- .2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers to maximize off gas time.
- .3 Where sealants are qualified with primers use only these primers.
- .4 Use products of one and same manufacturer for each condition.

2.02 SEALANT MATERIAL DESIGNATIONS

- .1 Type A: Polyurethane one part: to CAN/CGSB-19.13, non-staining, colour selected by Departmental Representative.
- .2 Type B: Acrylic latex one part: to CAN/CGSB-19.17, colour selected by Departmental Representative.
- .3 Preformed non-compressible back-up materials:
 - .1 Polyethylene:
 - .1 Extruded closed cell foam backer rod.
 - .2 Size: oversize 30 to 50 %.
 - .2 Bond breaker tape:
 - .1 Polyethylene bond breaker tape which will not bond to sealant.

2.03 SEALANT SELECTION

- .1 Exterior perimeters of doors, window, and louver frames where they meet the exterior facade of building (wood siding): sealant type A with preformed non-compressible back-up materials.
- .2 Exterior joints in metal flashing or where flashing meets fixed building components, including reglets: sealant type A.
- .3 Interior perimeters of doors, windows and louvers frames as detailed on drawings: sealant type B.

2.04 CLEANERS AND PRIMERS

- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.
- .2 Primer: in accordance with sealant manufacturer's written recommendations.

PART 3 EXECUTION

3.01 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.02 SURFACE PREPARATION

- .1 Remove existing perimeter caulking from door and wood window frames and adjacent substrate.
 - .1 Obtain approval of removal methods from Departmental Representative.
- .2 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .3 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.
- .4 Ensure joint surfaces are dry and frost free.
- .5 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.
- .6 Prepare surfaces in accordance with manufacturer's directions.

3.03 PRIMING

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

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

3.04 BACKUP MATERIAL

- .1 Apply bond breaker tape where required to manufacturer's instructions.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.05 MIXING

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

3.06 APPLICATION

- .1 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 Apply sealant in continuous beads.
 - .4 Apply sealant using gun with proper size nozzle.
 - .5 Use sufficient pressure to fill voids and joints solid.
 - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
 - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
 - .8 Remove excess compound promptly as work progresses and upon completion.
- .2 Curing:
 - .1 Cure sealants in accordance with sealant manufacturer's instructions.
 - .2 Do not cover up sealants until proper curing has taken place.

3.07 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean adjacent surfaces immediately.
 - .3 Remove excess and droppings, using recommended cleaners as work progresses.
 - .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 00 10 – General Instructions, Waste Management.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.08 PROTECTION

- .1 Protect installed products and components from damage during construction.

- .2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION