Do not hammer lag screws into place. Provide malleable washers under screw heads where necessary. Install screws with anchorage embedment into piece lagged of not than 60% of screw length of 8 diameters. Place lag screws by screwing in an angle perpendicular to the surface it will adhere to.

END OF SECTION

06 00 00	DIVISION 6 WOOD AND PLASTICS
06 40 2	Interior Architectural Woodwork

1. **PART 1 GENERAL**

1.1 RELATED DOCUMENTS

1.1.1Technical Architectural Drawings
1.1.2Specifications
1.1.3Requests for Interpretation
1.1.4Product Samples and Brochures
1.1.5Manufacturer's Data Sheets and Certificates
1.1.6Material Safety Data Sheets
1.1.7Work Program and Methodology Submittals

1.2 SUMMARY

This section includes provisions on architectural woodwork, namely:
1.2.1Built-in cabinet works, drawers and countertops for pantries, toilets, and kitchens
1.2.2Custom cabinetry/woodwork for pigeon holes
1.2.3Custom wooden paneling works

1.3 RELATED SECTIONS

1.3.1Metal Fabrication
1.3.2Mirrors
1.3.3Solid Surface Countertops
1.3.4Toilet and Bath Accessories

1.4 GENERAL PROVISION

1.4.1Refer to the architect's working drawings on cabinetry detail and custom ornamental woodwork to match work requirements, i.e. design and dimensions, mounting heights, hardware specifications, wood type, staining, and other similar details necessary to complete work.
1.4.2No hand-cut wood allowed. All woodwork shall be machine-cut.
1.4.3Include and provide all fastening items necessary to complete and install all woodwork. Refer to Division 5 Section Metal Fabrication for metal fastening and anchorage specifications.
1.4.4Coordinate timely sample submission for approval such that the completion work schedule is kept free of delays. All samples, shop drawings, and similar submittals should be approved before the required schedule of placing orders for delivery on site. The architect is not responsible for sample approvals submitted at a much later time.

1.5 MAINTENANCE

1.5.1Keep completed and installed architectural woodwork free of dust, discoloration, defects, and similar irregularities throughout construction.
1.5.2Restore all defects, replace dysfunctional hardware, hinges, and touch up all damaged paint and finish work such that all woodwork are turned to its original condition at the time of substantial completion of the project.

1.6 SUBMITTALS

1.6.1PRODUCT APPROVAL ATTACHMENTS
1.6.1.1 Submit all wood treatment data for each type of wood specified, including: Type of preservative solution, pressure process used, amount of preservative retained, and moisture content of wood after kiln drying
1.6.1.2 On ornamental wood work requiring wood transparent stains, submit sample stained and finished wood cut at least 150mm if the lumber is in strips, and 200mm X200mm if the wood is in sheets. Label each sample according to the location of installation. State specie, dimensions, manufacturers of wood, and indicate all wood stains applied on each wood material. State color, chemical composition, brand, and amount of all stains and finish coatings applied. Only submit the actual wood to be used for installation or as specified by the architect in the technical working drawings. Wood installed on site that differs from the approved material is subject to rework.

1.6.1.3 On ornamental wood work requiring veneer and laminates, submit sample finished work at least 200mm X200mm, showing applied veneer sheets and edgework. Label each sample according to the location of installation. State color, code, grade, thickness, and brands of the laminates as well as the adhesives used.

1.6.1.4 On ornamental wood work requiring opaque paint finish, submit sample finished work at least 200mm X200mm, showing applied finish paint. Label each sample according to the location of installation. State color, code, number coats, and brands of paints and primers used.

1.6.1.5 Submit one sample each of all cabinet hardware and accessories. State product code and labels of each accessory in coordination with labels on shop drawings.

1.6.2EXECUTION APPROVAL ATTACHMENTS

1.6.3Shop drawings showing location of each woodwork item and actual dimensions, lines, levels, and reference elevations on the actual area of installation. Drawings must be drawn in full detail, showing locations and sizes of furring, blocking, hanging strips, veneer layers, surface finish, hardware type, miter joints, etc.

1.7 QUALITY ASSURANCE

1.7.1For repeating ornamental woodwork in typical areas, i.e. typical cabinet pantries, fabricate and install one build mockups for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1.7.2Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.

1.7.3Notify Architect seven days in advance of dates and times when mockups will be installed.

1.7.4Demonstrate the proposed range of aesthetic effects and workmanship.

1.7.5Obtain Architect's approval of mockups before starting interior architectural woodwork fabrication and installation on other units.

1.7.6Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

1.7.7Demolish and remove mockups when directed.

1.7.8Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 WARRANTIES

Provide lumber only from wood manufacturers and suppliers offering a minimum of five-year warranty.

2. PART 2 PRODUCTS

Comply with requirements of referenced quality standard for moisture content of lumber in relation to relative humidity conditions existing during time of fabrication and in installation areas. Provide wood with moisture content not greater than 12 percent (%).

2.1 WOOD PRESERVATIVES

Wood preservative shall not contain copper chrome arsenic (CCA) or any of the following toxic substances:

2.1.1Methyl Bromide and Chloropicrin

2.1.2Chlorpyrifos Fenitrothion

2.1.3Cupirichydroxide.

2.1.4And other harmful chemicals

2.2 PLYWOOD

Provide solid wood edging for all work requiring marine plywood.

Use Type I C-marine type plywood in thicknesses compliant to drawing details. Marine plywood quality shall be of premium grade quality, with weight/density as follows:

5mm thick C-Marine Type shall be 6.7kgs more or less per piece

9mm thick C-Marine Type shall be 12.0kgs more or less per piece

10mm thick C-Marine Type shall be 13.4kgs more or less per piece

11mm thick C-Marine Type shall be 14.7kgs more or less per piece

18mm thick C-Marine Type shall be 24kgs more or less per piece

Only use Grade A/B for face and back of plywood. For Exposed plywood subject to paint finish, expose Grade A facing.

2.3 LUMBER

Use kiln-dried Tanguile for opaque and transparent applications where required. Follow dimensions as approved on shop drawings and architectural working details.

2.4 FINISHES

All cabinet-work finishes shall be of natural, clear satin finish. Samples showing actual stains and finished sample shall be approved by the architect.

2.5 HARDWARE

All hardware finishes must be in uniform stain chrome finish, unless otherwise indicated and approved by the architect.

2.5.1When using hinges, use self-closing concealed hinges.

2.5.2Always use Cabinet and Drawer Pulls

2.5.3Always use heavy-duty drawer guides with size to match indications on working drawings.

2.5.4Finish of keyed cylinders shall match finish of Cabinet and Drawer Pulls

3. PART 3 EXECUTION

3.1 GENERAL FABRICATION AND INSTALLATION

3.1.1 All fabrication and installation work shall be done as intended by the Architect.

3.1.2 Coordinate with masonry work, paint work, and with other relevant trades to ensure timely completion of project with least restoration work.

3.1.3 Obtain and comply with Woodwork Manufacturer's and Installer's coordinated advice for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained and stabilized so that woodwork is within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.

3.1.4 Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of work.

3.1.5 All woodwork installations shall be plumb, level, true, and straight with no distortions. Install to a tolerance of 3mm in 2.40m for plumb and level and with no variations in flushness of adjoining surfaces.

3.1.6 Anchor woodwork to anchors or blocking integrally attached to substrates. Secure woodwork to substrate, grounds, or horizontal and vertical levels by means of concealed fasteners, blind nailing, concealed stripping and blocking as required to complete installation. Ensure that anchoring work is done as neatly as possible. Always install for uniform appearance unless otherwise required by drawings approved by the architect.

3.1.7 Adjust all damaged and defective woodwork where possible to eliminate functional and visual effects.

3.1.8 Fabricate woodwork to dimensions, profiles, & details as indicated in approved shop drawings. Ease edges to radius indicated for the following:

3.1.8.1 Corners of cabinets & edges of solid wood (lumber) members less than 25mm in nominal thickness: 1.59mm (1/16 inch).

3.1.8.2 Edges of rails and similar members more than 25mm in nominal thickness: 3.175mm (1/8 inch). All arises on joinery are to be rounded to a radius of 1.5mm whether shown on the drawing or not.

3.2 CLEANING AND PROTECTION

3.2.1Clean, lubricate, and adjust all hardware to ensure smooth and true operation, latching and movement of cabinetry.

3.2.2Clean woodwork on all exposed and semi exposed surfaces.

3.2.3Touch up applied finishes to restore defective areas.

3.2.4Provide protective films for on all ornamental woodwork so that all completed work remains in good visual and functional conditions at the time of Substantial Completion.

END OF SECTION

06 00 00	**DIVISION 6 WOOD AND PLASTICS**	
06 42 0	Wood Paneling	

1. **PART 1 GENERAL**

1.1 RELATED DOCUMENTS

1.1.1Technical Architectural Drawings
1.1.2Specifications
1.1.3Requests for Interpretation
1.1.4Work Program and Methodology Submittals

1.2 SUMMARY

This section includes provisions on architectural woodwork, namely:
1.2.1Custom ornamental wood panels for movable walls

1.3 RELATED SECTIONS

1.3.1Interior Architectural Woodwork
1.3.2Flush Wood Doors

1.4 GENERAL PROVISION

1.4.1Refer to the architect's working drawings on custom ornamental paneling to identify work requirements, i.e. dimensions, mounting heights, hardware specifications, wood type, staining, and other similar details necessary to complete work.
1.4.2Paneling includes wood furring, blocking, and shims for installing paneling, unless concealed within other construction before paneling installation
1.4.3Include and provide all fastening items necessary to complete and install all woodwork. Refer to Division 5 Section Metal Fabrication for metal fastening and anchorage specifications.
1.4.4Coordinate timely sample submission for approval such that the completion work schedule is kept free of delays. All samples, shop drawings, and similar submittals should be approved before the required schedule of placing orders for delivery on site. The architect is not responsible for sample approvals submitted at a much later time.

1.5 MAINTENANCE

1.5.1Keep completed and installed architectural woodwork free of dust, discoloration, defects, and similar irregularities throughout construction.
1.5.2Restore all defects, replace dysfunctional hardware, hinges, and touch up all damaged paint and finish work such that all woodwork are turned to its original condition at the time of substantial completion of the project.

1.6 SUBMITTALS

1.6.1PRODUCT APPROVAL ATTACHMENTS

1.6.1.1 Submit all wood treatment data for each type of wood specified, including: Type of preservative solution, pressure process used, amount of preservative retained, and moisture content of wood after kiln drying.

1.6.1.2 On ornamental wood work requiring wood transparent stains, submit sample stained and finished wood cut at least 150mm if the lumber is in strips, and 200mm X200mm if the wood is in sheets. Label each sample according to the location of installation. State specie, dimensions, manufacturers of wood, and indicate all wood stains applied on each wood material. State color, chemical composition, brand, and amount of all stains and finish coatings applied. Only submit the actual wood to be used for installation or as specified by the architect in the technical working drawings. Wood installed on site that differs from the approved material is subject to rework.

1.6.2EXECUTION APPROVAL ATTACHMENTS

1.6.2.1 Shop drawings showing location of each woodwork item and actual dimensions, lines, levels, and reference elevations on the actual area of installation. Drawings must be drawn in full detail, showing locations and sizes of furring, blocking, hanging strips, surface finish stain legends,

1.7 QUALITY ASSURANCE

1.7.1Fabricate and install one mock-ups for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1.7.2Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
1.7.3Notify Architect seven days in advance of dates and times when mockups will be installed.
1.7.4Obtain Architect's approval of mockups before starting interior architectural woodwork fabrication and installation on other units.
1.7.5Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
1.7.6Demolish and remove mockups when directed.
1.7.7Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 WARRANTIES

Provide lumber only from wood manufacturers and suppliers offering a minimum of five-year warranty.

2. **PART 2 PRODUCTS**

Comply with requirements of referenced quality standard for moisture content of lumber in relation to relative humidity conditions existing during time of fabrication and in installation areas. Provide wood with moisture content not greater than 12 percent (%).

2.1 WOOD PRESERVATIVES

Wood preservative shall not contain copper chrome arsenic (CCA) or any of the following toxic substances:
2.1.1Methyl Bromide and Chloropicrin
2.1.2Chlorpyrifos Fenitrothion
2.1.3Cupirichydroxide.
2.1.4And other harmful chemicals

2.2 FINISH

2.2.1Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing paneling, as applicable to each unit of work.
2.2.2For Back priming: Apply two coats of sealer or primer, compatible with finish coats, to concealed surfaces of paneling. Concealed surfaces of plastic-laminate-clad paneling do not require back priming when surfaced with plastic laminate.
2.2.3Confirm with Project specifics as to use of lacquer or varnish finish by means of sample approval.
2.2.4Match approved sample stains for colors.
2.2.5Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed grain wood before staining and finishing.
2.2.6Do not apply filler to open-grain woods.
2.2.7Apply wash-coat sealer after staining and before filling.
2.2.8Confirm sheen with Project requirements: [Flat, 15-30] [Satin, 31-45] [Semigloss, 46-60] [Gloss, 61-100] gloss units measured on 60-degree gloss meter per ASTM D 523

2.3 LUMBER

Use kiln-dried Tanguile, for opaque and transparent applications where required. Follow dimensions as approved on shop drawings and architectural working details.

2.4 HARDWARE

Use rough hardware as required to complete sound installation.

3. **PART 3 EXECUTION**

3.1 GENERAL FABRICATION AND INSTALLATION

3.1.1All fabrication and installation work shall be done as intended by the Architect.
3.1.2Coordinate with masonry work, paint work, and with other relevant trades to ensure timely completion of project with least restoration work.

3.1.3Obtain and comply with Woodwork Manufacturer's and Installer's coordinated advice for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained and stabilized so that woodwork is within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.
3.1.4Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of work.
3.1.5All woodwork installations shall be plumb, level, true, and straight with no distortions. Install to a tolerance of 3mm in 2.40m for plumb and level and with no variations in flushness of adjoining surfaces.
3.1.6Anchor woodwork to anchors or blocking integrally attached to substrates. Secure woodwork to substrate, grounds, or horizontal and vertical levels by means of concealed fasteners, blind nailing, concealed stripping and blocking as required to complete installation. Ensure that anchoring work is done as neatly as possible. Always install for uniform appearance unless otherwise required by drawings approved by the architect.
3.1.7Adjust all damaged and defective woodwork where possible to eliminate functional and visual effects.
3.1.8Fabricate woodwork to dimensions, profiles, & details as indicated in approved shop drawings. Ease edges to radius indicated for the following:

3.1.8.1 Corners of cabinets & edges of solid wood (lumber) members less than 25mm in nominal thickness: 1.59mm (1/16 inch).

3.1.8.2 Edges of rails and similar members more than 25mm in nominal thickness: 3.175mm (1/8 inch). All arises on joinery are to be rounded to a radius of 1.5mm whether shown on the drawing or not.

3.2 CLEANING AND PROTECTION

3.2.1Clean, lubricate, and adjust all hardware to ensure smooth and true operation, latching and movement of cabinetry.
3.2.2Clean woodwork on all exposed and semi exposed surfaces.
3.2.3Touch up applied finishes to restore defective areas.
3.2.4Provide protective films for on all ornamental woodwork so that all completed work remains in good visual and functional conditions at the time of Substantial Completion.

END OF SECTION

DIVISION 07
THERMAL AND MOISTURE PROTECTION

07 00 00	**DIVISION 7 THERMAL AND MOISTURE PROTECTION**
07 16 0	Integral Waterproofing

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1Technical Architectural Drawings
1.1.2Specifications
1.1.3Requests for Interpretation
1.1.4Product Samples and Brochures
1.1.5Manufacturer's Data Sheets and Certificates
1.1.6Material Safety Data Sheets
1.1.7Work Program and Methodology Submittals

1.2 SUMMARY

This section includes provisions on integral cementitious waterproofing found in the following areas:
1.2.1Weather-Exposed corridors and patios
1.2.2Water tanks, concrete sewage holding tank,
1.2.3Walls and floors of fuel storage tanks
1.2.4Roof Decks
1.2.5Kitchen and Pantry
1.2.6Toilet
1.2.7Other indicated below ground areas and spaces where required or directed by the architect

1.3 GENERAL PROVISION

1.3.1No leakage allowed from the concrete placed with integral waterproofing. Comply with recommendations for testing as per COE CRD-C 48 at 140m exposed to vertical water head.
1.3.2Test chemical resistance of concrete samples with integral waterproofing. Immerse samples in sulfuric acid and weigh daily.
1.3.3The compressive strength of concrete mixes cast with integral water proofing should be 10% stronger than the regular concrete mix without admixtures. Comply with ASTM C 39/C 39M after 28 days for testing procedures.
1.3.4Use permanently watertight Hydrophilic integral waterproofing system compliant to the following performance requirements:

1.3.4.1 Compressive Strength, 28 day (ASTM C39/C 39M); equal to and up to 8% increase.

1.3.4.2 Water permeability, CRD C48-92; > 70% reduction.

1.3.4.3 Capillary absorption, ASTM C-1585; > 40% reduction

1.3.4.4 Drying Shrinkage performance shall be compliant to testing results of ASTM C157 or equivalent.

1.3.4.5 Resistance to Chloride penetration, ASTM C1202; 10% improvement

1.3.4.6 Materia shall be self-sealing as certified by independent testing; capable of treating concrete for cracks with width of 0.5mm or greater.

1.3.4.7 Sulphate resistance, ASTM C1012; .33% improvement in 6 months

1.3.4.8 Length change, ASTM C-157, up to 20% reduction

1.3.4.9 Capillary absorption, ASTM C-1585; > 40% reduction

1.3.4.10 NSF International — NSF61 Potable water approval

1.3.4.11 Corrected 30 Minute Water Absorption, Age at Test 7 Days (BS 1881-122): Not greater than 1.0%.

1.4 SUBMITTALS

1.4.1PRODUCT APPROVAL ATTACHMENTS

1.4.1.1 Product data including manufacturer's written instructions for evaluating, preparing and treating substrate, technical data, and tested physical and performance properties of waterproofing.

1.4.1.2 Submit all material safety data sheets of products intended for the project.

1.4.1.3 Submit product test reports from qualified independent testing agency.
1.4.1.4 Field quality control reports or project references.

1.4.2EXECUTION APPROVAL ATTACHMENTS
1.4.3Detailed Work methodology

1.5 QUALITY ASSURANCE
1.5.1Only engage experienced installers and applicators with experience in completing integral waterproofing work of similar size and scope of the project.
1.5.2Obtain integral waterproofing materials from one same bonafide manufacturer. Make sure that all waterproofing products used are compatible as certified by the manufacturer.

1.6 WARRANTIES
Manufacturer to submit a certification guaranteeing a five (5) year warranty.

2. PART 2 PRODUCTS

2.1.1HYDROPHILIC INTEGRAL WATERPROOFING
2.1.1.1 Minimum cement content of concrete mix with integral waterproofing shall be 350kg/ cu.m.
2.1.1.2 Concrete shall contain high range reducer such that free water-cement ratio shall not exceed 0.45 to ensure concrete workability for placement.
2.1.1.3 When subjected to sulfuric acid tests, use 5% sulfuric acid exposed for 70 days. Minimum weight loss for concrete shall be 20% less the original weight.
2.1.1.4 Concrete shall contain any admixture to comply with absorption requirements resulting to water-repellency for at least 15 years, without detrimentally affecting the structural strength and properties of the concrete.
2.1.1.5 When including slump-retaining Superplasticizer as admixture for the purposes of reducing batching water requirements, superplasticizers shall be sourced from acceptable manufacturers and shall comply with ASTM C494, Type F.
2.1.1.6 When using evaporation retardant, curing compound, water stops, polypropylene fiber reinforcement, and similar accessories, obtain materials that are compatible to the approved waterproofing cementitious material. Follow recommendations of approved manufacturer.
2.1.1.7 Dosage of the waterproofing admixture shall be at 2% by mass of all cementitious content of the concrete up to a maximum of 8kg/m3 (13.5 lb. / cu. yd.).

3. PART 3 EXECUTION

3.1 APPLICATION
Comply with recommendation of the manufacturer.

3.2 EXAMINATION
Check that site conditions are ready for concrete pouring. Coordinate with manufacturer for pre-inspection schedule. Acquire certification from the manufacturer that site conditions are acceptable for placement.
For mixing, transporting and placing concrete under conditions of high temperature or low temperature, follow concrete practices as referred to in ACI 305R-10 (Hot Weather Concreting) and ACI 306R-10 (Cold Weather Concreting) respectively. For flatwork being placed in either hot, dry or windy conditions, surface humidity must be maintained by fogging or use of monomolecular film (evaporation retardant). Shotcrete walls must be water cured following the procedures in ACI 308 or treated with a curing compound conforming to ASTM C309.

3.3 PREPARATION
Conduct trial mixes to determine workability, setting times, and strength.

3.4 CONCRETE PLACING
3.4.1Comply with COSH safety requirements as well as other regulations for health and safety. Comply with manufacturer's instructions as stated on the material safety data sheet provided by the manufacturer.

3.4.2Place, consolidate and cure concrete in compliance with ACI 301, ACI 305, ACI 306, ACI 308 and ACI 309. Install water stop system components in compliance with the drawings

3.5 FIELD QUALITY CONTROL
Comply with manufacturer's requirements.

3.6 CURING AND PROTECTION
Protect installed work from damage due to subsequent construction activity on the site. Follow ACI 308 curing guidelines. Apply evaporation retardant on flatwork. Where wet curing is not possible, apply curing compound following ASTM C309. Apply curing compound immediately to finished or stripped surfaces.

END OF SECTION

07 00 00	DIVISION 7 THERMAL AND MOISTURE PROTECTION	
07 19 3	Polyethylene Sheet Damp-proofing/ Vapor Barrier	

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1Technical Architectural Drawings
1.1.2Specifications
1.1.3Requests for Interpretation
1.1.4Product Samples and Brochures
1.1.5Manufacturer's Data Sheets and Certificates
1.1.6Material Safety Data Sheets
1.1.7Work Program and Methodology Submittals

1.2 SUMMARY

This section includes provision on polyethylene sheets used to serve as damp-proofing/ vapor-barrier work under all floor and stair slabs in contact with the ground.

1.3 RELATED SECTIONS

1.3.1Architectural Concrete
1.3.2Concrete Finishes

1.4 GENERAL PROVISION

1.4.1Verify with structural specifications. Ensure that polyethylene barriers do not compromise the structural strength of concrete.

1.5 SUBMITTALS

1.5.1PRODUCT APPROVAL ATTACHMENTS
1.5.2Submit product samples of damp roofing polyethylene sheets not less than 1000 mm X 600 mm long, showing the 600mm overlap on one side as required. Properly label samples. Indicate grade and brand of damp roofing material.
1.5.3Submit product data on adhesives used for overlap. Submit brand, label, and manufacturer's instructions for storage and application.

1.5.4EXECUTION APPROVAL ATTACHMENTS
1.5.5Submit detailed work methodology. Clearly state the required overlap

1.6 QUALITY ASSURANCE

1.6.1Obtain all materials for damp-roofing and waterproofing from a single source at all times, unless otherwise recommended by manufacturer.
1.6.2Only engage installers with relevant experience in installing damp roofing materials, to a size and scope similar to that of the project.

2. PART 2 PRODUCTS

2.1 ADHESIVE AND MISCELLANEOUS MATERIALS

Use adhesive compounds as recommended by the manufacturer for bonding to substrate and overlaps, for sealing of seams in membrane, and for sealing of joints between membrane and flashings, adjoining surfaces and projections through membrane.

When using Plastic Cement, comply with ASTM D4586, Type 1. Sand shall comply with ASTM C 144 or ASTM C897.

2.2 POLYETHYLENE SHEET DAMPROOFING

Use chlorinated polyethylene formed into uniform flexible sheets, plain, 0.008-inch thick, compliant to ASTM C171.

3. PART 3 EXECUTION

3.1 PREPARATION AND EXAMINATION

3.1.1Check and comply with manufacturer's instructions on surface preparation requirements.
3.1.2Conduct an on-site pre-conference with installer and manufacturer representatives to check for work details, material selections, and site conditions, whether or not conditions are appropriate for performing work.

3.2 INSTALLATION

3.2.1Check and comply with manufacturer's instructions on installation.
3.2.2Schedule all installation work in the best possible time to optimize a timely construction schedule.
3.2.3When maximum length of the sheet is not enough for the work surface area, overlay a second sheet length. Provide minimum 300mm overlap at edges of polyethylene sheets. Fill overlap with adhesives at the full length.
3.2.4Extend sheets beyond flashings or at perpendicular surfaces, such as walls to provide complete coverage. Seal overlapping edges with adhesive. Bond to both vertical and horizontal surfaces, or as manufacturer shall recommend.
3.2.5Where pipes, and other permanent penetrations and punctures are necessary, seal damp proofing sheets around punctures with adhesives and tapes.

3.3 CLEANING AND PROTECTION

Neatly remove all excess laps, remove masking materials, and clean all stains on exposed surfaces as caused by installation work.

Do not allow any traffic on unprotected installed membranes and stored membrane materials.

END OF SECTION

07 00 00	DIVISION 7 THERMAL AND MOISTURE PROTECTION
07 55 3	Building Insulation

1. **PART 1 GENERAL**

1.1 RELATED DOCUMENTS

1.1.1Technical Architectural Drawings
1.1.2Specifications
1.1.3Requests for Interpretation
1.1.4Product Samples and Brochures
1.1.5Manufacturer's Data Sheets and Certificates
1.1.6Material Safety Data Sheets
1.1.7Work Program and Methodology Submittals

1.2 SUMMARY

This section includes provisions for both thermal and acoustic insulation materials installed in the following areas:
1.2.1Mechanical Equipment areas to disperse excess noise
1.2.2Thermal Insulation under Sheet Metal Roofing

1.3 RELATED SECTIONS

1.3.1Sheet Metal Roofing

1.4 GENERAL PROVISION

1.4.1Refer to Technical Working Drawings to identify areas of application.
1.4.2For Thermal Insulation Material under Metal Sheet Roofing, install insulation on all surface areas beneath the Sheet Metal Roofing, where specified by the architect. See products in this section for descriptions on insulating material. All insulating materials installed under sheet metal roofing shall be supported with a 10mm square welded wire mesh, primed and painted according to provisions in Division 9 Interior and Exterior Painting Sections. Comply with color and paint finish as specified by the architect.
1.4.3For Mechanical Equipment areas, use ASTM E-84, Class A, non-combustible, fire retardant wool with aluminum foil on one side, mounted and supported by Metal Furring Assemblies and/or built up steel assemblies using, with facing material 10mm square welded wire mesh, primed and painted. Comply with Division 9 Interior and Exterior Painting Sections. Comply with color and paint finish as specified by the architect.
1.4.4Test acoustical installations for machine and equipment areas. Ensure that when all acoustical installations in place, no point outside the mechanical equipment room that is subject to work conditions requiring focus shall receive noise levels higher than 80db at a time when all mechanical equipment installed are running.
1.4.5Do not use Spray-Applied Insulation unless otherwise approved. If approved, do not apply spray insulation until all installation of pipes, ducts, conduits, and other similar openings are completed. Do not seal or obstruct such similar openings with spray-applied insulation.
1.4.6Do not block necessary openings such as pipes, ducts, conduits, wirings, windows, and similar items.

1.5 MAINTENANCE

1.5.1Upon delivery on site, protect insulation materials from physical damage. Store away from wet areas or areas with high moisture content. Comply with manufacturer's instructions on handling and storing.

1.6 SUBMITTALS

1.6.1PRODUCT APPROVAL ATTACHMENTS
1.6.2Material and Safety Data Sheets for all Insulating Materials
1.6.3Technical Data Sheets for all Insulating Materials
1.6.4Product Sample 300mm x 300mm for each insulating material.
1.6.5Manufacturer's written installation, maintenance, storage, and protection instructions.

1.6.6EXECUTION APPROVAL ATTACHMENTS

1.6.6.1 Submit detailed work installation methodology.
1.6.6.2 Submit scaled and detailed shop drawings for all installation strategies, especially fastening, welding points, spacing of furring, etc.

1.7 QUALITY ASSURANCE

1.7.1Provide insulation materials compliant to UL Testing, or other testing and inspecting agency acceptable to authorities.
1.7.2Surface Burning characteristics of the insulating material shall be compliant with ASTM E 84, such that:
1.7.2.1 Class A Flame Spread shall be at 0-25; smoke-developed 0-450
1.7.2.2 Class B Flame Spread shall be at 26-75; smoke-developed 0-450
1.7.2.3 Class C Flame Spread shall be 76-200; smoke-developed 0-450

1.7.3Fire resistance rating of the material shall comply with ASTM E 119.
1.7.4Combustion characteristics of the material shall comply with ASTM E 136.

1.8 WARRANTIES

Insulation items shall be entitled to at least one (1) year warranty.

2. **PART 2 PRODUCTS**

2.1 INSULATION MATERIALS

2.1.1INSULATION FASTENERS
2.1.1.1 Use Self Adhesive Aluminum Foil Tapes complying with recommendations by the manufacturer of the approved insulating material. Minimum width of tape shall be 75mm to ensure proper fastening. Holding power shall be 1,50+Min in compliance to test method PSTC-7. Peel adhesion shall be at 20N/25mm in compliance to PSTC-1 test methods.
2.1.1.2 For metal assemblies, comply with metal fasteners as specified in the metal fabrication section.

2.1.2MINERAL WOOL
2.1.2.1 Use ASTM E-84, Class A, non-combustible, fire retardant wool with aluminum foil on one side.
2.1.2.2 Encase mineral wool in Metal Furring Assemblies and/or built up steel assemblies with one or two faces using 10mm square welded wire mesh, primed and painted. Comply with metal fabrications division of this specifications.
2.1.2.3 Aluminum on foil side shall be foil-scrim-kraft or foil-scrim-polyethylene vapor retarder with maximum flame spread of 25 and smoke development index of 5.

2.1.3THERMAL INSULATION FOR SHEET METAL ROOFING UNDERSLAB
2.1.3.1 Use fire-resistant Aluminum Foil Scrim Kraft Paper with three-way fiberglass scrim; actual thickness 150 microns or 85 gsm, 1200mm X 120,000mm in standard length (one roll); silver color.
2.1.3.2 Minimum reflectivity of the surface material shall be 95%.
2.1.3.3 Burst strength of insulation material shall at least be 30N/cm2, compliant with ASTM D774.
2.1.3.4 Temperature resistance shall be compliant with ASTM C1263.
2.1.3.5 Water Vapor Permeability shall be at 5.75/N.s
2.1.3.6 Tensile strength of material shall be MD-130N/25mm or XD-50N/25mm compliant with ASTM D828.
2.1.3.7 Install using a metal-assembly of angle bars, flat bars, and 10mm square welded wire mesh, primed and painted in dimensions as recommended by the manufacturer and approved by the architect.

3. **PART 3 EXECUTION**

3.1 PREPARATION AND EXAMINATION

3.1.1Obtain installer's requirements and conditions for installations. Check that area to receive installation is ready to receive insulation work. Together with installer, inspect that all bolts, anchors, and fasteners for sheet metal roofing are stable and ready to receive work.
3.1.2For wool and metal assemblies for thermal and acoustic insulation in mechanical equipment areas, check that the installation schedule shall not disrupt critical schedules of testing and other construction work.

3.2 INSTALLATION

3.2.1Comply with the installation requirements and instructions by the manufacturer of approved material insulation.
3.2.2Do not pierce or cut through insulation material aluminum facing. When faces are accidentally cut, replace damaged sheets.
3.2.3Single-layer installation of insulation sheets is acceptable provided installed work is free of tears and damages.
3.2.4Do not install torn insulation sheets.
3.2.5For mineral wool, ensure that the wool density is sufficient to absorb above level acoustic noise. Comply with ASTM C 1015 and manufacturer's written instructions.
3.2.6Separately prime and paint metal assemblies prior to installation of insulation whether under sheet metal roofing or on horizontal and vertical surfaces of rooms with mechanical equipment. Comply with Division 9 Interior Paints Section of this specifications for painting requirements. Only paint touch ups are allowable upon installation.
3.2.7Do not smear finishing paint on insulation material. Completed insulation installation shall be clean, and free of smears and other unwanted smudges. Restore all affected insulation sheets as needed.
3.2.8All metal assemblies supporting insulation shall be primed with red oxide, and non-gloss painted elastomeric paint, black color unless otherwise indicated on drawings and approved by architect. Comply with paint division of this specifications.
3.2.9All metal assemblies supporting insulation work shall be fabricated according to approved shop drawings.
3.2.10 When using mineral wool, do not place insulation assemblies near lighting fixtures and other electrical equipment not fire rated or protected from contact with insulation material.
3.2.11 All aluminum facing shall be set placed towards areas of high humidity.
3.2.12 Where there are openings such as windows, access panels, duct ends, electrical devices and boxes, ducts, air registers, and any such similar openings, neatly cut the insulation sheets such that these openings are not obstructed and are able to function, Show all opening locations on shop drawings. Neatly seal by manufacturer-approved adhesive tape the cut insulation sheets to ensure adhesion to nearby surfaces. Maintain visual neatness of installation.

3.3 PROTECTION

Protect installed insulation from weather exposure and other construction work that exposes it to damages. Schedule insulation installation work such that no critical construction work conflicts with its installation.

END OF SECTION

07 00 00	DIVISION 7 THERMAL AND MOISTURE PROTECTION
07 60 00	Sheet Metal Roofing

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1Technical Architectural Drawings
1.1.2Specifications
1.1.3Requests for Interpretation
1.1.4Product Samples and Brochures
1.1.5Manufacturer's Data Sheets and Certificates
1.1.6Material Safety Data Sheets
1.1.7Work Program and Methodology Submittals

1.2 SUMMARY

This section includes provisions on Sheet Metal Roofing, where indicated by the architect as referenced in the technical working drawings.

1.3 RELATED SECTIONS

1.3.1Metal Fabrications
1.3.2Exterior Painting

1.4 GENERAL PROVISION

1.4.1Only use pre-painted metal sheet and roofing accessories fabricated from cold rolled galvanized iron sheets tempered for extra strength and durability; compliant with PNS 67:2014 Hot-dip Metallic-Coated Steel Sheets for Roofing.
1.4.2Coordinate with structural designer to comply with purlin spacing requirements by manufacturer.
1.4.3Comply with ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
1.4.4Length of sheets shall be long span, cut to lengths approved by the architect. Comply with special lengths for roof span exceeding 18000mm. Sheet metal roofing shall be homogenous when possible.
1.4.5Comply with profiles, thickness, and desired colors as approved by the architect.
Utilize Gauge Designation as follows:

1.4.5.1 BASE METAL THICKNESS, DESIGNATED GAUGE
1.4.5.1.1 0.400 mm thick, Gauge 28
1.4.5.1.2 0.500 mm thick, Gauge 26
1.4.5.1.3 0.600 mm thick, Gauge 24
1.4.5.1.4 0.800 mm thick, Gauge 22

1.4.5.2 PROTECTIVE COATINGS, THICKNESS
1.4.5.2.1 Zinc shall be minimum14 microns, (100 gm/ni)
1.4.5.2.2 Paint coatings Top coat shall be 15.20 microns thick
1.4.5.2.3 Paint coatings Bottom coat shall be 6.8 microns thick

1.4.5.3 BASE METAL THICKNESS, OVERALL THICKNESS WITH PROTECTIVE COATS
1.4.5.4 0.400 mm, with thickness 0.427-451 mm
1.4.5.5 0.500 mm, with thickness 0.532-551 mm
1.4.5.6 0.600 mm, with thickness 0.638-651 mm

1.5 MAINTENANCE

Protect paint and galvanized coating of sheets via proper handling.

1.6 SUBMITTALS

1.6.1PRODUCT APPROVAL ATTACHMENTS
1.6.1.1 Submit all product data sheets, material safety data sheets, and technical specifications.
1.6.1.2 Submit all product and manufacturer certificates.
1.6.1.3 Submit Product samples at 300mm x 300 mm of each sheet metal material
1.6.1.4 Submit Manufacturer's written instructions for handling, installation, and cleaning.

1.6.2EXECUTION APPROVAL ATTACHMENTS
1.6.3Detailed work methodology
1.6.4Shop drawings, namely roof plan indicating boundaries and location of finish area and detailed drawings of connections for rolls, ridges, hips and valleys, gutters, and other special connections as required to complete roofing installation and as indicated in technical working drawings. Show purlin distances, riveting details and/or any applicable fastening method. Submit these drawings to both architectural and structural consultants.

1.7 QUALITY ASSURANCE
1.7.1Only engage installers with specific training experience in installing sheet metal roofing works.
1.7.2Installers shall be supervised by the manufacturer's technical representative.
1.7.3Only source material from one manufacturer to ensure uniform application. Coordinate construction schedules properly to ensure timely completion.
1.7.4Only source materials from tried and tested manufacturers with minimum of five year satisfactory performance in the field of roofing systems.
1.7.5Metal roof panel systems shall have no water leakage tested compliant to ASTM E1646.
1.7.6All sheet panels shall be designed such that it is capable of supporting 140kgs temporary concentrated loads at mid-span in installed conditions, unless otherwise specified by the structural designer.

1.8 WARRANTIES
1.8.1Warranty period by manufacturer shall at least be two (2) years from Substantial Date of Completion.

2. PART 2 PRODUCTS

2.1 METAL ROOF PANELS
2.1.1Use Rib-Type, standard nominal dimensions, seam type, and thickness by manufacturer as specified and approved by architect.
2.1.2Base metal type shall be Galvalume steel sheet, G90, conforming to ASTM A653, Galvalume steel sheet AZ50, conforming to ASTM A792 for painted and unpainted panels, Galvalume steel sheet AZ55, conforming to ASTM A792 for unpainted panels.
2.1.3Texture of surfaces shall be smooth. Follow finish on sample approved by architect.
2.1.4Color Fading shall not be more than 5 Hunter, tested according to ASTM D 2244.
2.1.5Chalking shall not be in excess of a No.8 rating, tested according to ASTM D 4214.
2.1.6Solar Reflectance Index shall be calculated according to ASTM E 1980.
2.1.7Fire Classification shall be Class A-90.

2.2 ACCESSORIES AND FASTENERS
2.2.1Color and material of all accessories and fasteners shall be uniform to that of approved sample.
2.2.2Use Rubber-Asphalt sealing compound, compliant to CAN/CGSB-37.29.
2.2.3Cleats shall be of same material and temper sheet metal, minimum 50mm wide with thickness or gauge as approved/ indicated by the architect in the technical working drawings.
2.2.4Conceal all fasteners, unless otherwise indicated or approved by the architect.

2.3 LONG SPAN ROOFING (CRIMP LOK SYSTEM)
This item is specified particularly for continuous roofing with a span beyond 18M, unless otherwise specified by the architect.
2.3.1Base metal type shall be Cold Rolled Steel; 275 MPa or 40,000 psi.
2.3.2Substrates shall be Galvalume 55, Aluminum-Zinc Alloy-coated steel complying with ISO 9364.
2.3.3Paint coating shall be oven-baked epoxy primer and regular polyester finish.

2.3.4Top coating shall be 25 microns thick.
2.3.5Finish coating shall be 20 microns thick.
2.3.6Primer coat shall be 5 microns thick
2.3.7Bottom coat shall be a total of 10 microns, composed of backing coat at 5 microns and primer coat at 5 microns.
2.3.8Total thickness of metal sheet shall be from 0.40mm to 0.60mm, using a seam lock process of 180 degrees.
2.3.9Metal sheet shall withstand Salt Spray Test with a Class 1000 rating as per PNS 201:1990.
2.3.10 Texture of surfaces shall be smooth. Follow finish on sample approved by architect.

3. PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION
Engage a technical representative from the manufacturer of the approved product to check actual site conditions, whether compliant to manufacturer's prerequisites for installation. Conduct a pre-installation on-site conference and product inspection.

3.2 INSTALLATION
3.2.1Follow approved shop drawings for spacing of cleats, alignment of panels, flashing details, and other drawing indications.
3.2.2No cleat shall be spaced beyond 600mm apart measured on center.
3.2.3Form all seams in direction of the water-flow.
3.2.4Ensure water tightness of all seams.
3.2.5Begin installation of metal panels at the eaves, or at the lowest slope point of the roofing. Loose lock pans to valley flashing and edge strips at eaves and gable rakes.
3.2.6Observe lap requirements by manufacturer.
3.2.7Form valleys of sheets not exceeding 3 m in length. Lap joints 150 mm in direction of flow. Extend valley sheet minimum 150 mm under roofing sheets. At valley line, double fold valley and roofing sheets and secure with cleats spaced 450 mm oc.

END OF SECTION

07 00 00	DIVISION 7 THERMAL AND MOISTURE PROTECTION	
07 92 0	Joint Sealants	

1. **PART 1 GENERAL**

1.1 RELATED DOCUMENTS

1.1.1Technical Architectural Drawings
1.1.2Specifications
1.1.3Requests for Interpretation
1.1.4Product Samples and Brochures
1.1.5Manufacturer's Data Sheets and Certificates
1.1.6Material Safety Data Sheets
1.1.7Work Program and Methodology Submittals

1.2 SUMMARY

1.2.1This section includes provisions on joint work in the following areas:
1.2.1.1 Exterior and interior joints between all fenestration frames, i.e. louvers, doors, windows, skylights, and similar fenestration components and wall masonry.
1.2.1.2 Exterior and interior joints for concrete pavement and flooring.
1.2.1.3 Exterior and interior joints for unit pavers and pre-cast concrete curbs.

1.3 RELATED SECTIONS

1.3.1Architectural Concrete

1.4 GENERAL PROVISION

1.4.1Use airtight and watertight elastomeric joint sealants.
1.4.2Provide joint sealants where indicated on technical working drawings and in standard areas for joint sealing, unless otherwise specified by the architect.
1.4.3Unless otherwise indicated on drawings, joint sealers shall match the color and type of the adjacent finish.
1.4.4Do not install joint sealers in ambient and substrate temperatures not within the recommendations of the manufacturer. Do not install joint sealers when substrates are wet due to rain or other condensation.
1.4.5Remove all contaminants on the substrate that affect the adhesion of joint sealers.
1.4.6Comply with manufacturer's requirements on required width of joints for accepting joint sealers.
1.4.7Install all joint sealers within 21 to 30 days from completion of waterproofing work.
1.4.8Provide fire-resistant joint sealers in areas prone to combustive behavior, namely utility areas, electrical rooms, and service chutes.
1.4.9Where applicable, bond breaker tapes shall be utilized to prevent adhesion to rigid surfaces that can cause sealant failure.
1.4.10 Use non-staining absorbent type masking tapes compatible with joint sealant surfaces.

1.5 MAINTENANCE, DELIVERY, STORAGE, AND HANDLING

1.5.1Deliver all joint sealing products in sealed containers, complete with labels and instructions. Containers with tampered seals shall not be accepted.
1.5.2Comply with manufacturer's instructions for proper storage of all joint sealing materials.
1.5.3Ensure that cleaners use chemical cleaners of type and make compatible to the joint sealant used.

1.6 SUBMITTALS

1.6.1PRODUCT APPROVAL ATTACHMENTS
1.6.1.1 Submit samples of all joint sealers in exposed areas. Ensure that the color of the joint sealer is approved by the Architect. Indicate area of application on the sample submittal. Include a list of alternative colors as provided by the manufacturer.
1.6.1.2 Submit product data for all joint sealer products required. Include technical data and material safety data sheets, indicating proper methods for storage and application.

1.6.1.3 Copies of product warranties.

1.6.2EXECUTION APPROVAL ATTACHMENTS
1.6.2.1 Detailed work methodology indicating date and time of application.

1.7 WARRANTIES

Warranties shall not cover damages due to structural movements, such as settlement. However, all joint sealers are expected to be of quality and shall not showing any marks of disintegration for at least 5 years from the date of the Substantial Completion of the project.

2. **PART 2 PRODUCTS**

2.1 GENERAL MATERIALS

2.1.1Ensure that all joint sealers, fillers, and related materials are compatible with joint substrates and waterproofing materials. Check manufacturer's recommendations and comply with instructions on proper handling of materials.
2.1.2For liquid-applied Elastomeric Sealants, comply with ASTM C 920.
2.1.3Elastomeric sealants in areas continually exposed to water shall comply with ASTM C 1247.
2.1.4Elastomeric sealants in areas continually exposed or in contact with food shall comply with 21 CFR 177.2600.
2.1.5All sealants shall be UV resistant, non-chalking, non-staining, non-yellowing, self-cleaning, dirt pick resistant, and chemical resistant.
2.1.6For seals required in toilets and kitchens, i.e. sanitary seals, control and expansion joints, joints between mirrored glass and plywood backing, joints between stone countertops, and other joints required in sanitary areas, use mildew-resistant silicon sealant, formulated with fungicide and algaecide, and shall be intended for sealing interior joints with non-porous substrates.
2.1.7For sealing vertical joints on exposed surfaces in interior applications, i.e. interior unit masonry, concrete walls and partitions, joints between glazed aluminum frames and masonry at interiors interior steel door frames, masonry termination, ensure that joint sealers are paintable, with fungicide and algaecide. Sealers shall be capable of withstanding movement at +/-50 and shall be compliant to ASTM C 719.
2.1.8Use acoustical sealants for concealed joints where needed. Acoustical sealants shall be non-drying, non-hardening, non-skinning, non-staining, and gunnable.
2.1.9Where compression seals are necessary, use pre-formed Hollow Neoprene Gaskets. Comply with ASTM D 2628.
2.1.10 Fire resistant joint sealers where needed shall be compliant to ASTM E 814 and considered acceptable by the inspecting agency of the locality where the project is located.

3. **PART 3 EXECUTION**

3.1 EXAMINATION AND PREPARATION

3.1.1Examine that indicated areas of application are compliant to the manufacturer's conditions.
3.1.2Comply with manufacturer's requirements on surface area preparations of areas to receive joint sealers.
3.1.3Remove all foreign material affecting adhesion of joint sealers to indicated area of application.
3.1.4Clean receiving areas by brushing, grinding, blast cleaning, and other methods necessary to remove loose particles.
3.1.5Remove all forms of laitance.
3.1.6Use appropriate chemical cleaners for surfaces such as metal, glass, porcelain enamel. Glazed ceramic, and other similar non-porous surfaces. Ensure that chemical cleaners are compatible with both the receiving area and the joint sealers.
3.1.7Prime joint substrates where recommended by manufacturer.
3.1.8Use masking tape where needed to prevent unwanted contact of sealant onto adjoining surfaces. Carefully remove making tapes after tooling. Take care to keep applied joint seals undisturbed.

3.2 INSTALLATION OF SEALERS

3.2.1Comply with manufacturer's instructions to applicable products and areas of application.
3.2.2Comply with recommendations of ASTM C 962 for use of joint sealants as applicable.
3.2.3For Acoustical Sealants, comply with recommendations of ASTM C 919 as applicable.