

- 2.1.1.6 When using Silica Fume, comply with ASTM C 1240 with optional chemical and physical requirements;
- 2.1.1.7 When using coloring admixtures, comply with ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures. Use non-fading color admixture. Check stable temperature.
- 2.1.1.8 Ensure that chemical admixtures are certified by manufacturers as compliant and compatible with other admixtures. Components of admixtures cannot contain calcium chloride or more than 0.15% chloride ions or other salts by weight of admixture.
- 2.1.1.9 When using water-reducing admixture, comply with ASTM C 494 / C 494M, Type A.
- 2.1.1.10 When using, Retarding Admixture, comply with ASTM C 494 / C 494M, Type B.
- 2.1.1.11 When using, Water-Reducing and Retarding Admixture, comply with ASTM C 494 / C 494M, Type D.
- 2.1.1.12 When using, Water-Reducing and Accelerating Admixture, comply with ASTM C 494 / C 494M, Type E.
- 2.1.1.13 When using, High-Range, Water-Reducing Admixture, comply with ASTM C 494 / C 494M, Type F.
- 2.1.1.14 When using, High-Range, Water-Reducing and Retarding Admixture, comply with ASTM C 494 / C 494M, Type G.
- 2.1.1.15 When using plasticizing Admixture to increase plasticity of concrete, comply with ASTM C 1017 / C 1017M.
- 2.1.2AGGREGATES
- 2.1.2.1 Source aggregates from a uniform supplier or ensure that the quality of aggregates for use are consistent and in accordance with specifications.
- 2.1.2.2 Comply with PCI MNL 117, ASTM C 33, for normal weight coarse aggregates Class 55 requirements. Provide and stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
- 2.1.2.3 Check that selected coarse aggregates are hard, durable, free of material that reacts with cement or causes staining; to match selected finish sample.
- 2.1.2.4 Check that selected fine Aggregates, natural, or manufactured sand are of a material compatible with coarse aggregate selected to match selected sample finish.
- 2.1.2.5 Check that backup concrete aggregates comply with ASTM C 33 or C 330.
- 2.1.2.6 Comply with PCI MNL 117, ASTM C 330, for light weight aggregates. Check that absorption less than 11%.
- 2.1.3WATER
- Use potable water free from any deleterious materials affecting color stability, setting, durability or strength of concrete. Check that the resulting concrete will comply with ASTM C 1602 / C 1602M within chemical limits of PCI MNL 117.
- 2.1.4STEEL, PLATES, ANGLES, ANCHORS, AND EMBEDMENTS
- 2.1.4.1 When using Carbon-Steel Shapes and Plates, comply with ASTM A 36 / A 36M.
- 2.1.4.2 When using Carbon-Steel Headed Studs, comply with ASTM A 108, Grades 1010 through 1020, cold finished.
- AWS D1.1 / D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 117, Table 3.2.3.
- 2.1.4.3 When using Carbon-Steel Plate, comply with ASTM A 283 / A 283M.
- 2.1.4.4 When using Malleable Iron Castings, comply with ASTM A 47 / A 47M, Grade 32510 or 35028.
- 2.1.4.5 When using Carbon-Steel Castings, comply with ASTM A 27 / A 27M, Grade 60-30 (Grade 415-205).
- 2.1.4.6 When using High-Strength, Low-Alloy Structural Steel, comply with ASTM A 572 / A 572M.
- 2.1.4.7 When using Carbon-Steel Structural Tubing, comply with ASTM A 500, Grade B or C.
- 2.1.4.8 When using Wrought Carbon-Steel Bars, comply with ASTM A 675 / A 675M, Grade 65 (Grade 450).
- 2.1.4.9 When using Deformed-Steel Wire or Bar Anchors, comply with ASTM A 496 or ASTM A 706 / A 706M.
- 2.1.4.10 When using Carbon-Steel Bolts and Studs, comply with ASTM A 307, Grade A or C (ASTM F 568M, Property Class 4.6) carbon-steel, hex-head bolts and studs, carbon-steel nuts (ASTM A 563 / A 563M, Grade A); and flat, unhardened steel washers (ASTM F 844).
- 2.1.4.11 When using Studs, include stud stock and threaded bolts.
- 2.1.4.12 When using High-Strength Bolts and Nuts, comply with ASTM A 325 / A 325M or ASTM A 490 / A 490M, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel units, (ASTM A 563 / A 563M) and hardened carbon-steel washers (ASTM F 436 / F 436M). Use high-strength bolts for friction-type connections between steel members. Do not use galvanized bolts between steel and concrete to avoid concrete creep and crushing. As per ASTM A 490 / A 490M do not use galvanized bolts.
- 2.1.4.13 Non-galvanized steel items shall be of Shop-Primed Finish, except those surfaces to be embedded in concrete and as such shall comply according to requirements in Steel Structures Painting Council, Surface Preparation SSPC-SF3 and shop-apply lead-and-chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 according to SSPC-PA 1.

- 2.1.4.14 When using Zinc-Coated Finish for steel items in exterior walls and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123 / A 123M, after fabrication, ASTM A / A 153M, or ASTM F 2329 as applicable or electro-deposition according to ASTM B 633, SC 3, Type 1 and 2 and F 1941 and F 1941M.
- 2.1.4.15 For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03% or to between 0.15 and 0.25% or limit sum of silicon content and 2.5 times phosphorous content to 0.09%.
- 2.1.4.16 Galvanizing Repair Paint: High zinc-dust-content paint with dry film containing not less than 94% zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20. Comply with manufacturer's requirements for surface preparation.

2.1.5 CONCRETE MIX

2.1.5.1 READY-MIX CONCRETE

- 2.1.5.1.1 The Contractor is solely responsible for amount of water added and resulting strength of concrete. If concrete strength does not conform to 28 day compressive strength requirements, it shall be removed and replaced at no cost.
- 2.1.5.1.2 Comply with requirements of ASTM C94, with the following exceptions:
 - 2.1.5.1.2.1 During hot or cold weather conditions affecting the compressive strength of the concrete upon the 28th day of curing, only add or remove water to the mix with the approval of the structural designers and engineers.
 - 2.1.5.1.2.2 When air temperature is between 85o F and 90oF, reduce mixing and delivery time from 90 to 75 minutes.
 - 2.1.5.1.2.3 When air temperature is above 90oF, reduce mixing and delivery time to 60 minutes.

2.1.5.2 DESIGN CONCRETE MIXES

- 2.1.5.2.1 Provide normal weight concrete with the following properties, as indicated on applicable details:
 - 5,000 psi 28-day compressive strength. (Type II Cement).
 - 4,000 psi 28-day compressive strength. (Type II Cement).
 - 3,000 psi 28-day compressive strength. (Type II Cement).
- 2.1.5.2.2 For Slump Limits, proportion and design mixes to result in concrete slump at point of placement as follows:
 - Reinforced foundation systems and treatment tanks — Not less than 1 inch or more than 4 inches.
 - Concrete with high range water reducing admixtures — Not more than 8 inches.
 - Ramps and sloping surfaces — Not more than 4 inches.
 - Slabs and floors — Not less than 1 inch and not more than 3 inches.
 - Miscellaneous Concrete — Not less than 1 inch and not more than 4 inches.
- 2.1.5.2.3 The maximum permissible water-cement ratio will be as follows:
 - 5,000 psi concrete — maximum water/cement = 0.40
 - 4,000 psi concrete — maximum water/cement = 0.45
 - 3,000 psi concrete — maximum water/cement = 0.50
- 2.1.5.2.4 The minimum cement content utilized for the concrete mix design shall be as follows:
 - 5,000 psi concrete — 715 pounds per cubic yard.
 - 4,000 psi concrete — 611 pounds per cubic yard.
 - 3,000 psi concrete — 564 pounds per cubic yard.

2.1.6 GROUT MATERIALS

- 2.1.6.1 When using sand-cement grout, use Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement.
- 2.1.6.2 When using non-metallic, non-shrink grout, use pre-mixed, packaged non-ferrous aggregate, noncorrosive, non-staining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing admixtures, complying with ASTM C 1107, Grade A for dry-pack and Grades B and C for flowable grout and of a consistency suitable for application within a 30-minute working time.
- 2.1.6.3 When using Epoxy-Resin Grout, use two-component mineral-filled epoxy-resin complying with ASTM C 881/ C 881M to suit type, grade, and class requirements as specified.

2.1.7 FORMWORK

- 2.1.7.1 Use standard form materials, i.e. plywood, metal, metal-framed plywood, phenolic boards, and other standard form materials available in the market.
- 2.1.7.2 When curved surfaces are indicated on the technical working drawings, ensure the use of flexible forms or curves.

- 2.1.7.3 All forms must be attached with a commercially formulated form-release agent that does not damage the resulting concrete surface.
- 2.1.7.4 Store formworks to minimize task hazards, i.e. tripping, unnecessary deformation and damages to formworks.
- 2.1.7.5 Provide appropriate bracing to formworks to avoid warping and other deformations detrimental to the quality of the resulting concrete surface.
- 2.1.7.6 Erect formworks systematically and progressively such that it is stable and safe.
- 2.1.7.7 Whether using traditional or modular formwork systems, comply with loadings and general principles of formwork erection according to ACI 347: Guide Formwork for Concrete.
- 2.1.7.8 Use formwork materials and equipment fit for the intended purpose and design of the concrete item being cast.
- 2.1.7.9 Unless otherwise specified by the structural engineer, follow a safety factor of 2.0 in the design and implementation of all formwork accessories, except formwork anchors supporting form weight, concrete pressures, wind loads, construction personnel live loads.
- 2.1.7.10 For formwork supporting form weight, concrete pressures, wind loads, personnel live loads, use Safety Factor 3.0.

3. PART 3 EXECUTION

3.1 MOCK-UPS

- 3.1.1 Construct full-sized mockups to verify selections approved via sample submittals.
- 3.1.2 Build mock-ups in the location and of the size indicated in the technical working drawings.
- 3.1.3 Notify architect in advance to secure mock-up approvals prior to implementation.
- 3.1.4 During construction, maintain mock-ups so as not to incur any damages during construction.
- 3.1.5 Demolish and remove mock-ups if found unacceptable, or if directed by written notice.

3.2 EXAMINATION AND PREPARATION OF WORK AREA

- 3.2.1 Verify that subsurface and field conditions are acceptable and ready to receive work. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- 3.2.2 Verify requirements for concrete cover over reinforcement.
- 3.2.3 Verify that anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete. In case of inconsistencies in drawings, submit a request for clarification.
- 3.2.4 Do not place concrete against surfaces of absorbent materials that are dry.
- 3.2.5 Do not place concrete against surfaces that have free water.
- 3.2.6 Prepare all materials required for accepted evaporation control measures and have them available on site so that specified measures can be executed as needed. Initiate accepted evaporation control measures when concrete and air temperatures, relative humidity of the air, and the wind velocity have the capacity to evaporate water from a free water surface at a rate that is equal to or greater than 1000 sqmm per hour, unless otherwise specified.
- 3.2.7 Inspect and complete formworks, reinforcing steel, and items to be embedded or cast-in-place.
- 3.2.8 Notify other trades to check slope, degrees, and positioning of conduits and other embedment, and secure approval from involved trades prior to casting.
- 3.2.9 Install homogenous vapor barrier under interior slabs on grade. If using multiple sheets, lap joints should be minimum 150 mm and seal with watertight sealant applied between overlapping edges and ends.
- 3.2.10 In case of damaged vapor barriers during casting, repair remaining vapor barrier with 150 mm laps over damaged seal watertight.

3.3 PLACING CONCRETE

3.3.1 GENERAL PROVISIONS

- 3.3.1.1 Place concrete in accordance with ACI 301, ACI 304, ACI 305, ACI 306 and ACI 318.
- 3.3.1.2 Ensure approved reinforcement, inserts, embedded parts, and formed expansion and contraction joints are not disturbed during concrete placement.
- 3.3.1.3 Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken for each structural pour.

divisions for performance requirements of waterproofing membrane for approval. Submit waterproofing material approval prior to commencement of concrete casting for surfaces subject to waterproofing. Allot proper time schedules so as not to affect timely delivery of work.

- 3.4.9 After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven or manual floats. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units.
- 3.4.10 Check and level surface plane to a tolerance not exceeding 5mm in every 1meter, unless otherwise specified on the drawings and the Concrete Finish section of this Division. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. For horizontal surfaces with critical drainage slope requirements, i.e. slab on grade with drainage inlets, roof slabs with roof drainage, canopies, toilets and baths, slab work in exterior corridors, and other surfaces with exposure to wet weather, ensure precision in sloping such that surface water will run-off to the desired direction as indicated on the drawings.
- 3.4.11 For flooring and walls with specific finish plans, verify the wall and floor finish floor plans to check appropriate concrete finish as specified in the Concrete Finishes Section of this specifications and the technical working drawings.

3.5 SURFACE SEALING

Comply with Division 03 Section 03 35 0 Concrete Finishes.

3.6 PROTECTION OF WORK

Protect the concrete against thermal shrinkage cracking due to rapid drops in concrete temperature greater than 22 °C (40 °F) during the first 24 hours unless otherwise specified. Acceptable protection materials to prevent excessive temperature drops are insulating blankets, batt insulation with moisture-proof covering, layers of dry porous material such as straw, hay, or multiple layers of impervious paper meeting ASTM C 171. Do not apply protection materials until the concrete surface temperature has become steady or is beginning to decline.

3.7 CLEANING

- 3.7.1 Comply with Division 01 Section 01 17 10 Final Cleaning.
- 3.7.2 Clean all surfaces of precast concrete to be exposed to view, as necessary, prior to installation.
- 3.7.3 Clean mortar, plaster, fireproofing, weld slag, and any other deleterious material from concrete surfaces and adjacent materials immediately.
- 3.7.4 Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, dirt, stains and other markings.
- 3.7.5 Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect adjacent work from staining or damage due to cleaning operations.
- 3.7.6 Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

3.8 JOINT SEALING

- 3.8.1 Joint sealing between pre-cast concrete and concrete cast-in-place. Separate slabs on grade from vertical surfaces with isolation joint material. Place joint filler in floor slab pattern. Set top to required elevations. Secure to resist movement by wet concrete. Extend joint filler from bottom of slab to within ¼ inch of finished slab surface. Install joint devices in accordance with manufacturer's instructions. Install joint device anchors. Maintain correct position to allow joint cover to be flush with finished surfaces. Install joint covers in longest practical length, when adjacent construction activity is complete.

END OF SECTION

03 00 00	DIVISION 3 CONCRETE	
03 35 0	Concrete Finishes	1 of 4

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

- 1.1.1 Technical Architectural Drawings
- 1.1.2 Specifications
- 1.1.3 Schedule of Finishes
- 1.1.4 Shop Drawings — Tile Layout

1.2 SUMMARY

Refer to this section parallel to the schedule of floor and wall finishes as indicated in the technical working drawings. This section includes concrete finish provisions in preparation of the final finished surfaces of the project.

1.3 RELATED SECTIONS

- 1.3.1 Concrete Pavement
- 1.3.2 Concrete Floor Topping
- 1.3.3 Thermal and Moisture Protection

1.4 GENERAL PROVISION

- 1.4.1 Perform patching, when permitted, in compliance with applicable provisions of the Structural Specifications.
- 1.4.2 Ensure that concrete surface conditions are appropriate and compliant to the requirements of the material for final application on the indicated surface area. Check the Wall and Floor Finishes on the architectural working drawings to identify areas of coverage. Submit Requests for Clarifications in case of queries.
- 1.4.3 On areas requiring specific concrete finishes to accommodate the final finishing material such as homogenous tiles, pavements, and the like, comply with the concrete surface condition requirements by the manufacturer of the approved finish material. Refer to the manufacturer's printed instructions.
- 1.4.4 Allow concrete to cure not less than seventy-two (72) hours before commencing surface finish work, unless otherwise acceptable to the Architect or as prescribed by the manufacturer of the final finishing material.
- 1.4.5 Provide the following concrete finishes appropriate to the requirements of the Schedule of Finishes and Materials:
 - 1.4.5.1 Troweled
 - 1.4.5.2 Floated
 - 1.4.5.3 Brushed
 - 1.4.5.4 Broomed.
 - 1.4.5.5 Fair-faced finish (Rubbed).
 - 1.4.5.6 Straight to finish structural slab and power floated.
 - 1.4.5.7 Smooth form finish
 - 1.4.5.8 Sand Washed Finish
 - 1.4.5.9 Other finishes necessary in conjunction with the required floor finishes.

1.5 FINISHES

Unless otherwise specified in the technical working drawings, take note of the following:

- 1.5.1 STRUCTURAL SLAB: Steel trowel or power float to give a smooth untextured/textured finish. Provide where required in Schedules to receive hardener/dustproofer,retarder, and other scheduled floor finishes where directed by the Architect as requiring smooth untextured/textured finish. Trowel to Class A tolerance. Moist cure only.
- 1.5.2 SLABS TO RECEIVE HOMOGENOUS TILES: For slabs to receive thickset homogenous and ceramic tiles, stone flooring and other scheduled flooring finishes requiring lightly roughened textured finish for substrate preparation, provide a roughened texture. Use stiff brush. Trowel to Class A Tolerance. Striate uniformly with fine-haired broom.
- 1.5.3 SLABS TO RECEIVE WATERPROOFING AND CONCRETE TOPPING: For slabs to receive thin-set homogenous tiles, ceramic tiles, and stone flooring, ensure fins are removed and all honeycombs and voids are repaired. Comply with manufacturer's requirements. Provide even textured finish unless otherwise specified by the manufacturer. Refer to Division 07 Thermal and Moisture Protection.
- 1.5.4 SLABS TO RECEIVE RESILIENT WOOD FLOORINGS: For slabs to receive laminate wood flooring, vinyl coverings including vinyl tiles, sports floor coverings, and epoxy flooring, use steel trowel to give smooth untextured finish.

1.5.5 **SLABS TO RECEIVE THICK-SET STONE PAVING:** For concrete slabs to receive pre-cast concrete pavers for vehicular ramps, natural stone paving, use heavy-broomed concrete finish as substrate preparation.

1.6 SUBMITTALS

1.6.1 PRODUCT APPROVAL ATTACHMENTS

1.6.1.1 *300mm x 300mm sample work for each type of required concrete finish for the color and texture review of the architect.*

1.6.1.2 Where used, submit grout samples, complete with manufacturer's data indicating grout color, brand, and other codes of identification.

1.6.2 EXECUTION APPROVAL ATTACHMENTS

Detailed work and methodology indicating:

1.6.2.1 Date and time of finishing

1.6.2.2 Area of finish application

1.6.2.3 Restoration and cleaning procedures upon completion of work.

1.6.2.4 Shop drawings indicating area of location.

1.7 QUALITY ASSURANCE

Establish a mock-up surface at least 1000mm x 1000mm to 3000mm X 3000mm, complete with joint and edge termination details if any for the approval of the architect.

2. PART 2 PRODUCTS

2.1 PREMIXED PRE-PACKAGED CEMENTITIOUS GROUT

Request for color approval from the architect. Do not apply grout materials that are not compatible with the finish material as indicated in the schedule of finishes. If used for patching and resurfacing damaged concrete surfaces, use one-component, polymer-modified, shrinkage-compensated renovation mortar.

2.2 EPOXY BONDING AGENT

Unless otherwise approved by structural designer, use two-component solids liquid epoxy bonding adhesive for warm environments.

2.3 CEMENT

Comply with ASTM C150. Type to match original concrete surface.

2.4 AGGREGATE

ASTM C33, one hundred percent (100%) passing the No. 30 mesh sieve.

2.5 BOND COAT MORTAR

Use mortar of the same material as the bond patching mortar and of approximately the same proportions as used for the concrete, excluding coarse aggregates. Mortar ratio shall be (1) part cement to not more than one (1) part sand by damp loose volume.

2.6 PATCHING MORTAR

Use patching mixture of the same materials and of approximately the same proportions as used for the concrete, excluding coarse aggregates. Mortar ratio shall consist of one (1) part cement to not more than two and one-half (2-1/2) parts sand by damp loose volume. White Portland cement may be substituted for a part of the gray Portland cement on exposed concrete in order to produce a color matching the color of the surrounding concrete. Implement a trial patch or mock-up prior to commencing work completely, as determined by a trial patch. Use appropriate amount of water needed for handling and placing. Mix patching mortar in advance and allow to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that shall permit placing.

2.7 WATER

Only clean potable water shall be used. Use a calibrated measuring device to measure the proper amount of water to be added to pre-packaged grouts and mortars.

3. PART 3 EXECUTION

3.1 PREPARATION

- 3.1.1 In repairing surface defects, measure all concrete surface temperatures, and if needed, cool surfaces down to facilitate maximum quality repair.
- 3.1.2 For honeycombs and other defects, remove down to sound concrete and chip if necessary. Ensure that no reinforcements will be compromised during the chipping process. Always use the appropriate solids-liquid bonding agents during the patching work. Refer to approved material by the structural designer.
- 3.1.3 Clean and dampen the chipped area for patching and dampen an additional 150mm surrounding it, unless otherwise specified by the manufacturer of the approved bonding agent. Comply with manufacturer's requirements.
- 3.1.4 Prepare bonding grout mixtures prior to patching.

3.2 CLEAN-UP AND PROTECTION

Clean up and remove concrete chips, dust and debris on all areas of work upon each day of application and upon completion. Prevent migration of airborne dust and debris by using windbreaks. Cooperate with other trades for protection of completed finishes.

3.3 PATCHWORK AND REPAIRS

3.3.1 FLATWORK SURFACES — GENERAL

- 3.3.1.1 Set bulkheads and screed strips to facilitate continuous concrete placement and to produce cross sections within tolerances specified. For cambered steel or concrete beams, place screed strips or other indicators along the beam centerline to maintain constant slab thickness. Float, trowel, broom, cure, seal and apply other surface treatments to the top of the structural slab or to the top of concrete fills as shown in the Contract Documents.
- 3.3.1.2 Power Float and Hand Float after water sheen has disappeared to push down aggregate, raise mortar, and level.
- 3.3.1.3 Power Trowel and Hand Trowel as soon as surface can be worked without cement paste clinging to the blades.
- 3.3.1.4 Non-Slip: Where non-slip is called for with any finish, embed particles at the rate of 1 kilogram per square meter with the final tooling.
- 3.3.1.5 Tolerances: 1.Class A: Level to within 3 millimeters in 3 meters (1/1000).

3.3.2 TIE HOLES

Fill tie holes and repair as patchwork unless otherwise specified in the drawings.

3.3.3 SMOOTH FORM FINISH

- 3.3.3.1 Arrange facing material in a symmetrical and orderly manner to reduce seams.
- 3.3.3.2 Ground smooth all surface texture defects caused by formworks, such as raised grain, torn surfaces, worn edges, patches,
- 3.3.3.3 Use patching mortar to fill air voids on formed surfaces.

3.3.4 FAIR-FACED CONCRETE FINISH (RUBBED)

- 3.3.4.1 Begin surface grinding, using power-driven, abrasive stone grinders, after wearing course has hardened sufficiently to prevent dislodgment of aggregate particles. Keep surfaces wet during grinding process. Remove ground-off material and flush with water.
- 3.3.4.2 Fill air holes, pits, and other blemishes with cement grout. Spread grout over surface and work into openings with a steel straight edge. Rub grout into surface by use of grinding machine. Keep surface moist an additional three (3) days before final grinding.
- 3.3.4.3 When surface is in proper condition, begin second or final grinding to remove grout film and polish surface. After final grinding and polishing, wash thoroughly and remove surplus material.
- 3.3.5 Conduct grinding operations and use such techniques as required to provide surface finish to match Architect's samples.

END OF SECTION

03 00 00	DIVISION 3 CONCRETE	
03 35 2	Concrete Floor Topping	1 of 4

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

- 1.1.1 Technical Architectural Drawings
- 1.1.2 Specifications
- 1.1.3 Schedule of Finishes

1.2 SUMMARY

Refer to this section parallel to the schedule of floor and wall finishes as indicated in the technical working drawings.

1.3 RELATED SECTIONS

- 1.3.1 Concrete Finishes
- 1.3.2 Thermal and Moisture Protection

1.4 GENERAL PROVISION

- 1.4.1 Ensure that all concrete mixes follow the specifications of structural designers and architects.
- 1.4.2 Do not modify the appearance, strength, and durability of the concrete architectural elements without any approval issued by the architect of record and the structural designer of record. Submit a request for approval for any modifications proposed. Any modifications found on site without corresponding approvals are subject to re-work at the expense of the contractor.
- 1.4.3 No concrete topping should be less than 50mm thick.

1.5 SUBMITTALS

As required by structural consultant.

1.5.1 PRODUCT APPROVAL ATTACHMENTS

- 1.5.1.1 Submit manufacturer's product data, particularly application and installation instructions for cement, cementitious materials, additives, admixtures, bearing pads, and other materials used. Submit material certificates as signed or certified by manufacturers.
- 1.5.1.2 For concrete surfaces subject to weather exposure and surface water run-off, submit the manufacturer's data of the approved waterproofing material. Include manufacturer's application and installation instructions for waterproofing, particularly data on concrete surface finish and conditions as needed.
- 1.5.1.3 Submit mix design for each concrete mix to be used.

1.5.2 EXECUTION APPROVAL ATTACHMENTS

- 1.5.2.1 Detailed work methodology, indicating at least the following
 - 1.5.2.1.1 Date and time of application
 - 1.5.2.1.2 Area of application
 - 1.5.2.1.3 Restoration and cleaning procedures upon completion of work.

1.6 QUALITY ASSURANCE

Repair and replace areas of concrete topping that fail to bond with the substrate, produces a hollow sound when tapped, and disintegrates.

1.7 WARRANTIES

Contractor agrees to a two (2) year warranty to rectify work, which deteriorates excessively or otherwise fails to perform as required, due to failure of materials and or workmanship.

2. PART 2 PRODUCTS

2.1 CEMENT AND AGGREGATES

Use Portland Cement, ASTM C 150 Type I. Furnish grey cement. Combine with standard aggregate ASTM C 33. Fine aggregates using sand, crushed stone screenings should be clean, hard, and free from deleterious matter. Follow grades and sieves:

Fine aggregates:		
9.53mm (3/8")	-	100 percent.
No. 4	-	95-100 percent.
No. 8	-	80-90 percent.
No. 16	-	50-75 percent.
No. 30	-	30-50 percent.
No. 50	-	10-20 percent.
No. 100	-	2-5 percent.

Coarse aggregates:		
12.7mm (1/2")	-	100 percent.
9.525mm (3/8")	-	30-50 percent.
No. 4	-	0-15 percent.
No. 8	-	0-5 percent.

2.2 REINFORCEMENT

Use ASTM A 185, welded steel wire fabric for all concrete topping thicker than 50mm. Use WWF 4 x 4 - W1.4 x W1.4.

2.3 MISCELLANEOUS

2.3.1 Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material "Type," "Grade" and "Class" to suit project requirements. Apply as per manufacturer's recommendation.

Concrete Hardener and Dustproofer must be colorless, odorless, non-toxic (contains no VOC as per U.S. Federal requirements), non-combustible, and non-flammable.

Depth of Wear, comply with ASTM C 779.

Abrasion resistance - Revolving disks 32.5% improvement at 30 minutes.

Surface Adhesion, comply with ASTM D3359

Compressive Strength, comply with ASTM C39

Rebound Number, comply with ASTM C805

Friction, comply with ASTM C-1028

Light Exposure Degradation, comply with ASTM G23

Depth of Wear, comply with DIN 52 108

Determination of Water Permeability, comply with DIN 1048 T.5

2.4 STANDARD TOPPING MIX

Ensure that compressive strength of topping material is at 3000psi.

3. PART 3 EXECUTION

3.1 MIXING

Use batch type mechanical mixer for mixing topping material at project site. Use only mixers which are capable of mixing aggregates, cement, and water into a uniform mix within specified time, and of discharging mix without segregation.

Mix each batch of 1.5 cubic meters (2 cu. yd.) or less for at least 1-1/2 minutes after ingredients are in mixer. Increase mixing time (15 seconds) for each additional cubic meter or fraction thereof.

3.2 CONDITION OF SURFACES

- 3.2.1 When topping hardened concrete, remove dirt, loose material, oil, grease, paint or other contaminants. Ensure that the surface is washed clean.
- 3.2.2 Roughen surface of base slabs that are not suitable for bonding performance by chipping or scarring before cleaning.
- 3.2.3 Before placing topping mixture, dampen slab surface. Do not leave standing water on the surface. Apply approved epoxy adhesive on dampened surface. Place topping mix while epoxy adhesive is not fully dry.
- 3.2.4 For reinforced toppings, maintain position of reinforcing mesh through necessary chairs or supports.
- 3.2.5 Consistently mark locations of joints in base slab and align with joints on the top course.

3.3 PLACING AND COMPACTING

Float Finish: Spread topping mixture evenly over prepared base to the required elevation and strike-off. Use highway straightedge, bull float, or darby to level surface. After the topping has stiffened sufficiently to permit the operation, and water sheen has disappeared, float the surface at least twice to a uniform sandy texture. Re-straighten where necessary with highway straightedge. Uniformly slope surface to drains.

Where joints are required, construct to match and coincide with joints in base slab. Provide other joints as shown on drawings.

3.4 TROWEL FINISH

After floating, begin first trowel finish operation using power driven trowels. Continue troweling until surface is ready to receive final troweling. Begin final troweling when a ringing sound is produced as trowel is moved over surface. Continue final trowel operation to produce finished surface free of trowel marks, uniform in texture and appearance.

3.5 CURING AND PROTECTION

3.5.1 Protect freshly placed topping from premature drying and excessive cold or hot temperatures. Apply evaporation retarder to topping surfaces in hot, dry, or windy conditions before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying topping, but before float finishing.

3.5.2 Begin curing immediately after finishing topping. Cure by one or a combination of the following methods, according to topping manufacturer's written instructions:

3.5.2.1 **Moisture Curing:** Keep surfaces continuously moist for not less than seven days with water. Cover topping surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

3.5.2.2 **Moisture-Retaining-Cover Curing:** Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 300mm (12 inches), and sealed by waterproof tape or adhesive. Cure for not less than seven (7) days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.5.2.3 **Curing Compound:** Apply uniformly in two coats in continuous operations by power spray or roller according to manufacturer's written instructions. Re-coat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

END OF SECTION

DIVISION 04
UNIT MASONRY ASSEMBLIES

04 00 00	MASONRY
04 81 0	Unit Masonry Assemblies

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

This section includes Unit Masonry Assemblies as specified for fixed wall systems as indicated in the project, namely *Reinforced Concrete Hollow Blocks for the toilet and pantry partition and the Concrete Masonry Units for the exterior walls as indicated.*

1.3 RELATED SECTIONS

- 1.3.1 Anchorage Devices
- 1.3.2 Joint Sealants

1.4 GENERAL PROVISION

- 1.4.1 Prior to complete installation of masonry work, build field mock-ups at least 1000sqmm in area for the approval of the architect.
- 1.4.2 Comply with ASTM C-90- Load Bearing Masonry Units.
- 1.4.3 Comply with ASTM C-129- Non- load Bearing Masonry Units.
- 1.4.4 Comply with ASTM C-140- Testing Concrete Masonry Units.
- 1.4.5 Comply with ASTM C-744- Specification for Pre-Faced Concrete and Calcium Silicate Masonry Units.
- 1.4.6 Comply with ASTM E-119- Fire Tests with Building Construction and Materials.
- 1.4.7 Provide special shapes where required for lintels, jambs, corners, sash, control joints, headers bonding, and other special conditions.
- 1.4.8 Comply with required face size and texture for the exposed face.
- 1.4.9 Hollow Load-Bearing Block ASTM C-90, normal weight (125 lbs. per cubic foot dry weight).
- 1.4.10 E. Solid Load-Bearing Block: ASTM C-90n normal weight (125 lbs. per cubic foot dry weight)

1.5 MAINTENANCE, DELIVERY AND STORAGE

- 1.5.1 Upon delivery on site, ensure that materials are stored in a dry area. Make sure that storage area is weather protected to avoid disintegration of masonry units.
- 1.5.2 Do not accept damaged or unsealed materials during delivery.
- 1.5.3 Store cementitious materials off the ground, under cover, and in a dry location.

1.6 SUBMITTALS

1.6.1 PRODUCT APPROVAL ATTACHMENTS

- 1.6.1.1 For prefaced concrete masonry units, submit product data for each type of masonry unit indicating inherent strength of the material in psi and the proportioning of cement, sand, gravel and other cementitious materials or additives as included in each unit. Indicate whether materials is load bearing or non-load-bearing.
- 1.6.1.2 Submit shop drawings showing prevailing dimensions and detailed sections of the material. Indicate mortar thickness, if any or if needed by the assembly.

- 1.6.1.3 For prefaced concrete masonry units, submit material samples showing final face of the material for the approval of the architect. Concurrently acquire finishing approval from the architect. Submit a raw-surfaced sample and another sample containing the finished face of the material.

1.6.2 EXECUTION APPROVAL ATTACHMENTS

- 1.6.3 Submit a detailed work methodology showing the time and date of application. Indicate steps and procedures to be followed down to the finishing stage of the material. Include instructions on jointing and mortar applications.

1.7 QUALITY ASSURANCE

- 1.7.1 Source exposed masonry units from a single source and ensure uniform texture and color.
1.7.2 Source mortar materials from a single supplier to ensure material compatibility.
1.7.3 Ensure that masonry units are compliant to fire performance characteristics as required by the code. Employ material that has undergone testing compliance with ASTM E 119.
1.7.4 Do not install masonry units with defects such as chipped corners, discoloration, and other such defects that affect the face and strength of the material. Dispose all defecting masonry units properly.
1.7.5 Do not apply concentrated loads on the masonry assembly for at least 12 hours after erection.
1.7.6 Prevent ground, mortar or soil from staining the face of masonry to be left exposed. Immediately remove ground or mortar in contact with the masonry and restore to original condition.
1.7.7 Do not lay wet masonry units. When laying masonry units during inclement weather, ensure that the area of application is protected from bad weather by temporary rainwater protection such as tents and tarpaulin films.
1.7.8 Do not lay masonry units with ground stains.

2. PART 2 PRODUCTS

2.1 MORTAR AND GROUT MATERIALS

- 2.1.1 Portland Cement: ASTM C-150, Type I, except use Type III for construction below 40
2.1.2 Degrees F. Provide natural color or white cement as required to produce required mortar color.
2.1.3 Hydrated Lime: ASTM C-207, Type S.
2.1.4 Aggregate for Mortar: ASTM C-144, except for joints less than 1/4 inch use aggregate graded with 100% passing the No. 16 sieve.
2.1.5 Aggregate for Grout: ASTM C-404.
2.1.6 Water: Clean and potable

2.2 CONCRETE HOLLOW BLOCKS

- 2.2.1 Size: manufacturer's standard units, at least 200mm height, 100mm thick, and 400mm long or approved equivalent.
2.2.2 Face: rough face for plastering
2.2.3 Minimum compressive strength: 800psi for each CHB
2.2.4 Reinforcements: laid in mortar in both horizontal and vertical spaces following specifications by structural engineer.

2.3 EXPOSED CONCRETE MASONRY UNITS

- 2.3.1 Size: manufacturer's standard units, at least 600mm height, 75mm to 100mm thick, and 1200mm long or approved equivalent.
2.3.2 Face: rough face for use as exposed surface
2.3.3 Minimum compressive strength: 1000psi for each CHB or as certified by manufacturer.
2.3.4 Solid load-bearing blocks shall comply with ASTM C-90n normal weight
2.3.5 Hollow load-bearing Block shall comply with ASTM C-90n normal weight.

2.4 JOINT REINFORCEMENT, TIES AND ANCHORS

- 2.4.1 Where anchorage is needed to connect to structural framework, comply with specifications by structural designer. Complete all joint reinforcement, ties, and anchors as needed for the structural soundness of the assembly.
2.4.2 Use galvanized metallic accessories appropriate to the load requirements of the assembly.

3. PART 3 EXECUTION

3.1 INSPECTION AND PREPARATION

- 3.1.1 Verify plumb-ness and all tolerances of receiving surfaces. Ensure accuracy and compliance with technical working drawings. If conditions are not met, comply and restore.
- 3.1.2 Verify proper size and location of masonry units to be installed.
- 3.1.3 Establish lines, levels, and coursing. Protect lines from any type of disturbance.
- 3.1.4 Remove laitance, loose aggregate, and other materials that prevents bonding between mortar and foundation.
- 3.1.5 Ensure uniformity in bond patterns and concrete masonry placement.
- 3.1.6 Comply with course heights as specified by manufacturer.

3.2 PLACEMENT OF UNITS

- 3.2.1 Lay units with bed and head joints filled from the faces of the units to a distance in not less than the thickness of the face shell.
- 3.2.2 Webs are fully mortared in all courses of piers, columns, pilasters, starting course on footings or foundations, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout.
- 3.2.3 Spread out full mortar bed including areas under cells, for starting course on footings where cells are not to be grouted.
- 3.2.4 Vertical cells to be grouted are aligned and unobstructed openings for grout are provided in accordance with drawings.
- 3.2.5 Keep cavity airspace and weep holes clean or mortar, clean out promptly if mortar falls into cavity airspace or plugs weep holes.
- 3.2.6 In-Progress Cleaning: Remove excess mortar, dry brush exposed masonry prior to the end of each workday, protect wall from mud splatter and mortar droppings, set scaffolds and scaffold boards so that mortar is not deflected onto masonry.
- 3.2.7 At end of each workday turn scaffold boards so that rainwater is not deflected onto masonry.
- 3.2.8 Place Concrete Masonry Unit such that mortar does not run down the face of the wall or smear the masonry face.
- 3.2.9 Adjustments: Do not shift or tap Concrete Masonry Unit after mortar has taken initial set, remove unit and mortar and replace. After joints are tooled, cut off mortar tailings with trowel and dry brush excess mortar burrs and dust from the face of the masonry, fully bond external and internal corners and properly anchor intersecting wall.
- 3.2.10 Termination of Wall Height: For the fire-rated walls, construct walls to finish against bottom of roof or floor deck and fill voids in fire stopping. For other than fire-rated walls, cut units to match the slope of the roof deck and finish construction to within 2-inches of a parallel to roof deck.
- 3.2.11 Isolate masonry partitions from vertical structural framing members with the control joint.

3.3 MORTAR AND GROUT MIXES

- 3.3.1 Do not use calcium chloride in mortar or grout. Use only the specified additives to mortar and grout mixes.
- 3.3.2 Mixing: Combine and thoroughly mix cementitious materials, water, aggregates and admixtures
- 3.3.3 in a mechanical batch mixer.
- 3.3.4 Comply with applicable ASTM standards and material manufacturer's recommendations for mixing time and water content. Measure and batch materials by volume so that required proportions can be accurately controlled and maintained.
- 3.3.5 Mortar for Unit Masonry: Comply with ASTM C-270, Proportion Specifications, Cement-Lime Mortar, for types of mortar required, unless otherwise indicated.
- 3.3.6 Use Type N mortar for interior non-load bearing walls.
- 3.3.7 Air Content: 8-14% Maximum.
- 3.3.8 Colored Aggregate Mortar: Produce mortar of color required by use of colored aggregates in combination with selected cementitious materials.
- 3.3.9 Color: To be selected by Architect.
- 3.3.10 Limit cementitious materials in mortar to Portland cement-lime.
- 3.3.11 Grout for Unit Masonry: Comply with ASTM C-476. Use grout of consistency which at time of placement will completely fill all spaces intended to receive grout.
- 3.3.12 Place grout within 1-1/2 hours of introducing of mixing water and prior to initial set.
- 3.3.13 Prevent grout from flowing onto or otherwise staining faces of CMU intended to be exposed.
- 3.3.14 Confinement: Confine grout to the area indicated on the Drawings.
- 3.3.15 Grout Pour Height: Use fine or coarse grout in accordance with requirements in technical working drawings

3.3.16 Consolidate grout at the time of placement. Consolidate grout pours 300mm or less in height by mechanical vibration or puddling.

3.3.17 Consolidate grout pours exceeding 300mm in height by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.

3.4 CONCRETE HOLLOW BLOCKS

3.4.1 Apply architectural plaster as indicated on the technical working drawings

3.5 CONCRETE MASONRY UNITS

3.5.1 For prefaced masonry units, ensure that obtained masonry units are of a rough surface material.

3.5.2 Prepare masonry unit surfaces as indicated in the technical working drawings and as advised by the manufacturer. Do not apply chemicals on the material that are detrimental to original face and make of the material.

3.6 CLEANING AND PROTECTION

3.6.1 Clean unit masonry as Work progresses by dry brushing to remove mortar fins and smears before tooling joints.

3.6.2 After mortar has set, reached initial curing; within 7 days of completion of work for custom masonry units, clean exposed masonry as follows:

3.6.2.1 Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.

3.6.2.2 Cut out any defective mortar joints and holes and re-point with mortar.

3.6.3 Protect non-masonry surfaces from contact with cleaning solution by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.

3.6.4 Clean Concrete Masonry Units with proprietary masonry cleaner. Thoroughly wet surface of masonry.

Scrub using non-metallic brushes. Immediately rinse with water. Do small sections at a time. Work from top to bottom. Do not use high pressure cleaning methods.

3.6.5 Cleaned surface shall appear as represented by mockup wall panel.

3.6.6 Maintain protective boards at exposed external corners that may be damaged by construction activities. Provide protection without damaging work.

3.6.7 Protect the base of walls from rain-splashed mud and mortar droppings.

END OF SECTION

DIVISION 05
METALS

05 00 00	DIVISION 5 METAL	
05 12 00	Structural Steel Framing (Refer to specifications by Structural Engineer)	

DIVISION 05
METALS

05 00 00	DIVISION 5 METAL	
05 50 0	Metal Fabrications	

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

This section includes the following metal fabrications as follows:

- 1.2.1 Grill Works
- 1.2.2 Metal bars gratings/ trench gratings
- 1.2.3 Railings and handrails
- 1.2.4 Steel nosing
- 1.2.5 Access panels
- 1.2.6 Welded wire fabric enclosures as specified
- 1.2.7 Steel-framed stairs and ramps
- 1.2.8 Truss, Rafter, and Purlin Works for Roofing Assemblies
- 1.2.9 Miscellaneous steel fabrications

1.3 RELATED SECTIONS

- 1.3.1 Division 01 26 63 Requests for Interpretation
- 1.3.2 Division 09 91 1 Interior Painting
- 1.3.3 Division 09 96 5 Exterior Painting

1.4 GENERAL PROVISIONS

1.4.1 Schedule and sequence all metal fabrications and work such that rework is avoided. Mount handrails on completed/finished surfaces only. Do not finish handrails or metal fabrication works such that it is exposed to construction work that will damage the metal assembly. Any such faulty sequencing resulting to damages will be absorbed by the Contractor.

1.5 PERFORMANCE REQUIREMENTS

- 1.5.1 Assemblies shall allow for thermal movements resulting from change in ambient and surface temperatures due to both mechanical and weather-induced heat gain and heat loss.
- 1.5.2 Always use non-shrink, pre-mixed, factory-packaged, corrosion and erosion resistant, non-metallic grout complying with CE CRD-C621 when anchoring steel to concrete. Check all labels by manufacturers and follow proper handling and application instructions. Use waterproofing sealers or coatings as recommended by the manufacturer, especially for metal fabrications exposed to exterior use.

1.5.3 Do not exceed the allowable working stress of the assembly, including considerations on its materials, anchors, and connections. Consider the following:

- 1.5.3.1 For Top Rail of Stair Railings, Guardrails, and hand rails, comply with the following structural loads:
- 1.5.3.1.1 Any point of the railings shall be capable of withstanding concentrated load at least 136 kgs, whether applied vertically or horizontally.
- 1.5.3.1.2 *The railing assembly shall be capable of withstanding a uniform load of 135kg per linear meter.*

1.5.4 Ensure that all metal fabrications are compliant to structural requirements, such that it is capable of withstanding structural loads as determined by professional structural designers. Determine allowable design working stresses according to following standards:

- 1.5.4.1 For aluminum materials, comply with AA 30 "Specifications for Aluminum Structures"
- 1.5.4.2 For Stainless Steel fabrications, comply with ASCE 8, "Specification for the Design of Cold-Formed Stainless Steel Structural Members."
- 1.5.4.3 For Cold-Formed Structural Steel, comply with AISI S6-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."
- 1.5.4.4 For Structural Steel, comply with AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."

1.6 MAINTENANCE AND STORAGE

1.6.1 Ensure that assemblies are protected from corrosion due to weather and chemical exposure. Apply protecting films and keep materials away from corrosives.

1.6.2 When metal works are completed, restore any defects incurred on the assembly during the time of construction. No discoloration or any early markings indicative of early stages of corrosion will be accepted upon substantial completion of work.

1.6.3 Regularly clean surfaces where fabricated assemblies are completed, stored or kept. Ensure that the areas of work and storage are free of corrosive substances.

1.6.4 Clean all metal fabrications and ensure that items are free of marks, bulges, discolorations, prints, finger marks, etc. Wrap in polyethylene or an equivalent protective material and keep completed metal works protected until substantial completion.

1.7 SUBMITTALS

1.7.1 PRODUCT APPROVAL ATTACHMENTS

- 1.7.1.1 Submit product data. Describe steel composition, including nominal thicknesses for hollowed tubes, finish type. Include detailed description of paint products to be affixed on the steel parts, weld points, etc.
- 1.7.1.2 For metal assemblies to accept paint works, submit manufacturer's data on the proper handling of paint products, including instructions on application, storage, and maintenance.
- 1.7.1.3 Indicate areas of application on all requests for approval.

1.7.2 EXECUTION APPROVAL ATTACHMENTS

- 1.7.2.1 Submit a detailed work methodology, indicating at least the following
 - 1.7.2.1.1 Date and time of application
 - 1.7.2.1.2 Area of application
 - 1.7.2.1.3 Welder's certificates compliant to the Quality Assurance portion of this section.
 - 1.7.2.1.4 Shop drawings showing the location of the installation on the project site. Detail all dimensions. Show typical weld points, cross section details of railings, clearly defining relative points of measurement for survey and/or laying out. All drawings shall be to scale. Include plans, elevations, sections, and other drawings required. Properly label all components of the assemblies. If using hollowed sections, indicate nominal thicknesses. If using steel plates, indicate gauge of plate. Label all bolts and anchors, including prescriptive sizes if any. Certify that assemblies on the shop drawings are structurally sound, otherwise drawings will be forwarded to the structural engineer for verification. Clearly label finish types and verify that finish types are consistent with technical working drawings issued. In case of inconsistencies, submit requests for clarification.

1.8 QUALITY ASSURANCE

- 1.8.1 Ensure fabricators are experienced in fabricating metal assemblies similar to the items indicated in the technical working drawings of this project.
- 1.8.2 Ensure installers are equally familiar with fabricators and are in constant communication on the proper installment procedures.
- 1.8.3 Certify that all welders for fabrication assemblies have satisfactorily passed AWS qualifications for welding in accordance to the structural welding code—steel D1.1, D1.2, and D1.3.
- 1.8.4 The contractor is to make sure that all metal fabricators and installers are duly supervised by qualified professional engineers, licensed and experienced in supervising construction works.
- 1.8.5 Do not complete works prior to mock-up approvals. Install a handrail/rail mock up to verify selections and shop drawings and have the mock-ups approved prior to the completion of work. Always build mock-ups in intended locations.

1.9 WARRANTIES

Metal fabricators are to comply with minimum five (5) years warranty, certifying against rusts, corrosion, and any form of metal deterioration.

2. PART 2 PRODUCTS

2.1 METALS

All metal fabrications exposed to views or areas with high user traffic shall be free from surface blemish. Do not use deteriorated materials. Unless otherwise specified or indicate in the technical working drawings, follow the prescribed thicknesses of given metal sections below. In case of conflict, submit requests for clarification. Do not implement any work prior to the verification of the architect.

Only use Welding Rods and Bare Electrodes compatible with steel/ or metal alloy to be welded. Comply with American Welding Society Standards (AWS) specifications.

2.1.1 GENERAL METALS

- 2.1.1.1 For Steel Plates, Shapes, and Bars, comply with ASTM A 36.
- 2.1.1.2 For Rolled Steel floor Plates, comply with ASTM A 786.
- 2.1.1.3 For Steel Bars for Gratings, comply with ASTM A 569 or ASTM A 36.
- 2.1.1.4 When using Wire Rod for Gratings Crossbars, comply with ASTM A 510.
- 2.1.1.5 For Cold-Formed Steel Tubing, comply with ASTM A 500, Grade A, unless otherwise specified.
- 2.1.1.6 For Cold-Rolled Structural Steel Sheet, use ASTM A 611, Grade A, unless otherwise specified.
- 2.1.1.7 For Uncoated Non-structural Cold-Rolled Steel Sheet, comply with ASTM A 366.
- 2.1.1.8 For Structural Quality Galvanized sheets, comply with ASTM A 446, Grade A, unless another grade is required for design loading, and G90 coating designation unless otherwise directed.
- 2.1.1.9 For Galvanized finish Steel Pipes for exterior installations and where indicated, comply with ASTM A 53; Type F, Schedule 40, unless otherwise directed, or another weight, type, and grade required by structural loads and/or by technical working drawings.
- 2.1.1.10 For Malleable Iron Castings, comply with ASTM A 47, grade 32510.
- 2.1.1.11 For Brackets, Flanges and Anchors, use Cast or formed metal of the same type material and finish as supported rails, unless otherwise directed.
- 2.1.1.12 When using Concrete Inserts, use Threaded or wedge type, galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.
- 2.1.1.13 When using Wrought Iron, conform to ASTM designation A-41.
- 2.1.1.14 When using Gray Iron Castings, conform to ASTM A 48, Class 30.

2.1.2 FOR STAINLESS STEEL:

- 2.1.2.1 For Stainless Steel Bar Stock, comply with ASTM A 276, Type 302.
- 2.1.2.2 For Stainless Steel Plate, comply with ASTM A 167, Type 302.
- 2.1.2.3 For Stainless Steel Pipe, comply with ASTM A 312, Grade TP 316.
- 2.1.2.4 For Stainless Steel Castings, comply with ASTM A 743, Grade CF 8 or CF 20
- 2.1.2.5 For Stainless Steel Tubing: ASTM A 554, Grades MT301, MT302 or MT304.

2.1.3 ALUMINUM

- 2.1.3.1 Refer to technical working drawings to verify temper, finish, and coats of the Aluminum.
- 2.1.3.1.1 For Extruded Bars and Shapes, comply with ASTM B 221, 6063-T6
- 2.1.3.1.2 For Extruded Pipe and Tube, comply with ASTM B 429, 6063-T6.
- 2.1.3.1.3 For Drawn Seamless Tubes, comply with ASTM B 483, 6063-T832
- 2.1.3.1.4 For Plate and Sheet, comply with ASTM B 209, 6061-T6
- 2.1.3.1.5 For Die and Hand Forgings, comply with ASTM B 247, 6061-T6
- 2.1.3.1.6 For Castings, comply with ASTM B 26, 356.0-T6.
- 2.1.3.1.7 Minimum Thickness of Plates shall be 3mm.
- 2.1.3.1.8 Minimum Extrusions shall be 3mm.

2.1.4 FASTENERS

Use zinc-coated fasteners for exterior use or where built into exterior walls. Performance Requirements of Fasteners shall be as follows:

- 2.1.4.1.1.1 When using Bolts and Nuts, use Regular hexagon head type compliant with ASTM A 307, Grade A.
- 2.1.4.1.1.2 When using Lag Bolts, use Square head type FS FF-B-561.
- 2.1.4.1.1.3 When using Machine Screws, use Cadmium plated steel FS FF-S-92.
- 2.1.4.1.1.4 When using Wood Screws, use Flat head carbon steel FS FF-S-111.
- 2.1.4.1.1.5 When using Plain Washers, use Round, carbon steel, FS FF-W-92.
- 2.1.4.1.1.6 When using Toggle Bolts, use Tumble-wing type, FS FF-B-588, type, class, and style as required
- 2.1.4.1.1.7 When using Lock Washers, use Helical spring type carbon steel, FS FF-W-84
- 2.1.4.1.1.8 When drilling expansion anchors, comply with FS FF-S-325, Group VIII anchors, expansion, non-drilling, Type I (*Internally threaded tubular expansion anchor*) and machine

2.1.5 PAINT

Use shop primers to ensure protection of metal fabrications. Use primers as follows:

- 2.1.5.1 For ferrous metals, use fast-curing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated. Primer should be compatible with field-applied topcoats and compliant to requirements of FS TT-P-645.
- 2.1.5.2 For galvanized steel, use primers with zinc-dust, zinc-coated steel compatible for priming zinc-coated steel and finish paint systems as indicated. Comply with SSPC-Paint 5.

2.1.6 CONCRETE FILL AND REINFORCEMENT

Comply with Division 03 Sections for normal weight concrete. Use reinforcements compliant with ASTM A615, Grade 60 unless otherwise directed.

3. PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- 3.1.1 Properly label metal assemblies, and fixtures such as urinals and lavatories in coordination with labels of receiving anchors to avoid incorrect installations.
- 3.1.2 Coordinate with concrete casting schedule and material deliveries to ensure the proper integration of anchorage to be embedded in concrete or masonry construction.

3.2 GENERAL INSTALLATION

- 3.2.1 Provide anchorage and fastening devices in all necessary areas to structurally secure metal fabrications in place. Use toggle bolts, lag bolts, and other masonry inserts and connectors as required for structural soundness without compromising the aesthetic quality of exposed areas.
- 3.2.2 Plumb, set, level, align, edge, measure, and layout all metal fabrications from established lines and levels to ensure accurate fabrication and installation.
- 3.2.3 Comply with AWS Code for procedures of manual shielded metal-arc welding for all field welding work.
- 3.2.4 Remove all welding flux immediately.
- 3.2.5 Finish all exposed welds to match adjacent metal surfaces.
- 3.2.6 Coat all exposed steel or metal fabrications for corrosion protection.

- 3.2.7 For metals assemblies specified to receive paint, apply primer on all surfaces including grind smooth welded connections. Comply with Division 09 Section Interior and Exterior Painting.
- 3.2.8 Pre-drill holes on the metal fabrication to receive exposed bolt anchorage.
- 3.2.9 For concrete surfaces, use drilled-in expansion shields and concealed hanger bolts or exposed lag bolts as applicable.
- 3.2.10 For hollow masonry anchorage, use toggle bolts having square heads.
- 3.2.11 Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.
- 3.2.12 Manually clean all metal and concrete surfaces to receive anchorage work. Remove all dirt, weld splatter, grease, and similar loose substances that affect adhesion. Chip, scrape and wire brush to remove dirt on metal.
- 3.2.13 Correct all chippings on concrete surfaces as affected by installation work. Comply with Division 03 Concrete for all concrete patchwork.
- 3.2.14 Clean aluminum and stainless steel with through soap and clean water wash and rinse.
- 3.2.15 Touch up all painting works damaged by installation work.
- 3.2.16 Restore all other complete finish work damaged during installation work.

3.3 GENERAL FABRICATION

- 3.3.1 Comply with performance requirements as indicated above and as indicated in the drawings. Verify drawings and ensure that metal fabrications are compliant. Use types of materials as specified.
- 3.3.2 All angles, surfaces, edges whether smooth or straight shall true to line and levels and consistent with drawings.
- 3.3.3 Shearing and punching of metals must done cleanly and accurately.
- 3.3.4 Buff exposed edges to no more than 0.8mm unless otherwise indicated in the drawings. Ensure that buffing or easing work will not damage grains or impair work in any way.
- 3.3.5 No sharp, flesh-cutting edges allowed, whether exposed or unexposed.
- 3.3.6 Smoothen exposed welds.
- 3.3.7 Weld corners and seams continuously.
- 3.3.8 Remove welding flux immediately.
- 3.3.9 Fabricate metals such that hairline joints are minimal. Conceal hairline joints.
- 3.3.10 Exposed fasteners shall be consistent as indicated on drawings. If not indicated, use flathead countersunk screws or bolts. Verify drawings for the accurate positioning of fasteners. If not specified on drawings, fabrication shall consider equal and structurally sound spacing of fasteners.
- 3.3.11 Space anchoring devices to provide adequate support as approved by structural drawings. Refer to approved shop drawings. Consider prescribed anchoring distances during the fabrication stage.
- 3.3.12 Fabricate weep holes where water is likely to accumulate. Ensure that the metal assembly is fabricated such that no part is subject to accumulation of corrosives and therefore damaging the unit.

3.4 GENERAL FINISHES

- 3.4.1 Prepare steel fabrications to receive the finishes as specified in drawings.
- 3.4.2 Exposed fasteners shall be finished with matching appearance, including color and texture of the steel fabrication, unless otherwise indicated in the approved drawings.

3.5 ROUGH HARDWARE

The contractor shall furnish all custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for all rough support and anchoring work.

3.6 RUNGS, LADDER, and SAFETY CAGES

- 3.6.1 Fabricate all rungs and ladders, and safety cages as indicated on the working drawings and as required by the project. Rungs, ladders and safety cages should be provided on elevated water tanks, elevator pits, machine rooms, or where access is necessary for maintenance.
- 3.6.2 All exterior rungs, ladders, and safety cages shall be in stainless steel, and welded to be structurally sound enough to accept one or two persons. Ensure that no warping, disengagement of members, and any other form of deformation occurs when items are in use; check that anchorages are soundly installed and tested.
- 3.6.3 Situate rungs and ladders in the most accessible locations with least visual and traffic obstruction, or as indicated in the working drawings.
- 3.6.4 Do not install ladders and rungs where it becomes inaccessible and unfit for use.

- 3.6.5 Do not install ladder rungs in areas where its exposure destroys building aesthetics. Secure an approval from the architect as to the appropriate location of the ladders and rungs.
- 3.6.6 Submit shop drawings on rungs, ladders, and safety cages and secure approval prior to fabrication and installation.

3.7 METAL GRATINGS

- 3.7.1 Where required or as indicated in the drawings, provide metal bar gratings.
- 3.7.2 Fabricate gratings such that it is able to carry designed structural loads.
- 3.7.3 When required by the drawings of the architect, provide hinges on gratings that require access for maintenance.

3.8 RAILINGS AND HANDRAILS

- 3.8.1 Fabricate all railings and handrails to comply with all indications on approved shop drawings.
- 3.8.2 Fabricate all assemblies such that splicing and on-site disassembly is minimized.
- 3.8.3 When splicing is necessary due to delivery or installation restrictions, ensure that all units are properly labeled and coordinated for reassembly.
- 3.8.4 Join railing and hand-railing members by butt welding, unless otherwise indicated.
- 3.8.5 At tees, intersections, and crossings, weld around all creases to ensure sound jointing. Where hollowed tubes are specified, joints must be welded such that corrosives are not allowed into the interiors of the tubes.
- 3.8.6 Anticipate all anchorages during fabrications and where possible, ensure a nearly homogenous and sound connection.
- 3.8.7 Especially for hollow tubes, close all exposed pipe ends by welding a 4.7625mm thick steel plate to ensure that corrosives do not enter the interiors of the tubes, unless otherwise indicated.
- 3.8.8 Grind all joints and anchorages smoothly to match adjacent surfaces.
- 3.8.9 Handrails, posts, and other steel sections shall be at least schedule 20 to schedule 40 or as required by the Structural Consultant to carry design loads.
- 3.8.10 Finish railings and handrails in compliance to interior painting requirements if painted finish is specified in the drawings. Refer to Division 09 Section "Interior Painting".
- 3.8.11 Stainless steel railings and handrails shall be in hairline finish unless otherwise indicated in the drawings or as approved by the architect.
- 3.8.12 Secure handrails to walls with proper wall brackets and end fittings unless otherwise indicated on drawings as approved by the structural designer.
- 3.8.13 Follow required slopes for handrails and railings as indicated in drawings, or to match the alignment of the stairs, ramp, and similar sloping surfaces. Follow slope installations according to approved shop drawings.
- 3.8.14 Use steel flanges as indicated in approved shop drawings. Accurately follow technical working drawings.

3.9 NOSINGS

- 3.9.1 Provide steel nosing as required in the technical working drawings.
- 3.9.2 Only use anti-slip strip and nosing surfaces.
- 3.9.3 Nosing shall be at least 25mm thick and shall run along the full length of the step/tread. Check that strips are installed in alignment or as indicated in the drawings.
- 3.9.4 Level all accepting nose strips and use patching compounds to fill cracks, holes, and other depressions or irregularities on the treads/steps.
- 3.9.5 Clean surfaces of application and check that receiving steps/treads are free of any substances, i.e. wax, dust, oil, salts that affect the adhesion of the nosing strip. Do not use solvents that disintegrate and loose adhesion due to thermal conditions. Where necessary support adhesive with screws, rivets, and similar anchorage devices.
- 3.9.6 Do not join nosing strip materials. Nosing strips must run homogeneously along the tread.
- 3.9.7 Unless otherwise specified in drawings, embed nosings in concrete steps or curbs and flush with riser and tread face levels.

3.10 ACCESS PANELS

- 3.10.1 Verify location of Access Panels as indicated in technical drawings. Always place Access Panels in obscure locations, accessibly by service personnel.
- 3.10.2 No Access Panel shall be lesser than 600mm X 600mm in dimensions.
- 3.10.3 For access panels placed on ceilings, locate it adjacent to the nearest to the wall.
- 3.10.4 Fabricate access panels according to materials as indicated in the drawings or as needed in the project site.
- 3.10.5 Fabricate access panels using materials that comply with fire rating as required by the code.

- 3.10.6 Unless otherwise required or specified, provide at least 2 pieces of steel butt hinges, painted to match the color of the corridor wall, or ceiling where the access panel is located.
- 3.10.7 Use silicone to adhere borders/perimeters of the access panels.
- 3.10.8 Where the access panel is a combination of fiber cement boards and steel perimeters, comply with Division 03 Fiber Cement Boards.
- 3.10.9 Submit detailed shop drawings showing dimensions, reference elevations, and materials for access panels installed in exposed areas. Fabricate access panels according to approved shop drawings.

3.11 WELDED WIRE FABRIC ENCLOSURES FOR MECHANICAL EQUIPMENT)

- 3.11.1 Frames and supports for welded wire fabric enclosures designated for mechanical equipment shall be fabricated with 50mm X 50mm x 2.8mm diameter tubular heavy duty steel unless otherwise intended by the architect or structural designers. Submit shop drawings prior to implementation.
- 3.11.2 Angular and flat bars may be used for frames not bearing critical structural load.
- 3.11.3 divisiaccessories.
- 3.11.4 All welded wire fabric enclosures shall be painted. Refer to Division 09 Section for Paint type and procedure requirements.

3.12 STEEL FRAMED STAIRS AND RAMPS

- 3.12.1 Conform to sizes, arrangements, dimensions as indicated in stair details on technical working drawings.
- 3.12.2 For fabricated steel stringers, treads, and newels, balusters, and other stair components with hollow sections, provide closure on exposed ends. Use prescribed steel plates and join by full butt welding such that no corrosives may enter the interiors of the assembly.
- 3.12.3 Unless otherwise indicated on drawings, use 6mm thick built steel concrete pans (concrete-filled steel pans) to form stair treads and landings. Bolt steel pans to supporting brackets.

3.13 MISCELLANEOUS

- 3.13.1 Provide steel framing and supports for all applications as required to complete structural steel frameworks and as required to complete works.
- 3.13.2 Integrally weld and anchor all steel fabrications into concrete or building masonry and ensure structural soundness.
- 3.13.3 Furnish inserts; if units must be installed after concrete is placed.
- 3.13.4 Except as otherwise indicated, space anchors 609.6mm (24 inches) on center and provide minimum anchor units in the form of steel straps 31.75mm x 6.35mm x 203.2mm (1-1/4 inches wide x 1/4 inch x 8 inches) long.
- 3.13.5 Epoxy-prime all framings and supports.
- 3.13.6 For lavatory counter, urinal, and other similar finish supports, provide steel angle supports capable of supporting the dead load of the item to be installed.
- 3.13.7 Protect all finishes of handrails and railings in exposed areas from damage during construction. Provide temporary protective covering to be removed only upon substantial completion of all construction work
- 3.13.8 Restore finishes damaged during installation works.

END OF SECTION

05 00 00	DIVISION 5 METAL	
05 51 36	Decorative Metals	

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

1.2.1 This section includes provisions on ornamental metals intended for the project, such as decorative steel for elevators and customized metal works with ornamental and intricate patterns, such as

- 1.2.1.1 Decorative metal signage
- 1.2.1.2 Miscellaneous ornamental steel requirements as intended for the project

1.3 RELATED SECTIONS

- 1.3.1 Exterior Painting
- 1.3.2 Metal Fabrications

1.4 SUMMARY

1.4.1 This section includes provisions on ornamental metals intended for the project, such as decorative steel for elevators and customized metal works with ornamental and intricate patterns, such as

- 1.4.1.1 Decorative metal signage
- 1.4.1.2 Miscellaneous ornamental steel requirements as intended for the project

1.5 GENERAL PROVISIONS

1.5.1 Fabricate all ornamental metals in conformance to design, dimensions, sizes, and other specifications indicated on technical working drawings or as approved by the architect.

1.5.2 Ornamental metals shall be delivered on site and installed on the project in its completely finished state.

1.5.3 Before fabrication, submit sample swatches of the finished metal showing a complete modular assembly for the approval of the architect.

1.5.4 Restore any finishes damaged during installation work.

1.5.5 Prior to fabrication, submit Shop Drawings to the Architect of Record for approval. Indicate structural anchorage on the shop drawings.

1.5.6 Submit approved shop drawings by the architect to the structural designer for approval on structural soundness. Ensure that shop drawings have sufficient data to check structural computations.

1.5.7 Protect all ornamental work until substantial completion of the project. Ensure that surfaces are free of scratches.

1.5.8 Do not exceed the allowable working stress of the assembly, including considerations on its materials, anchors, and connections. Ensure that all metal fabrications are compliant to structural requirements, such that it is capable of withstanding structural loads as determined by professional structural designers. Determine allowable design working stresses according to following standards:

- 1.5.8.1 For aluminum materials, comply with AA 30 "Specifications for Aluminum Structures"
- 1.5.8.2 For Stainless Steel fabrications, comply with ASCE 8, "Specification for the Design of Cold-Formed Stainless Steel Structural Members."
- 1.5.8.3 For Cold-Formed Structural Steel, comply with AISI S673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."
- 1.5.8.4 For Structural Steel, comply with AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."

1.5.9 EXTERIOR ASSEMBLIES

- 1.5.9.1 Ornamental Metal Assemblies for installation on exteriors shall allow for thermal movements due to weather-induced heat gain and heat loss without any visual distortion or damage to the anchorage.
- 1.5.9.2 Fabricate exterior metal assemblies in anticipation of weather disturbances such as rain and strong winds. Assemblies should be able to carry design loads such as wind pressure, live loads, and dead loads.
- 1.5.9.3 Fabricate weather-exposed assemblies with weep holes to drain any rainwater and moisture accumulation on any part and point of the assembly that can lead to corrosion and degradation.
- 1.5.9.4 Use materials with inherent strength capable of withstanding weather exposure. Comply with drawings specifications.
- 1.5.9.5 Use waterproofing sealers or coatings to protect exterior assemblies to weather exposure. Submit waterproofing and sealing products for approval.
- 1.5.9.6 Apply approved waterproofing and sealing products as recommended by the manufacturer.
- 1.5.9.7 When anchoring steel to concrete, always use non-shrink, pre-mixed, factory-packaged, corrosion and erosion resistant, non-metallic grout complying with CE CRD-C621. Check all labels by manufacturers and follow proper handling and application instructions.
- 1.5.9.8 Do not apply final paint coat finishes on exterior metal assemblies without the color swatch approval of the architect. Refer to product and execution submittals of this section for details.

1.5.10 INTERIOR ORNAMENTAL METAL

- 1.5.10.1 Validate levels, reference lines and grades according to actual site conditions and indicate true data on shop drawings for approval.
- 1.5.10.2 Do not fabricate interior metal ornaments without the approval of the architect.
- 1.5.10.3 For intricate metal work such as signage, install mock-ups and templates of the signage made of thin gauged metal sheets, cardboard, or other cheaper materials for verification of sizes, dimensions, mounting heights, and thicknesses.
- 1.5.10.4 Coordinate fabrication and delivery schedule with approval periods and mock-up installations such that the schedule of substantial completion is on time. Seek drawing and mock up approvals with a healthy lead time.

1.6 MAINTENANCE AND STORAGE

- 1.6.1 For interior ornamental metal assemblies, ensure that assemblies are protected from corrosion due to weather and chemical exposure.
- 1.6.2 Apply protecting films and temporary protective coverings to keep completed work and materials away from scratches, discoloration, and other defects affecting its original quality upon completion of work.
- 1.6.3 Keep materials away from corrosives especially during the construction phase.
- 1.6.4 When metal works are completed, restore any defects incurred on the assembly during the time of construction. No discoloration or any early markings indicative of early stages of corrosion will be accepted upon substantial completion of work.
- 1.6.5 Regularly clean surfaces where fabricated assemblies are completed, stored or kept. Ensure that the areas of work and storage are free of corrosive substances.
- 1.6.6 Clean all metal fabrications and ensure that items are free of marks, bulges, discolorations, prints, finger marks, etc.
- 1.6.7 Exterior metal assemblies already installed on the project need not be wrapped in polyethylene, however all finishes damaged during the time of construction shall be restored, repainted, and cleaned at the time of the project turnover.

1.7 SUBMITTALS

1.7.1 PRODUCT APPROVAL ATTACHMENTS

- 1.7.1.1 Submit product data for each metal type used in the ornamental work. Describe steel composition, including nominal thicknesses for hollowed tubes, finish type, and other data needed for structural computation as well as other data affecting the overall quality of the fabrication.
- 1.7.1.2 For ornamental work to receive paint, include detailed description of paint products to be used, as well as application instructions as specified by the manufacturer. Submit manufacturer's data on the proper handling of paint products, including proper storage, and maintenance.
- 1.7.1.3 Indicate areas of application on all requests for approval.

- 1.7.1.4 For finished steel, submit finish steel swatches at least 100mm x 100mm in size if steel plates for the approval of the architect. Properly label the swatches according to finish, grade, and grain whether satin, hairline, or as indicated on the drawings.
- 1.7.1.5 For ornamental steel to be finished in paint, submit finish steel swatches at least 100mm x 100mm in size if steel plates and at least 100mm cut portions if hollowed tubes, angular bars, flats, and similar components. Each submitted swatch shall be fully primed and finish coated, compliant to Division 09 Exterior Paint Section. Submit swatches in every color required on the ornamental steel work and only apply paint finish on metal sections conforming to approved drawings. Submit painted angle bars when painted angle bars are indicated on approved drawings; submit painted steel plates where painted steel plates are indicated on approved drawings, and so on. For example, where steel plates are indicated to receive different colors, submit one swatch of steel plate for every color specified.

1.7.2 EXECUTION APPROVAL ATTACHMENTS

- 1.7.2.1 Submit a detailed work methodology, indicating at least the following
- 1.7.2.1.1 Date and time of fabrication
- 1.7.2.1.2 Area of installation
- 1.7.2.1.3 Welder's certificates compliant to the Quality Assurance portion of this section.
- 1.7.2.1.4 Shop drawings dedicated to showing the location of the installation on the project site. Detail all dimensions. Show typical weld points, cross section details, clearly defining relative points of measurement for survey and/or laying out. All drawings shall be to scale. Include plans, elevations, sections, and other drawings required. Properly label all components of the assemblies. If using hollowed sections, indicate nominal thicknesses. If using steel plates, indicate gauge of plate. Label all bolts and anchors, including prescriptive sizes if any. Certify that assemblies on the shop drawings are structurally sound, otherwise drawings will be forwarded to the structural engineer for verification.
- 1.7.2.1.5 Submit separate shop drawings with a clearly defined legend for finish types, especially for metal fabrications to receive paint finish. On the finish legend, clearly indicate the color and finish boundaries on the metal assembly.

1.8 QUALITY ASSURANCE

- 1.8.1 Ensure fabricators are experienced in fabricating metal assemblies similar to the items indicated in the technical working drawings of this project. Fabricators should observe systematic proceedings and shall be capable of accomplishing required fabrication in the given amount of time.
- 1.8.2 Ensure installers are equally familiar with fabricators and are in constant communication on the proper installment procedures.
- 1.8.3 Certify that all welders for fabrication assemblies have satisfactorily passed AWS qualifications for welding in accordance to the structural welding code—steel D1.1, D1.2, and D1.3.
- 1.8.4 The contractor is to make sure that all metal fabricators and installers are duly supervised by qualified professional engineers, licensed and experienced in supervising construction works.
- 1.8.5 Contract experienced firms in the application of finish coatings to high-performance metal surfaces such as aluminum extrusions.
- 1.8.6 Do not cut or disassemble delivered metal assemblies on site. If assemblies delivered are incompliant to module specifications, have the fabricator redo the assembly work.

1.9 WARRANTIES

For exterior metal assemblies, metal fabricators are to comply with minimum five (5) years warranty, and for interior ornamental metals such as signage one (1) year warranty, certifying against rusts, corrosion, and any form of metal deterioration.

2. PART 2 PRODUCTS

2.1 METALS

All metal fabrications exposed to views or areas with high user traffic shall be free from surface blemish. Do not use deteriorated materials. Unless otherwise specified or indicated in the technical working drawings, follow the

prescribed thicknesses of given metal sections below. In case of conflict, submit requests for clarification. Do not implement any work prior to the verification of the architect.

Only use Welding Rods and Bare Electrodes compatible with steel/ or metal alloy to be welded. Comply with American Welding Society Standards (AWS) specifications.

2.1.1 GENERAL METALS

- 2.1.1.1 For Steel Plates, Shapes, and Bars, comply with ASTM A 36.
- 2.1.1.2 For Rolled Steel floor Plates, comply with ASTM A 786.
- 2.1.1.3 For Steel Bars for Gratings, comply with ASTM A 569 or ASTM A 36.
- 2.1.1.4 When using Wire Rod for Gratings Crossbars, comply with ASTM A 510.
- 2.1.1.5 For Cold-Formed Steel Tubing, comply with ASTM A 500, Grade A, unless otherwise specified.
- 2.1.1.6 For Cold-Rolled Structural Steel Sheet, use ASTM A 611, Grade A, unless otherwise specified.
- 2.1.1.7 For Uncoated Non-structural Cold-Rolled Steel Sheet, comply with ASTM A 366.
- 2.1.1.8 For Structural Quality Galvanized sheets, comply with ASTM A 446, Grade A, unless another grade is required for design loading, and G90 coating designation unless otherwise directed.
- 2.1.1.9 For Galvanized finish Steel Pipes for exterior installations and where indicated, comply with ASTM A 53; Type F, Schedule 40, unless otherwise directed, or another weight, type, and grade required by structural loads and/or by technical working drawings.
- 2.1.1.10 For Malleable Iron Castings, comply with ASTM A 47, grade 32510.
- 2.1.1.11 For Brackets, Flanges and Anchors, use Cast or formed metal of the same type material and finish as supported rails, unless otherwise directed.
- 2.1.1.12 When using Concrete Inserts, use Threaded or wedge type, galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.
- 2.1.1.13 When using Wrought Iron, conform to ASTM designation A-47.
- 2.1.1.14 When using Gray Iron Castings, conform to ASTM A 48, Class 30.

2.1.2 FOR STAINLESS STEEL:

- 2.1.2.1 For Stainless Steel Bar Stock, comply with ASTM A 276, Type 302.
- 2.1.2.2 For Stainless Steel Plate, comply with ASTM A 167, Type 302.
- 2.1.2.3 For Stainless Steel Pipe, comply with ASTM A 312, Grade TP 316.
- 2.1.2.4 For Stainless Steel Castings, comply with ASTM A 743, Grade CF 8 or CF 20
- 2.1.2.5 For Stainless Steel Tubing: ASTM A 554, Grades MT301, MT302 or MT304.

2.1.3 ALUMINUM

- 2.1.3.1 Refer to technical working drawings to verify temper, finish, and coats of the Aluminum.
- 2.1.3.1.1 For Extruded Bars and Shapes, comply with ASTM B 221, 6063-T6
- 2.1.3.1.2 For Extruded Pipe and Tube, comply with ASTM B 429, 6063-T6.
- 2.1.3.1.3 For Drawn Seamless Tubes, comply with ASTM B 483, 6063-T832
- 2.1.3.1.4 For Plate and Sheet, comply with ASTM B 209, 6061-T6
- 2.1.3.1.5 For Die and Hand Forgings, comply with ASTM B 247, 6061-T6
- 2.1.3.1.6 For Castings, comply with ASTM B 26, 356.0-T6.
- 2.1.3.1.7 Minimum Thickness of Plates shall be 3mm.
- 2.1.3.1.8 Minimum Extrusions shall be 3mm.

2.1.4 FASTENERS

For interior use, use same basic metal alloy for fasteners as the fastened metal prescribed. Especially for signage and elevator sill plates, and the like, make sure that the fastener does not corrode faster than the metal being fastened.

Use zinc-coated fasteners for exterior use or where built into exterior walls. Performance Requirements of Fasteners shall be as follows:

- 2.1.4.1.1.1 When using Bolts and Nuts, use Regular hexagon head type compliant with ASTM A 307, Grade A.
- 2.1.4.1.1.2 When using Lag Bolts, use Square head type FS FF-B-561.

- 2.1.4.1.1.3 When using Machine Screws, use Cadmium plated steel FS FF-S-92.
- 2.1.4.1.1.4 When using Wood Screws, use Flat head carbon steel FS FF-S-111.
- 2.1.4.1.1.5 When using Plain Washers, use Round, carbon steel, FS FF-W-92.
- 2.1.4.1.1.6 When using Toggle Bolts, use Tumble-wing type, FS FF-B-588, type, class, and style as required
- 2.1.4.1.1.7 When using Lock Washers, use Helical spring type carbon steel, FS FF-W-84
- 2.1.4.1.1.8 When drilling expansion anchors, comply with FS FF-S-325, Group VIII anchors, expansion, non-drilling, Type I (Internally threaded tubular expansion anchor) and machine

2.1.5 PAINT

Use shop primers to ensure protection of metal fabrications. Use primers as follows:

- 2.1.5.1 For ferrous metals, use fast-curing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated. Primer should be compatible with field-applied topcoats and compliant to requirements of FS TT-P-645.
- 2.1.5.2 For galvanized steel, use primers with zinc-dust, zinc-coated steel compatible for priming zinc-coated steel and finish paint systems as indicated. Comply with SSPC-Paint 5.

2.1.6 CONCRETE FILL AND REINFORCEMENT

Comply with Division 03 Sections for normal weight concrete. Use reinforcements compliant with ASTM A615, Grade 60 unless otherwise directed.

3. PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

Comply with Division 05 00 Metal Fabrications Section of this Specifications.

3.2 GENERAL INSTALLATION

Comply with Division 05 50 0 Metal Fabrications Section of this Specifications.

3.3 GENERAL FABRICATION

Comply with Division 05 50 0 Metal Fabrications Section of this Specifications.

3.4 GENERAL FINISHES

- 3.4.1 Prepare steel fabrications to receive the finishes as specified in drawings.
- 3.4.2 Exposed fasteners shall be finished of the same material as the fastened metal including color and texture of the steel fabrication, unless otherwise indicated in the approved drawings.

3.5 ORNAMENTAL METALS, MISCELLANEOUS TRIMS, and OTHER DECORATED ITEMS

- 3.5.1 Provide stainless steel sections with finish profile and size as intended in detailed architectural drawings.
- 3.5.2 For signage as indicated in architectural working drawings, use stainless steel in hairline finish, cut and jointed *seamlessly to a homogenous appearance. Anchor ornamental signage plates to structural concrete and follow plate thicknesses, impressions and depressions as specified in architectural detail drawings.*
- 3.5.3 Buff, clean, and smoothen signage edges.
- 3.5.4 Protect finished metals from damage due to construction. Apply strippable temporary protective covering on completed and installed work to be removed only upon substantial completion of the project.
- 3.5.5 Touch up and restore all finish surfaces damaged during installation work.

3.6 MISCELLANEOUS HARDWARE

The contractor shall furnish all custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for all rough support and anchoring work.

END OF SECTION

DIVISION 06
WOOD AND PLASTICS

06 00 00	DIVISION 6 WOOD AND PLASTICS
06 10 0	Rough Carpentry

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

This section includes provisions on:

- 1.2.1 Marine plywood backing requirements
- 1.2.2 Marine plywood underlayment for solid surface material countertops
- 1.2.3 Marine plywood backing for mirrored glass and cladding

1.3 RELATED SECTIONS

- 1.3.1 Interior Architectural Woodwork
- 1.3.2 Mirrors
- 1.3.3 Solid Surface Countertops

1.4 GENERAL PROVISION

Unless otherwise specified, C-Marine Type Plywood. Verify plywood thickness per purpose.

1.5 QUALITY ASSURANCE

Apply non-toxic wood preservatives on the backing surface.

2. PART 2 PRODUCTS

2.1 BACKING FOR MIRRORED GLASS

Unless otherwise specified, Use 5mm C-Marine Type Plywood, more or less 6.7kgs per piece.

2.2 ACCESS PANEL MATERIAL

Marine Plywood may be used as an alternative to steel access panels for dry areas not exposed to high levels of humidity. Unless otherwise specified, Use 11mm C-Marine Type Plywood, more or less 14.7kgs per piece. Use treated Tanguile or Lawaan wood as frames. Comply with Division 9 Interior Painting Section for finish preparations.

2.3 SOLID SURFACE COUNTERTOP

Unless otherwise specified, Use 18 mm C-Marine Type Plywood, more or less 24.0kgs per piece. Apply preservatives.

3. PART 3 EXECUTION

3.1 GENERAL INSTALLATION

Cut wood and plywood framing conforming to dimensions of the material to be supported. Refer to technical working drawings for finish material dimensions. When splicing is necessary, ensure that splices do not fall between bearing points. Surface backing to receive nails, bolts, and similar fasteners should be relatively homogenous in area or point of fastening.

3.2 NAILING

Minimum distances between nails and wood edges should be at least $\frac{1}{2}$ the nail length. Drill holes where necessary to prevent wood splitting. Use nail sizes appropriate to the thickness of the backing material and such that penetration to the second material is not less than $\frac{1}{2}$ of the nail length.

3.3 LAG SCREWS

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

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

1.2 SUMMARY

This section includes provisions on architectural woodwork, namely:

- 1.2.1 Built-in cabinet works, drawers and countertops for pantries, toilets, and kitchens
- 1.2.2 Custom cabinetry/woodwork for pigeon holes
- 1.2.3 Custom wooden paneling works

1.3 RELATED SECTIONS

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

1.4 GENERAL PROVISION

- 1.4.1 Refer 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.
- 1.4.2 No hand-cut wood allowed. All woodwork shall be machine-cut.
- 1.4.3 Include 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.
- 1.4.4 Coordinate 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

- 1.5.1 Keep completed and installed architectural woodwork free of dust, discoloration, defects, and similar irregularities throughout construction.
- 1.5.2 Restore 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

1.6.1 PRODUCT 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.

1.6.2 EXECUTION APPROVAL ATTACHMENTS

1.6.3 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, veneer layers, surface finish, hardware type, miter joints, etc.

1.7 QUALITY ASSURANCE

1.7.1 For 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:

- 1.7.2 Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
- 1.7.3 Notify Architect seven days in advance of dates and times when mockups will be installed.
- 1.7.4 Demonstrate the proposed range of aesthetic effects and workmanship.
- 1.7.5 Obtain Architect's approval of mockups before starting interior architectural woodwork fabrication and installation on other units.
- 1.7.6 Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
- 1.7.7 Demolish and remove mockups when directed.
- 1.7.8 Approved 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:

- 2.1.1 Methyl Bromide and Chloropicrin
- 2.1.2 Chlorpyrifos Fenitrothion
- 2.1.3 Cupirichydroxide.
- 2.1.4 And 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.

2.5.1 When using hinges, use self-closing concealed hinges. Piano type? :D

2.5.2 Always use Cabinet and Drawer Pulls

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

2.5.4 Finish 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

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

3.2.2 Clean woodwork on all exposed and semi exposed surfaces.

3.2.3 Touch up applied finishes to restore defective areas.

3.2.4 Provide 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

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

1.2 SUMMARY

This section includes provisions on architectural woodwork, namely:

- 1.2.1 Custom ornamental wood panels for movable walls

1.3 RELATED SECTIONS

- 1.3.1 Interior Architectural Woodwork
- 1.3.2 Flush Wood Doors

1.4 GENERAL PROVISION

- 1.4.1 Refer 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.*
- 1.4.2 Paneling includes wood furring, blocking, and shims for installing paneling, unless concealed within other construction before paneling installation
- 1.4.3 Include 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.
- 1.4.4 Coordinate 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

- 1.5.1 Keep completed and installed architectural woodwork free of dust, discoloration, defects, and similar irregularities throughout construction.
- 1.5.2 Restore 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

1.6.1 PRODUCT 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.

1.6.2 EXECUTION 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

1.7.1 Fabricate 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:

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

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

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

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

1.7.6 Demolish and remove mockups when directed.

1.7.7 Approved 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:

2.1.1 Methyl Bromide and Chlorpicrin

2.1.2 Chlorpyrifos Fenitrothion

2.1.3 Cupirichydroxide.

2.1.4 And other harmful chemicals.

2.2 FINISH

2.2.1 Comply 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.

2.2.2 For Backpriming: 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 backpriming when surfaced with plastic laminate.

2.2.3 Confirm with Project specifics as to use of lacquer or varnish finish by means of sample approval.

2.2.4 Match approved sample stains for colors.

2.2.5 Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed grain wood before staining and finishing.

2.2.6 Do not apply filler to open-grain woods.

2.2.7 Apply wash-coat sealer after staining and before filling.

2.2.8 Confirm 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

3.1.1 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.