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

1. PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1Technical Architectural Drawings
1.1.2Specifications
1.1.3Schedule 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

1.3.1Concrete Finishes
1.3.2Thermal and Moisture Protection

1.4 GENERAL PROVISION

1.4.1Ensure that all concrete mixes follow the specifications of structural designers and architects.
1.4.2Do 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 contactor.
1.4.3No concrete topping should be less than 50mm thick.

1.5 SUBMITTALS

As required by structural consultant.

1.5.1PRODUCT 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.

1.5.2EXECUTION 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

2.3.1Epoxy 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 Dust proofer 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

3.2.1When topping hardened concrete, remove dirt, loose material, oil, grease, paint or other contaminants. Ensure that the surface is washed clean.
3.2.2Roughen surface of base slabs that are not suitable for bonding performance by chipping or scarring before cleaning.
3.2.3Before 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.
3.2.4For reinforced toppings, maintain position of reinforcing mesh through necessary chairs or supports.
3.2.5Consistently 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

3.5.1Protect 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.
3.5.2Begin 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

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

1.2 SUMMARY

This section includes 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

1.3.1Anchorage Devices
1.3.2Joint Sealants

1.4 GENERAL PROVISION

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

1.5.1Upon 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.
1.5.2Do not accept damaged or unsealed materials during delivery.
1.5.3Store cementitious materials off the ground, under cover, and in a dry location.

1.6 SUBMITTALS

1.6.1PRODUCT 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.

1.6.2EXECUTION APPROVAL ATTACHMENTS
1.6.3Submit 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

1.7.1Source exposed masonry units from a single source and ensure uniform texture and color.
1.7.2Source mortar materials from a single supplier to ensure material compatibility.
1.7.3Ensure that masonry units are compliant to fire performance characteristics as require by the code. Employ material that has undergone testing compliance with ASTM E 119.
1.7.4Do 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.
1.7.5Do not apply concentrated loads on the masonry assembly for at least 12 hours after erection.
1.7.6Prevent 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.
1.7.7Do 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.
1.7.8Do not lay masonry units with ground stains.

2. PART 2 PRODUCTS

2.1 MORTAR AND GROUT MATERIALS

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

2.2 CONCRETE HOLLOW BLOCKS

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

2.3 EXPOSED CONCRETE MASONRY UNITS

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

2.4 JOINT REINFORCEMENT, TIES AND ANCHORS

2.4.1Where 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.
2.4.2Use galvanized metallic accessories appropriate to the load requirements of the assembly.

3. PART 3 EXECUTION

3.1 INSPECTION AND PREPARATION

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

3.2 PLACEMENT OF UNITS

3.2.1Lay 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.
3.2.2Webs 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.
3.2.3Spread out full mortar bed including areas under cells, for starting course on footings where cells are not to be grouted.
3.2.4Vertical cells to be grouted are aligned and unobstructed openings for grout are provided in accordance with drawings.
3.2.5Keep cavity airspace and weep holes clean or mortar, clean out promptly if mortar falls into cavity airspace or plugs weep holes.
3.2.6In-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 boars so that mortar is not deflected onto masonry.
3.2.7At end of each workday turn scaffold boards so that rainwater is not deflected onto masonry.
3.2.8Place Concrete Masonry Unit such that mortar does not run down the face of the wall or smear the masonry face.
3.2.9Adjustments: 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

3.3.1Do not use calcium chloride in mortar or grout. Use only the specified additives to mortar and grout mixes.
3.3.2Mixing: Combine and thoroughly mix cementitious materials, water, aggregates and admixtures
3.3.3 in a mechanical batch mixer.
3.3.4Comply 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.
3.3.5Mortar for Unit Masonry: Comply with ASTM C-270, Proportion Specifications, Cement-Lime Mortar, for types of mortar required, unless otherwise indicated.
3.3.6Use Type N mortar for interior non-load bearing walls.
3.3.7Air Content: 8-14% Maximum.
3.3.8Colored Aggregate Mortar: Produce mortar of color required by use of colored aggregates in combination with selected cementitious materials.
3.3.9Color: 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.

1.5.3Do 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.

1.5.4Ensure 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 SG-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
1.6.1Ensure that assemblies are protected from corrosion due to weather and chemical exposure. Apply protecting films and keep materials away from corrosives.
1.6.2When 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.
1.6.3Regularly clean surfaces where fabricated assemblies are completed, stored or kept. Ensure that the areas of work and storage are free of corrosive substances.
1.6.4Clean 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

1.7.1PRODUCT 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.

1.7.2EXECUTION 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

1.8.1Ensure fabricators are experienced in fabricating metal assemblies similar to the items indicated in the technical working drawings of this project.
1.8.2Ensure installers are equally familiar with fabricators and are in constant communication on the proper installment procedures.
1.8.3Certify 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.
1.8.4The 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.
1.8.5Do 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.

2.1.1GENERAL 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.

2.1.2FOR 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.

2.1.3ALUMINUM

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.

2.1.4FASTENERS

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

2.1.5PAINT

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.

2.1.6CONCRETE 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

3.1.1Properly label metal assemblies, and fixtures such as urinals and lavatories in coordination with labels of receiving anchors to avoid incorrect installations.

3.1.2Coordinate 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

3.2.1Provide 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.

3.2.2Plumb, set, level, align, edge, measure, and layout all metal fabrications from established lines and levels to ensure accurate fabrication and installation.

3.2.3Comply with AWS Code for procedures of manual shielded metal-arc welding for all feld weldng work.

3.2.4Remove all welding flux immediately.

3.2.5Finish all exposed welds to match adjacent metal surfaces.

3.2.6Coat all exposed steel or metal fabrications for corrosion protection.

3.2.7For 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.

3.2.8Pre-drill holes on the metal fabrication to receive exposed bolt anchorage.

3.2.9For 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

3.3.1Comply 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.

3.3.2All angles, surfaces, edges whether smooth or straight shall true to line and levels and consistent with drawings.

3.3.3Shearing and punching of metals must done cleanly and accurately.

3.3.4Buff 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.

3.3.5No sharp, flesh-cutting edges allowed, whether exposed or unexposed.

3.3.6Smoothen exposed welds.

3.3.7Weld corners and seams continuously.

3.3.8Remove welding flux immediately.

3.3.9Fabricate 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

3.4.1Prepare steel fabrications to receive the finishes as specified in drawings.

3.4.2Exposed 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

3.6.1Fabricate 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.

3.6.2All 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.

3.6.3Situate rungs and ladders in the most accessible locations with least visual and traffic obstruction, or as indicated in the working drawings.

3.6.4Do not install ladders and rungs where it becomes inaccessible and unfit for use.

3.6.5Do 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.
3.6.6Submit shop drawings on rungs, ladders, and safety cages and secure approval prior to fabrication and installation.

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

3.8 RAILINGS AND HANDRAILS
3.8.1Fabricate all railings and handrails to comply with all indications on approved shop drawings.
3.8.2Fabricate all assemblies such that splicing and on-site disassembly is minimized.
3.8.3When splicing is necessary due to delivery or installation restrictions, ensure that all units are properly labeled and coordinated for reassembly.
3.8.4Join railing and hand-railing members by butt welding, unless otherwise indicated.
3.8.5At 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.
3.8.6Anticipate all anchorages during fabrications and where possible, ensure a nearly homogenous and sound connection.
3.8.7Especially 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.
3.8.8Grind all joints and anchorages smoothly to match adjacent surfaces.
3.8.9Handrails, 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
3.9.1Provide steel nosing as required in the technical working drawings
3.9.2Only use anti-slip strip and nosing surfaces.
3.9.3Nosing 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.
3.9.4Level all accepting nose strips and use patching compounds to fill cracks, holes, and other depressions or irregularities on the treads/steps.
3.9.5Clean 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.
3.9.6Do not join nosing strip materials. Nosing strips must run homogenously along the tread.
3.9.7Unless 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 divisi accessories.
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

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

1.2 SUMMARY

1.2.1This section includes provisions on 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

1.3.1Exterior Painting
1.3.2Metal Fabrications

1.4 SUMMARY

1.4.1This 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

1.5.1Fabricate all ornamental metals in conformance to design, dimensions, sizes, and other specifications indicated on technical working drawings or as approved by the architect.
1.5.2Ornamental metals shall be delivered on site and installed on the project in its completely finished state.
1.5.3Before fabrication, submit sample swatches of the finished metal showing a complete modular assembly for the approval of the architect.
1.5.4Restore any finishes damaged during installation work.
1.5.5Prior to fabrication, submit Shop Drawings to the Architect of Record for approval. Indicate structural anchorage on the shop drawings.
1.5.6Submit 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.
1.5.7Protect all ornamental work until substantial completion of the project. Ensure that surfaces are free of scratches.
1.5.8Do 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 SG-673, 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."

1.5.9EXTERIOR 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

1.6.1For interior ornamental metal assemblies, ensure that assemblies are protected from corrosion due to weather and chemical exposure.
1.6.2Apply 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.
1.6.3Keep materials away from corrosives especially during the construction phase.
1.6.4When 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.
1.6.5Regularly clean surfaces where fabricated assemblies are completed, stored or kept. Ensure that the areas of work and storage are free of corrosive substances.
1.6.6Clean all metal fabrications and ensure that items are free of marks, bulges, discolorations, prints, finger marks, etc.
1.6.7Exterior 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

1.7.1PRODUCT 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.

1.7.2EXECUTION 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

1.8.1Ensure 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.

1.8.2Ensure installers are equally familiar with fabricators and are in constant communication on the proper installment procedures.

1.8.3Certify 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.

1.8.4The 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.

1.8.5Contract experienced firms in the application of finish coatings to high-performance metal surfaces such as aluminum extrusions.

1.8.6Do 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.

2.1.1GENERAL 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.

2.1.2FOR 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.

2.1.3ALUMINUM

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.

2.1.4FASTENERS

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

2.1.5PAINT

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.

2.1.6CONCRETE 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 50 0 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

3.4.1Prepare steel fabrications to receive the finishes as specified in drawings.
3.4.2Exposed 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

3.5.1Provide stainless steel sections with finish profile and size as intended in detailed architectural drawings.
3.5.2For 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.
3.5.3Buff, clean, and smoothen signage edges.
3.5.4Protect 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.
3.5.5Touch 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

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

1.2 SUMMARY

This section includes provisions on:
1.2.1Marine plywood backing requirements
1.2.2Marine plywood underlayment for solid surface material countertops
1.2.3Marine plywood backing for mirrored glass and cladding

1.3 RELATED SECTIONS

1.3.1Interior Architectural Woodwork
1.3.2Mirrors
1.3.3Solid 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 ½ 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 ½ of the nail length.

3.3 LAG SCREWS