

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 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

- 3.2.1 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 boars 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.