1.2.13.	ASTM A185	American Society for Testing Materials - Welded Steel Wire Fabric for Concrete Reinforcement.
1.2.14.	ASTM A615	Deformed and Plain Billet Steel for Concrete Reinforcement.
1.2.15.	ASTM C33	Concrete Aggregates.
1.2.16.	ASTM C330	Light Weight Aggregates for Structural Concrete.
1.2.17.	ASTM C94	Ready Mixed Concrete.
1.2.18.	ASTM C150	Portland Cement
1.2.19.	ASTM C260	Air-entraining Admixtures for Concrete.
1.2.20.	ASTM C309	Liquid Membrane-Forming Compounds for Curing Concrete.
1.2.21.	ASTM D2103	Polyethylene Film and Sheeting.
1.2.22.	FS TT-C-800	Curing Compounds, Concrete for New and Existing Surfaces.
1.2.23.	ASTM D1751	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.
1.2.24.	ASTM D1752	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
1.2.25.	ASTM D994	Preformed Expansion Joint Filler for Concrete (Bituminous Type).
1.2.26.	ASTM C494	Chemical Admixtures for Concrete.
1.2.27.	ASTM E1155	Test Method for Determining Floor Flatness and Levelness using the F Number
1.2.28.		American Welding Society, AWS D1.4 – Structural Welding Code for Reinforcing Steel
1.2.29.		Department of Works and Highway, DPWH; Standard Specifications, Volume II, 2004

1.3 SUBMITTALS

1.3.1 General: All submittals for approval as indicated herein shall be in accordance to the provisions under General Conditions of the Contract Documents.

1.3.2 Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent Work.

1.3.3 Provide mix designs as required herein and include laboratory test reports of trial strength and shrinkage tests. Furnish and deliver samples of cement and aggregates as selected by the Engineer for testing and analysis. Submit for the Engineer's approval the laboratory, ready-mix plant and concrete technologist that the Contractor intends to engage to design the concrete mixes.

1.3.4 Submit a delivery ticket with each batch of concrete delivered to the site in accordance with the requirements of ASTM C94.

1.3.5 Shop Drawings: Indicate reinforcement sizes, spacings, locations and quantities of reinforcing steel and wire fabric, bending and cutting schedules, splicing, and supporting and spacing devices. Include concrete placement schedule, method, sequence, quantities, location, and boundaries

1.3.6 Provide data on joint devices, expansion and control joint materials, attachment accessories, admixtures, curing and sealing materials. Submit drawings showing proposed locations of control joints in slab-on-grade, where not shown on Drawings.

1.4 DESIGN REQUIREMENTS

1.4.1 Comply with the construction notes and standard details as indicated in Structural Drawing, first page of the drawing, for the design provisions. Use high strength concrete for areas as designated in the construction notes, except, concrete works for slab on grade, curbs and as indicated on Drawings and notes.

1.4.2 Design and construct formwork, shoring and bracing to conform to Code requirements; resultant concrete to conform to required shape, line and dimension.

1.4.3 Provide expansion joints, control joints, construction joints, and isolation joints to prevent uncontrolled stress cracks in the structure and according to the latest engineering standards.

1.5 QUALITY ASSURANCE

1.5.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions. Perform work in accordance with ACI301 and applicable referenced documents.

1.5.2 The Contractor shall select a qualified concrete supplier capable of meeting project requirements as specified herein. Concrete supplier shall hold a valid certificate of conformance for concrete production facilities Philippine Concrete Industry Association and/or American Concrete Institute, ACI-RP.

1.5.3 Acquire cement and aggregate from same source for all work.

1.5.4 Conform to ACI 305R or ACI 306R when concreting during hot or cold weather, as appropriate.

1.5.5 Provide continuous on-site monitoring by a qualified inspection agency during all phases of construction. Inspection agency shall provide written reports of all inspections. Inspections shall be in conformance with the provisions of the Contract Documents.

1.6 DELIVERY, STORAGE AND HANDLING

1.6.1 Cement shall be stored in weather tight buildings, bins, or silos which will exclude moisture and contaminants.

1.6.2 Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of like aggregates. To ensure that this condition is met, any test for determining conformance to requirements for cleanliness and grading shall be performed on samples secured from the aggregates at the point of batching.

1.6.3 Natural or manufactured sand shall be allowed to drain until it had reached relatively uniform moisture content before it is used.

1.6.4 Admixture shall be stored in such a manner as to avoid contamination evaporation, or danger. For those used in the form of suspension or non-stable solutions, agitating equipment shall be provided to assure thorough distribution of the ingredients. Liquid admixture shall be protected from freezing and from temperature changes which would adversely affect their characteristics.

PART 2 PRODUCTS

2.1 Cement.

Portland cement shall conform to the "SPECIFICATIONS FOR PORTLAND CEMENT" (ASTM C150 Latest Revision) for Type I Portland Cement.

2.2 Admixture.

Admixture to be used in concrete, when required or permitted shall conform to the "SPECIFICATIONS FOR CHEMICALS ADMIXTURES FOR CONCRETE" (ASTM C494) for water-reducing, retarding and accelerating admixture or to the SPECIFICATIONS FOR FLY ASH AND RAW OR CALCINED NATURAL POZZOLANS FOR USE IN PORTLAND CEMENT (ASTM C618) for Pozzolanic admixtures.

2.3 Concrete Aggregates.

Concrete aggregates shall be well-graded, clean, hard particles of gravel, or crushed rock conforming to the "SPECIFICATIONS FOR CONCRETE AGGREGATES" (ASTM -C33 Latest Revision).

2.4 Water.

Mixing water for concrete shall be clean and free from injurious amount of oil, acids, alkali, organic materials or other substances that maybe deleterious to concrete or steel.

2.5 Reinforcement.

Shall be in accordance with Section 032000.

2.6 Accessories.

Shall be in accordance with Section 031500.

PART 3 EXECUTION

3.1 Proportioning

3.1.1 General.

Concrete for all parts of the work shall be of the specified quality capable of being placed without excessive segregation.

3.1.2 Strength.

The specified compressive strength of the concrete for each portion of the structure shall be as tabulated on S-1 of the Structural Drawings.

3.1.3 Durability.

Cast in place concrete for portions of structures to be watertight shall have a water-cement ratio not exceeding 0.48. For pre-stressed concrete, it shall be demonstrated by test that the mixing water of the concrete including that contributed by the aggregates and any admixture used, will not contain a deleterious amount of chloride ion.

3.2 Slump. Unless otherwise permitted and specified the concrete shall be proportional to have following maximum slump:

100 mm for fc'	=	21 MPa or less
75 mm for fc'	=	28 MPa to 35 MPa
50 mm for fc'	>	35 MPa but not more than 42 MPa

A tolerance of up to 25 mm above the indicated maximum shall be allowed for individual batches provided the average for all batches or the most recent 10 batches tested, whichever is fewer, does not exceed the maximum limit. Concrete of lower than usual slump maybe used provided it is properly placed and consolidated. The slump shall be determined by the "TEST FOR SLUMP OR PORTLAND CEMENT" (ASTM C143).

3.3 Maximum size of concrete aggregates. The nominal size of the aggregates shall not be more than the following:

25 mm ø for footing and tie beams
20 mm ø for slabs, beams, and columns

3.4 Admixtures. If required or permitted, admixtures used shall be subject to the following limitations:

3.4.1 The amount of calcium chloride shall not exceed 2% by weight of cement.

3.4.2 All admixtures shall be used in accordance with the manufacturer's instructions except as otherwise specified herein.

3.5 Selection of Proportions.

The proportions of ingredients shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcements by the methods of placing and consolidation employed on the work, but without permitting the materials to segregate in excessive free water to collect on the surface. The proportions of ingredients shall be selected to produce the proper placeability, durability, strength and other required properties. To method of measuring concrete materials shall be such that the proportions can be accurately controlled and checked at any time during the work. Measurements of materials for ready mixed concrete shall conform to the "STANDARD SPECIFICATION FOR READY MIXED CONCRETE (ASTM C194, Latest Revision) above applicable.

3.6 Method of Determination Concrete Strength

The Contractor shall submit design mixes from samples made in accordance with 'STANDARD METHOD OF MAKING AND CURING CONCRETE COMPRESSION AND FLEXURE TEST SPECIMENS IN THE LABORATORY" (ASTM C192, Latest Revision) for each strength required, stating the proposed slump and the proportional

weight of cement, saturated surface-dry aggregates and water. Samples shall be tested after 7, 14, and 28 days.

3.7 Formworks

3.7.1 General. Forms shall be used wherever necessary to confine the concrete and shape it to the required dimensions. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall have sufficient rigidity to maintain specified tolerances. Earth cuts should not be used as forms for vertical surfaces unless required or permitted.

3.7.2 Design and Installation of Formworks.

A. The design and engineering of the formworks, as well as its construction, shall be the responsibility of the Contractor.

B. Formworks shall be designed for the loads, lateral pressure and allowable stresses outlined in the "RECOMMENDED PRACTICE FOR CONCRETE FORMWORK (ACI 347) and for design consideration, wind load, allowable stresses and other applicable requirements of the local building code.

C. Forms shall be sufficiently tight to prevent loss of mortar from the concrete.

D. To maintain specified tolerances, the formwork shall be cambered to compensate for anticipated deflection in the formworks prior to hardening of concrete.

E. Temporary opening shall be provided at the base of column form and wall forms and at other points where necessary to facilitate cleaning and observation immediately before concrete is placed.

F. Form accessories to be partially or wholly embedded in the concrete such as ties and hangers shall be of commercially manufactured type. Form ties shall be constructed so that the ends or end fastener can be removed without causing appreciable spalling at faces of concrete. After the ends or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 2 diameters or twice the minimum dimension of the tie from the form surfaces of concrete to be permanently exposed to view except that in no case shall this distance be less than 20 mm. When the formed face of concrete is not permanently exposed to view, form ties maybe cut-off flush with formed surfaces.

G. At construction joints, contact surface of the form sheathing for flush surfaces exposed to view shall overlap the hardened concrete in the previous placement by not more than 25 mm. The forms shall be held against the hardened concrete to prevent offsets or loss of mortar at the construction joint and to maintain a true surface.

H. Formworks shall be so anchored to shore or other supporting surfaces or members that upward or lateral movement of any part of the formwork system during concrete placement is prevented.

I. All formworks shall be made of sheet metal or phenolic board and supported by steel post or equivalent.

3.7.3 Tolerances.

Unless otherwise specified, formwork shall be constructed so that the concrete surfaces shall conform to the following tolerance limits

A.	Variation from plumb In the lines and surface of columns and walls: In any 3 meters in length In any story of 6.0 m max In 12.0 meters or more	 6 mm 10 mm 12 mm
B.	Variation from the level or from the grades indicated on the drawings: a. In slab, soffits, cladding, beam soffit and parapets: In any 3.0 length In any bay or in any 6.0-meter length 10 Max. for the entire length b. For exposed lintels, sills, parapets, horizontal, grooves, and other conspicuous line. In any bay of 6.0 m (max) Max. for the entire length	 6 mm 20 mm 6 mm 12 mm
C.	Variations of the linear building lines from established position in plan and related position of columns, walls and partitions: In any bay In any 6.0 meter of length Max. for the entire length	 6 mm 6 25 mm
D.	Variation in the size and location of sleeves floors openings and wall openings	6 mm
E.	Variations in cross sectional dimensions of columns, beams, and thickness of slab and walls: Minus Plus	 6 mm 12 mm
F.	Footings a. Variation in dimension in Minus Plus b. Misplacement or eccentricity: Two (2) percent of the footing width in the direction of misplacement but not more than 50 mm c. Thickness Decrease in specified thickness Increase in specified thickness	 12 mm 50 mm 5 % No Limit
G.	Variation in Steps: a. In flight of stairs Rise Tread b. In consecutive steps Rise Tread	 ± 3 mm ± 6 mm ± 1.5mm ± 6 mm

3.7.4 Preparation of Form Surfaces

A. All surfaces of forms and embedded materials shall be cleaned of any accumulated mortar from previous concreting and of all other foreign materials before concrete is placed in them.

B. Before placing of concrete, the surfaces of the forms shall be covered with an approved coating materials that will effectively prevent absorption of moisture and prevent bond with the concrete, and will not stain the concrete surface.

3.7.5 Removal of forms

A. When repair of surface defects or finishing is required at an early stage, forms shall be removed as same as the concrete has hardened sufficiently to resist damage from removal operation.

B. Formworks for columns, walls, sides of beams and other part not supporting the weight of the concrete has hardened sufficiently to resist damages from removal operations.

C. Forms and shoring in the formwork used to support the weight of concrete in beams slabs and other structural members shall remain in place until the concrete has reached the minimum strength specified in the structural drawings for removal of forms and shoring.

3.7.6 Reshoring

A. When reshoring is permitted or required the operations shall be planned in advance and shall be subject to the approval of the Engineer/Architect while reshoring is underway, no live load shall be permitted on the new construction.

B. In no case during reshoring shall concrete in beam, slab, column or any other structural member be subjected to combined dead and construction loads in excess of the loads permitted by the engineer for the developed concrete strength at the time of reshoring.

C. Reshores shall be placed as same as practicable after stripping operations are complete but in no case later than the end of the working day on which stripping occurs.

D. Reshores shall be tightened to carry their respective loads without overstressing the construction.

E. Reshores shall remain in place until the concrete being supported have reached the specified strength.

F. Floors supporting shores under newly placed concrete shall have their original supporting shores left in place or shall be reshored. The reshoring system shall have a capacity sufficient to resist the anticipation loads and in all cases shall have a capacity equal to at least one half of the capacity of the shoring system above. The reshores shall be located directly under a shore position above unless other locations are permitted.

G. The reshoring shall extend over a sufficient number of stories (at least 2 floors) to distribute the weight of the newly placed concrete, forms and construction live loads in such a manner that the design super imposed loads of the floors supporting shores are not excluded.

3.7.7 Removal strength.
Formworks or re-shoring can be removed when test cylinders, field cured along with the concrete they represent have reached the require strength as specified in the construction notes. (S-1)

3.8 Reinforcement and Placing shall be in accordance to Section 03200, Concrete Reinforcement.

3.9 Joints and Embedded Items. All sleeves, inserts, anchors and embedded items required for adjoining work or for its support shall be placed prior to concreting in accordance to Section 031500. Expansion joint material, waterstop and other embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts and anchor slots shall be filled temporarily with readily available material to prevent the entry of concrete into the voids.

3.10 Production of Concrete

3.10.1 Ready-mixed concrete. Except as otherwise provided in this section, ready mixed concrete shall be batched, mixed and transported in accordance with "SPECIFICATIONS FOR READY-MIXED CONCRETE" (ASTM C94). Plant equipment and facilities shall conform to the "check list for Certification of Ready-Mixed Concrete Production Facilities" of the National Ready-Mixed Concrete Association.

3.10.2 Site Mixed Concrete. No hand mixing shall be allowed except in case of emergency, such as mixer breakdown during concreting operations and shall stop at the first allowed construction joints. All concrete shall be machine mixed for at least 1-1/2 minutes after all materials including water are in mixing drums. The mixer shall be of an approved size and type which will guarantee a uniform distribution of material throughout the mass.

3.10.3 Re-tampering of Concrete shall not be permitted. Concrete shall be mixed only in quantities for immediate use. Concrete which has set shall not be retampered but shall be discarded. When concrete arrived at the project with slump below that suitable for placing, as indicated by specifications, water maybe added only if neither maximum permissible water-cement ratio nor the maximum slump is exceeded. The water shall be incorporated by additional mixing equal to at least half of the total mixing required. An addition of water above that permitted by the limitation on water-cement ratio shall be accompanied by a quantity of cement sufficient to maintain the proper water-cement ratio. Such addition shall be authorized by the Engineer/Architect.

3.11 Placing

3.11.1 Preparation before placing.
Hardened concrete and foreign materials shall be removed from the inner surfaces of the conveying equipment. Semi-porous subgrades shall be sprinkled sufficiently to eliminate suction or porous subgrade shall be sealed in an approved manner.

3.11.2 Conveying

Concrete shall be handled from the mixers to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients and in "a manner which will assure that the required quality of the concrete is maintained. Conveying equipment shall be approved and shall be of the size and design such that detachable setting concrete shall not occur before adjacent concrete is placed. Conveying equipment shall be cleaned at the end of each operation or work day. Conveying equipment and operations shall conform to the following additional requirements.

A. Truck mixer's, agitators, and non-agitating units and their manner of operation shall conform to the applicable requirements of SPECIFICATIONS FOR READY-MIXED CONCRETE" (ASTM C94).

B. Chutes shall be metal or metal-lined and shall have a slope not exceeding 1 vertical to 2 horizontals and not less than 1 vertical to 3 horizontals. Chutes more than 6.0 m long and chutes not meeting the slope requirement maybe used provided they are discharged into hopper before distribution.

C. Pumping or pneumatic conveying equipment shall be of suitable kind with adequate pumping capacity. Pneumatic placement shall be controlled so that segregation is not apparent in the discharge of concrete. The loss of slump in pumping or pneumatic conveying equipment shall not exceed 50 mm. Concrete shall not be conveyed through pipe made of aluminum or aluminum alloy.

3.11.3 Depositing

Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located as approved by the Structural Engineer. Placing shall be carried on at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreader in forms shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. They may receive embedded in the concrete only if made of metal or concrete and if prior approval has been obtained. Placing of concrete in supported elements shall not be started until the concrete previously placed in columns and walls is no longer plastic and has been in place at least two hours. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to re-handling or flowing. Concrete shall not be subjected to any procedure which will cause segregation. All concrete shall be consolidated by vibration, spading, rodding or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting or planes of weakness. Unless adequate protection is provided and approval of the Engineer/Architect is obtained, concrete shall not be placed during rain.

3.11.4 Bonding

The hardened concrete of construction joints and of joints between footings and walls or columns, between walls or columns and beams or flows they supported, joint in unexposed walls and all others not mentioned below shall be dampened (but not saturated) immediately prior to placing of fresh concrete. The hardened concrete of joints in exposed work; joints in the beams, girders, joints, and slabs; and joints in works designed to contain liquid shall be dampened (but not saturated) and then thoroughly covered with a coat of cement grout of similar proportions to the mortar in the concrete. The grout shall be as thick as possible in vertical surfaces and least 12 mm thick in horizontal surfaces. The fresh concrete shall be placed before the grout has attained its initial sets. Joint receiving an adhesive shall have been prepared and adhesive applied in accordance with the Manufacturer's recommendations prior to placing of fresh concrete.

3.12 Repair of Surface Defects

3.12.1General.

Surface defects, including holes, unless otherwise specified by the contract documents shall be repaired immediately after forms are removed.

3.12.2Repair of Defective Areas.

All honeycombed and defective concrete shall be removed down to sound concrete. If chipping is necessary, the edges shall be perpendicular to the surface or slightly undercut. No featheredges shall be permitted. The area to be patched and an area at least 150 mm wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. A bonding grout shall be prepared using a mix of approximately 1-part cement to 1-part fine sand passing a No 30 mess, mixed to the consistency of thick cream and then brushed into the surface. The patching mixture shall be made of the same materials and of approximately the same proportions as used for concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than 1-part cement to 2 1/2 parts and by sand loose volume. White portland cement shall be substituted for a part of the gray portland cement in exposed concrete in order to produce a color matching the color of the surrounding concrete, as determined by trial patch. The quantity of mixing water shall be no more than necessary for handling in advances and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached even consistency.

After surface water has evaporated from the area to be patched, the bond coat shall be will brushed unto the surface. When the bond coated begins to lose the water sheen, the provided patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and stuck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least 1 hour before being finally finished. The patched area shall be kept damp for 7 days. Metal toll shall not be used in finishing a patch in formed wall which will be exposed.

END OF SECTION

DIVISION 03 00 00
SECTION 03 35 00

CONCRETE FINISHING

PART 1 GENERAL

1.1 SCOPE OF WORK

The work to be undertaken under this section shall comprise the furnishing of all labor, materials, equipment, plant and other facilities and the satisfactory performance necessary to complete concrete finishes which include exposed surfaces of the completed structure or building that requires special concrete materials, formwork, placement or treatment to obtain specified architectural appearance indicated on the drawings and specifications conforming to the Contract Documents provisions.

1.2 REFERENCES

Comply with the provisions under General Conditions of the Contract Documents and Manufacturer's instructions. Reference the following standards as applicable:

1.2.1 ACI 301 - Specifications for Structural Concrete for Buildings
1.2.2 American Concrete Institute ACI 303R Architectural Cast-in-Place Concrete
1.2.3 ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete
1.2.4 ASTM C494 Chemical Admixtures for Concrete

1.3 SUBMITTALS

1.3.1 General: All submittals for approval as indicated herein shall be in accordance to the provisions under General Conditions of the Contract Documents.
1.3.2 Shop Drawings: Design and prepare detailed drawings showing the forming proposed for architectural concrete surfaces.
1.3.3 Mockups: Cast mockup of pour to demonstrate proposed surface finish, texture, and color. Use job. Maintain sample panel exposed to view for duration of Project, after Architect's the same cement brand, aggregate type and construction methods that will be used on the acceptance of visual qualities.

1.4 QUALITY ASSURANCE

1.4.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.
1.4.2 ACI Publications: Comply with ACI 301.
1.4.3 Finisher Qualifications: Company specializing in performing the work of this Section with a minimum of 5-years documented experience or not less than 10 projects with similar quantity of surface area for colored or imprinted concrete.

PART 2 PRODUCTS

2.1 Slip-Resistive Exposed Aggregate Finish: 20mm gravel, coarse seeded application.

2.2 Dry-Shake Floor Hardener: Factory-packaged dry combination of Portland cement, graded quartz aggregate, and plasticizing admixture.

2.3 Concrete Floor Sealer: Clear, water-based, non-yellowing, blush-resistant concrete sealer.

2.4 Epoxy floor coating: high performance, two-component epoxy-based coating with excellent resistance to abrasion, impact and chemicals.

PART 3 EXECUTION

3.1 Finishing Formed Surfaces

3.1.1 Rough-Formed: As-cast texture.

A. The resulting surface shall be true and uniform. All repaired surfaces, the appearance of which is not satisfactory to the Architect/Engineer, shall be "rubbed" as specified herein.

3.1.2 Smooth-Formed Finish: As-cast texture where forms are arranged in an orderly and symmetrical manner with a minimum of seams.

A. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly.

B. Immediately following the removal of forms, all fins and irregular projection shall be removed from all surfaces except from those which are not to be exposed or are not to be waterproofed. On all surfaces the cavities produced by form ties and all other holes, honeycomb spots, broken corners or edges and other defects shall be thoroughly cleaned and after having been kept saturated with water for a period of not less than three hours they shall be carefully pointed and made true with a mortar of cement and fine aggregate mixed in the proportions used in the grade of the concrete being finished. Mortar used in pointing shall not be more than one hour old. All construction and expansion joints in the completed work shall be left carefully tooled and free of all mortar and concrete. The joint filler shall be left exposed for its full length with clean and true edges.

3.1.3 Rubbed Finish: Apply the following to smooth-formed finished concrete.
Smooth-Rubbed Finish: After removal of forms, the rubbing of concrete shall be started as soon as its condition will permit. Immediately before starting this work, the concrete shall be kept thoroughly saturated with water for a minimum period of three hours. Sufficient time shall have elapsed before the wetting down to allow the mortar used in the pointing of road holes and defects to thoroughly set. Surfaces to be finished shall be rubbed with a minimum coarse carborandum stone using a small amount of mortar on each face. The mortar shall be composed of cement and fine sand mixed in the proportions used in the concrete being finished. Rubbing shall be continued until all form marks,

projections and irregularities have been removed, all voids have been filled, and a uniform surface has been obtained. The face produced by this rubbing shall be left in place at this time. After all concrete above the surface being created has been cast; the final finish shall be obtained by rubbing with a fine carborandum stone and water. This rubbing shall be continued until the entire surface is of smooth texture and uniform color. After the final rubbing is completed and the surface has dried, it should be rubbed with burlap to remove loose powder and shall be left free from all unsound patches, paste, powder and objectionable marks.

3.1.4 Related Unformed Surfaces: Strike smooth and finish with a texture matching adjacent formed surfaces.

3.2 Finishing Floors and Slabs

Note: ***Refer to Architectural Drawings "Floor Pattern Layout" for floor finish requirements, details and layout.*** *Written below are for standard reference only.*

3.2.1 Scratch Finish: Texture concrete surface with stiff brushes, brooms, or rakes. Apply to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, Portland cement terrazzo, and other bonded cementitious floor finishes.

3.2.2 Trowel Finish: Apply a trowel finish to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a membrane, paint, or another coating system. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding three (3) meters long straightedge, resting on two (2) high spots and placed anywhere on the surface, does not exceed six (6) meters.

3.2.3 Trowel and Fine-Broom Finish: Apply as lightly scarified fine broom finish to surfaces where ceramic or quarry tile is to be installed.

3.2.4 Broom Finish:
Apply a broom finish to exterior concrete platforms, steps, and ramps. Generally used on interior and exterior concrete treads, pavement, platforms, and ramps subject to moderate foot traffic.

3.2.5 Slip-Resistive Aggregate Finish: Before final floating, apply slip-resistive aggregate finish.

A. Spread slip-resistive aggregate at 1kg/sq.m. Tamp flush with surface, but do no force below surface, then apply a float finish.
B. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose slip-resistive aggregate.

3.2.6 Dry-Shake Floor Hardener Finish: After initial floating, apply mineral dry-shake materials to surfaces as follows in conformance to Manufacturer's Instructions:

A. Apply mineral dry-shake materials at a rate of 5kg/sq.m.

B. Uniformly distribute approximately two-thirds of mineral dry-shake materials over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second mineral dry-shake application, uniformly distributing remainder of material, and embed by power floating. Coordinate selection of curing compounds for compatibility with dry shake materials and revise lists in part 2 accordingly, if required.

C. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake material manufacturer and apply immediately after final finishing.

3.2.7 Floor Sealer Finish: Do not apply sealer to green/fresh concrete. Allow 14 days for concrete to cure, or wait until the concrete is uniform in color. For optimum results, allow concrete to cure in 28 days or as per Manufacturer's standard application procedures. Apply light uniform coats using an airless sprayer or as per Manufacturer's recommended tool and equipment. Apply consecutive coats as soon as the surface will readily absorb.

END OF SECTION

SECTION 03 39 00

CONCRETE CURING

PART 1 GENERAL

1.1 SCOPE OF WORK

The Section shall comprise the furnishing of all labor, materials, equipment, plant and other facilities and the satisfactory performance necessary to complete curing practices for cast-in-place Portland cement concrete as indicated on the drawings and specifications conforming to the provisions of the Contract Documents.

1.2 REFERENCES

Comply with the provision under General Conditions of the Contract Documents and Manufacturer's instructions. Reference the following standards as applicable:

1.2.1 ACI 301: Specifications for Structural Concrete for Buildings
1.2.2 ACI 305: Hot Weather Concreting
1.2.3 ACI 306.1: Cold Weather Concreting
1.2.4 ACI 308R: Guide to Curing Concrete
1.2.5 ASTM C 171: Standard Specification for Sheet Materials for Curing Concreting
1.2.6 ASTM C 1315: Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concreting
1.2.7 AASHTO M-148 Liquid Membrane-Forming Compounds for Curing Concrete

1.3 SUBMITTALS

1.3.1 General: All submittals for approval as indicated herein shall be in accordance to the General Conditions of the Contract Documents.
1.3.2 Product Data: Submit manufacturer's recommended installation procedures, catalog and certifications of quality compliance and test reports.

1.4 QUALITY ASSURANCE

1.4.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.
1.4.2 Workmanship and methodology shall conform to ACI 301, 305, 306.1.

1.5 PRODUCT HANDLING

1.5.1 Protect materials of this section before, during, and after installation.
1.5.2 Protect the work and materials of other trades
1.5.3 In the event of damage, immediately make replacements and repair at no additional cost to OWNER.

1.6 WEATHER LIMITATIONS

A. Above 28 deg. C.; ACI 305
B. Below 13 deg. C.; ACI 306.1

PART 2 PRODUCTS

2.1 CURING MATERIALS

Evaporation retarder below temporarily reduces moisture loss from concrete surfaces awaiting finishing in hot, dry, and windy conditions. Evaporation retarders are not curing compounds.

2.1.1 Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

A. Product: Select curing aids and materials from par as below, retaining optional materials if applicable.

2.1.2 Absorptive Cover: Burlap cloth weighing approximately 9 oz./sq. yd. (300 g/sq.m) dry.

2.1.3 Moisture-Retaining Cover: Polyethylene film or white burlap-polyethylene sheet.

Select curing compounds from the types listed in the 3 categories listed below. Below is a waterborne curing compound, considered a "straight cure". It is only a temporary membrane for curing, and will breakdown under exposure to UV light and abrasion. It is usually recommended for exterior applications.

2.1.4 Clear Water-based Membrane-Forming Curing Compound: ASTM C-309, Type 1, Class B.

A. Product: Provide long-lasting products for curing and protection of finished concrete surfaces, recommended for interior applications. It should be a solvent-borne product or a water-borne product.

2.1.5 Clear Solvent-Based Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

A. Product: Provide curing compound meeting the material requirement as per specification.

2.1.6 Clear Water based Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

A. Product: Provide clear, non-yellowing, membrane forming cure-and-seals meeting newer ASTM C-1315 requirements. It should be a solvent-borne product or a water-borne product.

2.1.7 Clear, Solvent-Based, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

A. Product: Provide an approved product with super sealing property against UV.

2.1.8 Clear, Water-based, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

A. Product: Provide an approved product with super sealing property against UV.

PART 3 EXECUTION

3.1 CONCRETE CURING

3.1.1 Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

A. Moist cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

B. Cure concrete surfaces to receive floor coverings with a curing compound that the manufacturer recommends for use with floor coverings. If evaporation rate in par below is exceeded, ACI 305R states that plastic shrinkage cracking is probable.

3.1.2 Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sf. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

3.1.3 Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:

3.1.4 Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:

Select curing method(s) from par as below. Delete options or restrict use of curing method(s) to specific locations or types of surfaces if required.

A. Moisture Curing: Keep surfaces continuously moist for not less than seven days with absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

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

C. Curing Compound: Apply uniformly in continuous operation by power spray or roller. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period. Curing and sealing compound below is usually for floors and slabs and may act as a permanent surface finish.

D. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24

hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.2 LIQUID FLOOR TREATMENTS

3.2.1 Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

A. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.

B. Apply to concrete that is at least ten days old.

C. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous. The following paragraph can be used to improve appearance of an exposed concrete floor. It should be applied just prior to project closeout.

3.2.2 Sealer Coat: Just prior to project end, uniformly apply a sealer coat of cure-and-seal compound to floor slabs that have no other finish flooring. Apply to concrete surfaces by power spray or roller.

END OF SECTION

SECTION 03 53 00

CONCRETE TOPPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

1.2.1 Section includes concrete floor toppings. Extent of concrete floor toppings is shown on Drawings and in schedules.

1.2.2 Types of concrete floor toppings include:

a. Standard aggregate toppings.
b. Repair of concrete surfaces as necessary to receive finish materials.
c. Repair of holes less than 4 inches diameter and cracks in concrete slabs.

1.3 REFERENCES

1.3.1 Comply with requirements of Section 03 30 00 "Cast-in-Place Concrete" and as herein specified.

1.4 SUBMITTALS

1.4.1 Furnish data, samples, laboratory test reports, and materials certificates as specified in Section 03 30 00 "Cast-In-Place Concrete."

PART 2 PRODUCTS

2.1 CEMENT AND AGGREGATES

2.1.1 Portland Cement: ASTM C 150, Type I or III.

2.1.2 Normal Weight Aggregate: ASTM C 33 and as follows:
Fine aggregate, consisting of sand or crushed stone screenings, clean, hard, free from deleterious matter. Grade by weight to pass sieves as follows:

a. 3/8 inch: 100 percent.
b. No. 4: 95-100 percent.
c. No. 8: 80-90 percent.
d. No. 16: 50-75 percent.
e. No. 30: 30-50 percent.
f. No. 50: 10-20 percent.
g. No. 100: 2-5 percent.

2.1.3 Manufacturer: Subject to compliance with requirements, provide factory pre-mixed topping mix with at least ten (10) years of experience in the industry:

2.1.4 Furnish selected aggregates to match Owner's finish sample.

2.2 TOPPING MIX

2.2.1 Standard Topping: Design mix to produce topping material with the following characteristics:

a. Compressive Strength: 3500 psi at 28 days.

b. Slump: 8 inches maximum at point of placement for concrete containing high-range water reducing admixture (super-plasticizer) and 3 inches maximum for other concrete.

c. Maximum W/C Ratio: 0.51.

2.3 MIXING

2.3.1 Provide batch type mechanical mixer for mixing topping material at Project site. Equip batch mixer with a suitable charging hopper, water storage tank, and a water-measuring device. Use only mixers that are capable of mixing aggregates, cement, and water into a uniform mix within specified time, and of discharging mix without segregation.

2.3.2 Mix each batch of 2 cu. yds. or less for at least 1-1/2 minutes after ingredients are in mixer. Increase mixing time 15 seconds for each additional cu. yd. or fraction thereof.

2.3.3 Ready-mixed topping may be used when acceptable to Owner. When acceptable, furnish ready-mixed topping complying with requirements of ASTM C 94.

PART 3 EXECUTION

3.1 CONDITION OF SURFACES

3.1.1 Topping Applied to Fresh Concrete: Do not begin placement of topping until water ceases to rise to surface, and water and laitance have been removed from base slab surface.

3.1.2 Topping Applied to Hardened Concrete: Remove dirt, loose material, oil, grease, paint, or other contaminants, leaving a clean surface.

3.1.3 When base slab surface is unacceptable for good bonding, roughen surface by chipping or scarifying before cleaning. Prior to placing topping mixture, thoroughly dampen slab surface but do not leave standing water. Over dampened surface, apply specified bonding compound (re-wettable or non-re-wettable) or epoxy adhesive. Place topping mix after re-wettable bonding compound has dried or while non-rewettable bonding compound or epoxy adhesive is still tacky.

3.1.4 For reinforced toppings, provide necessary supports, and maintain position of reinforcing mesh as shown on Drawings.

3.1.5 Joints: Mark locations of joints in base slab so that joints in top course will be placed directly over them.

3.2 PLACING AND FINISHING

3.2.1 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 straight edge. The surface shall achieve an F(F) 20/F(L) 17 tolerance when tested in accordance with ASTM E 1155. Uniformly slope surface to drains.

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

3.2.3 Trowel Finish: After floating, consolidate concrete surface by final hand trowelling operations, free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8 inch in 10 feet when tested with a 10 foot straight edge.

3.2.4 Fill air holes, pits, and other blemishes with cement grout of same materials as used for topping. Spread grout over surface and work into openings with a steel straight edge.

3.3 CURING PROECTION

Cure and protect topping applications and finishes.

3.4 PERFORMANCE

Failure of concrete topping to bond to substrate (as evidenced by a hollow sound when tapped), or disintegration or other failure of topping to perform as a floor finish, will be considered failure of materials and workmanship. Repair or replace toppings in areas of such failures, as directed.

END OF SECTION

SECTION 03 60 00

GROUTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

1.1.1 Drawings and general provisions of the Subcontract apply to this Section.

1.1.2 Review these documents for coordination with additional requirements and information that apply to work under this Section.

1.2 REFERENCES

1.2.1 General:

a. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.

b. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.

c. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.

1.2.2 ASTM International:

a.	ASTM C33	Concrete Aggregates
b.	ASTM C40	Organic Impurities in Fine Aggregates for Concrete
c.	ASTM C88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
d.	ASTM C117	Material Finer Than 75µm Sieve in Mineral Aggregates by Washing
e.	ASTM C136	Sieve Analysis of Fine and Coarse Aggregates
f.	ASTM C150	Portland Cement
g.	ASTM C289	Potential Reactivity of Aggregates (Chemical Method)
h.	ASTM C494	Chemical Admixtures for Concrete
i.	ASTM C881	Epoxy-Resin-Base Bonding Systems for Concrete
j.	ASTM D2419	Sand Equivalent Value of Soils and Fine Aggregate
k.	ASTM E329	Inspection and Testing Agencies for Concrete, Steel, Bituminous Materials as Used in Construction

1.3 SUBMITTALS

1.3.1 Submit under provisions of Division 01 Section "General Requirements."

1.3.2 Manufacturer's data shall be provided for [bonding compounds] [pressure grout] [retardants].

1.3.3 Test reports, accompanied by a manufacturer's statement that previously tested material is of similar type, quality, and manufacture as that which is proposed for use on this projects, shall be submitted for:

a. Cement.
b. Aggregates.
c. Retardants.
d. Bonding compounds.

1.3.4 The subcontractor's testing laboratory shall provide evidence of the most recent inspection of its facilities by the Cement and Concrete Reference Laboratory of the National Bureau of Standards and evidence of correction of deficiencies noted in the inspection report before materials specified in this section are delivered to the job site.

1.4 QUALITY ASSURANCE

Conformance with the specified requirements will be demonstrated testing performed by an independent testing laboratory.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cement: Portland cement shall be ASTM C150 Type II or Type V, containing less than 0.6 percent alkali.

2.1.2 Aggregate:

a. General: Aggregate shall be non-reactive and shall be washed before use. When sources of aggregate are changed, test reports shall be provided for the material from the new source prior to commencing grout work.

b. Fine Aggregate: Fine aggregate shall be sand or crushed stone conforming to ASTM C33 as modified herein. When tested in accordance with ASTM C136, gradation shall be such that 100 percent by weight passes a standard No. 8 sieve and not less than 45 percent by weight pass a standard No. 40 sieve. Variation from the specified gradation in individual tests will be accepted if the average of three consecutive tests is within the following variation:

Standard Sieve	Permissible variation in individual test
No. 30 or coarser	2 percent by weight
No. 50 or finer	0.5 percent by weight

2.1.3 Admixtures:

a. General: Admixtures shall be compatible with the grout and shall comply with the manufacturer's recommendations. Admixtures shall be added to the grout mix separately.

b. Water Reducing Retarder: Water reducing retarder shall comply with ASTM C494, Type D.

c. Lubricant

2.1.4 Water:

Waste for washing aggregate, for mixing and for curing shall be potable, shall not contain more than 1000 mg/l of chlorides as Cl, nor more than 1300 mg/l of sulfates as SO4, and shall not contain impurities which may change the setting time by more than 25 percent or a reduction of more than 5 percent of the compressive strength of the grout at 14 days when compared to the results for grout made with distilled water.

2.2 GROUTING

2.2.1 Cement Grout:

Cement grout shall be a mixture of one-part cement, two parts sand proportioned by volume admixtures for pressure grouting and sufficient water to form a workable mix.

2.2.2 Epoxy Grout for Crack Repair and Dowel Anchorage:

a. Except for applications involving pressure grouting or crack injection, epoxy shall be a high modulus, moisture insensitive, two-component, 100 percent solids, thermosetting modified polyamide epoxy compound. The material shall conform to ASTM C881 Type I, Grade 3 which is capable of not sagging in horizontal or overhead anchoring applications.

b. Epoxy for applications involving pressure grouting or crack injection, shall be a high modulus, moisture insensitive, two components, injection grade, 100 percent solids blend of epoxy resin compounds. The material shall conform to ASTM C881 Type I, Grade 1 which is capable of achieving complete penetration of hairline and larger cracks.

2.2.4 Polymer Concrete for Resurfacing and Patching:

Polymer concrete shall consist of a liquid binder and dry aggregate mixed together to make a flowable mortar. The liquid binder shall be a chemical and oil resistant, stress relieved, low modulus, moisture insensitive, two component epoxy resin compound. The binder material shall conform to ASTM C881 Type 3, Grade 1 with a consistency similar to light weight oil for proper mixing with the aggregate. The aggregate shall be oven dry, kept in sealed packages until the time of mixing and be of size and consistency compatible with recommendations of the manufacturer of the liquid binder for the intended application.

2.2.5 Adhesive Resin for Dowel Anchorage:

ICC approved, structural epoxy; pre-packaged in cartridges for manually or pneumatically operated caulk gun and automatically mixed at nozzle. Subject to compliance with current ICC evaluation report.

2.3 PRESSURE GROUTING EQUIPMENT

Pressure grouting equipment shall include a mixer and holdover agitator tanks designed to place grout at pressures up to 50 psi (0.345 MPa). Gauges indicating grouting pressure shall be provided and the mixer shall be equipped with a meter capable of indicating to within 1/10 cubic foot (0.003 m^3) the volume of grout placed.

PART 3 EXECUTION

3.1 GENERAL

Bonding compounds for use with grout is specified in [Division 03 Section Cast-in-Place Concrete]. Primer, if required for polymer concrete, is to be provided and installed per the manufacturer's recommendations.

3.2 CEMENT GROUT

3.2.1 Cement grout is to be used for filling non-bearing portions of equipment pads and pressure grouting.

3.2.2 Except for the specialized requirements for pressure grouting, grout is to be mixed and placed in the same manner as cast-in-place concrete. Grout is to be mixed for at least one minute and diluted grout to agitated until placed.

3.3 NON SHRINK GROUT

3.3.1 Non shrink, non-metallic aggregate grout is to be used under equipment, bearing plates and column base plates. Non shrink, metallic aggregate grout is to be used under rotating equipment where high strength and fatigue are of concern, to grout anchor bolts and to grout reinforcing steel. Grout is to be placed and cured in accordance with the manufacturer's recommendations.

3.3.2 Holes required for grouting shall be blown clean with compressed air and are to be free of dust or standing water. Horizontal holes for grouting are to be drilled at a slight downward angle and with the inserted dowel or bolt bent to match.

3.4 EPOXY GROUT

3.4.1 Epoxy grout shall be used for repairing cracks by pressure grouting or gravity, repairing structural concrete and may be used for setting dowels or bolts in holes. Concrete is to be primed in accordance with the grout manufacturer's recommendations.

3.4.2 The use of epoxy grout must comply with the following restrictions:

a. Limited to areas where exposure, on an intermittent or continuous basis, to acid, chlorine gas or to machine or diesel oils, is extremely unlikely.

b. Limited to applications where exposure to fire or to concrete temperatures above the product heat deflection temperature or 120 degrees F (40-degrees C) (whichever is less) is extremely unlikely. Overhead applications are not allowed.

c. Holes for the anchors shall be drilled (not cored), shall be blown clean with compressed air and shall be free of dust or standing water.

d. The anchor type, size and embedment depth shall be as shown on the drawings and the anchor must be installed in accordance with the manufacturer's recommendations.

e. The anchor must not be loaded until after the full curing period has elapsed.

3.5 PRESSURED GROUTING

Prior to grouting, cracks and holes to be grouted shall be washed clean. Washing is not required for grouting soil voids. Once started, grouting shall be continuous until completed. In case of a mechanical failure or other stoppage of the work, the grout equipment shall be washed out sufficiently to ensure that fresh only grout is pumped when the work is restarted.

3.6 FIELD OF QUALITY CONTROL

3.6.1 The Testing Laboratory will:

a. Special Inspect installation of anchors in accordance with applicable ICC Evaluation Report, where special inspection is indicated on Contract Documents or where Subcontractor's design engineer has used ICC anchor capacities that require Special Inspection.

b. Develop and utilize an effective method of field marking anchor and dowel test locations and results.

3.6.2 Testing of grout mixes for conformance to manufacturer's specified strength: Testing laboratory shall take four test samples of each day's grout mix and test grout mix samples at 7 and 28 days. Test reports shall be submitted to the Architect/Engineer for evaluation and approval.

3.6.3 Test 25 percent of reinforcing steel dowels installed with adhesive resin on a given day in tension using pull-out procedure. Test to 80% of specified yield strength of the dowel or 150% of the ICC rated static capacity whichever is the lesser with special inspection. Dowels specifically noted on the drawings as "No test required" do not require tension testing.

3.6.4 If the failure rate of dowels exceeds 10 percent, testing will be increased to 100 percent of that day's installation of similar anchors or dowels. Testing will be reduced to 25 percent of that day's installation when the failure rate is reduced to 10 percent or less. Failed dowels will be replaced at no additional cost to the Owner. Subcontractor will reimburse Owner for cost of additional testing.

*****END OF SECTION*****

DIVISION 04 00 00
SECTION 04 10 00
CONCRETE UNIT MASONRY

PART 1 GENERAL

1.1 SCOPE OF WORK

This section shall include all management, labor, materials, tools, equipment and services required to furnish and install concrete masonry units as specified herein and shown in Drawings required to perform all works in accordance to the General Conditions of the Contract Documents.

1.2 REFERENCES

Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions. Reference the following standards as applicable:

1.2.1 American Concrete Institute (ACI)/American Society of Civil Engineers (ASCE)/The Masonry Society (TMS)

a. ACI 117 – Standard Specifications for Tolerance for Concrete Construction and Materials.

b. ACI 530.1/ASCE 6/TMS 315 - Specification for Masonry Structures.

1.2.2 American Concrete Institute (ACI)

a. ACI 315 – Details and Detailing of Concrete Reinforcement.

1.2.3 American Society for Testing and Materials (ASTM)

a. ASTM C 90– Specification for Load bearing Concrete Masonry Units.
b. ASTM C 140 – Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

1.3 SUBMITTALS

1.3.1 **General**: All submittals for approval as indicated herein shall be in accordance to the provisions under General Conditions of the Contract Documents.

1.3.2 **Product Data**: For each type of concrete masonry unit and accessory including certifications that each complies with specified requirements.

1.3.3 **Shop Drawings:**

a. For concrete masonry units, showing sizes, profiles, coursing, bond pattern, special shape locations, joint locations and embedded items.
b. For cast stone trim in form of cutting and setting drawings, showing sizes, profiles and locations of each stone trim unit required.
c. For joint reinforcement and steel reinforcing. Detail fabrication, bending and placement of unit masonry reinforcing bars. Comply with ACI 315 showing reinforcing bar schedules, stirrup spacing, and diagrams of bent bars and arrangement of masonry reinforcing.

D. Shop Drawings and/or manufacturer's catalog cuts of dovetail slots and other devices, if any, required for anchoring masonry to steel or other materials, including instructions for their proper use.

1.3.4 Samples:

Samples for approval for each different type and shape of exposed masonry unit required, showing full range of exposed color, texture and dimensions to be expected in the finished Work. When required by 2.01 B.6, prefaced or ground face, submit concrete masonry unit samples for color selection or verification. Two sample sections of cast stone sills and coping, if any, showing color and texture of finish. Samples of accessories embedded in masonry.

1.3.5 Quality Control Reports:

Submit copies of reports verifying compressive strength requirements of completed masonry, if required by the Engineer, within 7 calendar days of the date of each completed test.

1.4 QUALITY ASSURANCE

1.4.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.4.2 Manufacturer Qualification shall be at least five (5) years of production experience, whose published literature clearly indicates general compliance of products with requirements of this section.

1.4.3 Single Source Responsibility
Obtain exposed masonry units of uniform texture and color from a single manufacturer for each type of product required.

1.4.4 Mock-ups
Where shown on the Contract Drawings, before masonry Work commences, construct a panel approximately 6-foot-long by 4-foot-high of each type of exposed concrete masonry unit, as directed by the Engineer, for approval. Use mortar of type and color to be used in the Work.

a. Protect mock-ups from the elements with a weather-resistant membrane.
b. Retain mock-ups during construction as standards for judging completed masonry Work. When directed by the Engineer, demolish mock-ups and remove from Authority property.
c. Prepare a list of materials used to construct mock-ups, for information only, for Engineer. Include manufacturer and product names, generic materials, suppliers, colors, identifying lot or batch numbers and design mixes.
d. Where masonry is shown on the Contract Drawings to match existing, construct mock-up panel adjacent to and parallel to existing surfaces to be matched.

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 Comply with product delivery requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.5.2 All materials shall be so delivered, stored and handled so as to prevent the inclusion of foreign materials and damage of materials by water exposure and breakage. In stock piling concrete hollow blocks, measures shall be adopted to prevent the hollow

blocks from resting directly on soil surface. These measures may include provision of pallets or bed of sand about 2" thick. Packaged materials shall be delivered and stored in original packages until ready for use. Packages or materials showing evidence of water exposure or other form of damage shall be rejected. All materials shall be of the respective qualities specified herein and packaged materials shall carry the manufacturer's labels thereon to permit identification.

1.6 WARRANTY

Special written warranty for each material specified herein shall be submitted by Manufacturer/Contractor without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Failures are defined to include faulty workmanship or faulty materials.

1.7 PROJECT CONDITIONS

Comply with field examination requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.8 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation including all labor, tools and incidentals necessary to complete the works prescribed in this section.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement

PART 2 PRODUCTS

2.1 Specifications for the following materials are stated under section REINFORCED CONCRETE, and shall apply to this Masonry and Cement Work section as if written out in full.

2.2 Aggregate of different kinds and sizes shall be placed in different stock piles and positive means taken to prevent inclusion of foreign matter.

2.3 All cementitious materials must be kept dry until ready to be used; must be kept off the ground under cover, and away from sweating walls and other damp surfaces.

2.4 Cementitious materials that have hardened or partially set prior to actual use shall be removed from the site.

2.5 **Unit Masonry** - Concrete hollow block units shall be steam cured-weigh-batched units made. Concrete hollow block units shall be true to size, without cracks, chips, spawns, splits or other defects, which impair their strength or durability. They shall have three holes. All non-bearing type concrete blocks shall have a unit weight not to exceed 60 pcf, for load bearing type concrete blocks, a minimum compressive strength of 7.58 MPA (1,100 psi) shall be developed.

6" thick concrete hollow block shall be used for load bearing masonry wall especially at exterior wall while 4" concrete hollow block shall be used for non-load bearing masonry wall.

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2.6 **Steel Reinforcement**

The minimum steel reinforcement for concrete hollow block walls shall conform to the schedule as given hereunder or as indicated in the construction notes.

Minimum Vertical Reinforcement		Horizontal Reinforcement
4" CHB	10mm @ 0.4m	10mm @ 400mm
6" CHB	12mm @ 0.4m	10mm @ 400mm

All cores where vertical or horizontal reinforcements are placed shall be filled with mortar and shall thoroughly be worked inside the core to fill up to voids.

2.7 **Tie Wires** : Ga. #16 G.I

2.8 **Concrete Lintels**

Lintels for openings shall be the height and thickness of existing hollow block or as detailed in the drawings. The minimum reinforcement shall be that shown in the drawings.

2.9 **Mortars**

Mortar mix shall be 1 part Portland Cement and 3parts white sand. All materials for mortar shall be measured by volume. Sand and cement shall be mixed dry and then water added to bring to proper consistency for use. No mortar that has stood for more than 3/4 of an hour shall be used. Re-tempering of mortar shall not be permitted. Discard mortar which has begun to stiffen.

PART 3 EXECUTION

3.1 Masonry Units

3.1.1 Lay all units plumb, true to line, level and accurately spaced.

3.1.2 Set in place anchors, wall plugs and accessories to masonry as erection progresses.

3.1.3 Bed solidly each course on Portland cement mortar with vertical joints breaking halfway over course below.

3.1.4 Remove all loose mortar and thoroughly wet exposed joints not less than one hour before laying new work.

3.1.5 Concrete hollow blocks shall be laid in running bond method.

3.2 Plastering

3.2.1 All works shall be plumb true and accurately done. Use screeds at convenient intervals to assure even and flat finish.

3.2.2 Scratch coat shall be applied evenly floated to true plumb and correct planes.

3.2.3 Not less than 24 hours after the application of scratch coat, the second of finish coat consisting of 1 part Portland cement and 2 parts sand shall be floated, red and finished to a combined finish total of approximately 3/4" for both 2 coats.

3.2.4 All exterior plastering works shall be done with a waterproofing ingredient, mixed with scratch and finish coats in strict accord with the directions of the manufacturer of the waterproofing compound.

3.2.5 Each preceding coat shall be wetted before applying the next coat.

3.2.6 Plaster works for shall not be started until all trades have completed their work. If this is not possible, the plasterer shall repair the broken and defective plaster ad shall be done so that the finished surface presents an unbroken appearance.

3.2.7 Plastering shall be minimum 25mm thick. on each side of the wall.

* END OF SECTION *

DIVISION 05 00 00
SECTION 05 00 00
METALS

PART 1 GENERAL

1.1 SCOPE OF WORK

This section shall include all management, labor, materials, tools, equipment and services required to furnish and install metal materials as specified herein and shown in Drawings required to perform all works in accordance to the General Conditions of the Contract Documents.

1.2 SUBMITTALS

1.2.1 General: All submittals for approval as indicated herein shall be in accordance to the provisions under General Conditions of the Contract documents.

1.2.2 Product Data: For each metal components and accessory including certifications that each complies with specified requirements.

1.2.3 Shop Drawings and Sample sections based on the actual field measurements and as per layout and details of the drawings.

Note: All Shop Drawings and Sample Sections shall be submitted prior to purchasing and installing of materials for review and approval of the Architect.

1.3 QUALITY ASSURANCE

1.3.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.3.2 Manufacturer Qualification shall be at least five (5) years of production experience, whose published literature clearly indicates general compliance of products with requirements of this section.

1.3.3 Single Source Rèsponsibility
Obtain structural steel of uniform quality from a single manufacturer for each type of product required.

1.4 DELIVERY, STORAGE AND HANDLING

1.4.1 Comply with product delivery requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.4.2 Deliver, store and handle all materials to prevent damage by breaking, water or moisture and contamination by foreign materials.

1.4.3 Store materials on a clean, dry surface or platform, off ground, covered, separate from each other and protected from deterioration and the elements.

1.5 WARRANTY

Special written warranty for each material specified herein shall be submitted by Manufacturer/ Contractor without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Failures are defined to include faulty workmanship or faulty materials.

1.6 PROJECT CONDITIONS

Comply with field examination requirements under General conditions of the Contract Documents and Manufacturer's instructions.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Structural steel/trusses

Shall be of sizes as shown on drawings (refer to Structural Drawings), conforming to ASTM A36 and AWS Standards. Steel members shall be primed using thermal spray with coatings of zinc, aluminum, and zinc-aluminum alloys to provide long-term corrosion protection. Submit shop drawings shall be submitted for Architect's approval.

2.1.2 Roof Sheets

Roofing shall be gauge 24, long span, pre-painted galvanized iron sheets, conforming to ASTM A653 and ASTM A755. Samples shall be submitted for Architect's approval.

2.1.3 Aluminum Alloy Frames (for Windows)

Shall conform to ASTM B221, Alloy 6063-T5 for extrusions, ASTM B209, alloy and temper best suited for the purpose for aluminum sheets and strips, complete with hardware and accessories; Design as per Architect's approved sample. Verify drawings for thickness and finish of aluminum frames.

2.1.4 Hollow Metal Frames (for Steel Doors)

Shall be chromate-free electro galvanized steel sheet with zinc coating layer applied on base metal framing. Complete with hardware and accessories. Refer to Division 8 "Openings – under Division 8.1.1 "Steel Doors and Frames" for further specification.

2.1.5 Stainless Steel Pipe for Railings/ Steel Channels for Glass Door Frames

Shall be Schedule 40 corrosion-resistant Stainless Steel pipe, conforming to ASTM A167, ASTM A312, ASTM A999, Grade 304, No. 4 and mirror finish. Submit sample for Architect's approval. Refer to Architectural and Engineering drawings for size and finishes requirements.

2.1.6 Light Steel Framing System for Gypsum Ceilings

Shall be BPS (Bureau of Product Standards) certified, conforming to ASTM C645-18. Members shall be0.60mm thick gauge 24 x 19mm x 50mm galvanized light steel furring channel spaced at 600mm (max.) on both ways with 0.80mm thick gauge 22 x 12mm x 38mm carrying channel spaced at 1200mm (max.) on both ways and

0.40mm thick gauge 26 x 25mm x 25mm metal wall angle and metal angle, attached to slab/roof framing by a suspension clip and 6mm diameter hanger rod joiner spaced at 400mm x 600mm apart. Complete with screws, accessories and 0.40mm thick gauge 26 x 25mm x 25mm corner beads Ceiling Framing System. Submit product catalog and sample for Architect's approval. Refer to Architectural Drawings – Ceiling Details for layout and details.

2.1.7 Interior Drywall Partition Framing

Shall be BPS (Bureau of Product Standards) certified, 0.60mm thick gauge 24 x 35mm x 76mm galvanized light steel top and bottom tracks and 0.60mm gauge 24 x 35mm x 76mm vertical and horizontal studs spaced at 600mm both ways, complete with screws, accessories and 0.40mm GA. 26 x 25mm x 25mm corner bead. Submit product catalogue and sample for Architect's approval.

PART 3 EXECUTION

3.1 Fabrication

3.1.1 Fabricate items with joints neatly fitted and properly secured.

3.1.2 Pre-assemble items in shop to greatest extent possible, minimize field splicing and assembly, disassemble units only as required for shipping and handling limitations; clearly mark for field assembly.

3.1.3 Weld corners and seams continuously, comply with ASTM standards; grind exposed welds continuous, smooth and flush with adjacent finished surfaces, and ease exposed edges to approximate 1mm uniform radius.

3.1.4 Exposed Mechanical fastenings: Flush countersunk fasteners unobtrusively located, consistent with design of structure.

3.1.5 Fit and shop assemble in largest practical sections for delivery.

3.1.6 Make exposed joints flush butt type, hairline joints where mechanically fastened. Fabricate joints exposed to weather in manner to exclude water or provide weep holes where water could accumulate.

3.1.7 Supply components required for proper anchorage of metal fabrications; fabricate anchorage and related components of same material and finish as metal fabrication.

3.1.8 Ladders, Ships Ladders and Cast-in metal ladder rungs: comply with requirements of ANSI A14.3 and local codes.
Rungs: Fit centerline of side rails, plug weld and grind smooth on outer rail faces; provide non-slip surface on top of rung, similar to epoxy resin and aluminum oxide granules surfaces.

3.1.9 Trench Frames and Grated Covers: Provided heavy duty cast iron frames and covers with galvanized steel form pans as indicated.

3.1.10 Finishes: Unless otherwise schedules, galvanize and prime paint interior work, comply with requirements of Division 9 section, titled Painting for preparation and priming.

a. Thoroughly clean surfaces of rust, scale grease and foreign matter prior to applying finish.
b. Do not shop prime surfaces in contact with concrete or requiring field welding, shop prime in one coat.
c. Provide minimum ASTM A123 or A525 G90 coating, 0.90 oz/ft galvanized coating (formerly 1.25 Commercial Class) iron and steel hardware galvanized conforming with ASTM A153.
d. Preparation: SSPC – SP3, Power Tool Cleaning.

3.2 Erection

3.2.1 Obtain Architect's review prior to site cutting or making adjustments which are not part of scheduled work.

3.2.2 Perform necessary cutting and alternating for installation and co-ordination with other work.

3.2.3 Install items square and level, accurately fitted and free from distortion or defects detrimental to appearance.

a. Supply items requiring be casting into or embedding in other materials to appropriate trades.
b. Ensure alignment with adjacent construction; co-ordination with related work to ensure no interruption in installation.

3.2.4 Make provision for erection stresses by temporary bracing; keep work in alignment.

3.2.5 Field bolt and weld to match standard of shop bolting and welding; hide bolts and screws whenever possible, where not hidden, use flush countersunk/ fastenings. Perform field welding in accordance with AWS D1.1

3.2.6 After installation, touch-up field welds and scratched and damaged surfaces; use primer consistent with shop coat or recommended for galvanized surfaces, as applicable.

3.2.7 Replace items damaged in course of installation and constructions.

* END OF SECTION *

DIVISION 06 00 00
SECTION 06 40 00
ARCHITECTURAL WOODWORK

PART 1 – GENERAL

1.1 SCOPE OF WORK

The Work includes furnishing and installation of all wood doors and frames and all appurtenances complete in place.

1.2 RELATED SECTIONS

Other sections of the Specifications shall also apply to the extent required for proper performance of this Work.

- Carpentry Work
- Glass and Glazing
- Hardware
- Painting
-

1.3 SPECIFICATIONS AND STANDARDS

Standards specified in the Related Sections shall apply to the Work of this Section.

1.4 SUBMITTALS

a. Shop drawings of all wood doors and frames showing location, size and details of construction.

b. Samples as may be required under Part 2 - Products of this Specification.

1.5 QUALITY ASSURANCE

The Contractor is responsible for the performance of all tests and inspection required by this Standard Specification. However, the owner reserves the right to perform any or all prescribed tests and inspection where such is deemed necessary to ensure that delivered materials conform to the specifications, and shall be paid for by the Contractor. The Contractor shall furnish the owner certified copies of records showing that each material has been pre-tested, and complied with all applicable requirements of this Standard. The Contractor shall, at his own expense, replace all rejected materials for failure to comply with this Specification.

PART 2 – PRODUCTS

2.1 MATERIALS

a. Wood panel doors shall be made of solid, kiln dried, Tanguile wood stiles, rails, mullions, beads and panels, 50 mm thick, unless otherwise specified.

b. All door frames shall be made of solid, kiln dried, Tanguile wood. Joints shall be mortise and tendon, joined with an approved type of glue. Wood work shall be as shown on the drawings, sanded, filled, re-sanded, and finished as specified in Section 33035, Painting.

c. Wood doors and frames shall be made by a manufacturer specializing in this type of work.

d. Mullions. Rolled steel T-bars, pipe, plate or other formed section or a combination of them as shown on drawings shall be furnished where two or more door or window units are installed in the same opening.

2.2 FINISH

After fabrication and before installation, all wood doors and frames shall be coated with an approved synthetic resin clear sealer and shall be protected from damage until installation. All wood interior doors shall have spray paint finish.

PART 3 – EXECUTION

3.1 INSTALLATION

All wood doors and frames shall be fitted plumb and square in dry walls and masonry openings. Door jambs shall be anchored by means of screws and expansion shield anchors. Door leaf shall be anchored using hinges as specified in the drawings.

* END OF SECTION *

DIVISION 06 00 00
SECTION 06 41 00
ARCHITECTURAL CASEWORK

PART 1 – GENERAL

1.1 SCOPE OF WORK

The Work includes furnishing and installation of all shop-fabricated cabinets, cases and fixtures including cabinet hardware.

1.2 RELATED SECTIONS

Other sections of the Specifications shall also apply to the extent required for proper performance of this Work.

- Carpentry Work

1.3 SPECIFICATIONS AND STANDARDS

Standards specified in the Related Sections shall apply to the Work of this Section.

1.4 SUBMITTALS

a. Shop drawings of all wood cabinet and shelves showing location, size and details of construction.

b. Samples as may be required under Part 2 - Products of this Specification.

1.5 QUALITY ASSURANCE

The Contractor is responsible for the performance of all tests and inspection required by this Standard Specification. However, the owner reserves the right to perform any or all prescribed tests and inspection where such is deemed necessary to ensure that delivered materials conform to the specifications, and shall be paid for by the Contractor. The Contractor shall furnish the owner certified copies of records showing that each material has been pre-tested, and complied with all applicable requirements of this Standard. The Contractor shall, at his own expense, replace all rejected materials for failure to comply with this Specification.

PART 2 – PRODUCTS

2.1 MATERIALS

a. Wood cabinets and shelves shall be made of 20mm laminated (both sides) moisture resistant medium density fiber board (MDF), unless otherwise specified.

b. All hinges shall be concealed type chrome finish

c. Cabinet handles shall be stainless steel.

d. Board edges and screw holes shall be protected with sealer

e. Drawer slides or runners shall be heavy duty full extension type

f. Color and samples shall be submitted to the Architect for approval.

PART 3 – EXECUTION

3.1 INSTALLATION

Prior to fabrication, the Contractor shall measure the actual location of the cabinets. All fabrication shall be performed at the Contractor's/Sub-contractor's shop. Fabrication and lamination shall be done using pressing machine.

All cabinets shall be fitted plumb and square in dry walls and masonry openings. Cabinets shall be anchored by means of screws and expansion shield anchors. Cabinet door leaf shall be anchored using concealed hinges as specified in the drawings and specifications.

* END OF SECTION *

DIVISION 07 00 00
SECTION 07 22 00
ROOF INSULATION

PART 1 – GENERAL

1.1 SCOPE OF WORK

The Work includes insulation applied for thermal protection as part of the roofing assemblies.

1.2 SUBMITTALS

a. Samples - Submit to the Architect samples of materials to be used and secure approval prior to installation.

b. Manufacturer's Instructions - Submit to the Architect the manufacturer's complete printed instructions for the installation of the material.

1.3 PRODUCT HANDLING AND SPECIFICATION

a. Supply and deliver insulation material in its finished form.
b. Store at a place properly protected from rain and sunlight. Extended outdoor exposure is not recommended.
c. The insulation material shall not be in contact with wet concrete.
d. All works shall be performed only by qualified contractor.

PART 2 – PRODUCTS

2.1 MATERIALS

a. ROOFING INSULATION: 12mm thick polyethylene foam with laminated aluminum foil on both sides.
b. Side and end adhesives should be compatible with PE foam and aluminum foil as recommended by manufacturer
c. Submit sample for Architect's approval

PART 3 – EXECUTION

a. Install insulation in dry state.
b. Install insulation directly under C-purlins
c. Where cutting of material is necessary, use sharp knife and straight edge.
d. Fit tight around all roof protrusions. Fill the gaps with off cuts to avoid heat leakages.

- Side and end laps shall be 50 mm (2") to 100 mm (4") and adhered by rugby contact adhesive.
- Install insulation before roofing is fixed.
- Any accidental punctures and damages shall be repaired and sealed with aluminum tapes.

**** END OF SECTION ****

DIVISION 07 00 00
SECTION 07 10 00
DAMPPROOFING AND WATERPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION

A. General:

1. Furnish all labor, materials, tools, equipment, and services for the application of waterproofing as indicated, in accordance with provisions of Contract Documents.
2. Completely co-ordinate with work of all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

B. Related Work Specified Elsewhere:

1. Section 03000, Concrete General.
2. Section 05800, Expansion control.
3. Section 07920, Sealant.

1.2 QUALITY ASSURANCE

A. Applicator qualifications: Licensed or franchised by system manufacturer.

B. Reference standards: American society for testing and materials (ASTM) C -177: Test for Steady-State. Transmission properties by means of the guarded hot plate.

1.3 SUBMITTALS

A. Product data.

1. Submit product data which completely describes the waterproofing proposed for use and verifies all performance requirements.
2. Submit waterproofing manufacturer's printed installation instructions.

B. Test Reports.

1. Submit certified copies of test reports indicating compliance with test requirements specified herein.

C. Project information:

1. Certification of installer qualifications.

1.4 JOB CONDITIONS

Membrane should not be applied during inclement weather or where there is surface moisture, or visible dampness on the surface indicated to receive waterproofing and or protection and when ambient and surface temperatures are not within the limits allowed by the manufacturer.

1.5 STORAGE

Products should be stored in original unopened packaging in cool dry conditions, away from sunlight in a flat position.

1.6 WARRANTY

A. Warrant water proofing membrane remains watertight for a period of 10 years from date of final hand-over of the project.

B. Warranty signed jointly by the contractor, water proofer and manufacturer.

C. Warranty does not cover secondary damage to contents of structure.

D. Repair and replace waterproofing that fails during warranty period.

E. The contractor shall be held responsible for any failure or damage to the waterproofing system and for the repair of such damage whether this damage or failure is caused by defective material or workman ship or any other cause. The contractor shall also be responsible for any damages to the building or to the users resulting from failure or damage to the waterproofing system, and for making good and paying compensation in respect of these damages. The contractor's responsibility for the waterproofing system shall extend from the date installing the system to the end of the warranty period.

PART 2 - MATERIALS

2.1. WATER PROOFING

The waterproofing material shall be a UV resistant liquid applied membrane or any other approved liquid applied seamless coating. The material should conform to water permeability test (Depth of penetration at 5 bar pressure) where no leakage should occur after 24 hours as per EN 12390, part 8:2000 or as per IS 2645:2003 test methods.

2.3 DAMP PROOFING (slab on ground):

The damp proofing material for all ground slabs shall be 2mm thick Fosroc Membrane HDPE-S or approved equal, self adhesive waterproofing membrane consisting of HDPE-film and self adhesive glue which bonds to cured RC members.

The membrane shall be supplied with one self-adhesive selvedge to provide sealed laps and shall comply with ASTM D412, ASTM D903 and ASTM D751-06 (2011).

2.4 WATER STOPPER (for concrete joints)

Shall be Bentonite Waterstop (or approved equal), flexible strips made of plastic or rubber, that act as a physical barrier to water at concrete joints.

PART 3 - EXECUTION

3. 1. Surface Preparation

a. Surfaces to be applied with should be clean, reasonably dry, free form dirt, loose material, oil & grease and smooth as possible.

b. Honeycombing in concrete should be filled with polymer modified grouts before applying any surface patch material.

c. Slope of the surface shall be checked before applying waterproofing material.

3.2. Sealing the gap around plumbing fixtures

a. All PVC pipes should be wrapped with double sided bituminous tape, at the place where they go through the wall or floor.

b. The gap between wrapped pipe and wall, gaps around traps, and pipe outlets should be filled with ready to use free flowing non-shrink cementitious grout.

c. All concealed pipelines should be filled with polymer modified mortar.

d. Ensure the water tightness of plumbing system with pressure test and do any rectification for leakages if any.

e. Complete all plumbing and sanitation work before commencement of waterproofing works

3.3. Waterproofing Application

a. Surface should be pre-wetted to ensure surface saturated dry (SSD) condition.

b. Apply by brush or roller a coat of a polymer modified cementitious liquid applied seamless waterproofing coating at a specified coverage per kg to all required areas to achieve a thickness of 500 – 600 micron in one coat and allow the surface to dry for 4 -6 hours.

c. Apply second coat in the opposite direction at the same rate. After the application of second coat, the total thickness of membrane should be 1 to 1.2 mm. The treatment is left as it is for 48 hours for air cure before carrying out ponding test.

d. At the floor & wall joint junction provide a glass fibre mesh cut to size covering the fillet area laid to size and shape followed by 2nd coat of waterproofing for additional protection.

e. Sprinkle coarse sand after the 2nd coat application while it is still wet for providing a key for subsequent tile adhesive material.

f. The waterproofing shall be carried at least 300 mm on vertical surfaces above the floor finish level except the splash zone of shower where the waterproofing should be carried out to 1.8 to 2.1 m height in bathroom and toilets. In other wet areas the vertical surface should be waterproofed for a minimum height of 150 mm. The

coating shall be applied to the internals of the down pipes for minimum 50 mm down to the floor outlet before laying of the tiles, bedding and floor traps.

3.4. Damp proofing application

All concrete surfaces must be wood float or shutter finish and free from cavities or projections. All honey combs, cracks, surface defects and tie rod holes should be repaired using structural grade Fosroc Renderoc repair series. All surfaces must be clean, dry and free from contamination, ice and frost. The substrate shall be free from loose aggregate or other sharp protrusions. The surface should be dry enough, moisture content to be

a. Cut sheet membrane to a convenient length for installation.
b. Carefully align and roll out with printed coated side facing the concrete.
c. Lay adjacent sheets accurately so they overlap with the previous sheet 75mm along the selvedge.
d. When laying adjacent full rolls, there should be stagger of half a roll length to avoid a build-up of end joints in one area. The end joints should be done with 100mm overlap.
e. Apply starting from the bottom of the wall and work progressively removing the release paper in stages.
f. Carefully peel off without disturbing the alignment of the membrane
g. Press the membrane against the RC member firmly. The membrane should be thoroughly rolled through out the length along with overlaps and joints to ensure complete adhesion between the layers and the RC member

3.5. Ponding Test

Ponding test shall be carried out at a depth of 50 mm for 48 hours to determine the water tightness after closing all the outlets. Necessary remedial actions should be taken for any seepage or leakage of water. The waterproofing shall be considered satisfactory, if no leaks or damp patches show on the soffit. Testing methods shall conform to ASTM D5957-98(2013)

2.6. Protective Screed

a. Upon successful completion of the ponding test, a layer of 10mm cement/sand (ratio 1:4) protective screed, using an integral waterproofing compound shall be applied on top of the membrane.
b. If the drainage pipes are laid on the floor the minimum thickness of screed should be 20 mm.
c. The floor level should be provided with adequate slope considering the pipe thickness.
d. Care shall be taken whilst laying the protective screed so as not to damage the waterproofing membrane below.
e. The contractor shall take all measures necessary to prevent any damage to the membrane or protective screed during subsequent work.

* END OF SECTION *

DIVISION 07 00 00
SECTION 0792 00
JOINT SEALANTS

PART 1 – GENERAL

1.1 SCOPE OF WORK

Furnish all materials, labor, equipment, plant, tools, required to complete the application of caulks and sealants for panel joints, expansion joint, construction joints, glazing of doors and windows, acoustic control and others.

1.2 SUBMITTALS

A. Samples

Submit to the Architect sample of materials to be used and secure approval.

B. Manufacturer's Instructions

Submit to the Architect the manufacturers complete printed instructions for the application of the material.

1.3 PRODUCT HANDLING

A. Materials shall be delivered to the site in the original sealed containers or packages bearing manufacturer's name and brand specification.

B. Materials stored on jobsite shall be protected from weather moisture and extreme temperature with extra ordinary care.

1.4 PROJECT CONDITION

Temperature and relative humidity conditions for a period before, during and after application shall be as recommended by the manufacturer. If rain occurs, allow surfaces to dry before proceeding with the applications.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Silicon Sealant: RHODORSIL 668 or approved equal; to use for general purpose; neutral cure sealant. Contractor must guarantee water tightness of all joints even during strong winds.

B. Co-Polymer Clear Sealant: SELLEY'S ALL CLEAR or approved equal; for roofs, awnings, roof flashings, gutters and downspouts.

C. Solvent-Based Synthetic Rubber Contact Type Adhesive: SELLEY'S LIQUID NAILS or approved equal; for bonding wood, plastic laminate, concrete, steel, aluminum and hardwood, rubber and glass.

D. Acrylic Latex Gap Sealant: SELLEY'S NO MORE GAPS or approved equal; for use between windows or door frames and walls, along skirting boards, around cornices, between countertops and splashboard, in corner or between the wall and ceiling or where shrinkage or movement causes rigid fillers to crack.

E. Acid Cure Silicon: SELLEY'S BATHROOM AND KITCHEN SEALANT or approved equal; for use on non-porous surfaces such as glass, ceramics and porcelain.

F. Penetration Fire Stop: HILTI fire stop assembly; includes membrane penetration, through penetrations for electro-mechanical ducts, pipes, cables, cable trays, etc.; linear and perimeter firestop joints

G. Surface hardener, dust proofer, sealing and curing compound for concrete: SIKAFLOOR CURE HARD-24 or approved equal; for concrete slab with cement float finish

H. Tile Grout: ABC tile grout

PART 3 – EXECUTION

3.1 SURFACE PREPARATION

A. Surface to be bonded should be free of oil, grease and dust. Scrub off soap residue with water, and then clean with solvent. Surface must be completely clean and dry. Any trace of old sealant should be removed.

B. Concrete should be fully cured.

C. Wood surfaces should be lightly sanded and free from dust.

D. Metal must be free of corrosion, mill scale, oil tar or peeling paint.

E. Iron and steel surfaces should be painted to protect against rusting

3.2 APPLICATION

A. Apply sealant evenly in a continuous, steady flow pushing sealant ahead of nozzle to achieve a filled, void-free joint.

B. Do not apply too thick. A thin bead of sealant will accommodate more joint movement than a thick bead. Ideally, sealant depth should be no more than 12 mm and no less than 6 mm. Use backing material to reduce depth.

C. If necessary, widen joints by cutting sides or removing rigid filler. Wider joints accommodate more movement than narrow joints.

D. Use masking tape for neat appearance. Remove soon after smoothing before sealant cures.

E. Smooth with spatula for neat appearance, and to force sealant into joints and ensure proper contact onto sides of joint.

F. Clean up spills before sealant cures with suitable solvent-soaked cloth.

G. Remove cured sealant by scraping or wire brushing.

H. Read product instructions carefully and strictly follow them

* END OF SECTION *

DIVISION 08 00 00
SECTION 08 11 00
METAL DOORS AND FRAMES

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Furnish all materials, labor, equipment, plant, tools, required to complete all doors and frames

B. See drawings and schedules for size, details and location of required work.

1.2 SHOP DRAWINGS AND SAMPLES

A. Submit shop drawings and secure Architect's approval prior to placement of order.

B. Submit sample corner sections, hinges, tracks, handles and all other accessories.

C. Submit sample of one full size unit, complete assembly, with all accessories, prior to fabrication of steel windows.

PART 2 – PRODUCTS

2.1 HOLLOW CORE STEEL DOOR

2.1.1. STEEL DOORS AND FRAMES, STEEL DOOR HEAD AND JAMBS: Metaflus Doors, as manufactured and installed by Filipinas Shutters, Inc. or approved equal.

a) STEEL JAMBS AND HEADER: 1.4mm (gauge 16) thick x 50mm x 100mm single rabbet and 1.4 mm (gauge 16) thick x 50mm x 150mm double rabbet; fabricated cold-rolled steel; epoxy paint finish.
b) STEEL DOOR TYPES: Use manufacturer's standard details.

1) Plain, full flush design, 50mm panel thickness, lightweight, minimum 1.0 mm (gauge 20) thick galvanized aluminum - high carbon steel sheet faces with honeycomb chemically treated core, lock formed edge. Complete with stainless steel flag-type hinges and locksets. Provide optional accessories when required.

2) Fire Doors: UL 10/C, positive pressure test on side gaskets, full flush design, 50mm panel thickness, heavyweight, minimum 1.2 mm (gauge 18) thick galvanized aluminum - high carbon steel sheet faces with honeycomb chemically treated core, lock formed edge. Complete with panic device and all other U.L. listed hardware.

2.2 METAL SHUTTER: as per manufacturer's standards and specifications but not less than the following:

2.2.1 Curtain

- Slats: Formed in a cold-roll process in continuous lengths of galvanized steel interlocked to form curtains.
- Gauge: 18 gauge.
- End locks: Fitted to each end of alternate slats to achieve slat alignment and to serve as a wearing surface.
- Galvanizing: Zinc coated.

2.2.2 Bottom Track Reinforcement of curtain

- Achieved by using a bottom track consisting of steel angles.

2.2.3 Guide and Wall Angle Assembly

- Guides/Wall Angles: Guides can be constructed using steel angles or a steel channel. Wall angles of structural steel shall have a minimum thickness of 1/8".
- Depth of Guide: To be of appropriate size to allow slat penetration and to restrict horizontal slat movement.

2.2.4 Wind load Steel Roll-Up Door construction is designed to withstand wind loads of up to 20 PSF in a fully closed position, and can be designed to withstand higher wind loads upon request.

2.5.5 Bracket Plates

- Bracket Plates: To support the curtain and the counterbalance mechanism, the bracket plates shall be provided with minimum thickness of 1/4".
- Drive End Bracket Plate: The bracket plate on the drive end is to be fitted with a sealed ball bearing.

2.2.6 Spring Counterbalance

- Counterbalance: Housed in a steel pipe, maximum deflection of 0.03" per foot of door width is achieved by having the appropriate diameter and wall thickness.
- Springs: Helical torsion with a 25% overload factor for ease of operation and are greased packed mounted on a cold rolled steel inner shaft. - Spring Tension: Can be adjusted from outside of end bracket plate.
- Ball Bearing: Sealed in order to minimize wear of pipe shaft rotating around inner shaft.

2.2.7 Hoods

- Hoods: To completely enclose curtain and counterbalance; Ga 24 galvanized steel.
- Reinforcing: can be reinforced laterally to prevent sag.
- Intermediate Hood Supports: Provided where door width exceeds 16'.

2.2.8 Operation

- Electric motor operation

2.2.9 Locking

- Slide Bolts: On bottom track for manual push-up operated doors.
- Integral Gearing: Power operator can serve as an additional locking for the door.
- Hand Chain Lock: Consists of a locking bracket mounted on a guide angle

2.2.10 Finish

- Any un-galvanized surfaces shall be coated with a rust inhibiting metallic primer, except bearings

2.3 FULLY LOUVERED DOORS: Use manufacturer's standard details;

2.3.1 Material: gauge 18 CRS frame and blades; 50mm tubular frame; multiple sections can be combined for larger sizes

2.3.2 Louvers: "Z" blades with 1" blade spacing are attached by interlocking construction to the 1" deep, welded frame . Non-vision. 900A1 Frame: 1-1/4" trim, mitered and welded corners. Screws fasten through frame into louver core, leaving corridor side of frame free of fasteners

2.3.3 Size: See Door Schedule at drawing

2.3.4 Fasteners: Head screws #8 x 3/4" to match finish

2.3.5 Hinges: Heavy-duty stainless steel ball-bearing type

2.3.6 Door handle and lock - stainless steel mortise and key lever type door handle and locksets

PART 3 – EXECUTION

3.1 METAL DOORS

A. Fabrication

1. Factory prefabricates all frames in accordance to the designs and dimensions indicated in the drawings.
2. Flush type doors shall be 50 mm (2") thick. Reinforced doors form steel sections extending full height of doors and spaced not over 200 mm (8") o.k. vertically.
3. Tops and bottoms of doors shall have continuous stiffener channels welded to side plates.
4. Insulate hollow flush doors with fiberboard or cork to deaden metallic sound. Edges at top sides shall be reinforced and finished flush.

B. Installation

1. Set and anchor frames as shown in details and in approved shop drawings.
2. Set frames plumb and square and brace where necessary to prevent distortion.
3. Provide continuous vinyl weather-strip, vertically at meeting stiles on pairs and concealed top and bottom rails for all exterior doors. Entrances shall be constructed so that gaps will not occur between pivot stiles and door jambs when doors are locked or operational to prevent heat and air transmission and entrance of water and insects.
4. Protective Coating: Clean all surfaces and apply a protective coating of clear, water white methacrylate-type lacquer, resistant to alkaline mortar and plaster immediately after fabrication and may not be removed even after completion of installation.
5. Wedge clear of masonry all frames set in prepared openings 3/16 to 1/4 inch to allow for caulking.

6. Install hardware to fit details as shown in the drawings and as per manufacturer's specifications. Supply all necessary templates and instructions required.

C. Adjustments

1. Adjust all frames and attach all hardware before glazing.
2. Secure all windows and doors to be watertight and all hardware operating free and easy.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are warped, bowed, or otherwise unacceptable.

B. Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

C. Factory Finish Touchup: Immediately after erection, sand to feather-edge minor scratched, chipped, or damaged areas and apply touchup of compatible air-drying paint. Minor finish imperfections may be repaired provided finish matches new work finish and is acceptable to Architect; otherwise remove and replace.

* END OF SECTION *

DIVISION 08 00 00
SECTION 08 14 00
WOOD DOORS AND FRAMES

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Furnish all materials, labor, equipment, plant, tools, required to complete all doors and frames

B. See drawings and schedules for size, details and location of required work.

1.2 SHOP DRAWINGS AND SAMPLES

A. Submit shop drawings and secure Architect's approval prior to placement of order.

B. Submit sample corner sections, hinges, tracks, handles and all other accessories.

C. Submit sample of one full size unit, complete assembly, with all accessories, prior to fabrication of steel windows.

PART 2 – PRODUCTS

2.1 Interior Panel Doors

A. Door panel:
- made of stiles and rails
- 50mm thick made from 100% kiln-dried solid tanguile wood
- Lumbers to achieve 12% Moisture Content (MC) or less
- Dense, pre-sanded, and in precise cut
- All wood door components shall be bonded with a water resistant polyvinyl acetate industrial adhesive

B. Jamb:
- Size is 50mm thick x 150mm
- Made from 100% kiln-dried solid tanguile wood
- Lumbers to achieve 12% Moisture Content (MC) or less
- Dense, pre-sanded, and in precise cut

C. Finish:
- Sprayed enamel paint

D. Lock and Fittings:
- Stainless steel loose pin hinges; 4 sets per panel
- Stainless steel lever type door handle with key and mortise lock mechanism; brushed finish
- With stainless steel door stopper and automatic door closer

PART 3 – EXECUTION

3.1 Fabrication

1. Off-site factory to prefabricate all door and door jambs in accordance to the designs and dimensions indicated in the drawings.
2. All wood doors shall be machined by the manufacturer for cutouts, hinges, locks and all hardware requiring routing and mortising
3. Any required rabbeting to properly hang doors will be performed by the manufacturer prior to finishing.
4. Doors shall be sized to allow 1/8" clearance at top and each side, and ¾" at bottom (unless specified otherwise.)
5. All wooden door shall be spray painted. All finishing shall be performed at the factory

3.2 Installation

1. Set and anchor frames as shown in details and in approved shop drawings.
2. Set frames plumb and square and brace where necessary to prevent distortion.
3. Wedge clear of masonry all frames set in prepared openings 3/16 to 1/4 inch to allow for caulking.
4. Install hardware to fit as per manufacturer's specifications.

3.3 Delivery, Storage and Handling

1. Factory finished doors shall be individually wrapped in plastic sheet/film to protect the finish from damage by contact with other doors
2. Stack doors flat and off the floor, supported to prevent warping
3. Protect doors from damage and direct exposure to sunlight.
4. Doors shall be palletized at factory in stacks of no more than 30 doors per pallet. Door edges shall be protected with heavy corner guards
5. Contractor shall use all means necessary to protect doors from damage prior to, during, and after installation. All damaged doors shall be repaired or replaced by the contractor at no cost to the owner

* END OF SECTION *

DIVISION 08 00 00
SECTION 08 51 00
METAL WINDOWS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Furnish all materials, labor, equipment, plant, tools, required to complete all doors and frames

B. See drawings and schedules for size, details and location of required work.

1.2 SHOP DRAWINGS AND SAMPLES

A. Submit shop drawings and secure Architect's approval prior to placement of order.

B. Submit sample corner sections, hinges, tracks, handles and all other accessories.

C. Submit sample of one full size unit, complete assembly, with all accessories, prior to fabrication of entrance door.

PART 2 – PRODUCTS

A. ALUMINUM WINDOWS

2.1 Aluminum Frame

- Thickness and extrusion profile as per manufacturer's standard
- Refer to drawings for sizes
- Powder coated oven-baked paint finish
- Type: hidden frame

2.2 Glass Panels

- 12mm thick clear ordinary glass

2.3 Finish Hardware, Joint Sealant and Lock Mechanism

- Polyurethane caulk to fill rough openings and expands to aluminum with other materials; seals big gaps without causing frames to bend
- High strength, weather resistant silicone sealant; Sika Hyflex 305 AP (or approved equal)
- Complete assembly of aluminum lock/handle and retractable mechanism

B. LOUVERS

- Frames: extruded aluminium profiles as per manufacturer's specifications
- Blades: extruded aluminium profiles as per manufacturer's specifications; fixed type
- Aluminum screen: tough and durable, typically in 18 × 16 mesh, suitable for most door and window applications

PART 3 – EXECUTION

3.1 Fabrication

1. Off-site factory to prefabricate all windows in accordance to the designs and dimensions indicated in the drawings.
2. All metal windows shall be machined by the manufacturer for cutouts, hinges, locks and all hardware requiring routing and mortising

3.2 Installation

1. Set and anchor frames as shown in details and in approved shop drawings.
2. Set frames plumb and square and brace where necessary to prevent distortion.
3. Wedge clear of masonry all frames set in prepared openings 3/16 to 1/4 inch to allow for caulking.
4. Install hardware to fit as per manufacturer's specifications.

3.3 Delivery, Storage and Handling

1. Factory finished windows shall be individually wrapped in plastic sheet/film to protect the finish from damage by contact with other doors
2. Stack windows in flat and off the floor, supported to prevent warping
3. Protect windows from damage and direct exposure to sunlight.
4. Windows shall be palletized at factory in stacks of no more than 30 doors per pallet. Window edges shall be protected with heavy corner guards
5. Contractor shall use all means necessary to protect doors from damage prior to, during, and after installation. All damaged doors shall be repaired or replaced by the contractor at no cost to the owner

* END OF SECTION *

DIVISION 08 00 00
SECTION 08 70 00
HARDWARE

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Furnish and install all materials and equipment and perform labor required to fully equip in the most satisfactory conditions all:

- Finish hardware for doors, and windows and
- Other operating members

B. Include nails, spikes, bolts, long screws, etc.

C. Furnish and fit in place all:

Hardware not herein specifically mentioned but necessary to leave the work complete. All such hardware should there be any, shall conform in every respect to the balance of the hardware herein specified.

1.2 SUBMITTALS

Submit samples of locksets, hinges, door pulls, door stops, door closers, door lock chains, door eyes and other finish hardware and accessories for Architect's approval.

PART 2 – PRODUCTS

1. Door Locks And Locksets: Schlage, U.S. original or approved equal. Note: Provide 4 pcs Master Keys for all lever locksets and deadbolt locking device.
   - Lever type door knob: stainless steel brushed finish
   - Complete assembly of stainless steel top and bottom lock mechanism for frameless glass door; mirror finish
2. Deadbolts: Schlage (or approved equal), B160 Deadbolt Lock, 626, U.S. original, heavy duty. Deadbolt thrown or retracted by key from outside or by inside turn unit. Bolt automatically deadlocks when fully thrown.
3. Hinges:
   - Spartan Or Yank (USA made) (or approved equal): 88.5 mm x 88.5 mm, (3-1/2" x 3-1/2") stainless steel, plain ball bearing, loose pin or fixed pin, button tip, four (4) pieces per door panel for steel doors; threee (3) pcs for wood panel doors
   - Gravity Pivot Hinge: Stanley Or Hager Brand Gravity Pivot Hinge (USA made). 2 pieces, steel, plain bearing, for all toilets stall doors.
   - Complete assembly of stainless steel heavy duty door pivot hinges and patch fittings for frameless glass door; Hafele or approved equal
4. Automatic Door Closers: 40 kg. max. door weight, satin chrome finish. For doors of offices and conference rooms only and as indicated in the Door and Hardware Schedule.

5. Door Stop / Door Holder: Steel, chrome finish, floor or wall mounted. Attach securely to floor or wall to prevent door knob from hitting the wall.
6. Door Handles (main entrance): Stainless steel; mirror finish; 32mm diameter X 900mm; "H" type
7. Pantry cabinet handles: Stainless steel
8. Door Panic Device (for fire exits): steel; heavy duty
9. Door Silencers: Rubber, 3 sets per door, installed at jamb side. For all doors.

PART 3 – EXECUTION

3.1 INSTALLATION

1. All hardware shall be installed in strict accordance with the manufacturer's directions.
2. All work shall be installed plumb and true and secured with proper fastenings so as to make all work rigid and firm.
3. After installation, all finishing hardware shall operate and function smoothly and efficiently in strict accord with their respective expected operating performance.
4. All work which is to receive hardware shall be inspected and any defect must first be rectified before installing finishing hardware.
5. Exposed items of hardware: After hardware has been properly fitted, all exposed items such as knobs, plates, pulls, locks, etc. shall be removed until final coat of finish has been applied, and then hardware installed.
6. Door Knobs, Lock and Latch Strikes:

a. All locks, latch strikes and strike boxes be installed in door frames at the same height from the floor.

b. Door knobs shall be located so that the center of the knobs is 965 mm (38") from the finished floor or as directed by the Architect.

c. All lock turn to be non-ferrous metal. All lock mechanisms to be free of dye cast material.

d. All locks are to be interchangeable and reversible without any alterations to the door.

e. The face of each lock to be beveled 3 mm (1/8") in 50 mm (2") to conform to the level of the door.

f. Roses to hold firmly in place without use of wood screws. Knobs to be securely fastened to spindles without the use of set screws.

g. All cylinders must be removable and interchangeable with the aid of the key, but without requiring the lock to be removed from the door.

h. Key locks are to have automatic deadlocking latch to prevent forcing back of the bolt. All locks to have box strikes. Lips of strikes not to project beyond jamb trim.

3.2 PROTECTION

1. Hardware which might be damaged by the construction work shall be protected during the progress of the building work and uncovered upon completion.

2. Protection must be provided at all times including during painting operation.

3.3 CLEANING

1. Upon completion of the work, all hardware shall be cleaned and polished and left in perfect operating condition.
2. Any hardware that may have been damaged either on its finish or more shall be replaced.

* END OF SECTION *

SECTION 08 81 00
GLASS GLAZING

PART 1 GENERAL

1.1 SCOPE OF WORK

This section shall include all labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing operations in connections with furnishing, delivery and installing the glass panels as shown and specified.

1.2 SUBMITTALS

1.2.1 General: All submittals for approval as indicated herein shall be in accordance to the provisions under General Conditions of the Contract Documents.

1.2.2 Shop Drawings: Show complete details of setting methods of materials for each type of glazing material specified.

1.2.3 Samples: Two (2) 300mm square, factory labeled.

1.2.4 Manufacturer's Data: Include glass manufacturer's recommendations for setting and sealing materials and for installation of each type of glazing specified.

1.2.5 Calculations: Submit structural calculations. The manufacturer shall recommend the thickness of the glass, based on their computation.

Note: All Shop Drawings and Sample Sections shall be submitted prior to purchasing and installing of materials for review and approval of the Architect.

1.3 QUALITY ASSURANCE

1.3.1 Conform to the following standards:

A. Glazing Manual of the Flat Glass Marketing Association (FGMA)
B. Federal Standard 16 CFR 1201: Federal Safety Standard for Architectural Glass
C. ANSI Z97.1 Physical Properties

1.3.2 Labeling:

Labels showing glass manufacturer's identity, type of glass, thickness and quality will be required on each piece of glass. Labels shall remain on glass until it has been set and inspected. When glass is not cut to size by the Manufacturer, and is furnished unlabeled as "stock to cut", Contractor shall submit an affidavit, or other satisfactory evidence, stating quality thickness, type and manufacturer of glass furnished. Putty and glazing compounds shall arrive at Project Site in labeled containers that have not been opened.

1.3.3 Qualification of Installers:

Provide at least one person who shall be thoroughly trained and experienced in the skills required, who shall be completely familiar with the referenced standards and the requirements of his work, and who shall personally direct all installation performed under this Section of the specification.

not require painting. Other materials which will be exposed to view and unpainted shall be gray or neutral color. Glazing materials shall be as specified herein and as recommended by the glass the manufacturer as approved.

2.5 Glass Glazing for Exterior Doors, Curtain Walls and Windows

2.5.1 12mm thick clear tempered frameless glass door panel with stainless steel pivot hinge and patch fittings (main entrance); double leaf; double swing; with stainless steel frame (as per manufacturer's specifications); with UV protection

2.5.2 12mm thick clear tempered glass fixed wall panels on aluminum frame (as per manufacturer's specifications); with UV protection

Submit data and samples for Architect's approval.

2.6 Glass Glazing for Interior Doors and Walls

2.6.1 12mm thick clear tempered glass fixed wall panels on aluminum frame (as per manufacturer's specifications)

Submit data and samples for Architect's approval.

2.8 Glazing Sealant

Shall be Sika Hyflex 305 AP (or approved equal), neutral cure, high tensile-strength elastomeric silicone sealant and adhesive for structural bonding glass, metal and building components; shall comply with ASTM C 920, class 50

Color of sealant for exterior curtain wall shall be the same color as the wall aluminum frame. Glass sealant for stainless steel frame shall be clear type.

2.9 Glazing accessories

As required to supplement the installation shall be provided on the items to be glazed and provide a complete work. These include glazing points, clips, shim, angles, and beads, setting blocks, edge spacer, back up material, primer and masking tapes. Ferrous metal accessories which will be exposed in the finished work shall have a finish that will not corrode or stain while in service.

2.10 Masking tape

Shall be adhesive paper type and used to prevent contamination of glass or sash during application of primer or filling of sealant, and to maintain neat edge line of sealant.

2.11 Norton Tape

Shall be 6mm thick x 13mm x 50 LF Norton Thermal Bond high density structural glazing space tape double sided adhesive.

PART 3 EXECUTION

3.1 Install glass in accordance with manufacturer's recommended instructions.

3.2 The contractor shall secure an adequate storage space for his materials, tools, and equipment. Where aluminum is to be installed in contact with masonry or other similar materials, aluminum shall be back-painted with one coat of heavy bonded bituminous paint. All preservations to be applied shall be required quality or correct consistency and of sufficient thickness.

3.3 Verify surfaces and adjacent work prior installation and setting of glass. Determine the sizes to provide the required edge clearances by measuring the actual to receive the glass. Grind smooth all edges of glass that will be exposed to a finished work. Leave labels in place until the installation is approved. Secure fix movable items or keep in a closed and locked position until glazing compounds has thoroughly set.

3.4 Items to be glazed shall be either shop or field glazed using glass or the quality and thickness specified or indicated. Handle and install glazing materials in accordance with the manufacturer's instructions. Use beads or stops, which are furnished with items to be glazed to secure the glass in place.

3.5 Determine actual sizes of glass required by measuring frames to receive glass at Project Site, or from guaranteed dimensions provided by frame supplier. Dimensions for glass and glass holding surrounds shall be coordinated to provide the following minimum clearances.

3.6 Make edge cuts clean. Do not nip, seam, swipe, stone or strike edges. Do not knock-off flares. Do not bump, drag, or brush the edges of lites against frame or other hard objects.

3.7 Set glass in rebates using manufacturer's standard glazing fittings and as specified herein. Place setting blocks at quarter points of glass panels. Seal exterior side of each glass lite with sealant type specified.

3.8 No attempt shall be made to change size of tempered or laminated glass units after they leave the factory. Glass panels shall be clean cut. Nipping to remove flares or to reduce oversized dimensions of any type of glass will not be permitted.

3.9 Apply thin layer of putty to rebate and set glass of putty pressing until an even bed is secured; place spring wire or angle glazing clips and run face putty, remove excess putty from other side flush with edge of rebate.

3.10 Putty shall be neatly run in straight line paralleled with inside of glazing rebates, corners shall be carefully made and all excess putty shall be removed and surface left clean.

3.11 The contractor shall carry out a water-tightness test upon completion of all installation works under the Supervision of the Architect. The windows shall be hosed under direction of and in a manner approved by the Architect for a period of not less than ten (10) minutes closed state form the exterior of the building. Test shall be made by applying a water spray to all joints and surfaces exposed to the weather, after all caulking and sealing has been completed.

3.12 The water infiltration testing shall be made immediately after the setting or curing period prescribed for the sealants used.

3.13 Absolute water tightness shall be achieved in the interior of the building in any case. Should any form of leakage occur, the Contractor shall be responsible for rectifying same at his own expense and retested to the satisfaction of the Architect.

3.14 The Contractor shall provide all necessary labor and materials require to carry out water testing of these frames prior to acceptance.

3.15 The Contractor shall carry out such modifications, as are necessary, including additional sample frames if required, to these frames to satisfy the Architect that the details for fabrication and installation of all frames will produce a watertight result.

3.16 Attach crossed streamers away from glass face. Do not apply markers to glass surface.

3.17 Replace damaged glass which is broken, chipped, cracked, abraded or damaged during construction.

* END OF SECTION *

DIVISION 09 00 00
SECTION 09 21 16
GYPSUM BOARD

PART 1 GENERAL

1.1 SCOPE OF WORK

This section shall include all management, labor, materials, tools, equipment and services required to furnish and install gypsum boards for walls and ceiling as specified herein and shown in Drawings required to perform all works in accordance to the General Conditions of the Contract Documents.

1.2 REFERENCES

Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.3 SUBMITTALS

1.3.1 General: All submittals for approval as indicated herein shall be in accordance to the provisions under General Conditions of the Contract Documents.

1.3.2 Product Data: Submit product information from manufacturers for each type of product specified to include brochures, catalogs, sample and certificates of tests reports, quality compliance and accreditation from foreign manufacturer for authenticity of local distributed materials.

1.4 QUALITY ASSURANCE

1.4.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.4.2 Manufacturer Qualification shall be at least five (5) years of production experience, whose published literature clearly indicates general compliance of products with requirements of this section.

1.4.3 Single Source Responsibility
Obtain gypsum boards of uniform quality from a single manufacturer for each type product required.

1.4.4 Tests:
A. Sound Transmission Characteristics (STC): For gypsum board assemblies with STC Ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413.

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 Comply with product delivery requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.5.2 Deliver materials in manufacturer's original unopened packages clearly marked with identifying information. Protect materials as recommended by the manufacturer.

1.5.3 Store materials, keep dry, and protect against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels on level surface to prevent sagging.

1.6 WARRANTY

Special written warranty for each material specified herein shall be submitted by Manufacturer/ Contractor without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Failures are defined to include faulty workmanship or faulty materials.

1.7 PROJECT CONDITIONS

1.7.1 Comply with field examination requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.7.2 Environmental Conditions: Establish and maintain environmental conditions for application and finishing of gypsum board to comply with ASTM C840 and with gypsum board manufacturer's recommendations.

1.7.3 Minimum Room Temperatures: For attachment of gypsum board to framing, maintain not less than 40°F. For finishing of gypsum board, maintain not less than 50°F for 48 hours prior to application, and continuously thereafter until drying is complete.

1.7.4 Ventilation: Ventilate building spaces to remove water not required for drying joint treatment materials. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

PART 2 PRODUCTS

2.1 Interior Wallboards

2.1.1 Drywall partitions shall be Knauf Standard Shield 12mm thick x 1220mm x 24400mm standard gypsum, square edge board. Standard plasterboard shall be composed of 100% recyclable natural gypsum plaster core encased in heavy-duty face and backing linerboard, hazard and toxic-free. Dry wall partition shall be coated with high performance low VOC, odorless, ultra-premium water-based acrylic coating that gives a cleanable matte finish to walls with surface protector and anti-bacterial protection. Framing shall be standard galvanized steel framing, coated with water-based white acrylic anti-bacterial and dirt-resisting semi-gloss latex paint.

2.1.2 Adhesive for joint and fastener concealment shall be paper tape or as recommended in writing by the wallboard manufacturer and as approved for the following uses:

a. Embedding compounds for first and second coats.
b. Finishing compound for final coat.

2.1.3 Backing board shall be of the grade and form required for the insulation.

2.1.4 Wall and partition metal assemblies shall be as manufactured. Assemblies shall be as follows:

a. Track, top and bottom shall be galvanized steel gauge 22 or 24 and 2.4 or 3.0m long.
b. Stud shall be galvanized steel, gauge 22 or 24 and 2.4 or 3.0m long.

2.1.5 Fasteners.

a. Bolts and nuts shall be recommended by the framing manufacturer, steel and zinc-coated.
b. Expansion shields shall be of the type and class applicable.
c. Powder-driven fasteners as per Architect's approval

2.1.6 Screws for board attachment shall be shouldered flat-head design for use with special power-driven tools.

a. Wood Screws shall be not less than 15mm (1-1/8 inches) long.
b. Metal screws shall be not less than 25mm long with self-tapping threads and self-drilling points

2.1.7 Toggle bolts shall be of the type and class best suited for the purpose.

2.2 Ceiling Boards

2.2.1 General Office Ceiling: Acoustic Mineral Fiber Board; Shall be Knauf ClimaPlus Class A 600mm x 1200mm; edges with fine line bevel (FLB) profile. Framing system shall be Knauf Centricitee DXT grid profile; aluminum powder coated oven baked paint finish

2.2.2 Lobby: Gypsum Board

Shall be Knauf Standard Shield Gypsum Board 10mm x 1220 X 2440mm; square edge. Framing system shall be galvanized steel, gauge 22 or 24 and 2.4 or 3.0m long spaced every 610 x 1220mm on center.

2.2.3 Toilet & Pantry Ceiling: Gypsum Board

Shall be Knauf Moisture Shield Gypsum Board 10mm x 1220 X 2440mm; square edge. Framing system shall be galvanized steel, gauge 22 or 24 and 2.4 or 3.0m long spaced every 610 x 1220mm on center.

PART 3 EXECUTION

3.1 General

3.1.1 Examination: Examine areas and substrates, with installer present, and including hollow-metal frames, anchors, and structural and non-structural framing, for compliance with other requirements and other unsatisfactory conditions have corrected.

3.1.2 Steel Framing Installation Standard: Install steel framing to comply with ASTM C754 and with ASTM C840 requirements that apply to framing installation.

3.1.3 Install supplementary framing, blocking and bracing at terminations in the gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations.

3.2 Installation for Walls

3.2.1 Walls: Furring channels shall be spaced 0.40m on centers. Furring shall be secured to masonry or concrete with hardened nails, toggle bolts, expansion shields, or other approved method at not more than 0.60m centers staggered in alternate flanges of channel with one fastener located within 150mm of each end. Furring shall be secured to structural framing as shown. Furring shall be set plumb or level and rigid using shims of galvanized steel wherever necessary to assure a finished wall surface in a true, even plane. Board abutting dissimilar wall or ceiling materials shall have edges finished with casing beads aligned to provide a finished joint.

3.2.2 Steel framing: Non- load bearing walls and partitions shall be framed with 64mm and 92mm steel studs and runners installed as indicated and as hereinafter specified. Studs shall be spaced not more than 0.60m on centers and end studs in adjoining walls shall be interconnected with screws spaced at not more than 0.60m centers.

3.2.3 Application: Wallboard shall be applied with the separate boards in moderate contact but not forced into place. At internal and external corners the cut edges of the boards shall be concealed by the overlapping covered edges of the abutting boards. The boards shall be so staggered that the corners of any board will not meet a common point except in vertical corners.

A. Single-ply horizontal application: The long dimension of the panels shall be placed at right angles to the furring or framing members. End joints, where required, shall be made over furring or framing members.

B. Single-ply vertical application: The long dimension of the panels shall be placed parallel to the furring or framing members. the panels shall be of the length required to reach from the ceiling line to the floor line in one continuous length. Joints shall be made over framing or furring members.

3.2.4 Control Joints: shall be formed of casing bead trim installed back-to-back over separate framing or furring members. A spacing of 3mm shall be maintained between opposite beads. Control joints shall be located as indicated.

3.2.5 Attachment: If the paper surface is broken in nailing or screwing, another nail or screw shall be driven approximately 50mm from the faulty nailing or screwing. Attachment of wallboard to steel furring and steel framing shall be screw fasteners only. Nailing or screw attachment shall proceed from central portion of wallboard toward end and edges.

3.2.6 Joint and fastener concealment: Areas to be treated shall be inspected by the contractor to ascertain that wallboard fits tightly against supporting framework, and these areas shall be heated to not less than 55 degrees F. for 24 hours prior to commencing treatment, during treatment, and until adhesive compounds have dried. Application shall be by machine or hand tool. A minimum drying time of 24 hours shall be allowed between adhesive coats. Additional drying time may be necessary in poorly ventilated areas.

a. Embedding compound: Shall be applied to wall board joints and fastener heads in a thin uniform layer. Compound shall be spread not less than 75mm wide at joints, and reinforcing tape shall be centered on the joint

and embedded in the compound. A thin layer of compound shall be spread over the tape. After this treatment has dried, a second coat of embedding compound shall be applied to wallboard joints and fastener heads. Compound shall be spread in a thin uniform coat and not less than 150mm wide at joints. Treated areas shall be sanded to eliminate ridges and high points.

b. Finishing compound: After embedding compound has dried, a coat of finishing compound shall be applied to joints and fastener heads. Finishing compound applied at joints shall be feathered out to not less than 300mm (12 in) wide. After compound has dried, the treated areas shall be sanded as necessary to obtain uniformly smooth surfaces. Care shall be taken not to scuff the paper surface of the wallboard.

3.2.7 Corner Treatment

a. Internal corners: Shall be treated in the manner specified here-in-before for joints, except that the reinforcing tape shall be folded lengthwise through the middle and fitted neatly into the corner.

b. External corners: Shall have corner bead fitted neatly over the corner and secured with the same type fastener used for applying wallboard. The fastener shall be spaced approximately 150mm on centers and driven through the wallboard into the framing member. After the corner-piece has been secured in place, the corner shall be treated with joint compound and reinforcing tape in the manner here-in-before specified for joints. The joint compound shall be feathered out from 200mm to 250mm, on each side of corner.

3.3 Installation for Ceiling

3.3.1 Ceiling framing systems: Framing for furred ceilings shall be installed at the locations indicated and shall conform to the standards.

3.3.2 Suspended ceilings: Ceiling framing shall consist of 38mm steel main runner channels suspended plumb from structural slab or frame by hanger wires or straps, spaced at not less than 1.20m on centers. Hanger wires shall be wrapped around the reinforcing bars, of the supporting concrete-slab construction with twists before concrete is placed or shall be shaped into a 100mm diameter loops and embedded at least 50mm in the concrete, or shall be attached to approved inserts. Hanger wires shall be looped around bottom chord of open-web steel joist and shall receive three full turns around itself, or around structural steel members or to attached beam clamps and shall receive three full turns around itself. Hanger Strap shall be hung plumb and connected with 10mm galvanized bolts and nuts to anchors made of hanger strap set in the concrete, or shall be looped around structural framing and connected to itself with 10mm galvanized bolts and nuts. Main runner channels shall be located within 150mm of parallel walls and shall be cut short of abutting wall 12mm plus or minus 6mm. Where channels are spliced, the ends shall be overlapped not less than 300mm with flanges of channels interlocked and securely tied near each end of the splice with two loops of 1.0mm tie wire or the ends may be joined by approved standard main runner coupling Splices shall be staggered.

3.3.3 Attached ceilings: Framing is not required for ceilings attached to structural members, except for framing openings as specified. Furring as hereinafter specified shall be attached directly to structural members.

3.3.4 Furring: Steel channels or steel studs shall be provided where steel furring is indicated for screw attachment of boards.

Ceilings: Hat –shaped furring members shall be spaced 0.40m on centers and securely attached across suspended runner channels or structural framing members with wire clips or double-strand of 1.0mm tie wire saddle-tied at each crossing. Ends of wire ties shall receive three full twists. Furring shall be spliced with 0.20m nested laps securely tied near each end of lap, with two loops of 1.0mm tie wire. Splices shall be staggered. Furring channels shall be located within 50mm of walls. Where board abuts dissimilar wall materials, perimeter of ceilings shall be finished with an edge bead trim strip applied to wall and accurately aligned with the finished ceiling. Board edges adjoining walls shall be laid on the horizontal leg of the trim strip against a continuous bead of approved type sealant.

3.3.5 Steel Framing: Non-load-bearing walls and partitions shall be framed with 64mm and 92mm steel studs and runners installed as indicated and as hereinafter specified. Studs shall be spaced not more than 0.60m on centers and end studs in adjoining walls shall be interconnected with screw spaced at not more than 0.60m on centers.

a. Ceiling runners: Shall be accurately aligned and securely attached to floors and to structural ceilings or roof deck except where partition-ceiling runners are applied directly to finish material of continuous ceilings. Attachment shall be by expansion shields, machine bolts, or other approved method, at not more than 0.60m centers and to furred ceilings by board screws at each furring member. Furring will be provided at ceiling runners oriented parallel to the direction of furring members. Runners shall extend beyond open-end partitions for 0.30m. Upon installation of end studs, runner extensions shall be bent and nested with the stud and attached thereto with two board screws. Runner shall be in the longest possible lengths with butt joints between lengths.

b. Studs: Shall be positioned plumb in ceiling and floor runners and securely attached with not less than one board screw on each side of the stud ends. Stud shall be installed in continuous lengths with no splicing in lengths up to 5m for 92mm studs, 3.5m for 75mm studs, and 3m for 64mm studs.

c. Special framing for beams, columns, soffits, and other special items shall be sized and built to the shapes or forms indicated by rigidly securing each intersection with board screws.

3.3.6 Ceiling openings: Support members shall be provided at ceiling openings such as required for access panels, recessed light fixtures, and for air supply or exhaust. Support members of not less than 38mm main runner channels and suspension wires or straps shall be located to provide at least the minimum support specified herein for furring and board attachment. Intermediate structural members, although not a part of the structural system, shall be provided for attachment or suspension of support members.

3.3.7 Application: Board shall be applied with the separate boards in moderate contact but not forced into place at internal and external corners the cut edges of the boards shall be concealed by the overlapping covered edges of the abutting boards. The boards shall be so staggered that the corners of any boards will not meet a common point except in vertical corners.

a. Ceilings: Board shall be applied to the ceilings with the long dimension of the board, at right angles to the furring members. Board may be applied with the long dimension parallel to furring members that are spaced 0.40m on centers when attachment members are provided at end joints.

3.4 Wall Board and Ceiling Jointing and Putty

1st Coat - Bedding and Tapping

1. Stir lightly if liquid separation is observed.
2. Evenly fill the plasterboard joint recess with Fast-Setting Gypsum Compound or, using a plasterers' broad knife. (A 3mm gap between boards is recommended to make sure enough material is used.)
3. Center the joint tape and press down into the fresh plaster. Remove excess Fast-Setting Gypsum Compound with a broad knife drawn along the joint at an angle approximately 45 degrees to the plasterboard surface. Care should be taken to ensure no air bubbles remain below the tape. Sufficient putty should be left under and over the tape to ensure a proper bond.
4. When the tape is embedded, apply a thin coat of Fast-Setting Gypsum Compound or approved equal, over fastener heads.

3.5 Cleaning and Protection

3.4.1 Promptly remove any residual joint compound from adjacent surfaces not indicated to receive texture.

3.4.2 Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board assemblies are without damage or deterioration at the time of construction complete.

* END OF SECTION *

DIVISION 09 00 00
SECTION 09 24 00
PLASTERING

PART 1 GENERAL

1.1 SCOPE OF WORK

This section shall include all management, labor, materials, tools, equipment and services required to furnish and install plastering as specified herein and shown in Drawings required to perform all works in accordance to the General Conditions of the Contract Documents. All masonry unit work or concrete work not specifically specified with a finish, exposed to view shall be cement plastered. Plastering work shall be coordinated properly with the work of other trades. The work of other trades shall be protected properly from damage during plastering operations. Floors and finished work shall be properly protected with a covering of polyethylene sheets or heavy kraft waterproof paper, with lapped and sealed joints. Scaffolding shall be amply strong, well braced, tied securely and inspected regularly. Overloading of scaffolding will not be permitted.

1.2 REFERENCES

Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.3 SUBMITTALS

All submittals for approval as indicated herein shall be in accordance to the provisions under General Conditions of the Contract Documents.

1.4 QUALITY ASSURANCE

Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 Comply with product delivery requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.5.2 Manufactured materials shall be delivered in the original packages and containers bearing the name and brand of the manufacturer. Cement and lime shall be stored off the ground under watertight cover, and away from sweating walls and damp surfaces, until ready for use. Damaged or deteriorated materials shall be removed from the premises.

1.6 WARRANTY

Special written warranty for each material specified herein shall be submitted by Manufacturer/Contractor without reducing or otherwise limiting any other rights to

correction which the Owner may have under the Contract Documents. Failures are defined to include faulty workmanship or faulty materials.

1.7 PROJECT CONDITIONS

Comply with field examination requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

PART 2 PRODUCTS

2.1 Portland Cement: Shall conform to PNS 07-1992, type 1.

2.2 Sand: Shall be clean natural sand or manufactured sand passing a 3mm screen and retained in a No. 100 mesh sieve.

2.3 Water: For mixing shall be potable.

2.4 Lime: Shall be hydrated lime with the requirement that the free (Unhydrated) calcium oxide (CaO) and magnesium oxide (MgO) in the hydrated product shall not exceed 8 percent by weight calculated on the "as received" basis.

PART 3 EXECUTION

3.1 Preparation

3.1.1 Mixing of plaster: Except where hand mixing of small patches is approved, mechanical mixers of an approved type shall be used for the mixing of plaster. Materials shall be accurately measured in a device that will maintain the specified proportions within a plus or minus tolerance not in excess of 5 percent by volume. Caked or lumped materials shall not be used. Mechanical mixers, mixing boxes, and tools shall be cleaned after mixing each batch and kept freely of plaster from previous mixes. Plaster shall be thoroughly mixed with the proper amount of water, until uniform in color and consistency. Re-tempering will not be permitted, and all plaster that has begun to stiffen shall be discarded.

3.1.2 Proportioning of plaster: Portland cement plaster shall be a two-coat application. Each coat shall be proportioned as follows:

One (1) part Portland Cement
Three (3) parts Sand; and
One-fifth (1/5) part Lime Putty

3.1.3 Application of plaster: Base coats shall be applied with sufficient pressure and the plaster shall be sufficiently plastic to provide good bonds on masonry or concrete base. Plaster work shall be finished level, plumb, square and true, within a tolerance of 3mm in 3m, without eaves, cracks, blisters, pits, grazing, discoloration, projections or other imperfections. Plasterwork shall have no visible junction marks where one day's work adjoins another. Finished work shall be covered and protected in an approved manner to prevent damage.

3.1.4 Portland Cement Plaster: Shall be applied in two coats double-up method on masonry or concrete to a thickness of not less than 12mm. Base coats shall be applied with sufficient pressure and excessive evaporation during hot or

drying weather conditions. Care shall be taken to prevent staining the finished plaster.

3.1.5 Patching and pointing: Upon completion of the building and when directed, all loose, cracked, damaged, or defective plastering shall be cut out and re-patch in a satisfactory and approved manner. All point-patching of plastered surfaces, and plaster work abutting or adjoining any other finish work, shall be done in a neat and workmanlike manner. Plaster droppings or splattering shall be removed from all surfaces. Exposed plastered surfaces shall be left in a clean unblemished condition ready to receive paint or other finish. Protective coverings shall be removed from floors, other surfaces, and all rubbish and debris shall be removed from the building.

* END OF SECTION *

DIVISION 09 00 00
SECTION 09 30 00
TILES

PART 1 GENERAL

1.1 SCOPE OF WORK

This section shall include all management, labor, materials, tools, equipment and services required to furnish and install tile works as specified herein and shown in Drawings required to perform all works in accordance to the General Conditions of the contract Documents.

The work shall not be started until the roughing-in for plumbing and electrical work has been completed and tested. The work of all other trades in the area where tile work is to be done shall be protected from damage in a skillfully manner and as directed.

1.2 REFERENCES

Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.3 SUBMITTALS

1.3.1 General: All submittals for approval as indicated herein shall be in accordance to the provisions under General Conditions of the Contract Documents.

1.3.2 Manufacturer's literature: Product data sheets, brochures, catalogs for all tile materials used for the work.

1.3.3 Certifications: Prior to delivery, submit certificates to the Architect attesting to compliance with the applicable Specifications herein.

1.3.4 Manufacturer's grout color charts. Sample of grout: Cured sample, 2 x 2 inches of selected colors.

1.3.5 Tile samples of the actual tile to be provided shall be submitted for approval before tile work is started. The finish work shall match the approved samples in sizes, color patter, finish and texture.

1.3.6 Tile Adhesive: product catalog and methodology of installing tiles.

1.4 QUALITY ASSURANCE

1.4.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.4.2 Source Limitations: Obtain all tiles of same type and color or finish tile from one source or producer. Materials shall be of the same production run and of consistent quality in appearance and physical properties for each contiguous area.

1.4.3 Setting materials such as mortar, adhesive and grout components shall be of uniform quality from a single manufacturer as well as finish treatments for nosing, stone thresholds and metal strips.

1.5 MOCK – UPS

Build mock-ups to verify selection made under sample submittal and to demonstrate aesthetic effects. When completed and approved by the Architect, the mock-up shall be incorporated into the finished Work and become the Standard of quality for the remainder of the Project.

1.6 DELIVERY, STORAGE AND HANDLING

1.6.1 Comply with product delivery requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.6.2 Manufactured materials shall be delivered in the original unbroken packages or containers that are labeled plainly with the manufacturer's name and brands. Containers for tiles shall be grade sealed.

1.6.3 Store all materials off ground to prevent contamination by mud, dust, or materials likely to cause staining or other defects. Cover material to protect from elements and neglect.

1.7 WARRANTY

Special written warranty for each material specified herein shall be submitted by Manufacturer/ Contractor without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Failures are defined to include faulty workmanship or faulty materials.

1.8 PROJECT CONDITIONS

1.8.1 Comply with field examination requirements under General Conditions of the Contract Documents and Manufactures instructions.

1.8.2 Verify dimensions of concrete substrate by accurate field measurement. Confirm concrete has been in place for at least 28 days prior to commencing tile installation. Do not begin work until deficiencies in the substrate are corrected. Commencement of tile installation indicate Contractor's acceptance of substrate.

1.8.3 Do not install until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and Manufacturer's instructions.

1.9 EXTRA MATERIALS

1.9.1 Comply with requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.9.2 Furnish extra materials that match products installed and that are packaged with protective covering for storage with quantity of full size units for tile and trims units equal to two (2) percent of amount installed, for each type, composition, color, pattern and size indicated.

1.10 PERFORMANCE REQUIREMENTS

Materials are to be from an accredited company with accomplished projects similar to the quality of material as specified herein. The Contractor shall submit tile samples to the Architect for approval prior to any installation. Design including texture and pattern shall be kept minimal with neutral color assignment as per Architect's approved sample. Submit material test reports and certificates acquired by Manufacturer from reputable testing and accreditation agency.

PART 2 PRODUCTS

2.1 Tile Adhesive
Shall be cement-based adhesive formulated for installing and fixing ceramic tiles on horizontal and vertical concrete surfaces for thin-bed or thick-bed application.

2.2 **Tile Grout** shall be ABC Grout; high performance, waterproof, cement-based tile adhesive conforming to PNS 53 with early high-strength characteristics. Color of grout shall match tile material as per Architect's approved sample.

2.3 **Water** shall be clean and free from injurious amount of oil, acids, alkali, organic materials or other substances that maybe deleterious to concrete or steel.

2.4 Floor and Pavement tiles

2.4.1 Polished Concrete Screed Floor Finish
Shall be plain cement smooth trowel finish with concrete hardener coated with a high performance, two component water-based acrylic epoxy paint/sealer which has a superior chemical, solvent and stain resistance, odorless and UV resistant finish. Refer to Architectural drawings for layout and detail.

2.4.2 Float Concrete Floor Finish
Shall be plain cement float finish with concrete hardener coated with a high performance, two component water-based acrylic epoxy paint/sealer which has a superior chemical, solvent and stain resistance, odorless and UV resistant finish. Refer to Architectural drawings for layout and detail.

2.4.3 Concrete Tactile Paver

Shall be 50mm thick, blister type; ±2mm tolerance in size (length and breadth); tolerance in block thickness ±5mm; water absorption rate not more than 6%; compressive strength not less than 450kg/sq. cm; average wear thickness due to abrasion not more than 2mm; thickness of wearing layer not less than 5mm

2.4.4 Unglazed Homogenous Ceramic Tiles
Shall be 12mm thick (refer to drawings for specific sizes) vitrified unglazed homogenous ceramic tiles, heavy-duty, anti-stain, acid-resistant, with medium to heavy resistance to abrasion. Submit product catalog and sample for Architect's approval. Provide 1-2mm gap in between tile joint during installation. Tile color and design shall be approved first before installation. Refer to Architectural drawings for layout and details

2.4.2 Glazed Homogenous Ceramic Tiles
Shall be 12mm thick (refer to drawings for specific sizes) vitrified glazed homogenous ceramic tiles, heavy-duty, anti-stain, acid-resistant, with medium to heavy resistance to abrasion. Submit product catalog and sample for Architect's approval. Provide 1-2mm gap in between tile joint during installation. Tile color and design shall be approved first before installation. Refer to Architectural drawings for layout and details

2.4.3 Non-skid Matte or Unglazed Ceramic Floor Tiles
8mm thick vitrified unglazed ceramic tiles, anti-stain, with medium to heavy resistance to abrasion. Submit product catalog and sample for Architect's approval. Provide 1-2mm gap in between tile joint during installation. Tile color and design shall be approved first before installation. Refer to

Architectural drawings for layout and details. Submit samples for Architect's selection and approval.

2.4.6 Pebble-wash Paver Block

Shall be 50mm thick, light traffic type; Pebble-wash finish; ±2mm tolerance in size (length and breadth); tolerance in block thickness ±5mm; water absorption rate not more than 6%; compressive strength not less than 450kg/sq cm; average wear thickness due to abrasion not more than 2mm; thickness of wearing layer not less than 5mm. Submit sample for Architect's approval.

2.5 Wall Tile Finishes

2.5.1. Glazed Ceramic Wall Tile

8mm thick glazed porcelain ceramic tiles. Submit product catalog and sample for Architect's approval. Provide 1-2mm gap in between tile joint during installation. Tile color and design shall be approved first before installation. Refer to Architectural drawings for layout and details. Submit tile sample for Architect's approval.

2.6 Counter tops (Pantry and Toilets)

Shall be 25mm thick quartz stone slab (verify actual measurement); polished and with bull nose edge. Submit sample for Architect's approval.

PART 3 EXECUTION

3.1 Comply with Manufacturer's standard installation procedures and applicable codes. Verify design and layout as approved from shop drawings submitted by Contractor in accordance to Drawings.

3.2 Examine surfaces to receive tile, before tile installation begins. Do not proceed with installation until adjoining work is satisfactorily protected. Correct the following conditions before proceeding with tile work.

3.2.1 Defects or conditions adversely affecting quality, execution and permanence of tile installation.

3.2.2 Maximum deviation of surfaces to receive tile:
A. Subfloor surface: ¼ inch in 10 feet
B. Vertical surface: ¼ inch in 8 feet

3.3 Condition of surfaces to receive tile shall be firm, dry, clean, and free of oily or waxy films. Grounds, anchors, lugs, hangers, recess frames, bucks, electrical and mechanical work in or behind tile to be installed prior to proceeding with tile installation.

3.4 Preparation

Use clean container and tools. Contamination may affect the setting time. Mix by hand or with a power mixer until a lump free homogeneous paste is reached. For best results, stand mixture for 2 minutes before use.

3.5 Installation

1. Mix All-purpose Tile Adhesive 25-kilogram bag with six (6) liters of water
2. Stir with a mixing device until desirable consistency is attained
3. Stand for two (2) minutes prior to use.
4. Wet substrate before application of tile adhesive
5. Use trowel to spread the adhesive per one (1) square meter at a time. Apply to desired level to smoothen the uneven surface of the flooring
6. Place and align tile by moving it back and forth.
7. Adjust height accordingly by gently tapping the tiles using the handle of the trowel or hammer. Fix tiles immediately within fifteen (15) minutes open time.

3.6 Grouting and Pointing

The tiles shall be wetted, if they have become dry, before applying grout. Joints of 3mm or less in width shall be routed with a neat white Portland cement grout of the consistency of thick cream. Other joints shall be pointed with mortar consisting of white Portland cement and two parts pointing sand. The grout or mortar for joints floors, walls and other vertical surfaces shall contain white Portland cement. Grout and pointing mortar shall be forced into joints by using trowel, squeegee, brush, or finger application. Before the grout or mortar sets, the joints of cushion-edge tiles shall be struck or tooled to the depth of the cushion, filling all skips or gaps, and the joints of a square-edge tile shall be filled completely flush with their surface. Dark cement shall not show through grouted white joints. Care shall be taken to avoid scratching glazed finishes. All surplus mortar or grout shall be removed before it has set or hardened.

3.7 Cleaning and Curing

Floors shall be covered with waterproofed paper with all joints lapped at least 100mm and the laps tape-sealed or held down with planks or other weights and allowed to damp-cure for at least 72 hours before foot traffic is permitted thereon. All completed tile work shall be thoroughly sponged and washed diagonally across joints, and finally polished with clean dry cloths. Acid cleaning unglazed tiles, when necessary, shall not be done within ten days after setting tiles. All metal shall be covered with approved grease and the tile wet with clean water before the tile is cleaned with a 10 percent muriatic-acid solution. After acid cleaning, the tile shall be flushed with clean water, and grease coating on metal removed. Acid cleaners shall not be used on unglazed tiles.

3.8 Protection

Finished tile floors shall be covered with clean building paper before foot traffic is permitted on them. Board walkways shall be placed on floors that are to be continuously used as passageways by workers. s

* END OF SECTION *

DIVISION 09 00 00
SECTION 09 90 00
PAINTS AND COATINGS

PART 1 GENERAL

1.1 SCOPE OF WORK

This section shall include all management, labor, materials, tools, equipment and services required to furnish and install paints and coatings as specified herein and shown in Drawings required to perform all works in accordance to the General conditions of the Contract Documents.

1.2 REFERENCES

Comply with quality assurance requirements under General conditions of the Contract Documents and Manufacturer's instructions.

1.3 SUBMITTALS

1.3.1 General: All submittals for approval as indicated herein shall be in accordance to the provisions under General Conditions of the Contract Documents.

1.3.2 Submit brochures or catalogs for the paint system to be used on the different surfaces to be applied for approval.

1.3.3 Material List: An inclusive list of required coating materials. Indicated each material and cross reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.

1.3.4 Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

1.3.5 Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.3.6 Verification Samples: For each finish product specified, two samples, minimum size 150 mm square, representing actual product, color, and patterns.

1.4 QUALITY ASSURANCE

1.4.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.4.2 Engage a reputable firm or manufacturer of paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful service performance. Installer shall be trained by the same paint manufacturer or shall have significant experience with the application as specified herein.

1.4.3 Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

1.4.4 Mock-up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

A. Finish areas designated by Architect.
B. Do not proceed with remaining work until workmanship, color, and sheen approved by the Architect.
C. Refinish mock-up area as required to produce acceptable work.

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 Comply with product delivery requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.5.2 Paints and paint materials shall be delivered in sealed containers that plainly show the designated name, specification number, batch number, color, date of manufacture, manufacturer's directions and name of manufacturer. Storage of paints and paint materials and the mixing of paints shall be restricted to the locations directed.

1.5.3 Store materials in a dry, clean, well-ventilated area designated by the Architect for the storage of paint materials and tools. The storage space floor shall be adequately protected from damage and from paint. Paint shall be kept covered at all times and safeguarded to prevent fire.

1.5.4 Protect floors and all adjacent surfaces from paint smears, spatters, and dropping use drop-cloths to protect floors. Cover fixtures and remove hardware not to be painted. Mask off areas where necessary.

1.5.5 For safety precautions, the Contractor shall provide appointed storage room with an ABC fire extinguisher throughout the duration of painting work. Foregoing fire extinguisher shall not be one required elsewhere in these specifications.

1.6 WARRANTY

Special written warranty for each material specified herein shall be submitted by Manufacturer/ Contractor without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Failures are defined to include faulty workmanship or faulty materials.

1.7 PROJECT CONDITIONS

1.7.1 Comply with field examination requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.7.2 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 PERFORMANCE REQUIREMENTS

1.8.1 General: Standard coating terms defined in ASTM D 16 apply to this Section.

A. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
B. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
C. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
D. Semi-gloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
E. High gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.8.2 The VOC concentrations of the product shall not exceed those listed below as determined by the U.S. Environmental Protection Agency (EPA) Reference Test Method 24 reference standard. Calculation of VOC to exclude water and tinting color added at the point sale.

Interior Coatings:

Coating Type	VOC weight in grams/liter of product minus water
Non-flat	150

Flat	50

Exterior Coatings:

Coating Type	VOC weight in grams/liter of product minus water
Non-flat	200
Flat	100

1.8.3 Aromatic Compounds: The product must contain no more than 1.0% by weight of the sum total of aromatic compounds.

PART 2 PRODUCTS

2.1 **General**: Comply with Manufacturer's standard material requirements in conformity to the specifications herein.

2.1.1 Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer instructions based on testing and field experience.

2.1.2 All paints, thinners, linseed oils, and varnishes to be used shall be high quality painting system, except as specified otherwise. All paints shall contain an effective amount of fungicide and mildew-proofing agent that shall prevent the paint from showing a mold growth or shall be inherently fungistatic by the nature of their constituents and shall be non-toxic to person.

2.1.3 Acceptable Colors and Finishes: All color and finish selections shall be as specified herein and as approved by the Architect. Use neutral shades and minimal pattern as required.

2.2 **Exterior and Interior Painting (Final Finish)**

2.2.1 Masonry Walls and Columns

Shall be coated with high performance low VOC; plain semi-gloss water-based latex paint coating that forms a seamless, non-porous water tight film which repels water and prevent seepage. Excellent adhesion and has long term durability, creates a very tight film, serving moisture sealant for concrete. Painting schedule shall be:

a. Prime surface
b. Fill hairline cracks and minor surface imperfections
c. Spot prime puttied portions.
d. Apply 2-3 coats of semi-gloss latex coating

Follow manufacturer's standard painting system, surface preparation and methodology. Submit color swatch and mock-up paint sample for Architect's approval. Final paint finish shall be on a plant-mixed procedure (by the manufacturer) before application.

2.3 **Ceiling**

2.3.1 Gypsum Ceiling

Shall be coated with high performance low VOC; plain matt water-based latex paint coating. Follow manufacturer's standard painting system, surface preparation and methodology. Submit color swatch and mock-up paint sample for Architect's approval.

2.4 **Flooring**

2.4.1 Epoxy Floor Coating

Shall be high performance, two-component epoxy-based coating with excellent resistance to abrasion, impact and chemicals.

2.5 Special Coating

2.5.1 Metals

Shall be coated with high performance, two component water-based acrylic epoxy paint which has a superior chemical, solvent and stain resistance, odorless and UV resistant finish. It has further excellent of brushability and easy water clean-up. Painting schedule shall be:

a. Primer Red Oxide with 1 part of its curing agent.
b. Reducer for Primer
c. Topcoat with at least 2 coats of water-based acrylic epoxy paint.

Follow manufacturer's standard painting system, surface preparation and methodology. Submit color swatch and mock-up paint sample for Architect's approval.

2.5.2 Paint for Steel Doors

Shall be coated with nitrocellulose based automotive lacquer type paint with easy application and rapidly dries to a long wearing. Painting schedule shall be:

a. Prime bare substrate (red oxide or gray primer)
b. Finish with 2-3 coats of automotive lacquer paint finish.

Follow manufacturer's standard painting system, surface preparation and methodology. Submit color swatch and mock-up paint sample for Architect's approval.

2.5.3 Aluminum Framing for Glass

Shall be powder-coated oven-baked finish. Follow manufacturer's standard application procedures. Color as per Architect's approved sample.

2.6 Concrete and Masonry Skim Coating

2.6.1 Concrete and Masonry Skim Coating

Shall be plastered with high performance skim coat made from acrylic based special bonding paste that is mixed with cement and applied on concrete to correct surface imperfection prior to painting, submit product catalog and sample coating for Architect's approval. Follow manufacturer's standard application procedure.

2.7 Miscellaneous for Paint

2.7.1 Masonry Neutralizer: Shall be acid-base concrete surface neutralizer.
2.7.2 Patching Compound Powder for sealing concrete and plaster: Shall be White Decalite type.
2.7.3 Sandpaper: Shall be waterproof type.
2.7.4 Trisodium Phosphate: Shall be used for removal of dirt, fungus, grease and oil shall be from concrete and plaster.

PART 3 EXECUTION

3.1 Comply with Manufacturer's instructions and standard installation requirements for each type of material.

3.2 Examination

3.2.1 Do not begin installation until substrates have been properly prepared.

3.2.2 If substrates preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2.3 Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

3.2.4 Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.2.5 If a potential incompatibility of primers applied by others exists, obtain the following from the primer Applicator before proceeding:

A. Confirmation of primer's suitability for expected service conditions.

B. Confirmation of primer's ability to be top coated with materials specified.

Concrete Preparation

3.3 Skim Coating Methodology

3.3.1 Using steel trowel, apply the mixture on uneven surfaces initially to surface with deep opening not more than 8mm.

3.3.2 Let it dry for thirty (30) minutes before applying 2nd coat if needed.

3.3.3 For smooth finish, apply skimcoat over renderer.

Renderer Application

- Using a steel trowel, apply the mixture thinly on the surface by pressing the edge of the trowel firmly on the concrete until all areas are covered.
- Let it dry for at least 30 minutes before applying the second coat.
- If trowel marks are visible, let surface dry for at least thirty minutes before sanding to further smooth surfaces.
- No need to neutralize the surface. Allow sufficient drying time before painting.

Painting and Coatings

3.4 Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.

3.4.1 Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.

3.4.2 Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.

3.4.3 Use only the type of thinners approved by manufacturer and only within recommended limits.

3.5 Workmanship shall be first class in every respect. Paint enamel and varnish finish shall be applied carefully with good clean brushes or approved rollers, or approved spraying equipment, except that the initial coat to be provided on any new or previously unpainted surface shall be painted brush. The work shall be so conducted as to avoid damage to other surfaces and public or private property in the area; any damage thereto shall be made good by the Contractor at his expense.

3.6 Installation: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

3.6.1 Sufficient time shall be allowed between coat to ensure thorough drying, and each coat shall be in proper condition before the next coat is applied.

Sanding and dusting, as required, to product finishes which are free from visible defects when viewed from a distance of 1.50m shall be performed. Varnish shall be sanded between coats.

3.6.2 Finish coat shall be smooth and free from runs, sags, or other defects. Each coat of paint shall be of sufficient thickness to cover completely the previous coat or surface. Exterior paint shall not be applied during rainy weather; the temperature shall be above 7°C and not over 35°C. Interior paint may be applied at any time provided the surfaces to be painted are dry and the temperature can be kept above 7°C during the application of ordinary paints, and between 18°C and 35°C during the application of enamels and varnishes.

3.6.3 Surfaces to be painted shall be thoroughly cleaned and except for cement-emulsion filler, shall be dry when the paint is applied. Interior areas shall be broom-cleaned and dust-free before and during the application of any painting materials.

3.6.4 Paint colors and finishes not specified shall be as approved. Surfaces which will be inaccessible after erection shall be treated and primed prior to erection, using two coats of the designated primer. Such inaccessible surfaces are defined as those surfaces that are concealed after erection or installation.

3.6.5 Surfaces of steel to be embedded in concrete shall not be painted. Succeeding coats of the same type and/ or color of paint shall vary sufficiently from the color of the preceding coat to permit ready identification. Damaged painting shall be retouched before the succeeding coat is applied. Finish surfaces shall be smooth, even, and free from defects. The number of paint coats specified shall be in addition to the shop priming coats.

3.6.6 Wood surfaces shall be free from dust and in an approved condition to receive the paint or varnish. The use of water on unpainted wood shall be avoided. Knots and resinous wood shall be treated with an application of knot sealer, prior to application of paint. Puttying of cracks and nail holes shall be done after the priming coat has been applied and has dried properly. Sand-papering, when required, shall be done after the undercoats are dry.

3.6.7 Concrete and plaster shall be repaired before painting. Dirt, fungus, grease, and oil shall be removed prior to application of paint by washing the surfaces with a solution composed of from 2 to 8 ounces of tri-sodium phosphate per gallon of hot water and then rinsing thoroughly with fresh water. Efflorescence shall removed from concrete and masonry surfaces by scraping, wire brushing, and washing with a 5 to 10 percent, by weight, solution of muriatic acid and then washing thoroughly with fresh water, removing all traces of the acid. The tri-sodium phosphate and muriatic acid solution shall be within the ranges specified and shall be of strengths to perform their functions properly. Glaze and all loose particles and scale be removed by wire brushing.

3.6.8 Puttying of concrete and plaster surfaces shall be done after the priming coat has been applied and has dried properly. Sand-papering will be required prior to second coat of paint to provide an even and smooth surface.

3.6.9 Metal surfaces to be painted: as mentioned in other section of these specifications including zinc-coated surfaces and unprimed steel and iron surfaces, immediately after being cleaned, shall be given one coat of pre-treatment coating. Primer paint shall be applied over the pre-treatment coating when practicable after the coating has dried. Powder coated installation need no priming as per Manufacturer's instructions.

3.6.10 Wood, cement board or gypsum surfaces, interior and exterior painted surfaces except otherwise specified shall be given required finish as per Manufacturer's instructions. Prior to painting application, all nail holes and grains shall be puttied to even surfaces.

3.6.11 Wood finish, interior varnish finishes as indicated. These include plywood. All nail holes and grains shall be applied with one coat of wood filler, and surfaces stained to a uniform color. All nail holes and grains shall be applied with wood filler and surfaces stained to a uniform color as indicated. Finishes shall be three coats of clear flat or clear gloss water resistant varnish applied by spray gun.

3.6.12 Pipe hangers, structural supports, pipe and pipe fittings, conduits and conduit fittings, and miscellaneous steel and iron work shall be painted as specified in accordance to ASME standards. Equipment shall be finished in accordance with the specification for the particular end item. Factory finished surfaces that are damaged during installation shall be restored to their original condition.

3.6.13 Tank Lining Application:

A. Water tank shall be pre-applied with waterproofing treatment as specified prior application of tank lining in accordance to Manufacturer's instructions. Surface to be coated must be dry and free of oil, dirt, grease, dust, loose particles and other contaminants.
B. Concrete should be neutralized or acid etched and washed thoroughly. Level off uneven surfaces using Manufacturer's recommended putty and filler.
C. Comply with Manufacturer's mixing ratio and curing period to produce homogenous compound for application. the applied epoxy tank lining shall be allowed to cure for seven (7) days as necessary to attain chemical resistance.

3.6.14 Other surfaces for which the type of paint has not been specified herein before shall be painted as specified for surfaces having similar conditions or exposure.

3.7 Cleaning

3.7.1 After completing painting, clean glass and paint spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.7.2 Wash cured lining using detergents and rinse the thoroughly.

3.8 Protection

3.8.1 Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

3.8.2 Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

3.8.3 After work of other trades is complete, touch up and restore damaged or defaced painted surfaces.

* END OF SECTION *

DIVISION 10 00 00
SECTION 10800
TOILET AND PANTRY FIXTURES

1.00 GENERAL

1.01 SCOPE

A. Furnish all materials, labor, equipment, plant, tools, required to complete all Toilet and bath accessories
B. See drawings and details for sizes and locations of work required.

2.00 PRODUCTS

2.01 MATERIALS

A. WATER CLOSET: ceramic color white; glossy finish; flush type valve

B. WASH BASIN: under counter lavatory in white

C. LAVATORY FAUCET: single control lever, counter mount faucet in chrome finish

D. URINAL: ceramic color white; flush valve type with strainer

E. TOILET PAPER HOLDER: Stainless steel in chrome finish, one (1) unit beside every water closet in toilets.

F. LIQUID SOAP DISPENSER: Piston and spout-type soap dispenser. One (1) set for each toilet

G. STAINLESS STEEL GRAB RAIL: 38 mm (1-1/2") diameter, in toilets for persons with disabilities in satin finish to conform to local codes for PWD

H. MIRRORS: Unframed plate. Electroplate copper warranted 5 years. Ease, polish, seal 100%. Mastic 35%. Block at ¼ pt. Clamp KV 227 bottom, 278 top. Frameless 1" Beveled edges or with aluminum frame with marine plywood backing and moisture resistant whenever applicable

I. KITCHEN SINK (at pantry): Stainless steel; single sink with drain on one side

3.00 EXECUTION

Furnish and install all toilet accessories true to line, plane and lever, in accordance to manufacturer's specifications.

* END OF SECTION *