

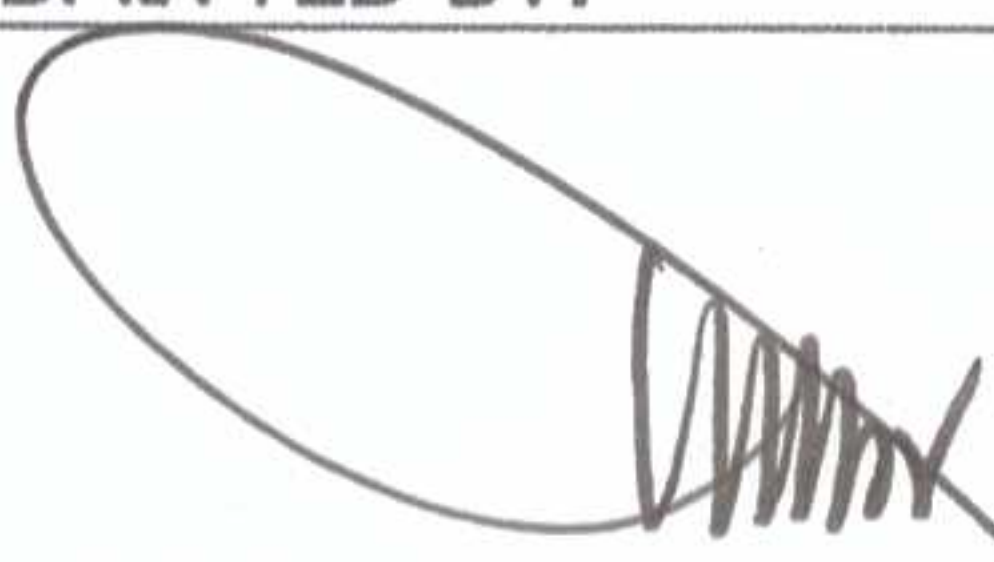


**PROCUREMENT OF CONSULTING SERVICES FOR THE
DETAILED ARCHITECTURAL AND ENGINEERING
DESIGN FOR THE PROJECT FOR CY 2017:
CONSTRUCTION OF THE
ACADEMIC BUILDING SENIOR HIGH PROGRAM**

AGHAM ROAD, DILIMAN, QUEZON CITY

OUTLINE SPECIFICATIONS

OCTOBER 2017

CONTRACT DOCUMENT PHASE	OUTLINE SPECIFICATIONS
SUBMITTED BY:	APPROVED BY:
	
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DATE: October 16, 2017	DATE:





OUTLINE SPECIFICATIONS

Academic Building

DIVISION 1 – GENERAL REQUIREMENTS

General. It is declared and acknowledged intention and meaning to provide and secure the (b) **Construction of the Academic Bldg for Senior High Program; for the Philippine Science High School-Main Campus (PSHS-MC)**, complete and ready for use. The Dormitory Building shall have architectural, structural, electrical, plumbing and sanitary, electronics and communications engineering provisions.

DIVISION 2 – EXISTING CONDITIONS

2.1 Removal and Disposal

Moving out, including cleaning of construction debris, removal of temporary construction facilities and hauling of construction related garbage out of work area should be included.

2.2 Demolition

Removal and disposal of existing structure debilitated material, including cleaning of major and minor debris and hauling of construction related garbage out of work area should be included.

DIVISION 3 – CONCRETE WORKS

3.1 Formworks

The formwork shall be designed for the loads, lateral pressure and allowable stresses outlined in the "RECOMMENDED PRACTICE FOR CONCRETE FORMWORK (ACI 347)". All formworks shall be made of sheet metal or phenolic board and supported by steel acro-post or equivalent.

3.2 Concrete Accessories

3.2.1 *Water Stops*

Shall be made of extruded polyvinyl chloride meeting the requirements and standards unless otherwise shown; Reference manufacturer for PVC water stop, submit sample for Architect's approval. Refer to structural drawings for requirements.

3.2.2 *Expansion Joint Filler*

Shall be closed cell polyethylene or PVC joint filler. Submit sample for Architect's approval.

3.2.3 *Joint Sealer*

Shall be either a single component urethane compound or a two component urethane compound meeting the requirements. Submit product catalog and material properties and specification for Architect's approval.



3.2.4 **Neoprene Pads**

Shall have a structural grade meeting the requirements of AASHTO, Section 25, Division 2. Submit sample for Architect's approval.

3.2.5 **Flashing Reglets**

Shall be gauge 24 galvanized steel foam filled reglets.

3.3 **Concrete Reinforcing - Reinforcement Steel Bars**

The minimum specified yield strength (Fy) for reinforcing bars with less than or equal to 12mm in diameter is 280 MPa and 414 MPa for reinforcing bars with diameters greater than 12mm.

All reinforcements shall be weldable deformed bars, new and free from rust, oil, defect, grease or kinks. They shall conform to the latest revision of ASTM A615 "SPECIFICATION FOR BILLET STEEL FOR CONCRETE REINFORCEMENT". Strength of reinforcing bars for the structure shall conform and have a minimum grade of PNS Grade 60 for 16mm diameters bars and PNS Grade 40 for 12mm diameters bars.

Welded wire fabric for concrete reinforcement shall conform to ASTM A185 "SPECIFICATION FOR WELDED STEEL WIRE FABRIC FOR CONCRETE REINFORCEMENT."

3.4 **Cast-In-Place Concrete**

3.4.1 **Cement**

Portland Cement shall conform to the "SPECIFICATIONS FOR PORTLAND CEMENT" (ASTM C150 Latest Revision) for Type I Portland Unblended that produces less CO₂ during manufacturing and construction and has less clinker.

3.4.2 **Admixture**

Admixture to be used in concrete, when required or permitted shall conform to the "SPECIFICATIONS FOR CHEMICAL ADMIXTURES FOR CONCRETE" (ASTM C494) for water-reducing, retarding, air-entraining 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.

3.4.3 **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).

3.4.4 **Sand**

Hard natural sand conforming to PNS 18, Type 1.



3.4.5 **Water**

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

3.5 **Exterior Precast Concrete Wall**

Shall be 150mm thick reinforced concrete precast wall sun baffles; that can withstand indicated design load conditions in accordance with applicable industry design standards (ACI 318, ACI 350, ASTM, ACPA Design Manual, PCL MNL – 120 and AASHTO) and considers stresses induced during handling, shipping and installation. Verify structural drawings for load capacities; refer to Architectural drawings for layout and design. Submit shop drawings for Owner's approval upon the recommendation of the Architect before fabrication of material.

3.6 **Glass Fiber Reinforced Concrete (GFRC)**

Shall be a prefabricated cementitious, composite material, cast into thin, lightweight non-structural exterior panel commonly produced by spray-up process either manually using hand equipment or mechanically on a production line. Shall be composed of Portland cement, aggregate, water, alkali-resistant glass fibers, polymer and additives, shall have high strength and good fire retardant property. See architectural and structural drawings for layout and details.

DIVISION 4 – MASONRY WORKS

4.1 **Concrete Masonry Unit**

4.1.1 **CHB Blocks**

Concrete hollow blocks shall be of standard manufactured machine-vibrated and shall have fine and even texture and well defined edges.

Minimum compressive strength of load bearing concrete hollow blocks shall be 1,100 psi (7.50 MPa) and 350 psi (2.41 MPa) for non-load bearing. Load bearing CHB shall have a unit weight of 150 pcf and non-bearing type concrete blocks shall have a unit weight not to exceed 60 pcf.

Concrete hollow blocks to be used shall conform to the requirements of ASTM Specification C-90 and PNS 16. Dimensions and tolerances shall be as individually specified on plans.

4.1.2 **Steel Reinforcement for CHB Blocks**

Shall conform to the schedule as given hereunder or as indicated in the construction notes, for CHB 4" thick shall be 10mm diameters minimum @ 400mm spacing and CHB 6" thick shall be 12mm diameters minimum @ 400mm spacing for both vertical and horizontal bars.



All reinforcements shall be weldable deformed bars, new and free from rust, oil, defect, grease or kinks. They shall conform to the latest revision of ASTM A615 "SPECIFICATION FOR BILLET STEEL FOR CONCRETE REINFORCEMENT".

4.1.3 ***Tie Wires***

Shall be Ga. #16 G.I.

4.1.4 ***Mortar***

A. Cement

Portland cement for concrete works shall conform to the requirements of the latest edition of the Standard Specifications for Portland Cement (ASTM C150) PNS 07, Type 1 Unblended that produces less CO₂ during manufacturing and construction and has less clinker.

B. Sand

Hard natural sand conforming to PNS 18, Type 1.

4.2 **Stone Masonry - Natural Stone Finishes**

4.2.1 ***Information Countertop, Pantry Counter and Backsplash, Toilet Lavatory Counters***

Shall be 18 to 20mm thick premium high quality natural granite stone slab in polished finish with medium to heavy resistance to abrasion; Submit product catalog and sample for Architect's approval.

4.2.2 ***Interior Wall Cladding and Floor Finish***

Shall be 18 to 20mm thick premium high quality natural marble/granite stone slab in polished finish with medium to heavy resistance to abrasion; Submit product catalog and sample for Architect's approval.

DIVISION 5 – METAL WORKS

5.1 **Metals**

5.1.1 ***Steel Trusses/ Roof Framing***

Shall be of sizes as shown on drawings (refer to Structural Drawings), conforming to ASTM A36 and AWS Standards. Complete with accessories, coated with high performance water-based epoxy paint finish. Submit shop drawings for Architect's approval.

5.1.2 ***Aluminum Alloy Frames (for Glass Windows and Glass Doors)***

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.

5.1.3 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.

5.1.4 Stainless Steel Pipes

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

5.1.5 Black Iron Pipes

Shall be Schedule 20 and Schedule 40 Black Iron pipe conforming to PNS 26 and ASTM A53/A120, coated with high performance water-based epoxy paint finish, complete with accessories; submit product information for Architect's approval.

5.1.6 Galvanized Iron Pipes

Shall be Schedule 40 Galvanized Iron pipe conforming to PNS 26 and ASTM A53/A120, coated with high performance water-based epoxy paint finish, complete with accessories. Submit product information for Architect's approval.

5.1.7 Light Steel Framing System for Ceilings

Shall be BPS (Bureau of Product Standards) certified, 0.60mm 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 m 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.

5.1.8 Lay-in Acoustical Ceiling Board Framing System

Shall be shall be 24mm x 38mm main runner and cross tee made aluminum powder-coated finish, attached to slab/roof framing by a suspension clip and 6mm diameter hanger rod joiner spaced at 600mm x 900mm apart, complete with screws and accessories Suspended Metal Ceiling Framing System; provide 0.5mm thick x 24mm x 24mm wall angle perimeter trim. Submit sample for Architect's approval. Verify Architectural drawings for design and details.



5.1.9 ***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 bothways, complete with screws, accessories and 0.40mm GA. 26 x 25mm x 25mm corner bead. Submit product catalog and sample for Architect's approval.

5.1.10 ***Nosing for Fire Exit Stairs***

Shall be 3mm thick x 50mm x 25mm stainless steel nosing with anti-skid grooves and built-in dowel that provides excellent anti-slip and acoustic effect; Submit sample for Architect's approval.

5.1.11 ***Stainless Steel Water Tank Ladder***

Shall be 20mm \varnothing stainless steel rod ladder rung at 300mm on center embedded to reinforced concrete.

5.1.12 ***Steel Trench Grates and Covers***

Shall be machine made/forged welded heavy duty trench gratings, complete with built-up frames of hot-dip galvanized steel with 7.136 tons per wheel loading capacity; Submit shop drawings and sample material for Architect's approval.

5.2 **Structural Steel Framing**

All structural steel required for this structure shall conform to "Specification for Structural Steel" (ASTM A-36, latest revision) for rolled and built-up sections.

All arc-welding electrodes shall conform to the requirements of American Welding Society SPECIFICATION FOR IRON AND STEEL ARC-WELDING ELECTRODES", latest revision.

Unless otherwise indicated, bolts for connections shall conform to ASTM designation A325 high strength bolts. For erection or for connections not requiring high strength bolts as shown in the plans, use ASTM A307 bolts.

5.3 **Metal Railing**

5.3.1 ***Main Staircase Railing and Circular Staircase***

Shall be grade 304, schedule 40 stainless steel handrail in hairline finish fully welded to 2 – 8mm thick x 50mm stainless steel flat bar vertical balustrades in hairline finish, fully welded to a 1.5mm thick x 100mm x 50mm x 100mm height, stainless steel bottom connector in hairline finish doweled to concrete stairs; submit shop drawings, mock-up layout and sample color for Architect's approval. Refer to Architectural drawings for layout and details.

5.3.2 ***Fire Exit Railing***

Shall be 50mm diameters, grade 304, schedule 40 stainless steel handrail in hairline finish fully welded to 25mm diameters schedule 20 stainless steel vertical connector in



hairline finish attached to a 50mm diameters, grade 304, schedule 40 stainless steel vertical support balustrades in hairline finish doweled to concrete slab with 3 - 25mm diameters, grade 304, schedule 20, stainless steel horizontal support balustrades in hairline finish, submit shop drawing and provide mock-up sample for Architect's approval. Refer to Architectural drawings for layout and detail.

5.3.2 ***Exterior Railing***

Middle Railing:

Shall be 50mm diameters, grade 304, schedule 40 stainless steel handrail in hairline finish, with 50mm diameters, grade 304, schedule 40, Y-shape stainless steel pipe in hairline finish vertical support balustrade and 50mm diameters, grade 304, schedule 40 horizontal support balustrade in hairline finish; Submit shop drawings and mock-up layout and sample for Architect's approval Refer to Architectural drawings for layout and details.

Side Railing:

Shall be 50mm diameters, grade 304, schedule 40 stainless steel handrail in hairline finish, with 50mm diameters, grade 304, schedule 40, stainless steel pipe in hairline finish vertical support balustrade and 50mm diameters, grade 304, schedule 40 horizontal support balustrade in hairline finish; Submit shop drawings and mock-up layout and sample for Architect's approval Refer to Architectural drawings for layout and details.

5.3.3 ***Exterior Ramp Railing***

Shall be 50mm diameters, grade 304, schedule 40 stainless steel handrail in hairline finish with 50mm diameters, grade 304, schedule 40 stainless steel vertical and 50mm diameters, grade 304, schedule 40, horizontal balustrade in hairline finish; Submit shop drawings and mock-up sample for Architect's approval. Refer to Architectural drawings for layout and details.

DIVISION 6 – WOOD, PLASTICS AND COMPOSITES

6.1 **Rough Carpentry**

6.1.1 ***Wood Framings***

Shall be of "Tanguile" or "Yakal" species of good grade, treated and kiln-dried (TKD), in standard commercial size and thickness as indicated in the drawings. Refer to Division 6.3 "Architectural Woodwork" for further specification.

6.2 **Finish Carpentry**

6.2.1 ***Door Jamb***

Shall be of "Tanguile" species of good grade, treated and kiln-dried (TKD), in standard commercial size and thickness as



indicated in the drawings, refer to Division 8.1.2 Wood Door” for further specification.

6.2.2 **Marine Plywood**

Shall be 6mm, 12mm, 18mm and 25mm thick marine plywood (Class A) made from 100% hardwood with high durability and strong bonding quality for exposed substrate.

6.3 **Architectural Woodworks**

Note: See Architectural drawings for layout and detail; submit shop drawings for Architect’s approval. Dimension, fabrication and installation of counters, cabinets, closets and shelves shall be based on the actual measurements and conditions of the site. For hardware and accessories see "Division 6.4 Cabinet and Drawer Hardware".

6.3.1 **Pantry Cabinets**

A. **PCF1 Cabinet Doors, Shelves, Carcass and Drawers**

Shall be 0.8mm thick High Pressure Laminate (HPL) conforming to EN 438:2005 or ANSI/NEMA LD 3:2005 with non-scratch property and water resistant, attached/glued to 18mm thick Medium Density Fiberboard (MDF) through a high compact machine pressed process complete with edge banding in double-faced finish (for cabinet doors and backings). Submit color swatches and sample with edge band for Architect’s approval.

B. **PCF2 Cabinet Doors with Louvers**

Shall be 0.8mm thick High Pressure Laminate (HPL) conforming to EN 438:2005 with non-scratch property and water resistant, attached/glued to 18mm thick Medium Density Fiberboard (MDF) through a high compact machine pressed process complete with pvc edge bond in double-faced finish (for cabinet doors) or single faced finish (for backings).

Louver blades shall be 6mm thick x 40mm TKD treated kiln dried Tanguile solid wood louvers on 18mm thick x 25mm TKD treated kiln dried Tanguile solid wood framing. Submit varnish/stain color swatches for Owner’s approval upon the recommendation of the Architect.

Note: Varnish/stain finish for louvered doors shall be of the same color finish for the MDF Cabinets.

C. **PCF3 Framing, Sidings and Backboards**

Framing shall be on 50mm x 50mm and 50mm x 100mm TKD treated kiln dried Tanguile wood framing. Submit stain/varnish color swatches for Architect’s approval.

Siding and backing shall be 0.8mm thick High Pressure Laminate (HPL) conforming to EN 438:2005 with non-scratch property and water resistant, attached/glued to 18mm thick Medium Density Fiberboard (MDF) through a high compact machine pressed process complete with edge banding in



double faced finish. Submit color swatches and sample for Architect's approval.

6.4 Cabinet and Drawer Hardware

6.4.1 CH1

Cabinet Hinges

Shall be 35mm cup size, concealed hinge, free swing with minimum of 100 degrees opening angle, full overlay or half overlay (verify drawing details) and inset type for screw attachment complete with mounting plates in nickel-plated or stainless steel finish. Provide two (2) units per door installations 1.20 meters high and below, three (3) units required for doors over 1.20 meters high (4) units for 2.4 meters high. Submit brochure and sample for Architect's approval.

6.4.2 CH2

Drawer/Rack Slides

Shall be 34 kgs. (75 lbs) minimum capacity for medium to heavy duty usage stainless steel, full extension ball-bearing drawer slides with side-mounted rails. Length shall be as required in the Drawings. Submit brochure and sample for Architect's approval.

6.4.3 CH3

Cabinet Handle

Shall be 10mm diameters x 100mm (for drawers) and 10mm diameters x 328mm (for closets) stainless steel, quality 1.4301, back mounted in matt brush finish. Design as per Architect's approved sample.

6.4.4 CH4

Locks for Drawers (on particular areas only – see drawings for location)

Inlay or rim style deadbolt or cam lock system shall be provided for drawers and cabinet doors as indicated on drawings, in satin chrome or satin nickel finish. Confirm keying required if master keyed, keyed alike in groups or keyed differently.

6.4.5 CH5

Cabinet Shelf Supports

Shall be 7-10mm diameters stainless steel pin type shelf support pegs. Submit sample for Architect's approval.

DIVISION 7 – THERMAL AND MOISTURE PROTECTION

7.1 Waterproofing System

7.1.1 WP-1

Polyurethane Waterproofing

Shall be a single component, polyamine-urethane based waterproofing, made of a mixture of ceramic and polymer materials, has outstanding durability and abrasion and impact resistance. Submit brochures and sample application for Architect's approval.

7.1.2 WP-2

Acrylic Polymer Waterproofing Coating



Shall be a specially formulated acrylic polymer designed for compounding with pozzolan or portland cement. Excellent adhesion, water resistance and flexible on thin sections application that eliminates cement plastering defect and water seepage. Submit brochures and sample for Architect's approval.

7.1.3 WP-3

Vapor Barrier Polyethylene Sheet

Shall be 6 mils thick clear low density polyethylene sheet (LDPE) made from virgin natural material, follow manufacturer's standard application procedures. Submit sample for Architect's approval.

7.1.4 WP-4

Nanobloc Waterproofing

Shall be a single component, penetrative waterproof coating made with inorganic nano-sized particles with 4.0mm thick minimum film thickness, environmental friendly and extra-strong chemical, alkali, and salt water resistance. Submit product catalog and product certifications for Architect's approval.

7.1.5 WP-5

Nanobloc Waterproofing with Water Tank Lining

Shall be a single component, penetrative waterproof coating made with inorganic nano-sized particles with 4.0mm thick minimum film thickness, environmental friendly and extra-strong chemical, alkali, and salt water resistance. Submit product catalog and product certifications for Architect's approval.

Tank lining shall be an epoxy lining material, solvent free, pigmented, two component preparation of liquid colored epoxy resin with formulated animer hardener. Safe for use on areas in direct contact with potable water or foodstuffs; lead free, food grade when fully cured, non-toxic and BFAD approved. Submit product catalog and shop drawings for Architect's approval. Follow manufacturer's standard application procedures.

7.2 Thermal Insulation

7.2.1 *Elastomeric Insulation – (for Pipes)*

Shall be 25mm nominal thickness x 2000mm length, tube type, black color, Elastomeric Insulation with high flexibility, high resistance to water vapour transmission and noise reduction, complete with adhesive and accessories. Submit brochures and sample for Architect's approval.

7.3 Roofing System

7.3.1 High Rib-Type Long Span Steel Roofing

Shall be 0.6mm thick gauge 24, 995mm nominal width x 95mm rib height, Rib-Type Long Span Roofing System; made up of alloy coating of aluminum and zinc alloy which comprises 55% aluminum, 43.4% zinc and 1.6% silicon for



anti-rust coating, conforming to ASTM A-792 coating standards. Top coat shall be 18-20 microns regular modified polyester with epoxy primer and 5-8 microns bottom coat in "Ivory" finish, complete with wafer teks, tekscrew fastener and other accessories. Submit brochures, samples and shop drawings for Architect's approval.

7.4 Flashing and Sheet Metals

7.5.1 *Stainless Steel Plate Gutter on Concrete Gutter and Flashing*

Shall be 0.6mm thick Gauge 24, pre-painted G.I. gutter and flashing. Verify manufacturer's standard requirements for roofing system.

7.5 Mineral Fiber Cement Board

Shall be 10mm thick (for ceiling) and 18mm thick for walls asbestos-free, smooth surface, square edge, fiber cement wall and ceiling boards, resistant to fire, sag, moisture and termite, coated with plain semi-gloss acrylic solvent-based coating, that forms a seamless, non-porous water tight film that repels water and prevent seepage. Refer to Division 9 "Ceiling Finishes" for further specifications.

7.6 Building Construction Perimeter Joints

Should have an ultraviolet resistant characteristic with a minimum joint movement capability of 50% expansion and 50% compression conforming to ASTM C-719. Dow Corning or equivalent.

7.7 Structural Sealant

Shall be one-part, high performance silicone glazing and waterproofing sealant, application is for exterior glass components and structural glazing system. Structural Sealant shall conform to ASTM 920 Type S, Grade NS, and Class 50. Follow manufacturer's standard application procedure.

7.8 Wood Preservative

Shall be colorless anti-termite solution, water repellant preservative treatment for woods. Follow manufacturer's standard application procedures.

7.9 Interior Concrete Poisoning

Shall be masonry concrete neutralizer. Follow manufacturer's standard application procedures.

DIVISION 8 – OPENINGS

8.1 Doors

Note: Dimension, fabrication and installation of Doors shall be based on the actual measurements and conditions of the site. Verify Manufacturer's standard details. Submit shop drawings and sample for Architect's approval.

8.1.1 *Steel Doors and Frames*



A. *Steel Door*

Shall be 1.3mm thick, gauge 18 base metal thickness, 45mm thick, cold rolled steel door made of chromate-free electro galvanized steel sheet with zinc coating layer applied on base metal and mineral rockwool with honeycomb core insulation. Framing shall be fully-welded, 1.6mm thick, gauge 16 x 45mm x 140mm single rebate, hollow metal frames of the same door panel material; door finish shall be coated with low VOC high build, high solid surface tolerant epoxy maintenance coating in semi-gloss finish. Follow manufacturer's standard installation procedures. Submit product catalog, shop drawings, color finish and sample section for Architect's approval.

B. *Steel Door with Glass Transom*

Shall be 1.3mm thick, gauge 18 base metal thickness, 45mm thick, cold rolled steel door made of chromate-free electro galvanized steel sheet with zinc coating layer applied on base metal and mineral rockwool with honeycomb core insulation. Framing shall be fully-welded, 1.6mm thick, gauge 16 x 45mm x 140mm single rebate, hollow metal frames of the same door panel material. Provide 6mm thick annealed clear glass transom, complete with hardware and accessories; door finish shall be coated with low VOC high build, high solid surface tolerant epoxy maintenance coating in semi-gloss finish. Provide 6mm x 10mm decorative grooves. Follow manufacturer's standard installation procedures. Submit product catalog, shop drawings, color finish and sample section for Architect's approval.

C. *Steel Door with Vision Glass Panel and Glass Transom 1*

Shall be 1.3mm thick, gauge 18 base metal thickness, 45mm thick, cold rolled steel door made of chromate-free electro galvanized steel sheet with zinc coating layer applied on base metal and mineral rockwool with honeycomb core insulation. Framing shall be fully-welded, 1.6mm thick, gauge 16 x 45mm x 140mm single rebate, hollow metal frames of the same door panel material. Provide 6mm thick annealed clear glass vision panel and transom, complete with hardware and accessories; door finish shall be coated with low VOC high build, high solid surface tolerant epoxy maintenance coating in semi-gloss finish. Provide 6mm x 10mm decorative grooves. Follow manufacturer's standard installation procedures. Submit product catalog, shop drawings, color finish and sample section for Architect's approval.

**D. *Steel Door with Vision Glass Panel and Glass Transom 2*
(for Kitchen 1 to 3)**

Shall be 1.3mm thick, gauge 18 base metal thickness, 45mm thick, cold rolled steel door made of chromate-free electro galvanized steel sheet with zinc coating layer applied on base metal and mineral rockwool with honeycomb core insulation. Framing shall be fully-welded, 1.6mm thick, gauge 16 x 45mm x 140mm single rebate, hollow metal frames of the same door panel material. Provide 6mm thick wired glass vision panel



and transom, complete with push/pull handle, kickplate, hardware and accessories; door finish shall be coated with low VOC high build, high solid surface tolerant epoxy maintenance coating in semi-gloss finish. Provide 6mm x 10mm decorative grooves. Follow manufacturer's standard installation procedures. Submit product catalog, shop drawings, color finish and sample section for Architect's approval.

E. *Steel Door with Vision Glass Panel and Jalousie Transom*

Shall be 1.3mm thick, gauge 18 base metal thickness, 45mm thick, cold rolled steel door made of chromate-free electro galvanized steel sheet with zinc coating layer applied on base metal and mineral rockwool with honeycomb core insulation. Framing shall be fully-welded, 1.6mm thick, gauge 16 x 45mm x 140mm single rebate, hollow metal frames of the same door panel material. Provide 6mm thick annealed clear glass vision panel and glass jalousie transom, complete with hardware and accessories; door finish shall be coated with low VOC high build, high solid surface tolerant epoxy maintenance coating in semi-gloss finish. Provide 6mm x 10mm decorative grooves. Follow manufacturer's standard installation procedures. Submit product catalog, shop drawings, color finish and sample section for Architect's approval.

F. *Steel Door with Louvers and Glass Transom*

Shall be 1.3mm gauge 18 base-metal thickness, 45mm thick hollow metal door with 5mm thick x 50mm flat bar alternating louver blades as shown in drawings, made of chromate-free electro galvanized steel sheet with zinc coating layer applied on base metal. Framing shall be fully-welded, 1.6mm thick gauge 16 x 45mm x 140mm single rebate, hollow metal frames of the same door panel material door finish shall be in low VOC high build, high solid surface tolerant epoxy maintenance coating in semi-gloss finish. Complete with hardware and accessories, provide 6mm thick annealed clear glass transom and 6mm x 10mm decorative grooves. Submit product catalog, shop drawings, color finish and sample section for Architect's approval.

G. *Steel Door with Louvers*

Shall be 1.3mm gauge 18 base-metal thickness, 45mm thick hollow metal door with 5mm thick x 50mm flat bar alternating louver blades as shown in drawings, made of chromate-free electro galvanized steel sheet with zinc coating layer applied on base metal. Framing shall be fully-welded, 1.6mm thick gauge 16 x 45mm x 140mm single rebate, hollow metal frames of the same door panel material door finish shall be in low VOC high build, high solid surface tolerant epoxy maintenance coating in semi-gloss finish. Complete with hardware and accessories, 6mm x 10mm decorative grooves. Submit product catalog, shop drawings, color finish and sample section for Architect's approval.



H. ***Steel Door with Full Louvers***

Shall be 1.3mm gauge 18 base-metal thickness, 45mm thick hollow metal door with 1.2mm thick GA. 18 x 45mm x 75mm Z profile full louver blades as shown in drawings, made of chromate-free electro galvanized steel sheet with zinc coating layer applied on base metal. Framing shall be fully-welded, 1.6mm thick gauge 16 x 45mm x 140mm single rebate, hollow metal frames of the same door panel material; complete with hardware and accessories; door finish shall be in polyurethane semi-gloss finish. Submit product catalog, shop drawings, color finish and sample section for Architect's approval.

I. ***Fire Exit Door: Fire Rated Steel Door with Wired Glass View Panel***

Shall be 1.3mm thick, gauge 18 minimum thickness (for interior exits), 1.6mm gauge 16 minimum thickness (for exterior exits), 45mm thick, pre-fabricated 1.5 or 2-hours Fire Resistant Steel Door Panel made from chromate-free electro galvanized steel sheets with mineral rockwool honeycomb core insulation on 1.6mm thick gauge 16 x 57mm x 143mm double rebate galvanized steel door framing, with 6mm thick x 124mm x 659mm wired glass; door finish shall be in "red" color coated low VOC high build, high solid surface tolerant epoxy maintenance coating in semi-gloss finish, complete with U.L. listed panic hardware, door closer and recessed type expandable graphite intumescent seal strip applied in between the door panel and framing gap. Clearance from finish floor line shall be 6mm. All fire rated doors and frames shall be in accordance with UL 10B and UL 10C Positive Pressure under Underwriter's Laboratories inspection and labeling service program. Provide floor level markings on fire exit stairs side. Follow manufacturer's standard installation procedures. Submit sample color finish and sample section for Architect's approval.

J. ***STC -Acoustical Steel Door***

Shall be 1.3mm thick, gauge 18 base metal thickness, 45mm thick, cold rolled steel door, made of chromate-free electro galvanized steel sheet with zinc coating layer applied on base metal and filled in with rockwool on honeycomb insulation for sound absorption and with stc and 1.5 to 2 hours fire rating with perimeter seal. Framing shall be fully-welded, 1.6mm thick, gauge 16 x 45mm x 140mm single rebate, hollow metal frames of the same door panel material. Complete with vertical pull handle, hardware, concealed door closer, jamb and head seal, threshold, automatic door bottom, meeting stile seal and accessories; provide recessed type expandable graphite intumescent seal strip applied in between the door panel and framing gap for additional fire retardant. Door finish shall be covered with 100% polyester foam and fabric with stainless steel hairline finish kick plate. Follow manufacturer's standard installation procedures. Submit sample color finish, sample section for Architect's approval.



K. *Gasketed Steel Door*

Shall be 1.3mm thick, gauge 18 base metal thickness, 45mm thick, cold rolled steel door, made of chromate-free electro galvanized steel sheet with zinc coating layer applied on base metal and filled in with rockwool on honeycomb insulation for sound absorption and 1.5 to 2 hours fire rating with gasketed seal on door opening. Framing shall be fully-welded, 1.6mm thick, gauge 16 x 45mm x 140mm, hollow metal frames of the same door panel material. Complete with vertical pull handle, hardware, and accessories. Door finish shall be covered with 100% polyester foam and fabric with stainless steel hairline finish kick plate. Follow manufacturer's standard installation procedures. Submit sample color finish, sample section for Architect's approval.

8.1.2 Wood Doors and Frames

A. *Semi-Solid Wooden Door with View Glass Panel and Jalousie Transom*

Shall be 44mm thick swing type semi-solid wooden door, made from double vacuum treated kiln-dried (TKD) Tanguile solid wood framing and alternating solid wood core covered with 6mm thick ribbon grain plywood (Class A) through a high compact machine press process in stain/varnish finish; door jamb framing shall be 45mm x 140mm treated kiln-dried (TKD) Tanguile single rabbeted stop wooden jamb, complete with locksets, hardware and accessories (see Division 8.3 Hardware for specifications). Provide 10mm thick x 25mm solid wood decorative lining. View glass panel shall be 6mm thick annealed glass & jalousie transom shall be 6mm thick x 152mm width tempered clear glass louver blades; jalousie framing shall be made from polypropylene mechanism that will break and flexible, with EPDM rubber for tighter sealing in between blades and single control mechanism, complete with hardware and accessories. Submit sample section and stain/varnish finish for Architect's approval. Follow manufacturer's standard fabrication and installation procedures.

B. *Semi-Solid Wooden Door with View Glass Panels and Glass Transom*

Shall be 44mm thick swing type semi-solid wooden door, made from double vacuum treated kiln-dried (TKD) Tanguile solid wood framing and alternating solid wood core covered with 6mm thick ribbon grain plywood (Class A) through a high compact machine press process in stain/varnish finish; door jamb framing shall be 45mm x 140mm treated kiln-dried (TKD) Tanguile single rabbeted stop wooden jamb, complete with locksets, hardware and accessories (see Division 8.3 Hardware for specifications). Provide 10mm tick x 25mm solid wood decorative lining. View glass panel and transom shall be 6mm thick annealed glass. Submit sample section and stain/varnish finish for Architect's approval. Follow



manufacturer's standard fabrication and installation procedures.

C. *Semi-Solid Wooden Door with Louvers and Glass Transom*

Shall be 44mm thick swing type flush hollow core door, made from double vacuum treated kiln-dried (TKD) Tanguile solid wood framing covered with 6mm thick ribbon grain plywood (Class A) through a high compact machine press process in stain/varnish finish; door jamb framing shall 45mm x 140mm treated kiln-dried (TKD) Tanguile wooden jamb complete with locksets, hardware and accessories with 10mm thick x 25mm solid wood decorative lining. Provide 10mm thick x 30mm treated kiln-dried (TKD) Tanguile solid wood louver blades (see drawing for design) and 6mm thick annealed glass transom. Submit sample section and stain/varnish finish for Architect's approval. Follow manufacturer's standard fabrication and installation procedures.

D. *Flush Wood Door with Louvers and Glass Transom 1 (Kitchen Storage)*

Shall be 44mm thick swing type flush hollow core door, made from double vacuum treated kiln-dried (TKD) Tanguile solid wood framing covered with 6mm thick marine plywood (Class A) through a high compact machine press process in stain/varnish finish; door jamb framing shall 45mm x 140mm treated kiln-dried (TKD) Tanguile wooden jamb complete with locksets, hardware and accessories. Provide 10mm thick x 30mm treated kiln-dried (TKD) Tanguile solid wood louver blades (see drawing for design) and 6mm thick annealed glass transom. Submit sample section and stain/varnish finish for Architect's approval. Follow manufacturer's standard fabrication and installation procedures.

E. *Flush Wood Door with Louvers and Glass Transom 2 (Small Toilets)*

Shall be 44mm thick swing type flush hollow core door, made from double vacuum treated kiln-dried (TKD) Tanguile solid wood framing covered with 6mm thick ribbon grain plywood (Class A) through a high compact machine press process in stain/varnish finish; door jamb framing shall 45mm x 140mm treated kiln-dried (TKD) Tanguile wooden jamb complete with locksets, hardware and accessories. Provide 10mm thick x 30mm treated kiln-dried (TKD) Tanguile solid wood louver blades (see drawing for design) and 6mm thick annealed glass transom. Submit sample section and stain/varnish finish for Architect's approval. Follow manufacturer's standard fabrication and installation procedures.

8.1.3 Glass Doors and Frames

A. *Frameless Glass Doors with Aluminum Framed Fixed Glass Panels and Transom*

Shall be 12mm thick tempered clear frameless swing glass doors with 10mm thick tempered clear glass fixed glass panels



and transom on a mullion type aluminum framing system in powder-coated finish, complete with push/pull handle, hardware and accessories, provide white frosted sticker film applied on both sides (refer to drawings for the design); follow manufacturer's standard sizes and thickness, submit powder-coating swatches, frosted sticker film sample and glass sample for Architect's approval.

B. *Frameless Glass Doors with Aluminum Main Framing and Fixed Glass Transom*

Shall be 12mm thick tempered clear frameless swing glass doors with 10mm thick tempered clear glass fixed glass transom on a mullion type aluminum framing system in powder-coated finish, complete with push/pull handle, hardware and accessories, provide white frosted sticker film applied on both sides (refer to drawings for the design); follow manufacturer's standard sizes and thickness, submit powder-coating swatches, frosted sticker film sample and glass sample for Architect's approval.

C. *Frosted Glass Door for Shower Door*

Shall be 12mm thick tempered frosted glass shower door complete with patch fittings, water tight rubber gasket, hardware and accessories; submit glass sample for Architect's approval.

8.2 Operable Wall Partition

Shall be 100mm thick x 1250 panel width maximum (verify drawings for partition dimension, Operable wall partition made up of 16mm thick MDF board in aluminum-steel framed construction, with free oscillating panel fixing and aluminum profile with integrated magnetic strip sealing lips. Acoustic infill shall be 50mm thick, 50 to 60kg/m³ high density mineral rockwool insulation complete with top and bottom retractable seal. Sound rating shall be 55 Db.

Panel connection shall be made up of natural anodized aluminum convex profile on each panels with natural anodized aluminum concave profile exposed fixed jamb complete with PVC gasket, PVC block and magnetic strip. Track mechanism shall be R track curve junction with 12mm thick gypsum board cover and 50kg/m³ mineral wool infill complete with hardware, accessories, and I-beam.

Panel finish shall be 0.8mm thick High Pressure Laminate (HPL) conforming to EN 438:2005 or ANSI/NEMA LD 3:2005 with non-scratch property and water resistant, attached/glued to the MDF board through a high compact machine pressed process complete with pvc edge bond with 100mm height aluminum baseboard. Submit sample swatches, section sample, acoustic test certificate (by a third body testing laboratory), and sound test result for Architect's approval. Operable wall partition shall conform to EN 20140 in Rw for weighted sound reduction. Refer to Architectural drawings, for



layout and details. Follow manufacturer's standard installation procedures.

8.3 **Glass Wall Partition**

8.3.1 **Aluminum Framed Fixed Glass Panels with Seamless Awning Transom**

Shall be 10mm thick tempered clear glass panels and seamless awning transom on a mullion type aluminum framing system, complete with hardware and accessories, provide white frosted sticker film applied on both sides (refer to drawings for the design); follow manufacturer's standard sizes and thickness, submit powder-coating swatches, frosted sticker film sample and glass sample for Architect's approval.

8.4 **Glass Panels and Windows**

Note: Dimension, fabrication and installation of Windows shall be based on the actual measurements and conditions of the site. Verify Manufacturer's standard details. Submit shop drawings and sample for Architect's approval.

8.4.1 **Jalousie Windows**

Shall be 6mm thick x 152mm width annealed reflective "smoke grey" glass louver blades;alousie framing shall be made from polypropylene mechanism that will break and flexible, with EPDM rubber for tighter sealing in between blades and single control mechanism, complete with hardware and accessories. Main framing shall be tubular aluminum frame in powder coated finish.

8.4.2 **Aluminum Framed Fixed Glass Panels with Jalousie Transom 1**

Shall be 6mm thick, fixed annealed clear glass panels on a tubular type aluminum framing system in powder-coated finish withalousie transom made from 6mm thick x 152mm width annealed clear glass louver blades;alousie framing shall be made from polypropylene mechanism that will break and flexible, with EPDM rubber for tighter sealing in between blades and single control mechanism, complete with hardware and accessories, follow manufacturer's standard sizes and thickness, submit powder coating swatches and glass sample for Architect's approval.

8.4.3 **Aluminum Framed Fixed Glass Panels with Jalousie Transom 2**

Shall be 6mm thick, fixed annealed reflective "smoke grey" glass panels on a mullion type aluminum framing system in powder-coated finish withalousie transom made from 6mm thick x 152mm width annealed reflective "smoke grey" glass louver blades;alousie framing shall be made from polypropylene mechanism that will break and flexible, with EPDM rubber for tighter sealing in between blades and single control mechanism, complete with hardware and accessories, follow manufacturer's standard sizes and thickness, submit powder coating swatches and glass sample for Architect's approval.



8.4.4 **Aluminum Fixed Glass Panels and Sliding Windows with Jalousie Transom**

Shall be 6mm thick, fixed annealed reflective "smoke grey" fixed glass panels with sliding windows on a mullion type aluminum framing system in powder-coated finish with jalousie transom made from 6mm thick x 152mm width annealed reflective "smoke grey" glass louver blades; jalousie framing shall be made from polypropylene mechanism that will break and flexible, with EPDM rubber for tighter sealing in between blades and single control mechanism, complete with hardware and accessories, follow manufacturer's standard sizes and thickness, submit powder coating swatches and glass sample for Architect's approval.

8.4.5 **Aluminum Framed Fixed Glass Transom**

Shall be 6mm thick annealed clear fixed glass transom on a mullion type aluminum framing system in powder coated finish. Submit powder coating swatches and glass sample for Architect's approval.

8.4.6 **Aluminum Framed Fixed Glass Panels with Jalousie**

Shall be 6mm thick, fixed annealed reflective "smoke grey" fixed glass panels on a mullion type aluminum framing system in powder-coated finish with jalousie transom made from 6mm thick x 152mm width annealed reflective "smoke grey" glass louver blades; jalousie framing shall be made from polypropylene mechanism that will break and flexible, with EPDM rubber for tighter sealing in between blades and single control mechanism, complete with hardware and accessories, follow manufacturer's standard sizes and thickness, submit powder coating swatches and glass sample for Architect's approval.

8.5 **Skylight/Canopy**

Note: Dimension, fabrication and installation of Skylight shall be based on the actual measurements and conditions of the site. Verify Manufacturer's standard details. Submit shop drawings and sample for Architect's approval.

8.5.1 **Skylight/Glass Canopy 1**

Shall be 12mm thick tempered clear glass and 12mm thick tempered frosted glass skylight panels, with 4mm thick x 200mm x 300mm steel tubular framing main framing system coated with high performance water-based epoxy paint finish and 4mm thick x 100mm x 200mm steel tubular sub-framing system coated with high performance water-based epoxy paint finish, provide 3mm thick x 100mm tubular cap on glass framing. Submit shop drawings and glass sample for Architect's approval. Refer to Architectural and Structural drawings for layout and details.

8.5.2 **Skylight 2**



Shall be 12mm thick tempered clear glass and 12mm thick tempered frosted glass skylight panels, with 4mm thick x 50mm x 50mm steel tubular framing main framing system coated with high performance water-based epoxy paint finish. Submit shop drawings and glass sample for Architect's approval. Refer to Architectural and Structural drawings for layout and details.

8.6 Hardware

Note: Submit hardware samples and product catalog for Architect's approval, before purchasing and installation of the material.

Steel Door/Wooden Door Hardware

8.6.1 DH-1a **Manual Flush Bolt for Steel Doors** (Double Swing Doors)

Manual Flush Bolt for Steel Doors and Fire Rated Doors

Shall be UL listed manual flush bolt made from brass faceplate with steel component. Bolt shall be set on inactive door of a pair with 25mm x 172mm face plate and 13mm standard threaded rod size in satin chrome finish (US26D) with 3 hour fire rating for metal doors complying to ANSI 156.16 for L14251 and UL10C.

8.6.2 DH-1b **Manual Flush Bolt for Wood Doors** (Double Swing Doors)

Shall be UL listed manual flush bolt made from brass faceplate with steel component. Bolt shall be set on inactive door of a pair with 25mm x 172mm face plate and 19mm bolt throw in satin chrome finish (US26D) with 1 1/2 hour fire rating for wood doors complying to ANSI 156.16 for L14251.

8.6.3 DH-2 **One-Way Deadbolt Lock**

Shall be UL listed deadbolt lock, made from high-strength steel alloy deadbolt lock with maximum security cylinder retracted by key outside and thumb turn with blank plate with exposed screws inside, complying to ANSI/BHMA A156.5-2001, Grade 1 Lock in satin chrome finish. Provide patented tough nickel silver key.

8.6.3 DH-3a **Single Cylinder Dead Lock for Gate**

Shall be UL listed single cylinder dead lock for gate, made from high-strength steel alloy with maximum security cylinder retracted by key inside and outside with exposed screws inside, complying to ANSI/BHMA A156.5-2001, Grade 1 Lock in satin chrome finish. Provide patented tough nickel silver key.

8.6.5 DH-3b **Auto Deadlocking Night Latch for Gate**

Shall be 60mm backset x 82mm case width x 88mm case height x 16 bolt length; latch automatically deadlocks on closing the door, key operated from the outside with lever



handle from the inside. Shall be 5 pin cylinder included in chrome plate finish, complying to ANSI/BHMA A156.5-2001, Grade 1 Lock in satin chrome finish. Provide patented tough nickel silver key.

8.6.6 DH-4

Door Hinges – Ball Bearing Hinges

Shall be four (4) pieces minimum, UL listed five knuckle ball bearing hinge made from stainless steel material with stainless steel pin, complying with ANSI A5112 and ANSI A2112, in satin chrome finish (US26D).

- Wood Doors: 89mm x 102mm hinge size
- Steel Doors: 114mm x 102mm hinge size

8.6.7 DH-5

Lever Type Locksets

Note: Complete with standard cylinders, latches and strikes. Submit sample for Architect's approval.

Grade 1, UL listed, exceeds ANSI/ BHMA certified A 156.2, entrance function high security cylindrical lock with thru-bolted mechanism, concealed mounting screws and independent heavy duty spring cages for lever support. Provide dummy trim for double doors and patented tough nickel silver key.

- ***Standard Cylinder (for lever type lockset)***

Grade 1, UL listed, exceeds ANSI/ BHMA certified A 156.2-2003 standard cylinder for lever type lockset, key operated in satin chrome finish.

- ***Latches and Strikes (for lever type lockset)***

Shall be Grade 1, UL listed, ¾" Throw Anti-Friction Deadlatch in push button release or turning inside lever with Square Corner Box Strike in satin chrome finish.

8.6.8 DH-6

Door Closer – Concealed Type

Grade 1, UL listed, ANSI standard A156.4 or EN 1154, concealed overhead door closer mounted on top jamb made from aluminum alloy bodies with high compression steel springs and steel cams and rollers for door opening upto 130° maximum in aluminum 689 finishes. Door closer shall be non-handed with hold open features adjustable to 80° to 120°. Submit sample for Architect's approval; Referenced brand and models shall be as follows or approved equal:

Note: for Fire Exit Doors - door closer shall be self-closing without hold open feature and shall be in accordance to UL10C for positive pressure.

8.6.9 DH-7

Door Stop 1 for Steel Doors and Wood Door

UL listed, meets ANSI/BHMA A156.16, casted aluminum in satin chrome finish with rubber tip door stop.



8.6.10 **DH-8**

Panic Hardware for Fire Exit Doors

Shall be UL listed conforming to ANSI A156.3-2008 Grade 1, 100mm x 1000mm (verify door length) fire exit device/hardware in US26D finish, provide standard lever trim with blank escutcheon (always operable without cylinder) at the back side of the door panel, complete with fasteners, bolts and accessories.

Note: Lever Trim will not be provided at the exterior side of the Fire Exit @ Ground Floor.

8.6.11 **DH-9**

Vertical Pull Handle

1.2mm thick, 25mm diameters x 1760mm/1800mm length, stainless steel, back to back, vertical pull handle complying with ISO9001 (Architectural Hardware) in satin chrome finish.

8.6.12 **DH-10**

Door Stop 2 for Glass Doors (for frameless glass doors with opening adjacent to a glass wall, CHB wall or dry wall)

UL listed, meets ANSI/BHMA A156.16, heavy-duty cast dome stops constructed of brass with grey rubber bumper.

8.6.13 **DH-11**

Pull Handle and Plate

Shall be UL listed, 20mm diameters x 150mm stainless steel pull handle with 88mm x 380mm stainless steel "Pull" sign in satin chrome finish "US26D".

8.6.14 **DH-12**

Kitchen Door Push Plate with Door Protection Plates

Shall be UL listed, exceeds to BHMA 630, and ANSI A156.6, 100mm x 400mm plate place on both side of the panel in US32D finish. Provide 3mm thick x 600mm x 900mm long door protection plates on both sides of the panels in stainless steel US32D finish.

8.6.15 ***Threshold, Automatic Door Bottom, Jamb and Head Seals and Meeting Stile Seals for Acoustical Wood Door***

A. ADH-1

Threshold

Shall be in compliance to BS EN ISO 140-3 or ASTM Procedure E90, suitable for internal and external applications for both opening in & out doors; Shall be low level unit that satisfies the requirements of disabled provisions for wheel chair traffic and extensively tested for sound attenuating smoke sealing and weather sealing application; complete with gasket and other accessories in mill finish aluminum; Follow manufacturer's standard installation procedure and recommendation.

B. ADH-2

Automatic Door Bottom

Shall be in compliance to BS EN ISO 140-3 or ASTM Procedure E90; 14.3mm x 34.9mm automatic door bottom for 3-5mm floor gap in mill finish aluminum that provides excellent sound attenuating performance and provide smoke sealing and weather sealing performances, complete with screws and



accessories. Follow manufacturer's standard installation procedure and recommendation.

C. ADH-3 *Jamb and Head Seals*

Shall be in compliance to BS EN ISO-140-3 or ASTM Procedure E90, 6.3mm x 12.7mm x 11.5mm silicon seal in black color finish, compressing at 6.3mm and can be compressed sufficiently to seal openings of 3mm. Shall be self-extinguishing and non-toxic under fire condition and impervious to fungus and mildew. Follow manufacturer's standard installation procedure and recommendation.

D. ADH-4 *Meeting Stile Seals*

Shall be in compliance to BS EN ISO-140-3 or ASTM Procedure E90, 6.4mm x 20.5mm stile seal in clear anodized aluminum finish recessed into the door that has been tested and suitable for use with sound attenuating door sets. Follow manufacturer's standard installation procedure and recommendation.

8.6.16 Toilet Cubicle Door Hardware

Note: Shall be complete with all necessary hardware and accessories in stainless steel hairline finish as stated on Division 10.3 "Compartments and Cubicles".

A. TCH-1 *Door Indicator Lock and Door Knob for Toilet Cubicles*

Shall be nylon coated red/green color indicator lockset for toilet doors.

B. TCH-2 *Door Knob for Toilet Cubicles*

Shall be nylon coated door knob for toilet doors.

C. TCH-3 *Gravity Hinge (Toilet Partition)*

Three (3) nylon coated gravity hinge rise and fall – stand type partition hinge.

D. TCH-4 *Top Round Channel*

Shall be nylon coated top round channel.

E. TCH-5 *U-Channel*

Shall be stainless steel hairline finish u-channel.

F. TCH-6 *Plate Leg*

Shall be nylon coated finish plate leg.

G. TCH-7 *Coat Hook*

Shall be nylon coated finish coat hook.

H. TCH-8 *Urinal Hinge*

Shall be (2) nylon coated urinal bracket.

8.7 Glass Glazing

8.7.1 Glass Glazing for Doors and Fixed Panels





A. Glass Glazing for Fire Exit Door

Shall be 6mm thick x 124mm x 659mm wired glass panel, submit sample for Architect's approval.

B. Glass Glazing for Steel and Wood Doors with Vision Panel

- Shall be 6mm thick annealed clear glass, submit sample for Architect's approval.
- Shall be 6mm thick wired glass, submit sample for Architect's approval.

C. Glass Glazing for Aluminum Framed Glass Doors and Fixed Panels

Shall be 10mm and 12mm thick clear tempered glass panels, submit glass sample for Architect's approval. Refer to Architectural drawings for sticker film design.

8.7.2 Glass Glazing for Glass Panels and Windows

- Exterior
Shall be 6mm thick annealed/tempered reflective "smoke grey" glass, submit glass sample for Architect's approval.
- Interior
Shall be 6mm thick annealed clear glass, submit glass sample for Architect's approval.

8.7.3 Glass Glazing for Skylight

Shall be 12mm thick tempered clear and frosted glass, submit glass sample for Architect's approval.

8.7 Mirror

8.7.1 FM-1

Facial Mirror for Male and Female Toilets

Shall be 12mm thick frameless, silver-coated float glass mirror with 2mm thick chamfered edges on both sides, glued to 12mm thick marine plywood backing by tile adhesive or mirror mastic with sponge tape on one side, facing wall provide 50mm x 50mm TKD Tanguile back framing. Provide screws with expansion shield and chrome-plated screw cap. Submit mirror sample for Architect's approval. Refer to Architectural Drawing for dimension, layout and design.

8.7.2 FM-2

Facial Mirror for PWD and Private Toilet and Bath

Shall be 6mm thick (for small mirrors) frameless, silver-coated float glass mirror with 2mm thick chamfered edges on both sides, glued to 12mm thick marine plywood backing by tile adhesive or mirror mastic with sponge tape on one side, facing wall. Provide screws with expansion shield and chrome-plated screw cap. Submit mirror sample for Architect's approval. Refer to Architectural Drawing for dimension, layout and design.



DIVISION 9 – FINISHES

9.1 Ceiling Finishes

9.1.1 CF-1

Gypsum Board Ceiling Finish

Shall be 12mm-13mm thick recessed edge, moisture resistant, sag resistant plasterboard, coated with high performance low VOC, odorless, ultra-premium water-based acrylic coating that gives a cleanable matte finish to walls and ceilings with surface protector and anti-bacterial protection.

Framing system shall be 0.60mm 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 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 1200mm (max.) on both ways. Complete with screws, accessories and 0.40mm gauge 26 x 25mm x 25mm corner bead Ceiling Framing System with BPS certification. Submit gypsum board and framing sample for Architect's approval. Verify drawings for design and details.

9.1.2 CF-2

Lay-in Beveled Tegular Edge Mineral Fiber Acoustical Ceiling Board – Fine Textured

Shall be 15mm thick x 600mm x 600mm non-asbestos mineral fiber, fine texture surface, beveled tegular edge with suprafine grid framing system, demountable acoustical ceiling board with factory applied vinyl latex paint with aluminum cap and factory baked enamel surface coating. Acoustical ceiling board shall be scratch resistant, RH99 humidity resistant with anti-mold and mildew properties and sound absorption of NRC 0.50 (minimum).

Framing system shall be shall be 24mm x 38mm main runner and cross tee made from aluminum powder-coated finish, attached to slab/roof framing by a suspension clip and 6mm diameter hanger rod joiner spaced at 600mm x 900mm apart, complete with screws and accessories Suspended Metal Ceiling Framing System; provide 0.5mm thick x 24mm x 24mm wall angle perimeter trim. Submit sample for Architect's approval. Verify Architectural drawings for design and details.

9.1.3 CF-3

Interior Exposed Ceilings: Exposed Reinforced Concrete Slab, Beams

Water-Based Acrylic Paint

Shall be exposed reinforced concrete slab form finished coated with high performance low VOC, odorless, ultra-premium water-based acrylic coating that gives a cleanable matte finish to walls and ceilings with surface protector and anti-bacterial protection. Submit color swatch and mock-up paint sample for Architect's approval.



9.1.4 **CF-4**

Exterior Exposed Ceilings: Exposed Reinforce Concrete Slab (Ledges)

Shall be exposed reinforced concrete slab (ledge) form finished coated with plain semi-gloss water-based 100% acrylic paint with high alkaline resistance and excellent gloss retention, highly resistant to airborne pollutants and dust and has good exterior durability. Submit color swatch and mock-up paint sample for Architect's approval.

9.1.5 **CF-5**

Acoustical Ceiling for Auditorium

Shall be 3 layers of 12mm-13mm thick recessed edge, moisture resistant, sag resistant plasterboard, coated with high performance low VOC, odorless, ultra-premium water-based acrylic coating that gives a cleanable matte finish to walls and ceilings with surface protector and anti-bacterial protection. Provide 100mm thick 48 kg/cum fiber glass blanket for insulation and sound absorption with isolation clips spaced @ 1200 O.C. both ways. Submit sample and shop drawings for Architect's approval.

9.1.6 **CF-6**

Fiber Cement Board (Exterior Ceiling Eaves)

Shall be 10mm thick asbestos-free, smooth surface, square edge, fiber cement ceiling board, resistant to fire, sag, moisture and termite, coated with plain semi-gloss acrylic solvent-based coating that forms a seamless, non-porous water tight film that repels water and prevent seepage. Excellent adhesion and has long term durability, creates a very tight film, serving moisture sealant for concrete.

Framing system shall be BPS (Bureau Product Standards) certified, 0.60mm 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 attached to roof rafters, or attached to slab/roof framing by a suspension clip and 6mm diameter hanger rod joiner spaced at 1200mm (max.) on both ways, complete with screws and accessories with BPs certification, provide steel corner bid.

9.2 **Flooring Finishes**

9.2.1 **FF-1**

Rough/Matte Finish Homogenous Porcelain Tiles

Location: Main Entry

Shall be 10mm thick x 600mm x 600mm rough/matte finish anti-stain, non-skid, homogenous porcelain tiles with heavy resistance to abrasion Class AAA, 7.5 kgs., submit product catalog and sample for Architect's approval. Provide 2-3 mm gap in between tile joint during installation. Tile color and design shall be approved first before installation. Refer to Architectural drawings for pattern, layout and details.

Note:



For exterior stair step provide 18-20mm thick x 50mm high quality granite stone nosing with medium to heavy resistance to abrasion. Submit sample swatches for Architect's approval.

9.2.2 FF-2

Polished Finish Natural Marble/Granite Stone

Location: Main Lobby, Lobbies

Shall be 18 to 20mm thick x 600mm x 600mm premium high quality natural marble/granite stone in polished finish (combination of light and dark color finish – refer to the design layout) with medium to heavy resistance to abrasion. Submit product catalog and sample for Architect's approval. Marble/granite color and design shall be approved first before installation. Refer to Architectural drawings for pattern layout and details.

9.2.3 FF-3

Polished Concrete

Location: Dining Hall, Food Science Lab, Staff and Faculty Dining Room

Shall be plain cement finish with concrete hardener and sealer in polished finish made through a mechanical grinding and polishing process with chemical hardener and impregnating sealer. Submit product catalog and material sample for Architect's approval.

Note: Provide 6mm x 6mm expansion grooves as per design layout.

9.2.4 FF-4

Polished Finish Homogenous Porcelain Tiles

Location: Coop Office, Security CCTV Room, Office of the Technician, All Faculty Rooms, Female Transient Rooms and Hallways, Secretariat, All Lecture Rooms, All Laboratory Rooms

Shall be 10mm thick x 600mm x 600mm polished finish anti-stain, non-skid with nano-technology (for polished finish quality), homogenous porcelain tiles with heavy resistance to abrasion Class AAA, 7.5 kgs., submit product catalog and sample for Architect's approval. Provide 2-3 mm gap in between tile joint during installation. Tile color and design shall be approved first before installation. Refer to Architectural drawings for pattern, layout and details.

9.2.5 FF-5

Matte Finish Homogenous Porcelain Tiles

Location: Male and Female Toilets, PWD, Kitchen, Pantry 1 & 2

Shall be 10mm thick x 600mm x 600mm matte finish anti-stain, non-skid, homogenous porcelain tiles with heavy resistance to abrasion Class AAA, 7.5 kgs., submit product catalog and sample for Architect's approval. Provide 2-3 mm gap in between tile joint during installation. Tile color and



design shall be approved first before installation. Refer to Architectural drawings for pattern, layout and details.

9.2.6 FF-6

Matte Finish Porcelain Tiles with Honed Finish Natural Granite Stone Nosing

Location: For Main Staircase

Shall be 10mm thick x 300mm x 600mm (for steps) 10mm thick x 600mm x 600mm (for landing) matte finish anti-stain, non-skid, homogenous porcelain tiles with heavy resistance to abrasion Class AAA, 7.5 kgs. Nosing shall 18mm to 20mm x 50mm thick premium high quality natural granite nosing with medium to heavy resistance to abrasion. Submit product catalog and sample for Architect's approval. Provide 2-3 mm gap in between tile joint during installation. Tile color and design shall be approved first before installation. Refer to Architectural drawings for pattern, layout and details.

9.2.7 FF-7

Carpet Tiles

Location: Meeting Rooms and Library

Shall be 4mm thick (min.) x 600mm x 600mm carpet tiles made from 100% nylon material, solution dyed method in Hi/Lo loop construction with non-woven primary backing and PVC secondary backing attached using a water-based glue. Final color and pattern as per Architect's approved sample.

9.2.8 FF-8

Homogenous Vinyl Composition Tiles

Location: Auditorium Seating Area

Shall be 3mm thick x 300mm x 300mm asbestos-free homogenous vinyl composition tile made of organic vinyl resins, plasticizers and additives as binders and natural limestone as fillers conforming to ASTM F- 1066, ASTM E 648, ASTM E 662, and ASTM F 970 requirements, submit product catalog and sample for Architect's approval. Provide premium grade tile adhesive as per manufacturer's requirement and follow standard application procedures.

9.2.9 FF-9

T & G Wood Planks

Location: Auditorium Stage

Shall be 20mm thick x 100mm treated kiln dried T&G Tanguile solid wood planks flooring, sanded and applied with sanding sealer in stain/varnish finish. Framing system shall be 50mm x 150mm treated kiln dried (S4S) Tanguile solid wood framing in varnish/stain finish. Refer to Architectural drawings for layout and details.

9.2.10 FF-10

Plain Cement Floor Finish with Epoxy Paint

Location: Back Stage, Dressing Room, Janitor Room, All Storage Rooms, EE Room, Pump Room, Main Ee Room, Transformer Room, ELV Room



Shall be plain cement smooth steel trowel finish with concrete hardener coated with a 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 the further excellent of brushability and easy water clean-up. Submit color swatches of paints for Architect's approval. Verify structural drawings for slab thickness.

Note: Provide expansion grooves spaced @ 1000mm x 1000mm, refer to layout (for bigger rooms only).

9.2.11 FF-11

Plain Cement Floor Finish with Epoxy Paint and Stainless Steel Nosing

Location: Fire Exit Stairs

Shall be plain cement smooth steel trowel finish with concrete hardener coated with a 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 the further excellent of brushability and easy water clean-up. Provide 3mm thick x 50mm x 25mm stainless steel nosing in hairline finish with anti-skid grooves and built-in dowel. Submit product catalog, nosing sample, and color swatches of paint finish for Architect's approval. Refer to architectural drawings for layout and details.

9.2.12 FF-12

Plain Cement Floor Finish with Expansion Grooves 1

Location: ACCU Deck, Roof Deck

Shall be class A concrete pavement with plain cement smooth trowel finish. Provide 6mm x 6mm expansion grooves spaced at every 1200mm O.C. Refer to Architectural/Civil Works drawings for layout and details. Provide necessary required waterproofing (refer to waterproofing layout and details).

9.2.13 FF-13

Plain Cement Floor Finish with Expansion Grooves 2

Location: Exterior Pedestrian Ramp

Shall be class A concrete pavement with plain cement smooth trowel finish. Provide 6mm x 6mm expansion grooves spaced at every 300mm O.C. Refer to Architectural/Civil Works drawings for layout and details.

9.2.14 FF-14

Plain Cement Floor Finish with Expansion Grooves 3

Shall be class A concrete pavement with plain cement smooth trowel finish. Provide 6mm x 6mm expansion grooves spaced at every 1000mm O.C. Refer to Architectural/Civil Works drawings for layout and details.

9.2.15 FF-15

Plain Cement Floor Finish

Shall be class A concrete pavement with plain cement smooth throwel finish.



9.3 Floor Terminations

9.3.1 FT-1

Natural Granite Stone Nosing 1: for Exterior Floor Termination

Shall be 18 to 20mm thick x 100mm premium high quality natural granite stone in honed/flamed finish with medium to heavy resistance to abrasion. Submit product catalog and sample swatches for Architect's approval.

9.3.2 FT-2

Natural Granite Stone Nosing 2: Interior Floor Termination

Shall be 18 to 20mm thick x 100mm/150mm premium high quality natural granite stone in polished finish with medium to heavy resistance to abrasion. Submit product catalog and sample swatches for Architect's approval.

9.3.3 FT-3

Natural Granite Stone Nosing 3: Interior Floor Termination and Toilet Entry Floor Nosing

Shall be 18 to 20mm thick x 150mm premium high quality natural granite stone in polished finish with medium to heavy resistance to abrasion. Submit product catalog and sample swatches for Architect's approval.

9.3.4 FT-4

Natural Granite Stone Nosing 4: Elevator Lobby Floor Termination

Shall be 18 to 20mm thick x 150mm premium high quality natural granite stone in polished finish with medium to heavy resistance to abrasion. Submit product catalog and sample swatches for Architect's approval.

9.4 Wall Finishes

9.3.1 Exterior Wall Finish

A. WF-1a

Exterior CHB Walls

Shall be 150mm thick CHB exterior wall with 25mm thick smooth trowel cement plaster finish coated with plain semi-gloss water-based 100% acrylic paint with high alkaline resistance and excellent gloss retention, highly resistant to airborne pollutants and dust and has good exterior durability. Provide high-performance acrylic skimcoat to exterior wall to achieve an even and smooth concrete surface before applying paint primer. 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.

Note:

For areas with grooves provide 10mm x 10mm expansion grooves spaced according to elevation design.

B. WF-2a

Exterior Concrete Columns

Shall be reinforced concrete columns straight to finish coated with plain semi-gloss water-based 100% acrylic paint with high alkaline resistance and excellent gloss retention, highly



resistant to airborne pollutants and dust and has good exterior durability. Provide high-performance acrylic skimcoat to achieve an even and smooth concrete surface before applying paint primer. 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.\

C. WF-3a Exterior Parapet Walls and Ledges

Shall be reinforced concrete parapet walls and ledges coated with plain semi-gloss water-based 100% acrylic paint with high alkaline resistance and excellent gloss retention, highly resistant to airborne pollutants and dust and has good exterior durability. Provide high-performance acrylic skimcoat to achieve an even and smooth concrete surface before applying paint primer. 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.

Provide acrylic polymer waterproofing, before applying the top coat semi-gloss acrylic solvent-based paint. Submit brochures and sample for Architect's approval.

D. WF-4a Exterior Pre-cast Concrete Wall

Shall be 150mm thick decorative precast concrete wall coated with plain semi-gloss water-based 100% acrylic paint with high alkaline resistance and excellent gloss retention, highly resistant to airborne pollutants and dust and has good exterior durability. 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. Refer to Architectural drawings for layout and design. Submit shop drawings for Architect's approval before fabrication of pre-cast material.

E. WF-5a Build-up Wall

Shall be 100mm thick CHB exterior build-up wall with 25mm thick smooth trowel cement plaster finish coated with plain semi-gloss water-based 100% acrylic paint with high alkaline resistance and excellent gloss retention, highly resistant to airborne pollutants and dust and has good exterior durability. Provide high-performance acrylic skimcoat to exterior wall to achieve an even and smooth concrete surface before applying paint primer. 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.

9.3.2 Interior Wall Finish

A. WF-1b Interior Concrete Hollow Blocks Cement Plaster Wall Finish – Painted

Shall be 150mm thick/100mm thick CHB interior wall with 25mm thick smooth trowel cement plaster finish coated with high performance low VOC, odorless, ultra-premium water-based acrylic coating that gives a cleanable matte finish to



walls and ceilings with surface protector and anti-bacterial protection. Provide high-performance acrylic renderer and skimcoat to interior wall to achieve an even and smooth concrete surface before applying paint primer. Submit color swatch and mock-up paint sample for Architect's approval.

B. WF-2b *Interior Concrete Hollow Blocks Wall and Concrete Column with Heat and Sound Insulation*

Shall be 150mm thick/100mm thick CHB interior wall and reinforced concrete column sprayed with a two component closed-cell spray applied polyurethane foam for heat and sound insulation, on 18mm thick asbestos-free, smooth surface, square edge, fiber cement wall board, resistant to fire, sag, moisture and termite. 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 bothways, complete with screws, accessories and 0.40mm GA. 26 x 25mm x 25mm corner bid. Wall finish shall be coated with semi-gloss 100% water-based acrylic latex paint with excellent hiding, durability and dirt pick-up resistance. Submit color swatch and mock-up paint sample for Architect's approval.

C. WF-3b *Interior Concrete Column and Shear Wall*

Shall be reinforced concrete column and or shear wall with cement plaster finish, 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. Submit color swatch and mock-up paint sample for Architect's approval. See Structural drawings for column and shear wall sizes, thickness and details.

F. WF-4b *Interior Concrete Hollow Blocks Wall/Column with Matte Finish Homogenous Porcelain Tiles*

Shall be 150mm thick/100mm thick CHB interior wall/ column with 10mm thick 300mm x 600mm anti-stain, matte finish homogenous porcelain tiles with heavy resistance to abrasion Class AAA, 7.5 kgs.; Submit tile sample and shop drawings for Architect's approval. Provide 2-3 mm gap in between tile joint during installation.

Remaining Upper Wall:

Provide with 25mm thick smooth trowel cement plaster finish coated with high performance low VOC, odorless, ultra-premium water-based acrylic coating that gives a cleanable matte finish to walls and ceilings with surface protector and anti-bacterial protection for the remaining wall finish. Verify Toilet Details for the design.

For Urinal plumbing wall ledge provide 18-20mm thick x 200mm width premium high quality natural granite stone with medium to heavy resistance to abrasion.



Verify Toilet Details for provisions and location of plumbing wall.

G. WF-5b ***Interior Concrete Hollow Blocks with Polished Finish Porcelain Tiles (for Kitchen Wall)***

Shall be 150mm thick/100mm thick CHB interior wall with 10mm thick 300mm x 600mm anti-stain, polished finish homogenous porcelain tiles with nano technology (for polish finish) with heavy resistance to abrasion Class AAA, 7.5 kgs.; Submit tile sample at shop drawings for Architect's approval. Provide 2-3 mm gap in between tile joint during installation.

H. WF-6b ***Interior Drywall Partition***

Shall be 100mm thick dry wall partition in 12mm to 13mm thick standard plasterboard on 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 bothways, complete with screws, accessories and 0.40mm GA. 26 x 25mm x 25mm corner bead with BPS (Bureau of Product Standards) certification. Coated with high performance low VOC, odorless, ultra-premium water-based acrylic coating that gives a cleanable matte finish to walls and ceilings with surface protector and anti-bacterial protection. Submit color swatch and mock-up paint sample for Architect's approval. All drywall framing shall be BPS (Bureau Product Standards) certified. Provide 32 kg/cum 50mm thick lightweight, flexible and resilient insulation board (acoustic fiberglass insulation) made of long fine glass fibers bonded with thermosetting resin and reflective aluminum foil vapor barrier.

9.3.3 Decorative Wall Claddings

A. WF-1c ***Interior Marble Wall Cladding (for Elevator Lobby)***

Shall be reinforced concrete column, shear wall and CHB wall with 18 to 20mm thick premium quality natural marble stone wall cladding with medium to heavy resistance to abrasion; Submit product catalog, shop drawings and samples for Architect's approval. Refer to Architectural drawings for layout and details.

B. WF-2c ***Decorative Sliding Wall Panel (for Gallery)***

Shall be 12mm thick x 379mm x 379mm laminated MDF cut out sliding panels covered with polyester internal padding covered with Trevira CS fabric; Submit product catalog, section sample and fabric sample for Architect's approval.

C. WF-3c ***Interior Concrete Hollow Blocks with Acoustical Wall Panels (Closed)***

Shall be ¾" high density board (Palmeco Board) in high performance low VOC, odorless, ultra-premium water-based acrylic coating or wood veneer laminate, provide 64 kg branded fiber glass, submit product sample, shop drawings and color swatches for Architect's approval. Follow



manufacturer's standard acoustical design requirements, installation and design recommendation. Refer to Architectural drawings for layout and details.

D. WF-4c *Interior Concrete Hollow Blocks with Acoustical Wall Panels (Open)*

Shall be 64 kg branded fiber glass covered with 3mm thick polyester cloth, submit cloth sample swatches and fiberglass sample for Architect's approval.

F. WF-5c *Veneer Wood Cladding* (for Stage Wall)

Shall be 150mm thick/100mm thick CHB interior wall/ column with 25mm thick smooth trowel cement plaster finish cladded with Shall be 18mm thick marine plywood (Class A) covered with 5mm thick wood veneer finish; framing system 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 400mm bothways, complete with screws, accessories and 0.40mm GA. 26 x 25mm x 25mm corner bead. Submit product catalog, veneer swatches and sample section for Architect's approval.

9.4 Painting and Coating

9.4.1 *Exterior Painting*

A. *Exterior Masonry Wall, Reinforced Concrete Wall, Build-up Walls, Pre-cast Wall, Columns & Parapet*

Shall be with plain semi-gloss water-based 100% acrylic paint with high alkaline resistance and excellent gloss retention, highly resistant to airborne pollutants and dust and has good exterior durability. Provide high-performance acrylic skimcoat to exterior wall to achieve an even and smooth concrete surface before applying paint primer. 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.

9.4.2 *Interior Painting*

A. *Interior Masonry, Reinforced Concrete Wall & Slab 1*

Shall be coated with high performance low VOC, odorless, ultra-premium water-based acrylic coating that gives a cleanable matte finish to walls and ceilings with Teflon surface protector and Microban anti-bacterial protection. Painting schedule shall be:

- a. Primer surface
- b. Fill hairline cracks and minor surface imperfections
- c. Spot prime puttied portions.
- d. Apply 2-3 coats of low VOC ultra-premium water based acrylic paint.



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

B. Interior Concrete Flooring

Shall be plain cement smooth trowel finish with concrete hardener coated with a 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 the further excellent of brushability and easy water clean-up. Painting schedule shall be:

- a. Prime surface
- b. When necessary, putty hollow surface
- c. Finish coat (verify manufacturer's recommended apply of coatings) of 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.

9.4.3 Interior Staining and Finishing

A. Wood Stain and Varnish

Shall be clear coated with oil wood stain that highlights wood grains and provides protection to interior wood works. Final coating shall be clear, nitrocellulose solvent-based, high gloss lacquer varnish finish that dries to an elegant and durable film. Has resistant to heat, chemical and abrasion. Painting schedule shall be:

- a. Paste wood filler
- b. Oil wood stain
- c. Sanding sealer.
- d. Final coat of clear gloss lacquer varnish.

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

9.4.4 Special Coatings

A. 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.

B. *Steel Doors*

Shall be coated low VOC high build, high solid surface tolerant epoxy maintenance coating in semi-gloss finish. Follow manufacturer's standard painting system, surface preparation and methodology. Submit color swatch and mock-up paint sample for Architect's approval.

C. *Aluminum Framing for Glass Windows and Doors*

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

D. *Water Tank Lining*

Shall be epoxy lining material, solvent free, pigmented, two component preparation of liquid colored epoxy resin with formulated animer hardener. Safe for use on areas in direct contact with potable water or foodstuffs; lead free, food grade when fully cured, non-toxic and BFAD approved. Submit product catalog and shop drawings for Architect's approval. Follow manufacturer's standard application procedures.

9.4.5 *Concrete and Masonry Skim Coating*

A. *Skim Coating on Concrete Wall Plastering (Interior and Exterior)*

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.

9.4.6 *Gypsum Board for Drywall and Ceiling Jointing and Putty*

A. *Gypsum Board Joint Filler*

Shall be coated with powder-type, all-purpose fast setting gypsum-based filler for joints and patching holes. Provide fiber mesh before filling the joints. Submit product catalog for Architect's approval.

B. *Gypsum Board Putty*

Shall be coated with asbestos-free formulation, water-based, high quality gypsum putty to be used specifically over joints and patching holes on gypsum boards. Submit product catalog for Architect's approval.



DIVISION 10 – SPECIALTIES

10.1 Exterior Signage

Shall be 1.2 mm thick, gauge 18 base metal thickness x 50mm width, stainless steel building signage lettering design; complete with build-up dowel attached to CHB wall. Font style for building signage shall be "Helvetica" bold.

10.2 Interior Signage

10.2.1 Interior Room Signage (Wall or Door Mounted)

Shall be 6mm thick opaque acrylic plastic with sticker for lettering, logo and design, on 1.5mm thick U-shape aluminum top and bottom support with end clips on both sides in hairline finish. Provide 1.5mm thick aluminum backing in hairline finish (attached at the other side of the glass wall) for glass wall partitions and or heavy duty double sided tape for concrete wall, wood or steel door attachment. Refer to Architectural drawings for layout and details. Submit mock-up sample for Owner's approval upon the recommendation of the Architect. Font style shall be "helvetica" bold.

10.2.2 Interior Signage and Interior Building Signage (Ceiling Mounted)

Shall be 6mm thick opaque acrylic plastic with sticker for lettering, logo and design, on a 19mm marine plywood (Class A) hidden framing system complete with 1.2mm thick x 19mm x 50mm stainless steel tubular vertical hanger with flange attached to ceiling, Refer to Architectural drawings for layout and details. Submit mock-up sample for Owner's approval upon the recommendation of the Architect. Font style shall be "helvetica" bold.

10.2.3 Interior Building and Logo Signage

Shall be 1.2 mm thick, gauge 18 base metal thickness x 25mm width, stainless steel building signage lettering and 50mm width building logo; for signage logo shall be powder coated finish according to PSHS Main Campus prescribe color. Complete with build-up dowel attached to CHB wall. Font style for building signage shall be "Helvetica" bold.

10.2.4 Toilet Entry Signage

Shall be 1.2mm thick stainless steel cut-out toilet signage in hairline finish. Submit sample for Architect's approval.

10.2.5 Fire Exit Signage

Shall be 2 Watts, double-sided, ceiling-mounted LED lamps in electro galvanized steel with epoxy powder-coated fitting construction and fire-retardant moulded acrylic diffuser. Provide ISO green legend as required in accordance to standards.

10.2.6 Signage for Controlled Areas

Shall be 6mm thick opaque acrylic plastic with sticker for lettering, logo and design, on 1.5mm thick U-shape aluminum



top and bottom support with end clips on both sides in hairline finish; Provide 1.5mm thick aluminum backing in hairline finish (attached at the other side of the glass wall) for glass wall partitions and or heavy duty double sided tape for concrete wall, wood or steel door attachment, to bear signage for Utilities. Refer to Architectural drawings for layout and details Submit full size drawing prior to fabrication and installation for Architect's approval. Font style shall be "hevetica" bold.

10.2.7 ***Building Directory Signage***

Shall be 6mm thick clear glass on 1.2mm thick x 25mm x 25mm stainless steel frame in hairline finish with 3mm thick high commercial grade cintra board insert showing building plan, back-mounted, font style shall be "helvetica" bold.

10.2 **Compartments and Cubicle**

10.2.1 **TCD-1**

Toilet Cubicle Door with Partition

Shall be 12mm thick compact laminated board doors and partition with pilasters resting on a nylon coated finish support/plate leg and anchored to the divisional walls by stainless steel hairline finish heavy duty U-channel, corner channel and top round channel, complete with nylon coated in finish accessories (coat hook, door knob, privacy thumb turn, gravity hinge and door indicator lock). Submit sample swatches for Architect's approval.

10.2.2 **UP-1**

Urinal Partitions

Shall be 18-20mm thick premium high quality natural granite stone with medium to heavy resistance to abrasion. Submit Sample for Architect's approval.

10.2.3 **TCL-1**

Toilet Cubicle Ledge

Shall be 200mm width, 12mm thick compact laminated board ledge complete with 25mm u-channel support and accessories. Submit sample for Architect's approval.

10.2.3 **UPL- 1**

Urinal Plumbing Ledge

Shall be 18-20mm thick x 200mm width premium high quality natural granite stone with medium to heavy resistance to abrasion. Submit Sample for Architect's approval.

10.3 **Folding Gates**

10.3.1 ***Foldable Grille Works and Swing Type Grille Works***

Shall be 1.5mm thick x 50mm x 50mm steel tubular main grille works framing with 1.5mm thick x 50mm x 100mm top and bottom connectors fully welded to 10mm thick x 50mm flat bars vertical decorative design and 2mm thick steel plate sheet (refer to drawings for the design layout) coated with high performance water-based acrylic epoxy paint finish, complete with hardware and accessories. Submit shop



drawings and mock-up sample for Architect's approval; refer to Architectural Drawings for layout and details.

10.3.2 **AHU Steel Louver Gate**

Shall be 1.2mm thick x 50mm x 100mm steel tubular frame with 1.2mm thick x 25mm x 50mm steel horizontal louvers, gate jamb shall be 1.2mm thick x 50mm x 100mm tubular framing; complete with pre-fabricated heavy duty gate hinges, 20mm diameters steel round bar for barrel bolt and 6mm thick flat bar hasp with 15mm diameters padlock eye and heavy duty padlocks, gate finish shall be coated with high performance acrylic water based epoxy paint finish. Submit sample color swatches and shop drawings for Architect's approval.

10.4 **Toilet and Bath Accessories**

10.4.1 **Toilet Accessories**

A. **TH-1** ***Tissue Paper Holder 1***

Shall be Grade A white vitreous china, semi-recessed wall-mounted tissue paper holder. Submit brochures and sample for Architect's approval.

B. **TH-2** ***Tissue Paper Holder 2***

Shall be anchored to partition wall (compact laminated partition walls – verify drawings for location), shall be black PV nylon-coated, wall-mounted tissue paper holder with lid cover and concealed screws. Submit brochures and sample for Architect's approval.

C. **BD** ***Bidet Hose***

Shall be chrome plated bidet hose and holder with 12mm diameter x 1200mm long stainless steel hose. Complete with 12mm x 12mm chrome plated single angle valve with filter without nut. Submit brochures and sample for Architect's approval.

D. **HD** ***Hand Dryer for Public Toilets***

Shall be a sensor type, 1.2 mm thick steel/stainless steel white epoxy high speed hand dryer with infrared automatic, self-adjusting circuit operation, 51mm to 30mm adjustable sensor range and dries hand completely in 10-15 seconds; Submit brochures and sample for Architect's approval.

E. **GR** ***Disabled Grab Rail***

Shall be 1.5mm thick 50mm diameter hairline finish, Schedule 40, corrosion-resistant stainless steel tube, No. 4 finish, conforming to ASTM F 446 and ASTM A554. Welded to stainless steel concealed flange complete with tenon plate and screws for concealed attachment.

F. **LSD** ***Liquid Soap Dispenser***



Shall be chrome-plated with push top control liquid soap dispenser, mechanism secured by a grub screw complete with 1 liter bottle. Submit sample for Architect's approval.

10.4.2 ***Bath Accessories***

- A. **SH** ***Soap Holder***
Shall be Grade A white vitreous china, semi-recessed wall-mounted soap holder. Submit brochures for Architect's approval
- B. **TB** ***Towel Bar – for Shower Area***
Shall be corrosion-resistant stainless steel with chrome finish towel bar, submit sample for Architect's approval.
- C. **SCR** ***Shower Curtain Rod***
Shall be 1mm thick x 25mm diameters shower curtain rod made stainless steel hairline finish; connected to wall thru a concealed flange complete with tenon plate and screws for concealed attachment. Verify toilet details for layout and sizes.
- D. **WH** ***Water Heater – Multi-Point Type***
Shall be open outlet type, 230V/60Hz, 6.0KW, 320mmx 185mmx 90mm, instant water heater with 3-step switch type power control and built-in ELCB and thermal cut-out. Submit product catalog and sample for Architect's approval.
- E. **ST** ***Shower Tray***
Shall be 900mm x 900mm x 160mm deep, free standing acrylic shower tray with drain. Submit product catalog and sample for Architect's approval.

DIVISION 11 – EQUIPMENT

11.1 Food Service Equipment

Food service equipment shall be made of stainless steel material, food grade, Grade 304 in hairline finish for kitchen area equipment, pot wash area and service area equipment complete with buy-out equipment. Dimension, fabrication and installation of kitchen equipment shall be based on the actual measurements and conditions of the site. Verify Manufacturer's standard details. Submit shop drawings for Architect's approval. Refer to Architectural drawings and Technical specification for further requirements, layout and details.

DIVISION 12 – FURNISHINGS – Refer to Goods Section of the Furniture and Furnishings

DIVISION 13 – SPECIAL CONSTRUCTION

13.1 Observatory Dome (by Others)



DIVISION 14 – CONVEYING EQUIPMENT

14.2 *Machine-Room-Less Passenger Elevator*

Shall be a Machine-Room-Less System Passenger Elevator with energy saving operation-allocation control, car capacity shall be 21 maximum numbers of persons, 1,600 rated capacity and 1.0 m/sec rated speed. Car internal dimensions shall be 2100mm x 1600mm and a minimum hoistway internal dimension of 5600mm x 2300mm clear (for two (2) – verify Architectural drawings for hoistway clear size).

Interior Car Wall and Transom Panel

Interior car wall (part of the wall - 3 sides) and transom panel shall be in stainless steel in mirror finish “titan mirror color” – 3 sides, complete with three sided stainless steel handrail in hairline finish and aluminum kickplate.

Interior and Exterior Car Door

Shall be two panel center opening doors in stainless steel framing (hairline finish)

Interior Ceiling Finish

Shall be full LED lighting, milky white resin panel at the center ceiling with mirrored surface and acrylic blocks on the sides.

Interior Floor Finish

Shall be 20mm thick premium high quality granite stone slab with medium to heavy resistance to abrasion in polished finish

Car Operational Panel for Front Return Panel

Shall be stainless steel with non-directional hairline finish with yellow-orange tactile buttons (provide brail guide for PWD or voice guidance system).

Hall Position Indicators and Buttons

Shall be stainless steel faceplate in hairline finish with smoky gray plastic, matte surface display panel and segment LED indicator for directional light, hall button shall be micro stroke click button. Provide hall lantern with indicative arrows located at the top of the elevator door, (provide brail guide for PWD or voice guidance system).

Provide Hall Motion Sensor (HMS), Emergency Landing Device, Fire Emergency Return (FER), Earthquake Emergency Return (EER-P/EER-S), emergency car lighting and supervisory panels. Elevator system shall be connected to video surveillance system. *Submit product catalog and shop drawings from the manufacturer's standard details and installation for Architect's approval, before pouring of elevator shaft's shear wall in the construction.* See Architectural and Structural Drawings for layout and details.



DIVISION 21 – FIRE SUPPRESSION

21.1 Fire Suppression Sprinkler System

Shall consist of the following requirements:

- Stop Valve
- Valve Monitor
- Alarm Valve
- Automatic Fire Sprinkler
- Alarm Test Valve
- Motorized Alarm Bell or Gong
- Pressure Switch
- Flow Switch
- Jacking Pump

Refer to Division 21 of the Technical Specification for complete information and requirements. Submit shop drawing and product catalog for Architect's approval.

21.2 Fire Pumps

21.2.1 Electric Fire Pump

- Capacity – 500 gpm
- TDH – 133 feet
- RPM – 3500
- Drive Motor – 55 Kw.

21.2.2 Jockey Pump

- Capacity – 20 gpm
- TDH – 105 feet
- RPM – 3500
- Drive Motor – 3.73 Kw.

Submit shop drawings and product catalog for Architect's approval.

21.3 Storage Tank for Fire Suppression Water

Refer to Plumbing and Fire Protection Drawings for capacity, layouts and details.

DIVISION 22 – PLUMBING

22.1 Domestic Water Piping

22.1.1 Pipes and Fittings for Hot and Cold Waterlines (for Roughing-ins)

Shall be high quality Polypropylene Random Co-polymer Resins or PP-R Type 3 made from 100% premium virgin raw-material with fusion welding technology, environmental friendly and has nominal pressure of PN-20 up to 100C temperature tolerance, conforming to "Thermal Stability" by hydrostatic pressure testing test at 110C for 8760 hours. Jointing shall be by socket fusion. Submit sample for Architect's approval.

22.1.2 Pipes and Fittings for Waterlines from Topping Point to Water Meter to Distribution to Riser and Downfeeds





Shall be galvanized iron (G.I.) pipe, schedule 40, conforming to ASTM A-120-80. Fittings shall be screwed connection for 65mm diameters and below; and flange connection for 75mm diameters and above. Provide corrosion protection, coated with petroleum based paste and wrapped with petrolatum tape.

22.1.3 Gate Valves

Shall be 75 mm. dia. & larger, shall be rising stem, iron body with bronze trim, flanged connection, min. of 150 psig working pressure. 65 mm. dia. & smaller, shall be rising stem, all bronze, female threaded, min. of 150 psig working connection.

22.1.4 Check Valves

For booster pumps, 75 mm. dia. & larger shall be iron body with bronze trim, flanged connection, min. of 150 psig working pressure. 65 mm. dia. & smaller, same except female threaded connection.

22.1.5 Float Valve

Shall be hydraulically operated, diaphragm actuated valve with the pilot control and float mechanism mounted on the cover of the main valve. The float positions the pilot control to close the valves when float contacts the upper stop and to open the valve when the float contacts the lower.

22.1.6 Pressure Reducing & Pressure Sustaining Valve

Shall be double chambered, hydraulically operated pilot controlled, diaphragm type globe valve. The control system shall consist of a reducing control sensitive to diaphragm pressure changes and pressure sustaining control that is sensed to the main valve inlet.

22.1.7 Pressure Relief Valve

Shall be a diaphragm type valve to maintain constants upstream pressure to close limits. The valve shall be hydraulically-operated, pilot controlled modulating type, main body at cover to Cast Iron ASTM-A1 with adjustment ranges, 20 to 200 PSIG.

22.1.8 Water Meter

Shall be standard B-meter complete with fittings and accessories.

22.1.9 Hose Bibbs

Shall be 20mm diameters standard hose connection, male tapered threads, polished chromium plated.

22.2 Domestic Water Pumps and Cistern Tanks

22.2.1 Constant Pressure Booster Pump (Potable)

Shall be 3 units Triplex Type, with capacity per unit of 75 GPM vs 262ft TDH, approx. 10 HP each. Horizontal Centrifugal End-



Suction, close coupled to electric motor on a common base, suitable for pumping domestic water by negative suction with pressure relief valves, factory pre-wired and pipe with section. Electric motor drive shall be 220/380/440V, 3-phase, 60 cycles, open drip proof, 10 HP.

Motor Controls: Microprocessors based variable frequency drive and soft motor starter. Designed for controlling and optimizing the speed and power requirement of one (1) electric motor driven pump. Motor control also consist of pressure transducer, speed potentiometer, overload relays, extra quick trip overload current relay, phase failure relay, ground fault relay (liquid sensor type) and alternators. Enclosure shall be NEMA TEFC, IP54.

Accessories: Vibration insulating hose connections at suction and discharge lines, electrode type water level control or equal to prevent pumps from running dry.

22.2.2 *Hydropneumatic Pressure Tank (Diaphragm Type or Bladder Type)*

Shall be one unit, diaphragm type, vertical mounted Cylindrical Tank with capacity per unit of 119 US gals, operating pressure of Cut-in 95 psi and cut-off 115 psi. Tank Material: Mild steel 3/16" minimum thickness, 100-psi pressure rating per ASME Code for Unfired Pressure Vessels. Bladder shall be FDA approved.

Accessories:

- Pressure gauge for operative pressure of 0 to 100 psi, dial face diameter-100mm.
- Water level gauge, consisting of a sight glass copper tubing with sufficient opening and graduations to indicate the level of water inside pressure tank correct to one (1) mm.
- Pressure relief valve – to release pressure at 95 psi
- Water drain valves
- Pressure switches to be set at cut-in-95 psi; and cut-off-115 psi.

22.2.3 *Constant Pressure Booster Pump (Non-Potable)*

Shall be 3 units Triplex Type, with capacity per unit of 90 GPM vs 250ft TDH, approx. 10 HP each. Horizontal Centrifugal End-Suction, close coupled to electric motor on a common base, suitable for pumping domestic water by negative suction with pressure relief valves, factory pre-wired and pipe with section. Electric motor drive shall be 220/380/440V, 3-phase, 60 cycles, open drip proof, 10 HP.

Motor Controls: Microprocessors based variable frequency drive and soft motor starter. Designed for controlling and optimizing the speed and power requirement of one (1) electric motor driven pump. Motor control also consist of pressure transducer, speed potentiometer, overload relays, extra quick trip overload current relay, phase failure relay,



ground fault relay (liquid sensor type) and alternators. Enclosure shall be NEMA TEFC, IP54.

Accessories: Vibration insulating hose connections at suction and discharge lines, electrode type water level control or equal to prevent pumps from running dry.

22.2.4 **Hydropneumatic Pressure Tank (Diaphragm Type or Bladder Type)**

Shall be one unit, diaphragm type, vertical mounted Cylindrical Tank with capacity per unit of 119 US gals, operating pressure of Cut-in 90 psi and cut-off 110 psi. Tank Material: Mild steel 3/16" minimum thickness, 100-psi pressure rating per ASME Code for Unfired Pressure Vessels. Bladder shall be FDA approved.

Accessories:

- Pressure gauge for operative pressure of 0 to 100 psi, dial face diameter-100mm.
- Water level gauge, consisting of a sight glass copper tubing with sufficient opening and graduations to indicate the level of water inside pressure tank correct to one (1) mm.
- Pressure relief valve – to release pressure at 115 psi
- Water drain valves
- Pressure switches to be set at cut-in-90 psi; and cut-off-110 psi.

22.2.5 **Potable Water Storage Tank**

Refer to Plumbing drawings for capacity and layout.

22.3 **Facility Sanitary Sewerage**

22.3.1 **Sewer/Waste Lines (Lateral Lines)**

Shall be Polyvinyl Chloride (PVC) conforming to ASTM D2729, ISO 4435, Series 1000 with IZOD impact test of 80 joules (minimum) and tensile strength of 55MPa (minimum), 90% K65 resin by mass, pipes shall be made of virgin PVC resin and compound with cell #12454D. Fittings shall conform to ASTM 3311 pipes and fittings and shall be lead free, jointing shall be solvent cement conforming to ASTM D2564. Verify Plumbing Drawings for sizes of pipes and fittings. Submit brochures and samples for Architect's approval.

Provide 25mm nominal thickness x 2000mm length, tube type, black color, Elastomeric Insulation with high flexibility, high resistance to water vapour transmission and noise reduction, complete with adhesive and accessories for pipes along Offices, Multi-Purpose Room, AVR Room.

22.3.2 **Sewer/Waste Lines (Stack and Collector)**

Shall be Polyvinyl Chloride (PVC) conforming to ASTM D2729, ISO 4435, Series 1000 with IZOD impact test of 80 joules (minimum) and tensile strength of 55MPa (minimum), 90% K65 resin by mass, pipes shall be made of virgin PVC resin



and compound with cell #12454D. Fittings shall conform to ASTM 3311 pipes and fittings and shall be lead free. Jointing shall be push-on fit with rubber ring made of TPV or EDPM. Verify Plumbing Drawings for sizes of pipes and fittings. Submit brochures and samples for Architect's approval.

22.3.3 Kitchen Waste Lines

Shall be polyvinyl chloride (PVC) pipes and fittings, series 1000 II. Jointing shall be by solvent cement jointing conforming to ASTM D2564.

22.3.4 Downspouts

Shall be Polyvinyl Chloride (PVC) conforming to ASTM D2729, ISO 4435, Series 1000 with IZOD impact test of 80 joules (minimum) and tensile strength of 55MPa (minimum), 90% K65 resin by mass, pipes shall be made of virgin PVC resin and compound with cell #12454D. Fittings shall conform to ASTM 3311 pipes and fittings and shall be lead free, jointing shall be solvent cement conforming to ASTM D2564. Verify Plumbing Drawings for sizes of pipes and fittings. Submit brochures and samples for Architect's approval.

22.3.5 Storm Drainage Collector

Shall be Polyvinyl Chloride (PVC) conforming to ASTM D2729, ISO 4435, Series 1000 II (high tensile) with IZOD impact test of 80 joules (minimum) and tensile strength of 55MPa (minimum), 90% K65 resin by mass, pipes shall be made of virgin PVC resin and compound with cell #12454D. Fittings shall conform to ASTM 3311 pipes and fittings and shall be lead free, jointing shall be solvent cement conforming to ASTM D2564. Verify Plumbing Drawings for sizes of pipes and fittings. Submit brochures and samples for Architect's approval.

For outside building shall be concrete drain pipe (CPD), tongue and groove, mortar joints, reinforced for 300mm diameters and larger.

22.3.6 FCU/AHU Refrigerant Drain Line

Shall be Polyvinyl Chloride (PVC) for 50mm diameters and above, conforming to ASTM D2729, ISO 4435, Series 1000 II (high tensile) with IZOD impact test of 80 joules (minimum) and tensile strength of 55MPa (minimum), 90% K65 resin by mass, pipes shall be made of virgin PVC resin and compound with cell #12454D. Fittings shall conform to ASTM 3311 pipes and fittings and shall be lead free, jointing shall be solvent cement conforming to ASTM D2564. For 40mm diameters and below use Polyvinyl Chloride (PVC) Blue conforming to PNS 65.

Provide 25mm nominal thickness x 2000mm length, tube type, black color, Elastomeric Insulation with high flexibility, high resistance to water vapour transmission and noise reduction,



complete with adhesive and accessories. Submit brochures and sample for Architect's approval.

22.3.7 Grease Traps

Shall be stainless steel grease traps with 7 GPM (min) to serve pantry sink.

22.3.8 Drains

A. Floor Drains (for toilets and pantry)

Shall be 102mm x 102mm x 57mm, grade 304, polished stainless steel floor drain with lift-up cover and strainer, with high flow rate that increases as water volume increases; has anti clogging effect and anti-odor qualities. Submit product catalog and sample for Architect's approval.

B. Deck Drain

Shall be dome type brass finish with cast iron body for 75mm and 100mm diameters pipe size. Submit brochures and sample for Architect's approval.

C. Roof Drain

Pre-fabricated stainless steel wire basket. Submit brochures and sample for Architect's approval.

D. Ledge Drain

Prefabricated stainless steel floor drain for 50mm diameters pipe size.

22.3.9 Fire Stopping Materials

Shall be of premium high quality materials for stopping smoke and toxic gases; brand manufacturer shall be UL listed.

22.3.10 Drainage Junction Box

Shall be 140 kg/sq. c.m. reinforced concrete with pre-cast reinforced concrete cover.

- a. Thrust Blocks – 140 kg/sq. c.m. plain concrete.
- b. Sewer Junction Boxes – 140 kg/sq. c.m. reinforced concrete with C.I. grating cover.
- c. Area Drain/Catch Basin – 140 kg/sq. c.m. reinforced concrete with C.I. grating cover.
- d. Cistern – 210 kg/sq. c.m. reinforced concrete.

22.4 Sump Pumps

22.4.1 Elevator Sump Pump

Shall be one (2) unit, with pump capacity of 20 GPM vs 30 Ft. TDH, 1 HP, portable submersible non-clog elevator sump pit with electric motor capacity of 220/440 volts, single phase 60 Hz. Submit product catalog for Architect's approval.

22.5 Plumbing Fixtures



22.5.1 WC

Water Closet

Shall be Grade A vitreous china, floor mounted, closed-coupled/one piece elongated front, top push button dual flush (3/4.5 LPF water consumption with siphon jet flush action) type water closet with slow closing seat cover, pre-installed tank fittings and two-bolt caps with concealed syphon legs complete with anti-bacterial technology, fittings angle valve and accessories. Submit brochures for Architect's approval.

22.5.2 UR1

Urinal 1

Shall be Grade A white vitreous china, washout flush action wall hung urinal with flushing rim extending from wall, top inlet, push button type flush valve and widened sides, complete with anti-bacterial technology, fittings and accessories. Submit brochures for Architect's approval.

22.5.3 UR2

Urinal 2 – Compact Type

Shall be Grade A white vitreous china, washout flush action wall hung urinal with flushing rim extending from wall, top inlet, push button type flush valve and widened sides, complete with anti-bacterial technology, fittings and accessories. Submit brochures for Architect's approval.

22.5.4 LAV-1

Under-the-Counter Lavatory

Shall be Grade A white vitreous china, under-the-counter wash basin complete with anti-bacterial technology, chrome plated brass P-trap, angle valve, and pop-up drain, provide provision for liquid soap dispenser. Submit brochure for Architect's approval.

22.5.4 LAV-2

Wall Mounted Lavatory

Shall be Grade A white vitreous china, wall mounted wash basin with half pedestal cover, complete with anti-bacterial technology, chrome plated brass P-trap, angle valve, and pop-up drain. Submit brochure for Architect's approval.

22.5.5 ***Faucets, Supplies and Trims***

A. LF

Lever Type Single Hole Basin Mixer Faucet

Shall be low lead, chrome-plated brass, lever type, single hole basin mixer, with pop-up waste. Submit sample and brochure for Architect's approval.

22.5.6 ***Shower***

A. SH01

Shower Head, Mixer and Spout – Direct Mount Type

Shall be low lead, chrome-plated brass finish, direct mount water shower head, spout and mixer with lime scale protection technology. Submit sample and brochure for Architect's approval.

B. SH02

Shower Head, Hand Shower with Spout (for Safety Shower and eye wash area)



Shall be low lead, chrome-plated brass finish, direct mounted shower head, hand shower and spout with lime scale protection technology. Submit sample and brochure for Architect's approval.

22.5.7 **Toilet Flush Valves**

A. **UFV** ***Push Button Type Urinal Flush Valve***

Shall be low lead, chrome-plated push button type flush valve, submit sample for Architect's approval.

22.5.8 **Other Accessories:**

A. ***P-Trap for Lavatory Fixtures***

Use 32mm x 200mm chrome plated brass with 100mm tail piece. Submit product catalog and sample for Architect's approval.

B. **FD** ***Floor Drain for Toilets***

Shall be 102mm x 102mm x 57mm, grade 304, polished stainless steel floor drain with lift-up cover and strainer, with high flow rate that increases as water volume increases; has anti clogging effect and anti-odor qualities. Submit product catalog and sample for Architect's approval.

C. ***Supply Pipe for Water Closet and Lavatory***

Shall be GA. 24, 12mm diameter chrome plated brass complete with accessories. Submit product catalog and sample for Architect's approval.

D. ***Angle Valve for Water Closet and Lavatory***

Shall be chrome-plated brass complete with accessories. Submit product catalog and sample for Architect's approval.

E. ***Angle Valve for Bidet Hose***

Shall be 12mm x 12mm chrome plated single angle valve with filter without nut. Submit brochures and sample for Architect's approval.

F. ***Tile Grout***

Shall be high quality tile joint filler.

G. ***Tile Adhesive***

Shall be High Performance, heavy duty, waterproof, cement based tile adhesive.

H. ***Slop Sink***

Shall be built-up concrete with 7mm thick x 300mm x 300mm unglazed vitrified ceramic tiles with granite nosing, complete with faucet and stainless steel floor drain. Submit product catalog and sample for Architect's approval.



I. **Hose Bib and Slop Sink Faucet**

Shall be 20mm standard hose connection, male tapered threads, polished chromium plated. Submit product catalog and sample for Architect's approval.

22.5.9 **Pantry Accessories**

A. **PS-1 Pantry Sink**

Shall be 0.7mm thick gauge 22, 464mm x 424mm x 200mm depth, stainless steel type 304, single type bar sink complete with waste kit, clips and other fittings. Submit product catalog and sample for Architect's approval.

B. **PSF Pantry Sink Faucet**

Shall be chrome-plated brass, single-hole lever mixer with swivel spout and mousseur; complete with fittings and accessories. Submit product catalog and sample for Architect's approval.

C. **P-trap for Pantry Sink**

Shall be 32mm x 200mm chrome-plated brass P-Trap with 100mm tail piece. Submit product catalog and sample for Architect's approval.

D. **Angle Valve for Pantry Sink**

Shall be chrome-plated brass. Submit product catalog and sample for Architect's approval.

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

23.1 **Hangers and Support for HVAC Piping and Equipment**

23.1.1 **Hanger Rods and Bolts**

Shall be zinc coated or hot dipped galvanized. All flanges, brackets and bracings for interior installation shall be treated with one coat of zinc chromate primer before installation.

23.1.2 **Sealing Tape**

For threaded connections; use Teflon tape conforming to ASTM D 3308 suitable for temperatures from minus 50 degrees C to 180 degrees C.

23.1.3 **Welding Rod**

Shall comply with AWS A 5.2 or shall be of material and type compatible with pipe material and welding process used in accordance with ANSI B 3.1.

23.2 **Vibration and Seismic Control for HVAC**

23.2.1 **Spring Isolators**

Shall be constructed from suitably treated and finished steel or steel alloys; shall be equipped with 2 layers of neoprene



'acoustic pads' to prevent transmission of high frequencies.

23.2.2 **Neoprene "In-Shear" Isolators**

Shall be bonded to mild steel or steel alloy plates, sleeves, pressings or forging, both element and bonding agent shall be resistant to lubricating oil and water suited to the operating temperature.

23.2.3 **Vibration Isolation Pads**

Shall be made of 40 to 50 durometer neoprene. Where required these shall be adhesively cemented to 1.6mm steel plates of similar area so as to form a sandwich.

23.2.4 **Double Deflection Pad**

Shall be of 40 to 50 durometer neoprene and sized so that deflections do not exceed 15 percent of the pad's thickness.

23.3 **Vibration Isolators**

Shall consist of the following requirements:

- Vibration isolators
- Equipment Bases
- Snubbers

Submit product catalog and shop drawings; Refer to "Section 230548.13 – Vibration Isolators" of the Technical Specification for complete information.

23.4 **Insulation of Mechanical System**

Shall consist of the following requirements:

- Piping Insulation
- Ventilating and ACU Ductwork Insulation
- Equipment
- Accessories

Submit product catalog and shop drawings for Architect's approval, Refer to "Section 230700 – Insulation of Mechanical System" of the Technical Specification for complete information.

23.5 **Hydronic Specialties**

Shall be consists of the following requirements:

- Pressurized Expansion Tank
- Tangential Air Separator
- P.T. Test plugs
- Pressure Test Kit
- Pressure Gauges
- Thermometers
- Thermometers Test Wells
- Relief Valves
- Triple Duty Valves
- Flow Balancing Valve
- Flow Measuring Meter
- Strainers



Submit product catalog and shop drawings for Architect's approval. Refer to Section 232100 – "Hydronic Specialties" of the Technical Specifications for complete information.

23.6 HVAC Ducts and Casing

23.6.1 *Air Conditioning and General Ventilation Ductwork*

Shall be ASTM A653 galvanized steel sheet of lock forming quality; Coating shall be 1.25 ounces per square foot both sides of sheet, in accordance with ASTM A90.

23.6.2 *Kitchen Exhaust Ductwork*

Shall be uncoated Black Steel Sheet: First quality, soft steel sheet capable of welding or double seaming without fracture. Use minimum 18 gauge black steel with all joints welded liquid tight.

23.6.3 *General Service Duct Connectors*

Shall be a flexible duct connector approximately 150mm in width where sheet metal connections are made to AHU or to dissimilar metals. Use woven suitable 'Canvass' cloth 16 ounces thick.

23.7 HVAC Fans

All fans and centrifugal blowers shall be of the type and capacity indicated and constructed in accordance with AMCA Standards. Wheels shall be dynamically and statically balanced and free from vibrations and noise. Fan wheels handling outside air shall have factory applied phenolic coating. Refer to M-1 Schedule for capacity and type of HVAC Fan to be used. Submit product catalog and shop drawings for Architect's approval.

23.8 Diffuser, Register and Grilles

Shall consist of the following requirements:

- Ceiling Supply Register and Grilles
- Wall Jet Diffusers

Submit product catalog and shop drawings for Architect's approval; Refer to "Section 233717 – Diffuser, Register and Grilles" of the Technical Specification for complete information.

23.9 Air Handling Unit

Shall be a draw-through type air-handling unit and operated with low noise level suitable for office application, shall be factory fabricated, tested and of efficient design and construction. AHU shall be consists of the following requirements:

- Casing
- Insulation
- Fan
- Filters
- Mixing Box
- Coils



Submit product catalog and shop drawings for Architect's approval. Refer to Section 237300 – "Air Handling Unit" of the Technical Specifications for complete information. Refer to Mechanical drawings for sizes and capacity.

23.10 Split System Air Conditioners

Shall be designed, constructed, and rating tested in accordance with ARI Standard 210 for air-conditioning equipment of capacities below 135,000 Btu's per hour and ARI Standard 300 for equipment with capacities of 135,000 Btu's per hour and greater. Units shall be ARI certified. Units with capacities below 135,000 Btu's per hour shall be listed in the ARI Directory of Certified Unitary Air-Conditioners.

23.8.1 Air Conditioners – Multi-V System (VRF)

Shall consist of Ceiling mounted type evaporator-blower unit and remote air-cooled condensing unit. The separate assemblies shall be designed to be used together and ratings shall be based on the use of the matched assemblies. Submit data to demonstrate that the units will produce the capacity requirement specified or indicated on the drawings. Shall be consists of the following parts and requirements:

- Evaporator Fan
- Compressors
- Fan Coil Unit Cooling Coils
- Air-cooled Condenser Coil
- Filter Boxes
- Mixing Boxes
- Controls
- Refrigerant Circuits

Submit product catalog and shop drawings for Architect's approval. Refer to Section 238129 – "Split System Air Conditioners" of the Technical Specifications for complete information. Refer to Mechanical drawings for sizes and capacity.

DIVISION 25 – INTEGRATED AUTOMATION – Not Applicable

DIVISION 26 – ELECTRICAL

26.1 Wires and Cables

Shall be 600Volts minimum insulation rating. Refer to Electrical drawings for loads schedule and Technical Specification "Section 260519 – 600Volts Wires and Cables" for further information.

26.2 Grounding and Bonding

Shall be brazed molded exothermic welded, bolted clamp terminal, or pressure connector type.

26.3 Conduits and Boxes



Metallic conduit shall be rigid conduit, heavy wall, hot dipped galvanized inside and out, threaded ends. Non-metallic conduit shall be schedule 40 polyvinyl chloride suitable for 90°C; with solvent cemented type fittings.

26.4 Medium-Voltage Circuit Protection Device

26.4.1 *Medium-Voltage Lightning Arrester*

Shall be Early Stream Emission (E.S.E) type lightning arrester with coaxial shielded down conductor and strike counter panel. Apply exothermic welding process for copper clad ground rods connection.

26.5 Switchboard and Panel Boards

26.5.1 *Panel Boards and Circuit Breaker*

Shall be bolt-on type moulded case circuit breaker. Enclosure shall be corrosion resistant galvanized (zinc finished) sheet steel. Fronts shall be cold rolled steel, preferably epoxy coated with ANSI 61 grey powder coat. Panel locks shall be keyed alike. Recessed flush mounted panels shall have overlapping front.

Panel boards to be installed indoor should be NEMA 2 (IP-31) while outdoor type panel boards shall be NEMA 3R (IP-65). Doors for branch shall be in one piece bolt on front with a lockable hinged door over the overcurrent protection devices. Branch for panel boards refer to Electrical drawings for capacity. Submit product catalog for Architect's approval.

26.6 Low-Voltage Distribution Equipment

26.7.1 *Electricity Metering*

Revenue metering shall be primary connected with CT/PT 15 KV. Provide secured and separate housing for primary meter.

26.6.2 *Wiring Devices*

A. *Convenience Outlets*

Shall be 16A rated, universal grounding type, wide series with metallic black or metallic gray finish plate cover conforming to IEC/PNS standards. Mounting heights shall be 300mm from the center of device to floor finished level for wall outlets. Install duplex convenience outlets in horizontal position, adjacent to voice/data ports.

Floor mounted convenience outlets shall be waterproof, pop-up type, flush mounted, duplex grounding type.

Submit product catalog and sample for Architect's approval. Refer to Electrical Drawings and ECE Drawings for Layouts. See Technical Specification Section 262726: Wiring Devices for standard requirements

B. *Switches*



Shall be wide series with metallic black or metallic gray finish plate cover conforming to IEC/PNS standards for 1 gang, 2 gang and 3 gang switches, submit product catalog and sample for Architect's approval.

Mounting height shall be 1375mm from center of device to floor finish level.

Refer to Electrical Drawings and ECE Drawings for Layouts. See Technical Specification Section 262726: Wiring Devices for standard requirements.

26.7 Lighting

Note: All lamps and lighting fixtures shall be CE, RoHs and U.L. approved brand. Submit certifications for Architect's approval. See Technical Specification - Section 265000 Luminaires and Accessories for further specifications.

26.8.1 IL-1

Troffer Lighting 1

Shall be 2x18watts T-8 cool white LED tube, with 603mm x 1213mm x 67mm height, mirrorized aluminum reflector and multi-lined satin finish aluminum louvers in powder-coated paint finish, zinc-phosphate steel sheet housing, recessed mounted. Submit brochures and sample for Architect's approval.

26.8.2 IL-2

Troffer Lighting 2

Shall be 2x18watts T-8 cool white LED tube, with 302mm x 1218mm x 75mm height, mirrorized aluminum reflector and multi-lined satin finish aluminum louvers in powder-coated paint finish, zinc-phosphate steel sheet housing, surface mounted. Submit brochures and sample for Architect's approval.

26.8.3 IL-3

Troffer Lighting 3

Shall be 1x18watts T-8 cool white LED tube, with 177mm x 1218mm x 75mm height, mirrorized aluminum reflector and multi-lined satin finish aluminum louvers in powder-coated paint finish, zinc-phosphate steel sheet housing, surface mounted. Submit brochures and sample for Architect's approval.

26.8.4 IL-4

Troffer Lighting 4 – Suspended

Shall be 2 x 18 watts T-8 cool white LED tube, with 250mm x 1226mm x 62mm height, mirror finish anodized aluminum reflector , zinc phosphate steel sheet housing, suspended mounted louver luminaire with beveled profile. Submit brochures and sample for Architect's approval.

26.8.5 IL-5

Troffer Lighting 5 – with Prismatic Diffuser

Shall be 2 x 18 watts, cool white or day light, T8 LED tube with 304mm x 1222mm x 100mm height, made from zinc phosphate steel sheet housing in powder coated paint finish



with prismatic diffuser and gasket for cleanroom application, surface mounted; Submit product catalog and sample for Architect's approval.

26.8.6 IL-6

Open Type T8 LED: Surface Mounted LEDtube Lamp

Shall be 1x18watts T-8 cool white LED tube, with 53mm x 1220mm x 40mm height, zinc-phosphate steel sheet housing in powder-coated paint finish, surface mounted. Submit brochures and sample for Architect's approval.

26.8.7 IL-7

Center Light

Shall be 1-24 watts LED, in 300mm diameters x 39mm aluminum plus PC with white powder-coated housing with cover, surface mounted. Submit sample for Architect's approval.

26.8.8 IL-8

Downlight 1 - Round

Shall be 20x 0.5 watts LED, cool white in 130mm diameters cut out, 140mm x 140mm x 80mm height recessed mounted LED downlight (with cover) made from aluminum and synthetic material in flat ring white color finish. Submit brochures and sample for Architect's approval.

26.8.9 IL-9

Downlight 2 – Round

Shall be 1 x 12.5 watts cool daylight, LED Bulb, in in 180mm diameters x 220mm height, recessed mounted downlight (without glass cover) with diamond design reflector and white ceiling rim with socket. Submit brochures and sample for Architect's approval.

26.8.10IL-10

Downlight 3 – Round

Shall be 1x12.5 watts cool daylight, LED Bulb, in 167mm diameter x 194mm height, surface mounted downlight (without glass cover) with dotted reflector and white casing with E27 socket. Submit brochures and sample for architect's approval.

26.8.11 IL-11

Downlight 4 – Round

Shall be 19 watts LED light, warm white in 111mm diameters x 160mm surface mounted, made from die cast aluminum with central housing made from extruded aluminum complete with safety glass, silicon gasket with external screws made of stainless steel. Submit product catalog and sample for Architect's approval.

26.8.12IL-12

Downlight 5 - Round

Shall be 10 watts LED with beam angle of 90°, with color temp of 3000K, in 108mm diameters x 108mm height, recessed mounted made from die cast aluminum with sophisticated diffuser and minimal glare without noticeable hot spot. Submit product catalog and sample for Architect's approval.

26.8.13 IL-13

Downlight 6 – Auditorium



Shall be 25 watts LED with beam angle of 90°, with color temp of 3000K, in 211mm diameters x 211mm x 97mm height, recessed mounted made from die cast aluminum with sophisticated diffuser and minimal glare without noticeable hot spot. Submit product catalog and sample for Architect's approval.

26.8.14 IL-14

Downlight 7 - Auditorium

Shall be 37 watts LED light with beam angle of 45°, in 219mm diameters x 112mm height, recessed mounted, made from die cast aluminum deep recessed with better glare free performance. Submit product catalog and sample for Architect's approval.

26.8.15 IL-15

Downlight 8- Auditorium

Shall be 54 watts LED lights, with beam angle of 45°, in 219mm diameters x 156mm height, recessed mounted, made from die cast aluminum deep recessed with better glare free performance. Submit product catalog and sample for Architect's approval.

26.8.16 IL-16

Suspended Track Light

Shall be 40 watts LED lights, with beam angle of 48°, in 100mm diameters x 254mm height, suspended surface mounted track lights, made from light head and control gear housing made from die cast aluminum complete with accessories. Submit catalog and sample for Architect's approval.

26.8.17 IL-17

Smart Bluetooth Adjustable Recessed Spotlight

Shall be 47 (60)watts LED lights, with beam angle of 10- 30°, in 3000K color temperature, warm white, 2720-3-80 lumens, with adjustable beam angles, recessed mounted. Submit product catalog and sample for Architect's approval.

26.8.18 IL-18

Stage Light

Shall be 110 watts LED lights, with beam angle of 35° or 60° in projection angle, recessed mounted made from die cast aluminum in chrome or black finish. Submit catalog and sample for Architect's approval.

26.8.19 IL-19

LED Strips 1

Shall be 9.6 watts/meters, warm white LED strips light, with beam angle of 110° and 941/m lumens, in 12mm x 5.5mm height, surface mounted for cove lighting. Provide 6mm thick acrylic cover in white opaque finish for cove lighting. Submit product catalog and sample for Architect's approval.

26.8.20 IL-20

Emergency Light

Shall be 3 watts LED 44 x 0.7watts (22 LEDS/lamp head), wall mounted emergency light made from ABS plastics with 5 hours operating time and 48 hours charging time. Submit brochures and sample for Architect's approval.



26.8.21 IL-21

Exit light

Shall be 2 Watts, double-sided, ceiling-mounted LED lamps in electro galvanized steel with epoxy powder-coated fitting construction and fire-retardant moulded acrylic diffuser. Provide ISO green legend as required in accordance to standards.

26.8.22 EL-22

Wall Mounted Lamp (Exterior)

Shall be 20 watts, LED-PAR 30 warm white, wall mounted luminaire made from die-cast aluminum body in powder-coated finish with clear toughened glass control gear and remote transformer gasket silicon rubber mounting surface. Submit brochures and samples for Architect's approval.

26.8.23 EL-23

Highbay Lights

Shall be 40/50 watts cool white, LED LIGHTS by "Samsung" or approved equal, in 495mm diameter x 400mm height, high bay luminaires in aluminum reflector and housing. Submit brochures and sample for Architect's approval.

Lighting @ Observatory Room and Ante Room

26.8.23 IL-24

LED Strip Light 3 (for Cove Lighting @ Ante Room)

Shall be 10 watts, blue and warm white LED strip lights with 18 to 20 lm, in 10mm; 15.8mm x 7mm cross section, one roll = 100m, 60 lights per 1 meter, complete with accessories, surface mounted for cove lighting. Submit brochure and sample for Architects approval.

26.8.23 IL-25

Circular Wall Lamp (for Observatory room)

Shall be 8 watts, red color, LED bulb in 300mm diameters wall mounted circular lamp made of polycarbonate base, ring and diffuser with high silicone seal for IP 65. Submit brochures and sample for Architect's approval.

DIVISION 27 – COMMUNICATIONS

27.1 Structured Cabling

27.1.1 *Structured Cabling Conduits and Pipes*

Wiring connections shall be provided with roughing-ins. PVC Conduits shall be Schedule 40, complete with fittings and accessories for site conduits. Use Intermediate Metal Conduit (IMC) for building conduits. Complete with all necessary accessories and local materials needed for the system connections.

27.1.2 *Horizontal Cabling System*

- ***Horizontal Cabling***

Shall be Category 6 rated, 4-pair Unshielded balanced Twisted Pair (UTP).

- ***Universal Information Outlets***



Shall be Category 6 Compliant, with electrical specification of ANSI/TIA/EIA-568-B and ISO/IEC 11801, UL listed; Faceplate shall be made by an ISO 9001 and 14001 Certified Manufacturer.

27.1.3 Administration Subsystem

- Shall be Copper Termination Block (Voice Riser and Cross-connection) and Fiber Optics Termination Block (Data Riser & Cross Connection)
- Termination block shall support the appropriate Category applications and facilitate cross-connection and inert-connection using either cross-connection wire or patch cords.
- Terminal Block shall be 110-type or equivalent
- Category 6 Modular Panel
- Rack-Mounted, High Density Fiber Interconnect Center
- Rack-Mounted, Low Profile Fiber Connect Panel
- Voice Cross Connect (jumper) Wire
- Voice Riser Interconnect Patch Plugs/Riser
- Fiber Patch Cords
- Modular Equipment Cord: Category 6 compliant
- Wall Mounted Racks

27.1.4 Entrance Facility

- Copper Connecting Hardware and Jumper/Patch Cords/Wires

27.1.5 Cabling Containment System

Shall be in a raceway system as indicated in the drawings, Raceways used for the structured cabling installation shall comply with Electronics General Provisions.

Note: For complete specification refer to Section 271000 "Structured Cabling System" of the Technical Specification. Submit product catalog, shop drawings and materials sample for Architect's approval.

27.2 Voice Communications

27.2.1 Telephone Conduits and Pipes

Wiring connections shall be provided with roughing-ins. PVC Conduits shall be Schedule 40, complete with fittings and accessories. Use Intermediate Metal Conduit (IMC) for building conduits. Complete with all necessary accessories and local materials needed for the system connections.

27.2.2 Telephone Wires and Cables

Shall be Category 6 (CAT-6) + 10G Compliance with fire rating compliance to UL 1581 FT2 (horizontal flame test), IEC 60332-1, UL444CM and in accordance to standards of EIA/TIA 568-B.2, IEC 61156-5, ISOP/IEC 11801 and EN50173.

27.2.3 Telephone Outlets

Shall be 16A rated, universal grounding type, wide series with metallic black or metallic gray finish plate cover conforming to IEC/PNS standards. Mounting heights shall be 300mm from the center of device to floor finished level for wall outlets.



Install duplex convenience outlets in horizontal position, adjacent to voice/data ports.

27.3 CATV System

27.3.1 CATV Conduits and Pipes

Wiring connections shall be provided with roughing-ins. PVC Conduits shall be Schedule 40, complete with fittings and accessories. Use Intermediate Metal Conduit (IMC) for building conduits. Complete with all necessary accessories and local materials needed for the system connections.

27.3.2 CATV Wires and Cables

Shall be co-axial RG-6 cable

27.3.3 CATV Outlets

Shall be 16A rated, universal grounding type, wide series with metallic black or metallic gray finish plate cover conforming to IEC/PNS standards. Mounting heights shall be 300mm from the center of device to floor finished level for wall outlets. Install duplex convenience outlets in horizontal position, adjacent to voice/data ports.

27.3.4 Cable Trays for Structured Cabling System/Telephone/CATV

Shall be 100mm x 200mm x 3,000mm cable tray with coupling, 100mm x 200mm x 3,000mm cable tray with connector 90deg., 100mm x 200mm x 3,000mm cable tray with T-connector and 100mm x 300mm x 3,000mm cable ladder. Submit sample for Architect's approval.

27.4 Community Antenna Television System

Shall be plug-in, modular, heavy-duty, industrial or commercial units. Protect signal cables and connected components against transient-voltage surges by suppressor and absorbers designed for that purpose. Refer to Section 274133 – Community Antenna Television System" of the Technical Specification for complete requirements.

27.5 Public Address and Background Music

27.5.1 PA/BGM System Conduits and Pipes

Wiring connections shall be provided with roughing-ins. PVC Conduits shall be Schedule 40, complete with fittings and accessories for site conduits. Use Intermediate Metal Conduit (IMC) for building conduits. Complete with all necessary accessories and local materials needed for the system connections.

27.5.2 Wiring Device

Shall be in accordance with National Codes (e.g. NEC Article 760) and as recommended by the manufacturer of the system. All wires and cables shall comply with the requirements of the Underwriters Laboratories, the ASTM and ICEA or local agencies responsible. The size of conductor shall not be less 1.25 mm² as indicated on the plans.



27.5.3 **Background Music and Public Address System Components:**

Shall be a certified compliant to IEC 60849 and compliant to other relevant local standards. Its system configuration shall be a network controller which control and monitor all activities in the system that includes the following components:

- Radio Tuner
- DVD/CD Player
- Audio Matrix
- Power Amplifiers
- Call Station Basic
- Call Station Keypad
- Call Station Kit
- Call Station Key Pad Kit
- Line Supervision Set
- Terminal Blocks
- Power supply
- Equipment Rack
- Ceiling mounted Loud Speakers
- Wall Mounted Box Speakers
- Volume Control
- Wiring

For complete specification refer to "Section 275000 Background Music and Public Address System" of the Technical Specification. Submit product catalog, shop drawings and materials sample for Architect's approval.

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28.1 **Closed Circuit Television (IP CCTV)**

Shall be consists of the following components but not limited to the following:

- Standard Cameras
- Reinforced Dome Cameras
- Lenses
- Camera-Supporting Equipment
- Monitors
- Digital Video Recorder
- Digital Matrix Switches
- Network Video Recorder
- Network Switches
- Control Stations
- Signal Transmission Components

Submit product catalog and shop drawings for Architect's approval. Refer to Technical Specifications "Section – 282300 – Closed Circuit Television (IP and Analog HD)" for further requirements and specifications.

28.2 **Fire Detection and Alarm**



28.2.1 **System Components**

All fire detection and alarm equipment, instruments and devices used shall be of the same manufacturer insofar as possible for the entire project. Fire alarm equipment shall be addressable, collective type, UL listed and/or FM approved. Refer to Section 283100 "Fire Detection and Alarm System" of the Technical Specification for complete requirements and design criteria.

Fire Detection and Alarm System shall be ready and has connection for a computer-based system – Building Management System.

28.2.2 **Line Supervision**

All system equipment and wiring shall be supervised. Style 7 wiring shall be arranged so that the system shall not be affected by a single open, short, or ground condition. Report trouble condition and automatically switch over to alternate wiring path.

28.2.3 **Standby Batteries**

Shall be a sufficient battery (NiCd) capacity to operate the entire system upon loss of power under maximum normal load for a minimum period of 24 hours with a minimum of 5 minutes of alarm operation at the end of this period; system shall automatically transfer to the standby batteries upon power failure. Battery charging and recharging shall be automatic.

28.2.4 **Fire Alarm Control Panel (FACP)**

Shall be solid state, microprocessor based, modular design, fully supervised Fire Alarm Control Panel with steel enclosure in standard finish, hinged and locking door, complete with integral power supply, standby batteries, and battery charger.

Provide power on LED, power failure LED, system trouble LED, system reset switch, alarm silence switch, trouble silence switch, manual evacuation switch, alarm acknowledge switch, trouble acknowledge switch, supervisory service acknowledge switch, lamp test button, tone alert, battery supervision LED, auxiliary relays, and other system indicators and controls necessary for processing alarm and signaling functions. Indicating lamps shall be LED type.

Provide appropriate permanent identification labeling of control and indicating functions. Submit product catalog and shop drawings for Submit brochures and sample for Owner's approval upon the recommendation of the Architect.

28.2.5 **Fire Alarm Initiating Device**

Shall be Intelligent Addressable Type

A. Manual Pull Station



Shall be UL listed and FM approved manual pull station constructed of Die Cast Metal or Lexan with clearly visible operating instruction, station shall be suitable for surface mounting on matching back box. Pulling the alarm handle shall activate the toggle switch which shall cause the station n alarm position. Push button type manual station shall not be acceptable. Submit product catalog and material sample for Submit brochures and sample for Owner's approval upon the recommendation of the Architect.

B. Photoelectric Smoke Detectors (Addressable)

Shall be UL listed FM approved smoke detector with LED light source, silicon photodiode receiving element. Line filter and time delay circuitry to prevent transient false alarms. 360o smoke entry, locking tamper screw, pulsating on power LED indicator, UL 268 compliant, complete with adjustable obscuration/smoke detection levels and provides maintenance identification alarm. Submit product catalog and material sample for Owner's approval upon the recommendation of the Architect.

C. Photoelectric Smoke Detectors (Conventional)

Shall be UL listed, FM, EN approved smoke detector with LED light source, silicon photodiode receiving element. Shall be able to send detection signal to the zone input module where this will give the zone address to FACP. 360° smoke entry, locking tamper screw, pulsating on power LED indicator, UL 268. submit product catalog and sample for Architect's approval.

D. Heat Detector

Shall be UL listed and FM approved heat detector, 135° combination fixed temperature and rate of rise heat detector Locking tamper screw, UL 521 compliant that provides maintenance identification alar has two LED function/working indication. Submit product catalog and materials sample for Owner's approval upon the recommendation of the Architect.

D. Detector Base

Shall fit into a common standard type base with built-in option allowing mechanical locking of the detector head to prevent unauthorized removal or tampering. Shall be equipped with screw-lwss terminals capable of securely retaining wires upto 1.5 sqm.

E. Device Monitoring Module

Shall permit the use of conventional detecting devices including sprinkler flow switches and supervisory switches on the addressable system.

F. Control Module

Shall interface a controlled device to addressable system.

G. Aspirating Smoke Detector (Air Sampling Detector)



Shall be a dual source optical smoke detector with advanced algorithms to detect a wide range of fires, shall be connected to the SLC loop to communicate five levels for display and use in control-by-event system programming. Shall be UL and FM approved system.

28.2.6 Fire Alarm Notification Appliance

Shall consist of the following:

- Speaker Strobes
- Annunciator Panel Back Lit Graphic Type

28.2.7 Fire Fighter's Telephone System (FTS)

Shall be solid state, microprocessor based, modular design, fully supervised with steel enclosure in standard finish, with hinged, locking door complete with integral power supply, standby batteries, and battery charger. Wall mount in FCC Room. Submit product catalog and materials sample for Owner's approval upon the recommendation of the Architect.

28.2.8 Emergency Voice Evacuation Panel (EVAC)

Shall be a fully automatic combination voice communication and fire fighters intercom system which provides automatic and alarm signaling per the NFPA 72. One or two-way communications system for relocation/evacuation of building personnel and assisting fire-fighting efforts in controlling smoke and fire. "ALL-CALL" tone and Voice Signaling; Selective Tone and Voice Signaling with Redundant tone generators; Module removal supervision Service Diagnostic Center; "ALARM/RESOUND/RESTORE" Feature; Local annunciation with Time-out of selective alarm signal to general alarm "ALL-CALL" Fully integratable with any Public Address system. Submit product catalog and materials sample for Owner's approval upon the recommendation of the Architect.

Note: For Cables, Short Circuit Isolator, Operator Workstation, Battery and Charger, Printer and System Software, and Special Detection System and Devices refer to technical specifications. For complete specification refer to "Section – 283100 – Fire Detection and Alarms System". System requirements shall be UL and FM approved. Submit product catalog and shop drawings for Architect's approval.

DIVISION 31 – EARTHWORK

31.1 Site Clearing and Grubbing

31.1.1 Gravel Bedding

Shall be 20mm ($\frac{3}{4}$ ") crushed gravel, consisting of hard, durable particles of natural gravel free of vegetable matter and of such nature to form a firm, stable base.

31.1.2 Backfilling



Shall be satisfactory material, free from roots, adobe and other organic matter, trash, debris and stones larger than 75 cm in any direction.

31.1.3 ***Degree of Compaction***

Shall be expressed as a percentage of the maximum density obtained by test procedure of ASTM D1557.

31.1.4 ***Removal/Disposal***

Moving out, including cleaning of construction debris, removal of temporary construction facilities and hauling of construction related garbage out of work area should be included.

31.1.5 ***Drainage Piping***

Unless specified in the approved drawings, drainage piping shall be non-reinforced concrete with tongue and groove and of standard strength. Pipes larger than 270 mm shall be reinforced.

31.1.6 ***Culvert Piping***

Shall be reinforced concrete tongue and groove and shall be of standard strength conforming to ASTM C76, Class II.

31.1.7 ***Foundation***

Shall rest on compacted granular fill materials conforming to the requirements of the DPWH Standards Specifications, 2004 or as per details indicated on the plans and specifications.

31.2 **Termite Control**

31.2.1 ***Soil Poisoning***

Shall be soil-applied, environmental friendly pyrethroid termiticide that contains 250 grams "Alphacypermethrin" (active ingredient) in a water-based (suspension concentrate formulation). Termiticide shall be a green label brand which belongs to the least toxic category among pesticides and odorless formulation. Follow manufacturer's recommendation and standard procedures.

DIVISION 32 – EXTERIOR IMPROVEMENTS

32.1 **Curbs, Gutter, Sidewalks and Driveways**

32.1.1 ***Sidewalks, Curbs and Gutter***

Shall be class A concrete pavement with plain cement smooth trowel finish. Provide 6mm x 6mm expansion grooves. Refer to drawings for layout and details. Verify drawings for grooves distances.

DIVISION 33 - UTILITIES

33.1 **Utility Septic Tanks**

33.1.1 ***Septic Tank – Anaerobic Baffle Reactor***



Treatment system shall be Anaerobic Baffled Reactor, complete with necessary equipment and materials. *Submit product catalog and shop drawings from the manufacturer's standard details and installation for Architect's approval before proceeding to purchasing and installation.* See Architectural and Engineering Drawings for layout and details.

33.2 Sanitary Utility Sewerage Structures

33.2.1 *Utility Area Drain and Catch Basin*

Shall be 400mm x 400mm x 700mm depth reinforced concrete area drain/catch basin with mild steel grating cover.

33.2.2 *Utility Trench Drain*

Shall be 150mm to 300mm width x 300mm depth reinforced concrete utility trench drain with machine made/forged welded heavy duty trench gratings, complete with built-up frames of hot-dip galvanized steel with 7.136 tons per wheel loading capacity. Submit shop drawings and sample material for Architect's approval.

33.3 SITE GROUNDING

33.3.1 *Grounding*

Shall be bare SDBCW copper, sized in accordance with Philippine Electrical Code (PEC). Provide isolate ground conductors in all raceways, metal wireways, IMC conduit for lighting and power systems. Connections between grounding wires, copper clad ground rods and building structures etc. shall be by exothermic welding process.

-NOTHING FOLLOWS-