



UNIVERSITY OF RIZAL SYSTEM
Province of Rizal

SPECIFICATION
for
INFRASTRUCTURE
PROJECT

Reference: RPEO Special Project

SITE CLEARING

I - SCOPE

Furnish equipment and perform labor requirement to complete the Division SITE WORKS to include: Clearing and grubbing of debris and brushes and disposal of the resulting trash, waste and construction debris. See drawings for area coverage of work.

II - PRODUCTS

1. MATERIALS AND EQUIPMENT

Materials and equipment required for the proper execution of the work of this section shall be selected by the Contractor subject to the approval of the Project Manager.

2. SITE INVESTIGATION

Visit the site of the work and examine the existing premises to fully understand all existing conditions relative to work.

3. PERMITS

Secure government building permits needed for the work, before start of work.

4. PROTECTION

Protect the existing land development, adjacent fence, properties, persons, trees, structures and utilities therein against harm or damage.

III - EXECUTION

1. DEMOLITION, CLEARING AND GRUBBING

Cut down shrubs in a manner to avoid damage to the site parking curbs and structure to be preserved, to avoid unnecessary disturbance of the ground surface or destruction of existing pavements. Prevent injury to existing structures and minimize danger to parked vehicles.

2. REPAIRS

Repair damages done to existing parking lots and structures on the premises by reason of the required work in this Section Demolition, Clearing and Grubbing.

3. RESPONSIBILITIES

Since the Works to be performed is under Contract, the Contractor assumes responsibility and shall hold the implementing agency the Project Manager, the signing Architect and Engineer free and harmless from any and all claims arising out of, or in connection with, any injury or damage sustained by any person or property in connection with the performance of the construction work under this Technical Specifications.

4. DISPOSAL OF MATERIALS

All cleared materials shall be disposed to off-site dumps by the Contractor in a manner approved by the project Manager.

END OF SECTION

EARTHWORKS

I - SCOPE

Furnish materials, equipment and perform labor required to complete the Excavation, Trenching, Backfilling, Compaction and Dewatering. See excavation drawings for location and extent of work required. Excavate, trench and backfill work for the following: new footing foundations; and to the points of connection to the existing utility lines outside of the existing structure or to terminal points as indicated or existing.

1. VERIFICATION OF EXISTING CONDITIONS

Verify and examine the site of work to familiarize with the character of materials to be encountered and all other existing conditions affecting the work.

2. PROTECTION

Provide adequate measures to protect materials, men and adjoining property. Provide perimeter fence, sheeting and bracing to prevent caving, erosion of sides of excavations.

Bracing and cribbing shall be provided when required to maintain earth in position. Should there be any earth movement the Superintendent should immediately inform the Project Manager and/or a representative from implementing agency for proper instructions.

Embankment, trenches and excavations shall be kept shaped and drained during construction. Site ditches and drains shall be maintained in such manner as to drain effectively at all times. Storage and stockpiling of materials on the ground will not be permitted. Graded areas shall be protected against the elements prior to acceptance of the work. Settlement that may have occurred shall be repaired and grades shall be re-established to required elevations and slopes immediately set prior to installation of final work

Protect all existing vehicular driveways, pavement, sewer and utilities from damage. Divert surface water excavations by means of temporary ditches. Keep all excavations free of water at all times. Pumping equipment shall be used kept at the site at all times. Safeguard, protect from damage, support if necessary all existing water service lines, utilities – structure that are to remain in service during construction. When such utility lines are encountered within excavated areas, notify the Project Manager and/or the implementing agency representative in time, for directions to prevent interruption of water service.

II - PRODUCTS

1. FILLING MATERIALS

Coarse-grained fill materials, such as gravel shall be from off-site source, passing a 75mm (3in) sieve. Only coarse-grained fill material shall be used in the excavated building foundations and driveway ramps. Fine-grained fill materials, such as silt, clay, clayey silt shall be from approved off-site source passing a 0.425mm (No. 40) sieve. Only fine-grained soil fill material shall be used outside the limits of the building for landscape purposes. Granular fill to form a capillary water barrier shall be clean crushed non-porous rock; crushed or un-crushed gravel, uniformly graded and of a size, which will pass a 1-inch mesh screen.

All materials including excavated materials approved for use as backfill shall be inorganic, free from large voids of earth or of stones larger than 3 inches, without rubbish and organic matters like roots, leaves and grasses.

2. BATTERBOARDS

Use second-class pest free lumber assembled and rendered source for proper delineation of building lines and grades. Use #16 GI tie wires for lay-outing.

3. UTILIZATION AND STORAGE OF EXCAVATED MATERIAL

Use only suitable material removed from the excavation, insofar as practicable in the formation of backfills. Separate all materials that are suitable for use as backfills. The suitability of excavated material for fill under slabs and paving shall be submitted to the Project Manager for final approval. No excavated materials shall be wasted without authorization of the Project Manager, nor deposit any excavated material at anytime in a manner that may endanger a partly finished structure by direct pressure, or in any way detrimental to the completed work.

III - EXECUTION

1. STRIPPING

Strip topsoil in driveway areas required as shown in the plans. Remove top soil to depths indicated or as required by the Project Manager but in no case less than 150mm in depth, prior to start of regular excavation or backfilling work.

Stockpile the topsoil, which is for subsequent use. Separate topsoil from other excavated materials in locations designed by the Project Manager. Spread and compact topsoil with rollers in specific areas, as directed by the Project Manager.

2. STAKES AND BATTERBOARD

Stake out building accurately. Establish grades using boards & reference marks, erected at locations where they will not be disturbed during construction. Construct two permanent benchmarks of previously known elevations near the site of construction.

3. EXCAVATION – GENERAL

Excavate to the dimensions and elevations indicated on the structural plans and drawings. Carry excavation to the depths directed by the Project Manager and/or the Engineer, if unsuitable bearing will be encountered at the indicated elevations in plans.

Precautions shall be taken such that excavation does not extend below the exact lines of bottoms of footings and other soil bearing foundations. Otherwise, backfill to the proper level for bearing with concrete specified for column footings.

Bottoms of excavations shall be level, free from loose material and brought to required levels in undisturbed earth or in compacted fill. Excavate with proper allowance made for board piles, form erection, shoring, drain and provide adequate space for inspection of foundations.

4. EXCAVATION FOR FOOTINGS

All sub-grades of footings shall be approved by the Project Manager and/or Engineer before proceeding with the construction of footing pads.

Unauthorized Excavation: In case suitable bearing soil is encountered at the sub-grade elevation shown in the drawings and the excavation has been made to greater depth, concrete fill shall be installed.

Authorized Additional Excavation: Excavate columns and footings as shown in plans and as directed by the Project Manager. In case unsuitable bearing is encountered at the sub-grade elevations, the Engineer may re-design the footing to correct any sub-grade and foundation footing deficiencies.

5. DEWATERING

Control grading around building so that ground is pitched to prevent water from running into excavated areas of building and to the lower portion of the existing building damaging properties and other structures/

Remove water by using pumping equipment or any other approved method out of excavated areas throughout the construction. Water shall not be spilled over to the adjacent driveway but shall be discharged at a safe distance from the excavation site.

6. BACKFILLING – GENERAL

Prior to backfilling around the new structures, remove all forms, trash, debris and other unsatisfactory material. Use only approved backfill material and place symmetrically on all sides in layers, compacted in accordance with this Section.

Provide area for excavated fill materials free from organic materials and rock boulders. Place fill material in successive horizontal layers of loose material not more than 12 inches in depth. Each layer shall be spread uniformly on prepared surface and plowed or otherwise broken up, moistened or aerated as necessary to bring moisture content to optimum density thoroughly mixed and compacted as required. Backfill around new laid structures only after concrete footings have attained sufficient strength to resist lateral pressure resulting only after concrete footings have attained sufficient strength to resist lateral pressure resulting from the backfill.

7. APPURTENANCES

All forms of trash and debris shall be removed prior to backfill. Approved backfill materials shall be placed symmetrically on all sides loose layers. Each layer shall be moistened, if necessary and compacted with mechanical or hand tampers, care being taken so as not to injure the existing structures by excessive tamping.

8. COMPACTION

All disturbed materials shall be compacted with vibratory rollers or other approved equipment well suited to the particular soil being compacted. Fill materials shall be moistened or aerated as necessary to obtain the desire compaction with the utilized equipment. Each layer shall be compacted to not less than the soil density below engineering standards.

9. DISPOSAL of EXCAVATED MATERIAL

Surplus material, debris and rubbish resulting from all earthwork operations not required or unsuitable for fill or backfill shall be disposed off-site properly.

END OF SECTION

FORMWORKS

I - SCOPE

Furnish materials, equipment and perform labor required to complete this Section on Concrete Formworks. All work shall be done in accordance with the minimum formworks requirements for REINFORCED CONCRETE.

II - SUBMITTALS

Formwork layout and design shall be submitted for approval before fabrication and erection. All form materials are subject to approval before installation.

III - PROTECTION

Provide adequately braced forms that will produce correctly aligned concrete, able to meet the specific weights and side pressure of newly placed concrete. Choose form fittings that are adequate to the purpose. Exercise care in the choice forms & form fittings that will be in contact with concrete.

IV - MATERIALS

Use of plywood, metal or surfaced lumber forms where it will best give the most advantage in the specific concrete work involved.

For beams, use not less than ½ inch thk form plywood veneer for concrete.

For floating slab, use ½ inch thk form plywood veneer as underneath support.

For columns, use ½ inch thk form plywood veneer.

Good lumber can be used for bracings for formworks. Metal frames are preferred.

V - EXECUTION

1. PREPARATION

Check all forms to conform to the shape, lines and dimensions of the structural members as called for in the plans. The forms shall be substantial and designed to resist the pressure and weight of the concrete. Forms shall be properly tied, braced or shored so as to maintain position and shape. They shall be sufficiently tight to prevent leakage of mortar. Check all formwork for plumbness and correct alignment.

Coat forms with approved form oil before reinforcement is placed. Remove surplus oil on form surfaces. Use 1 or 2 coats of Pre-form Sealer on the approved forms to be used for exposed finishes whether exterior or interior. Used engine oil is not to be used as form oils.

2. REMOVAL of FORMS

Remove forms in such manner and at such time as to insure the complete safety of the structure. In no case shall the supporting forms and shoring be removed until the members have attained sufficient strength to support safely their own weight and load thereon. Exercise due care while stripping formworks. Protect corners against chipping.

Forms shall remain in place for a minimum time of:

Parts of Structure	Classification of Structural Parts	Time Required for Removal
Footings	Footings	2 days (24hrs)
	Slab on Fill	5 days (120hrs)
Walls and Plasters	CHB walls 15cm thick or more	Up to 2mts. High – 1 day (24hrs) (36hrs) for every additional meter
Beams	Sides	4 days (96hrs)
Columns	3 meters high	3 days (72hrs)
Jacketed Columns	5 to 6 mts high	Up to 2m high – 2 days (48hrs)
		Add 1 day (24hrs) for every additional meter or fraction thereof but not more than 28 days (672hrs)
Floating Concrete slabs	7 to 10ft (2.10m to 3.00m) span	7ft (2.10m) span – 7 days (168hrs)

Add 1 day (24hrs) for every (1) foot (0.3m) additional foot distance or fraction thereof but not more than 28 days (672hrs)

END OF SECTION

REINFORCEMENT

- I - SCOPE**
Furnish materials, equipment & perform labor required to complete the Section on Concrete Reinforcing Bars, bar supports and miscellaneous reinforcement accessories.
- II - REFERENCE STANDARDS**
The publications listed below form a part of this Technical Specification to the extent referenced. The publications are referred to in the text by basic designation only.
American Society for Testing and Materials (ASTM)
ASTM A 615 Deformed Billet – Steel Bars for Concrete Reinforcement
ASTM A 675 Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
ASTM A 706 Low-Alloy Steel Deformed Bars for Concrete Reinforcement
American Welding Society (AWS)
AWS D 1.4 Structural Welding Code-Reinforcing Steel
American Concrete Steel Reinforcing Institute (CSRI)
CSRI 01 Manual of Standard Practice
- III - SUBMITTALS**
- 1. SHOP DRAWINGS**
Shop Drawings shall be prepared by the Contractor. Submittals shall show reinforcing steel schedules, plans, sizes, splicing and bending details. Any embedded plates, bolts shall also be shown for purposes of checking for potential interference. Drawings shall show support details including types, sizes and placement.
 - 2. WELDING PROCEDURES and QUALIFICATIONS**
Project Manager shall be furnished a list of qualified welders. Welders shall be qualified as certified welders. Notify the Project Manager 24 hours prior to conducting test.
 - 3. CERTIFICATES of COMPLIANCE**
Certified copies of mill reports attesting that the reinforcing steel furnished meets the requirements specified shall be obtained from the material supplier prior to the installation of reinforcing steel.
- IV - TESTING**
Tests shall conform to ASTM standards of specified materials. Provide samples of materials for testing. Copies of the results shall be furnished to the Project Manager, Engineer and implementing representative promptly.

- V - PRODUCTS**
- 1. MATERIALS**

Reinforcing Steel Bar sizes 20mm dia or smaller shall be Intermediate Grade 40 and for 25mm dia and larger, use Grade 60.
Tie Wires: Use Ga. 16 GI tie wires, annealed wire double strands at joints or laps of place reinforcements as indicated in the plans.
 - 2. FABRICATIONS**

Steel Bar Reinforcement: Fabricate and form to correct shape and dimension shown on the drawings in accordance with ACI 315.
Bending & Straightening: In accordance with ACI 318, unless otherwise noted on drawings; no bending or straightening of reinforcement will be permitted after partial embedment in concrete. Heating of reinforcement will be permitted only if entire operation is approved.
Welding: Welding of reinforcing bars is not permitted unless specifically shown and stated welded on structural drawings. When welding of steel reinforcement is indicated and required, provide welds in accordance with AWS D 1.4
 - 3. ACCESSORIES**

Provide steel bars supports, spacers and other accessories necessary to hold reinforcing bars in proper position while concrete is being placed. Bar supports are subject to approval of the Project Manager.
 - 4. LABELLING**

Reinforcing Steel Bars shall be properly labeled to facilitate identification.
 - 5. STORAGE and MATERIALS**

Store steel reinforcing bars on platforms and supports. Keep them covered with tarpaulins if required due to delayed use. Protect steel reinforcement adequately from rusting and store under cover.
- VI - EXECUTION**
- 1. PREPARATION**

Before placing reinforcement and before pouring of concrete, remove all loose rust, mill scale, oil and other adhering materials, which tend to reduce or destroy bond between concrete and reinforcement. All bars shall be bent cold. Bends for stirrups and ties shall be made around pins with a diameter of at least twice the thickness of the bars; for bars 20mm and smaller, six times the thickness; for larger bars, eight times the thickness.
 - 2. PLACING REINFORCEMENT**

Metal Reinforcement
Placing of reinforcement shall be in accordance with the plans. Refer to the Project Manager and/or Engineer in case doubt in placing reinforcing steel bars. Steel reinforcing bars shall be accurately placed and adequately secured with spacer bars, ties, anchors or other accessories. Steel reinforcement where shown in slabs shall be secured in position by spacer bars and chairs. Spacer bars shall be lapped not less than 5 inches. In slabs

on fill, pre-cast concrete blocks may be substituted for chairs. All stirrups shall be held in place.

Bar Spacing

Spacing of steel reinforcing bars shall be done in accordance with ACI standards as follows: Clear distance shall not be less than 1-1/3 times the maximum size of aggregates, 20mm or bar diameter whichever is biggest.

3. SPLICE in REINFORCEMENT

Bar splices in beams and columns shall be shown in the plans and construction notes. In general, avoid splices in slabs, beams and girders at points of maximum stress. Splices shall be shown in the reinforcing steel shop drawings for approval of the Project Manager and/or Engineer.

Lap weld splicing shall only be made by certified welders. Butt-welding is not allowed. Welding of bars shall conform to welding standards of AWS and/or Recommended Practice for Welding Reinforcing Steel. Splices in adjacent steel bars shall be staggered a minimum distance of 600mm. Reinforcing bars shall be lap spliced for tension.

4. OFFSETS in REINFORCEMENT

Where changes in cross section of columns (as in jacketed columns show in plans) vertical longitudinal bars shall be offset in a region where lateral support is afforded. Where offset, the slope of the included portion shall not be more than 1:6 and in case of jacketed columns the ties shall be spaced 3 inches on center for a distance of 1-foot below and above the point of offset.

END OF SECTION

CONCRETE

I - SCOPE

Furnish material and equipment and perform labor required to complete plain and reinforced concrete as shown on the drawings and as specified herein with the requisite:

Proportioning and Mixing

Placement and Curing

Finishing of Concrete

TYPES OF CONCRETE:

- **Transit mixed concrete:** For floating slabs, beams and columns works.
- **On-site mix concrete:** Cast-in-place concrete: for footing, columns and grade beam.

II - APPLICABLE PUBLICATIONS

The publications listed below form a part of this Technical Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. American Concrete Institute (ACI)

- ACI 117 Standard Tolerances for Concrete Construction & Materials
- ACI 315 Manual of Standard Practice for Detailing Reinforced Concrete Structures
- ACI 318 Building code Requirements for Reinforced Concrete

2. American Society for Testing and Materials (ASTM) Publications

- Deformed Steel Bars for Concrete Reinforcement
- Making and Curing Concrete Test Specimens in the Field
- Concrete Aggregates
- Compressive Strength of Cylindrical Concrete Specimens
- Ready-Mixed Concrete

III - PROTECTION and STORAGE

Portland Cement: Store in dry, water tight, properly ventilated structure.

Aggregates: Protect and prevent from inclusion of foreign matter. Maintain storage piles in a manner that will afford good drainage. Prevent segregation of particle size.

Admixtures: Store to prevent deterioration or intrusion of foreign matters.

IV - SUBMITTALS

Concrete Design Mix

Thirty (30) days minimum prior to concrete placement, submit design mix for each strength and type of concrete. Furnish a complete list of materials including type, brand source and amount of cement and admixtures; applicable reference specifications; and applicable reference specifications; and copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions. Obtain approval from the Project Manager before concrete placement. Submit additional data regarding concrete coarse and fine aggregates, if the source of these materials has changed.

Samples of Concrete Materials

Submit samples of Portland cement and aggregates for all concrete work for approval, giving names, sources and descriptions of the materials.

V - DESIGN STRENGTH of CONCRETE

All strengths of concrete shall be as indicated on the construction notes or as specified herein.

Stone Concrete

$F_c' = 4000$ psi
(27.60 MPa)

All footings, columns, beams, roof deck slabs as specified in the construction notes and plans

$F_c' = 3000$ psi
(21.0MPa)

All slab on fill/grade as specified in the construction notes and plans

Lean Concrete

Lean concrete mix shall be designated to produce concrete with 28-day strength of 1000 psi. Concrete slump and size shall be subjected to approval depending on where concrete is mixed.

VI - MATERIALS

Portland Cement: Use only one brand of Portland cement throughout. Use ASTM C-150 Type I Portland cement for normal operations; Use Type III for high-early-strength Portland cement. The same brand strength for Portland cement from the same mill shall be used for exposed for exposed concrete throughout the job. Use only one brand for the whole structural and masonry works.

Concrete Aggregates: Use well-graded, cleaned and hard particles of gravel or crushed rock for beams, columns and footings. Maximum size of coarse aggregate shall not be larger than $\frac{3}{4}$ " diameter.

Water: Use only water that is clean and free from injurious amounts of oil, acids, alkali, organic materials and other deleterious substances. Water should be fit for drinking.

Fine Aggregates: Clean river sand, free from organic and other deleterious matter. Sand from saltwater source is not allowed.

VII - CONCRETE PROPRTIONS and CONSISTENCY

1. CEMENT and AGGREGATES

Make proportions to produce a concrete mixture, which will work readily into the corners and angles of the forms and around reinforcement. Place concrete materials in a manner that avoids segregation or accumulation of excess water on surface. If at any time during construction, the concrete resulting from approved design mix proves to be unsatisfactory for any reason, such as too much water, lack of plasticity, to prevent segregation and honeycomb, immediately notify the Project Manager, Engineer and/or the implementing agency representative. Modify the design mix subject to the approval of the Project Manager, Engineer or the provincial government until a satisfactory concrete mix is obtained.

VIII - MIXING CONCRETE

1. SITE MIXED CONCRETE

All concrete shall be machine mixed. No hand mixing shall be allowed except in case of emergency such as breakdown. Concrete mixers shall be of the approved type and size, which will insure a uniform distribution of material throughout the mass, Place materials in mixer in such a way that the first batch of concrete shall contain sufficient cement, sand and water.

2. READY MIX CONCRETE

All ready mix concrete shall be placed in forms within one hour after adding water or not more than 1-1/2 hours if a retarder is used. It shall be kept constantly agitated during the transit period. ASTM C-94 and as herein specified.

IX - EXECUTION

1. PREPARATION

Inspect all forms and check all installations before placing concrete. Wet surfaces thoroughly and grout before placing concrete. Clean all laitance from pouring and expose aggregates before renewing pouring.

2. DEPOSITING CONCRETE

Do not start placing concrete until the forms and reinforcing bars for the whole unit to be poured have been completed, clean, inspected and approved. Deposit concrete without segregation on buggies, buckets or wheelbarrow. Place concrete immediately after mixing and in no case more than 90 minutes after water has been added provided a retarder is used. In placing concrete, never let it drop freely from a height exceeding 5 feet. Deposit in uniform, horizontal layers not more than 18 inches deep. Work around all reinforcement and in corners of forms. Properly paddle by the use of rods, shovels and hand spades. Agitate by means of internal or external vibrators to obtain the densest possible concrete, without over-vibration to the point where separation results.

3. CONCRETE TOPPING

Concrete slabs previously constructed, on which topping is to be poured, shall be free from dirt, grease or other foreign matter, which may affect the bond. Surface shall be wet down prior to pouring the mortar topping.

4. CURING CONCRETE

Finished Surface: Protect all concrete work from drying out after removal of forms by covering with polyethylene sheeting, burlap or coating of approved membrane with moisture retention property equal to 90%. Wet burlap as often as required to keep concrete wet throughout each day, for a period of at least 7 days. Protect freshly exposed concrete from rain and the elements by tarpaulins at all times.

5. REPAIR of CONCRETE

Complete concrete repair within 24 hrs after removal of forms. Remove fins neatly from exposed surfaces. Remove damaged or honeycombed concrete and replace with dry-pack, rich mortar or concrete with pea gravel to produce a sound one.

X - FORMED SURFACE FINISHES

Concrete shall be placed and finished as herein specified and as required to provide even and dense surfaces of uniform color, free from marks, honeycombs or other imperfections.

1. SLAB FINISHES

Prepare concrete slabs suitable in surface and elevation to receive finishes. Finish floor shall be level, plane-surface unless otherwise indicated on the drawings, with tolerance of 1/8" in 12". Surfaces shall be pitched to drains as required. Finishes shall be:

2. EXPOSED CONCRETE FINISH

Surfaces where no applied finish is called for on the drawings shall be finished with a steel trowel as required producing a hard, dense finish free from surface imperfections. Do not use dry materials on the surface to be finished.

3. BROOM FINISH

Brush surfaces so designated with a stiff broom after concrete has been floated and sufficiently hardened, so that the broom marks will not be more than 1/16" deep. Make the broom strokes all in one direction. Broom strokes on sloped surfaces shall be perpendicular to the direction of the slope.

END OF SECTION

MASONRY WORKS

I SCOPE

Furnish materials, equipment and perform labor required to complete the Section CONCRETE UNIT MASONRY WORK to include: the restoration of demolished CHB Wall of the existing building and the new unit masonry works located at the façade. See drawings for area coverage of work involved.

II TECHNICAL SPECIFICATIONS

The publications listed below form a part of this Technical Specification to the extent referenced. The publications are referred in the text by basic designation only.

American Society for Testing and Materials (ASTM) Publications

- Deformed Steel Bar for Concrete Reinforcement
- Non – Load Bearing Concrete Hollow Blocks
- Aggregate for Masonry Mortar
- Portland Cement

1. SUBMITTALS

Samples - Submit for approval three samples of each type of CHB, concrete hollow block units, wall reinforcements and GI tie wires.

Certificates of Conformance – Submit certificates attesting that cement, CHB masonry units, aggregates and accessories meet the requirements specified herein.

2. DELIVERY and STORAGE

Deliver Portland cement and other materials to the site in unbroken bags, plainly marked and labeled with manufacturer's names and brands. Store materials in dry and weather tight enclosures so as to prevent breakages and damages to the materials. Handle CHB masonry units with care to avoid chipping and breakage. Protect CHB masonry materials from damage, Keep CHB and other materials dry until used.

III PRODUCTS

1. MASONRY UNITS

Concrete Masonry Units – CHB units of modular dimensions air or water cured. Store the CHB units at the site before use at a minimum of 28-days for air-cured units. Surface of CHB units which are to be plastered shall be sufficiently rough to provide a suitable rough to provide a suitable bond; elsewhere, exposed surfaces of units shall be comparatively smooth and of uniform texture.

- a. **Concrete Hollow Blocks Non-Load Bearing Units** – made with normal weight aggregates and with ultimate compressive strength of 4.5 Mpa at 28 days, as required.
- b. **Special Shapes** – Provide special shapes such as closures and header units in special applications as necessary to complete the work.

2. MORTAR

- a. **Portland Cement** – ASTM Type C 150, Type I. Shall be gray color for mortar setting bed and scratch coat.
- b. **Fine Aggregates** – White Sand be clean natural sand passing a 3 mm screen and retained in a No. 100 mesh sieve.
- c. **Water** – clean and free from substances which could adversely affect the mortar.

3. ACCESSORIES

- a. **Horizontal and Vertical Reinforcement** – Horizontal and vertical reinforcement shall be deformed steel bars as indicated conforming to ASTM. Deformed steel bars reinforcement shall consist of parallel longitudinal (upright) and horizontal steel bars not less than 10mm in diameter, connected both ways. The distance between rebars shall be base on approved plan.
- b. **Ties Wires** – Annealed, non-corrosive gauge 16 galvanized iron wires.
- c. **Fastenings** – provide suitable bolts and nuts or other approved metal fastenings for securing electrical fixture metal base to masonry as necessary.

IV EXECUTION

1. INSTALLATION

Coordinate CHB unit masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching. Do not change materials supplier after the work has started if the appearance of the finished work would be affected.

Protection

- a. **Stains** - Protect exposed finish surfaces from stains by covering area with polyethylene sheets.
- b. **Loads** – Do not apply loads for at least 12 hours of concentrated loads for at least 72 hours after masonry is constructed.

2. WORKMANSHIP

Exterior CHB masonry wall shall be carried up level and plumb all around. Section of the CHB wall partitions shall not be carried up in advance of the others, unless specifically approved by the Project Manager. Unfinished unit masonry work shall be stepped back for joining with new work. Doors and window frames, openings, anchor, pipes, AC ducts and conduits shall be protected carefully and neatly as the unit masonry CHB work progresses. Spaces around walls shall be filled solidly with mortar.

CHB wall partitions on all floors shall be structurally bonded, fastened and anchored to beams, columns and to each other. Non-load bearing

partitions and interior CHB walls shall be securely anchored to the construction above, in a manner that provides lateral stability while permitting unrestricted deflection of construction above. Scaffolding shall be inspected regularly, and shall be strong, well braced and securely tied in position. Overloading of scaffolding will not be permitted.

3. MORTAR MIXING

Mix and measure mortar materials in containers to maintain control and accuracy of proportions. Do not measure materials with shovels. Unless specified otherwise, mix mortar in proportions by volume. Introduce and mix aggregate in such manner that the materials will be distributed uniformly throughout the mass. Add water gradually and mix not less than 3 minutes, until properly plasticity is obtained.

Hand mixing of mortar may be used. Keep mortar boxes, pans and mixer drums clean and free of debris or dried mortar. Retemper mortar, which has stiffened because of evaporation by adding water and mixing with a trowel to obtain the proper, workable consistency. Do not use retempered mortar which has not been placed in its final position with 1-1/2 hours after the initial mixing.

4. LAYING OF MASONRY UNITS

Lay the first course of CHB in a full bed of mortar for the full width of the unit. Lay succeeding course in running bond. Form bed-joints by applying the mortar to the top surfaces of the inner and outer face shells. Form head joints by applying the mortar for a width of about 25mm to the end of the adjoining units laid previously.

The mortar shall be smooth, not furrowed and shall be of such thickness that it will be forced out of the joints as the CHB units are being placed in position. Where anchors, bolts, and ties occur within the cells of the units, place metal lath in the joint at bottom of such cells and fill the cells with mortar as the work progresses. Do not dampen concrete masonry CHB units before or during laying.

Select CHB units for uniformity of size, texture, true plane, and undamaged edges and ends of the exposed surfaces. Place CHB units plumb, parallel and with properly tooled joints of maximum 10mm thickness. Keep exposed surfaces clean and free from blemished or defects. Lay units in the bond pattern indicated.

5. BONDING AND ANCHORING

Structurally bond or anchor CHB walls and partitions to concrete beams, columns and to each other. Secure non-load bearing CHB wall partitions and interior walls to the construction above. Provide reinforcement in every other CHB course and in the first two courses above and below openings in walls and partitions of masonry units. Reinforcement shall be

continuous except at control joints and expansion joints. Place the steel bar reinforcements and apply mortar so as to provide mortar cover at least 15mm for exterior wall face and 6mm for interior wall face. Completely embed steel anchors in mortar joints.

a. **Non-Load Bearing Partitions with Other Walls-** Tie with GI wires at vertical intervals of not more than 600mm or with masonry bonding in alternate courses.

b. **Architectural Façade Entablature Walls – Resting on Concrete Slab / Beam-** Anchor CHB masonry units to the concrete slab-beam with dovetail or wire-type anchors inserted in slots or insert built into the concrete. Locate anchors not more than 450mm on centers vertically and not more than 600mm on centers horizontally.

6. **FORMS AND SHORING**

Construct to the shape, lines and dimensions of form members and make sufficiently rigid top to prevent CHB masonry unit deflections that may result in cracking or other damage to supported masonry. Forms shall remain as support beam not less than 10 days after completion of walls.

7. **CLEANING**

Protection – protect work that may be damaged or stained during cleaning operations.

Pointing – Upon completion of CHB masonry work, cut out defective mortar joints, tuck joints and all holes solidly with mortar.

Cleaning – Clean exposed masonry surface with clear water and stiff fiber brushes and rinse with clean water. Where stains, mortar or other soil remain, continue cleaning as follows: Clean masonry surfaces by scrubbing with warm water and soap, rinsing thoroughly with clean water. Restore damaged, stained, and discolored work to its original conditions or replace with new work.

WATERPROOFING

I - SCOPE

This Section covering Elastomeric Membrane Waterproofing System for the Roof Deck – Gutter shall include furnishing of materials, equipment and perform labor required to complete the work. The membrane waterproofing shall include a complete system of compatible materials supplied by the manufacturer to create a seamless waterproof membrane.

II - PRODUCT DELIVERY, STORAGE and HANDLING

Membrane Waterproofing Materials shall consist of a neoprene emulsion or elastomeric polyurethane resin reinforced with net or cloth.

1. **DELIVERY:** Materials shall be delivered in original sealed containers, clearly marked with brand name and type of materials.

2. **STORAGE:** Materials shall be stored at 85F with normal handling to prevent damage to container. Do not store for long periods in direct sunlight.

III - MATERIALS

Manufactured Waterproofing Materials shall be delivered to site in original sealed containers or package bearing the manufacturer's name and brand designation.

ELASTOMERIC WATERPROOFING COATING

Product shall be from heavy-duty high solid contents polyvinyl acetate elastomer, water-based, high elasticity, abrasion and chemical resistant to most acid. The elastomeric coatings shall have world-class quality distinction and have been in service for a period of 20 years to prove its adaptability, reliability and dependability in the area of application.

IV - SURFACE PREPARATION

All surfaces to which elastomeric coating is to be applied shall be dry, clean, smooth and free from oil or grease and projections that might puncture the coatings. Final cleaning method, if necessary, shall be treating the concrete surfaces with 10% to 15% solution of muriatic acid to remove laitance and impurities. After acid has stopped foaming or boiling, immediately rinse thoroughly with water. Keep the surfaces that will receive application completely dry prior to and during installation. Concrete surfaces that slope to drain shall be checked and approved before installation of any coating is started. All defects or inaccuracies in the surfaces shall be corrected in a satisfactory manner to eliminate poor drainage and low spots.

- V - INSPECTION:** Verify that the concrete work done under other Section meets the following requirements:

1. **CONCRETE SLAB SURFACE**

Prepare slab sloped to roof deck gutter drainage system free of ridges or sharp projections.

2. **CONCRETE FINISH**

Applied by wood or hand steel trowel followed by soft hair broom to obtain light textured finish to prepare for elastomeric coat applications.

VI - MATERIAL APPLICATION

Elastomeric material application shall be done by roller, brush or squeegee

1. **INTEGRAL FLASHING**

Apply 40-mil film thickness of elastomeric coating to the surface to be flashed extending 150mm unto the floor slab and up the vertical wall. Apply a minimum of 0.04" elastomeric coating at protrusions or projections, such as service pipes, to a height equal to desired wearing surface height.

2. **MEMBRANE WATERPROOFING COATING**

- a. Apply elastomeric coating approximately 2 mils thick as first coat at 15 square meters per gallon.
- b. Apply elastomeric coating for six coats as top coating, approximately 7 mils thick per coat (at 10 square meters per gallon) after other coat has completely dried. Total thickness of membrane waterproofing shall be approximately 40 mils. Mortar setting beds for tile works to cover the membrane waterproofing shall be done by others. Provide an average of 39mm thickness and this shall slope to drain.

VII - FIELD QUALITY CONTROL – Flood Testing (Optional)

- a. Waterproofed area shall be given a 24-hour flood test upon complete installation of the waterproofing system. Allow system to cure 48 hours prior to flood test.
- b. Plugs drains and place barrier to contain the water.
- c. Repair any leak that may appear.

VIII - CLEANING

All debris resulting from work shall be removed from the project site.

IX - SUBMITTAL REQUIREMENTS

Prior to procurement and delivery, the Contractor shall submit brochure and sample of elastomeric waterproofing materials to be used for approval. Work shall be started until materials and system is received and approved.

END OF SECTION

PLASTERING

I - SCOPE

Furnish materials, tools, equipment and perform labor required to complete this Section on Plastering covering delivery, handling, storage and execution as shown in the drawings.

All pertinent provisions of the GENERAL CONDITIONS form part of this section.

II - DELIVERY and STORAGE of MATERIALS

Deliver all manufactured materials in the original packages and containers bearing the name of the manufacturer and its brand. Store portland cement and lime off the ground under watertight cover and away from sweating walls and damp surfaces until ready for use. Remove damage or deteriorated materials from the premises.

III - MATERIALS

- a. **Portland Cement** - ASTM Type C 150, Type I
- b. **Fine Aggregates** - White Sand be clean natural sand passing a 3 mm screen and retained in a No. 100 mesh sieve.
- c. **Water** - clean, potable and free from substances which could adversely affect the mortar.
- d. **Lime** - Shall be hydrated lime with the requirements that the free (unhydrated) calcium oxide (CaO) and magnesium oxide (MgO) in the hydrated product shall not exceed 8 percent by weight.

IV - EXECUTION

1. GENERAL

Plaster on walls shall be carried to the finish floor line. All completed plastered surfaces shall first be coated with bonding agent.

2. THICKNESS of PLASTER

The minimum thickness of plaster cover over various concrete surfaces shall be as follows:

Beams, Poured Wall and other types :	½ inch thk
Masonry Units (CHB) :	5/8 inch thk
Monolithic Concrete Wall :	5/8 inch thk

3. PREPARATION for PLASTERING

- a. **Temperature and ventilation:** In damp or rainy weather, provide properly regulated heat and take precautions against poor rapid drying before set has occurred. Protect from blasts of wind and from drying too rapidly. As soon as the plaster has set, provide

circulation of air to provide sweat-outs and heat to ensure as rapid drying as possible.

- b. **Surfaces:** Carefully examine surfaces before the plaster is applied thereto and do not proceed until unpleasant conditions have been satisfactorily remedied.
- c. **Bonding Agent :** ABC or approved equal shall be used over concrete surfaces indicated on drawings to receive regular plaster finish or white skim coat of plaster. Prior to application of the bonding agent, remove all dirt, dust, oil, grease, wax and loose materials from surfaces to be coated. Apply bonding agent by brush or roller in accordance with manufacturer's directions and to completely cover the surface.

4. **MIXING of PLASTER**

Portland cement plaster: Mix in the following mortar to a proportion by volume for all coats:

- 1 part cement
- 3 parts sieved white sand

5. **APPLICATION of PLASTER**

Surfaces that are to receive plaster shall be clean and free of defects. Provide regulated ventilation. Plastering except as otherwise indicated scratch and brown coats are carried down to the floor. Finish coats shall have a reasonably uniform thickness at any point. Surfaces shall be flat and walls shall be straight and plumb, interior angles shall be square. Solidly grout frames occurring in plaster walls, using plaster specified for base coat. No cement dusting is allowed to hasten finishing work.

END OF SECTION

FINISHES

WALL and FLOOR CEMENT

- I - SCOPE**
Furnish materials, equipment and perform labor required to complete this Section on WALL and FLOOR CEMENT FINISHES.
- All pertinent provisions of the GENERAL CONDITIONS form part of this section.
- II - FINISH PRODUCT**
- 1. STEEL TROWEL FINISH**
Provide score joints wherever required. For roof deck gutter, catch basins, manhole covers, splash blocks and concrete paving blocks, borders, trenches.
 - 2. WOOD TROWEL FINISH**
Provide score joints wherever required for cemented wall surfaces to be painted with the required finished coat.
 - 3. BROOMED FINISHED**
Brush surfaces so designated with a stiff broom after the concrete has been floated and sufficiently hardened, so that the broom marks will not be more than 1/16" deep. Make the broom strokes all in one direction. Broom strokes on slope surfaces shall be perpendicular to the direction of the slope.
 - 4. PLAIN CEMENT PLASTER FINISH**
Consisting of scratch and finish coats, both consisting of: 1 part Portland cement and 2 parts of clean, washed sieved white sand, measured by volume.
 - 5. CEMENT FINISH – SLAB FLOORS**
Concrete floors without specific finish and so shown on plans as cement finish shall be given a wearing surface of 1:2 cement / sand mortar mix, 1 cm thk. Apply immediately after the concrete has been placed before it has been set. The mortar shall be spread and troweled well to a smooth even surface with sufficient slope for drainage where necessary. Staright V-grooves shall be placed where indicated on plans, in accordance with the existing building pattern shown and the whole surface cure as specified.

END OF SECTION

TILE WORK

I - SCOPE

Furnish materials, equipment and perform labor required to complete delivery, preparation and installation of ramp spike TILE WORK of the project. See details and location of work.

All pertinent provisions of the GENERAL CONDITIONS form part of this section.

II - GENERAL

The work shall not be started until the rough-ins has been completed and tested. The work of all other trades in the area where ramp Tile Work is to be done shall be protected from damage.

III - DELIVERY AND STORAGE

Materials shall be delivered in original unbroken boxes labeled plainly with the manufacturer's name and brand.

IV - PRODUCTS AND MATERIALS

Vitrified Floor Tiles – for Main and Side Entrances, Lobby, Hallways, and offices as indicated in plans shall be vitrified floor granite tiles and have a compressive strength of 1000 psi homogenous type of good quality grade, granite color, texture and size. Submit samples and test certificates for UPFDU or representative's approval.

Ceramic Tiles – for Comfort Rooms and Utility Areas as indicated in plans shall be ceramic unglazed tiles for flooring; glazed tiles for walls. For lavatory counter as indicated in the drawings shall be glazed ceramic tiles.

Trim Units – Shall be provided for a neat and completely finished installation. Trim units shall be of material and finish identical to the tiles. Use ABC tile adhesives or approved equal.

Portland Cement – ASM Type C 150, Type I. Shall be gray color for mortar setting bed and scratch coat.

ABC Grout – For grouting shall conform to PNS 53 with early high strength characteristics. Grout sealer shall be applied to all grouting works within a specified time after grouting.

Fine Aggregates – White Sand be clean natural sand passing a 3mm screen and retained in a No. 100 mesh sieve.

Water – clean, potable and free from substances which could adversely affect the mortar.

Lime – Shall be hydrated lime with the requirement that the free (unhydrated) calcium oxide (CaO) and magnesium oxide (MgO) in the hydrated product shall not exceed 8 percent by weight.

V - MORTAR SETTING BEDS

Mortar beds shall be a minimum thickness of 20mm for all level areas. The prepared slabs shall be wetted thoroughly but no free water shall be permitted to remain in the surface. A skim coat of neat Portland cement mortar shall be applied not more than 1.6mm thick. A setting mortar bed as large as can be covered with tiles before the mortar has reached its final set shall be placed in the operation.

VI - APPLICATION OF TILE FLOORING

All clay tiles shall be soaked in water at least 8 hours before it shall be used. No free water shall remain on the tiles at the time of setting. The tiles shall then be pressed over the prepared ABC mortar bed, worked lightly and beaten into the mortar until true and even with the plane of the floor. Beating and leveling shall be completed within an hour after placing the tiles. Cutting of tiles, when necessary (sirujo), shall be done along the outer edges (perimeter lines) of the floor. CR and Hallway Tiles shall fit closely and neatly along edges. All tiles shall be secured firmly in place, kept in straight, parallel, true and even with the floor planes.

VII - WORKMANSHIP

Special care shall be taken to prevent sagging and consequent dropping of applications. All work shall be done in neat and professional manner. There shall be no visible junction marks on finish coat where a day's work adjoins another. Finished work shall be covered and protected in an approved manner to prevent damage.

VIII - CLEANING

At the completion of the tiling operation, surfaces shall be thoroughly wetted with water and scrubbed with a solution of not more than 1 part of muriatic acid to 10 parts of water, applied to an area not more than 5 to 6 sq.m at a time, with a stiff brush. Immediately after cleaning, each area shall be rinsed with water. Work that may be damaged, stained, discolored shall be protected during the cleaning process and later restored to its original condition or totally replaced.

END OF SECTION

PAINTING

- I - SCOPE**
Provide labor, materials, painting equipment, scaffolding and protective coverings required for the painting and finishing of all surfaces as designated in the drawings and specifications.
- All pertinent provisions of the GENERAL CONDITIONS form part of this section.
- II - WORK IN OTHER SECTIONS**
Examine the surfaces to be painted & see that the work in other trades has been installed in satisfactory condition before work commences.
- III - PROTECTION OF WORK**
Protect the painting work and the work of others against damage or injury caused by paint application. Areas to be painted must have suitable coverings.
- IV - WORKMANSHIP**
The paint shall be applied only by skilled painters to the method specified so as form a film of uniform thickness, free from sags, runs, crawls or other defects. For painted work, each succeeding coat shall differ slightly in color or tint from that of the preceding coat.
- V - MATERIALS STORAGE**
All materials shall be delivered to the job site in clean, original containers with all the labels and other markings intact. Materials will be stored in the area designated and all storage area will be kept neat, clean and locked.
- VI - COLORS**
All colors are to be selected or approved project by designer or representative from UPFDU and actual color chips shall be prepared and submitted for inspection and approval prior to any use. Prepare sample panels of selected color or shade on one square foot plywood panels for approval by the designer and or representative from UPFDU. Special color shall be provided as required.
- VII - FIRE PREVENTION**
Every precaution will be taken to prevent fires. At the end of each days' work, oily rags, empty containers and combustible material shall be removed form the premises.

VIII - PRODUCTS

Paint materials shall meet the standard requirements of the designer and / or the UPFDU representative and shall be in accordance with the latest Classification class A of the Institute of Science, Manila. Use Davies, Dutch Boy, Boysen or approved equivalent. Paint materials shall be delivered on site in the original containers with labels intact and seal unbroken.

IX - PAINTING SCHEDULE

As specified hereunder:

- | | | |
|-----------|--|-------------------------|
| 1. | INTERIOR CONCRETE – MASONRY and DRY WALL SURFACES | |
| | 1 st coat | Flat Latex |
| | Intermediate coat | Acrylic concrete putty |
| | 2 nd coat | Latex semi-gloss finish |
| | 3 rd coat | Latex semi-gloss finish |
| 2. | EXTERIOR CONCRETE-MASONRY SURFACES | |
| | 1 st coat | Flat Latex |
| | Intermediate coat | Acrylic concrete putty |
| | 2 nd coat | Latex semi-gloss finish |
| | 3 rd coat | Latex semi-gloss finish |
| 3. | INTERIOR WOODEN PANELS (Governor’s Offices) | |
| | 1 st coat | Flatwall enamel |
| | Intermediate coat | Glazing Putty |
| | 2 nd coat | Flatwall Enamel |
| | 3 rd coat | Flatwall Enamel |

X - SURFACE PREPARATION

Before the start of the painting works, prepare paint on a 4 feet x 4 feet area designated by the Project Manager and same be used as standard workmanship for the entire work. Samples shall be made of surface preparation, primers, fillers and finish coat applications.

1. CONCRETE and MASONRY SURFACES

Scrape off loose cement, sand, surface contaminants, then steel brush to remove chalk, dust, dirt, powdery materials and surface deposits. Wash off oils, grease and wax with concrete neutralizers, 1 liter of bottle, 10 liters of water. Apply by brush and make sure that alkaline surfaces are completely neutralized. On area with excess alkalinity, seal surfaces with concrete sealer. Allow work to dry for at least four (4) hours before applying succeeding coats.

Apply Latex concrete paint primer. Thin paint material with water if necessary. Tint the first coat with acrylic tint to the desired color of the topcoat. Allow to dry for at least 2-4 hours. Repair all imperfections with putty made by mixing Latex with Patching Compound Powder. Let dry for 24 hours then spot coat with topcoat color. Apply Flat Latex semi-gloss as final finish. Tint work with acrylic tint.

XI -

APPLICATION

1. Employ only experienced skilled craftsmen for all Painting jobs.
2. Apply paint by brush, roller or spray in accordance with the manufacturer's directions. All materials when brushed shall be evenly flowed on with brush best suited for the type of material being best suited for the type of material being applied. When using roller, floor spills shall be adequately covered.
3. Do not apply exterior paint in damp, rainy weather. Do not apply interior paint when satisfactory results cannot be attained due to high humidity and excessive temperature.

XII -

PROTECTION

1. Protect or remove all exposed hardware, electrical fittings, lighting fixtures and accessories, plumbing fixtures and accessories, window panes and the like so that these are not stained during painting operations. Reinstall items after completion of the painting work.
2. Repair any damage done. Refinish any work caused by defective workmanship for material or carelessness of other crafts.

XIII -

WORKMANSHIP IN GENERAL

1. Mix paint in proper consistency in accordance with the manufacturer's printed instructions. Apply paints evenly and smoothly without runs, sags or other defects and brush efficiently to minimize brush marks. Make edges of paint adjoining other material or color sharp and clean without overlapping.
2. Stir paint thoroughly to keep pigment in even suspension when paint is being applied. Before applying succeeding coats, primers and undercoats shall be completely integral and performing the functions for which they are specified.

Properly prepare and touch up all scratches or any other disfigurement and remove any foreign matter before proceeding with the following coats. All spot priming and spot coating shall be feathered into the adjacent coatings to produce a smooth, level surface.

3. Sand smooth areas to be finished with enamel. Use fine sandpaper between coats of enamel applied to metal to produce an even smooth surface.
4. Do not apply final coats until after other trades whose operations would be detrimental to finish painting have finished with their work in the areas to be painted and the areas have been approved for painting.

XIV -

SAMPLE and SUBMITTAL REQUIREMENTS

Prior to procurement, the Contractor shall submit brochures or catalogs of the paint system to be used on the different surfaces to be applied for approval. Provide applied paint swatches on walls large enough to be viewed by the Project Manager and UPFDU representative for appreciation and approval.

END OF SECTION

TOILET ACCESSORIES

- I - GENERAL**
Accessories are as shown on the drawings and as specified herein. The Contractor shall furnish and install all toilet accessories as listed or indicated on the drawings.
- II - PRODUCT DELIVERY, STORAGE AND HANDLING**
Delivery of materials shall be so scheduled as to allow for immediate installation. Products shall be protected and kept under cover both during transit and at the jobsite. Handle products carefully to prevent damage.
- III - MATERIALS**
Manufactured materials shall be delivered in the manufacturer's original unbroken packages or containers that are labeled plainly with the manufacturer's name and brands. Materials shall be stored in any weather-tight enclosures, and shall be handled in a manner that will prevent damage.
- 1. TOILET ACCESSORIES**
Toilet accessories shall be as manufactured or distributed by accredited manufacturer.
 - 2. MODELS**
Models shall be as specified herein and shall be provided with color as indicated in the drawings or as approved. Contractor shall furnish and install all indicated toilet and bath accessories including all required fittings.
 - 1. WATER CLOSET**
It shall be supplied by a accredited manufacturer. with matching seat covers.
 - 2. LAVATORY**
Lavatory shall be supplied by a accredited manufacturer
 - 3. URINAL**
Urinal shall be supplied by a accredited manufacturer.
 - 4. PAPER HOLDER**
Paper holder shall be supplied by a accredited manufacturer
 - 5. FAUCET**
Faucet for lavatory shall be "supplied by a accredited manufacturer, solid brass body and spout with 12 mm connection thread.

6. BIB TAP

Bib tap for slop sink shall be stainless faucet of any brand from accredited manufacturer

7. ANGEL VALVE

Angle valve for sink and lavatories shall be supplied by a accredited manufacturer (10mm pipe)

- IV - INSTALLATION**
Comfort Rooms, Toilet and Bath accessories shall be installed on locations as shown. Surfaces of fastening devices exposed after installation shall have the same finish as the attached accessory. Exposed screw head shall be oval. Installed heights shall be as shown on the drawings. Upon completion of the installation, accessories shall be protected with strippable plastics or by other approved means until the installation are accepted. The manufacturer's accessory mounting details shall be coordinated with other trades as their work progresses.
- V - QUALITY ASSURANCE**
Comfort Rooms, Toilet and Bath accessories shall be supplied by a accredited manufacturer
- 1. SUBMITTAL REQUIREMENTS**
Brochures and technical publications relative to the product specified shall be submitted for approval.

MEN AND WOMEN COMFORT ROOM CUBICLES

- I - SCOPE**
This section includes toilet cubicles, complete.
- II - GENERAL**
This section includes toilet partitions as follows:
Type : High Moisture Resistance (H.M.R.)
Phenolic Type Particle Board
Partition type: Overhead braced, wall hanged and floor mounted
- III - MATERIALS**
- 1.** Manufacturer's subject to compliance with requirements, provide products by supplied by a accredited manufacturer

2. Provide materials that have been selected for surface flatness and smoothness. Exposed surface that exhibits fittings, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are unacceptable.
3. **HIGH MOISTURE RESISTANCE – PHENOLIC TYPE PARTICLE BOARD:**
Factory laminated both sides with a decorative hardwearing melamine surface, fused to substrate without visible glue line or seam. The core supplied by a accredited manufacturer and meets the specification of the International V313 test. Provide units with 2mm PVC edges and with minimum 33mm thickness on doors and panels.
4. **OVERHEAD AND WALL BRACING:**
Manufacturer's standard continuous , extruded aluminum U channels for head rail and wall channel with anti grip profile in manufacturer's standard finish.
5. **HARDWARE AND ACCESSORIES**
Manufacturer's standard design, heavy duty operating hardware and accessories manufactured from stainless steel or aluminum and available in chrome, satin or polished brass finish.
6. **ANCHORAGES AND FASTENERS**
Manufacturer's standard exposed fasteners of stainless steel pin matches hardware, with theft resistance type heads. For concealed anchors, use rust resistant, natural anodized aluminum.

IV - FABRICATION

1. Manufacturer's standard phenolic type particle board is supplied by a accredited manufacturer and cut to precise dimensions in the factory (\pm 0.05 in 5m). The accuracy of cut is critical to provide a serviceable and quality finish on installation.
2. Provide doors, panels and pilasters fabricated for compartment system. Provide doors with predrilled for hinges fixings and indicator bolts to assist the quality installation on site.
3. **OVERHEAD WALL CHANNEL and FLOOR MOUNTED CUBICLES**
Provide manufacturer's standard stainless steel or aluminum channel that supplied pre-punched to the user, assisting the location of fixing on site. Make provision for setting and securing continuous head rail at top of each

pilaster. Provide aluminum box at pilasters to conceal supports and leveling mechanism.

4. DOORS

Unless otherwise indicated, provide 726mm wide out swing doors for standard toilet cubicles and 927 mm wide out-swing doors with a minimum of 900 mm wide clear opening for cubicles indicated to be handicapped accessible.

1. Hinges: Manufacturer's standard self opening type that can hold door open at any angle up to 90 degrees.
2. Indicator Bolts; provide units that comply with accessibility requirements of authorities having jurisdiction at cubicles to be handicapped accessible.
3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting the panels.

V

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EXECUTION

1. GENERAL

Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of maximum 12mm between pilasters and panels and maximum of 12mm between panel and walls. Secure units in position with manufacturer's recommended anchoring devices.

2. Secure panels with continuous aluminium U channel attached from top to bottom of panel. Locate wall channel so holes for wall anchors can achieve maximum rigidity. Fixing into the masonry joint should not be into blocks.

3. OVERHEAD – CHANNEL and FLOOR-MOUNTED CUBICLES

Secure pilasters with stainless steel or aluminium box to the floor and level, plumb and tighten. Continuous head rail to each pilaster fixings should be 40mm from each edge and intermediate fixing at 100mm centers. Hang doors and adjust so top of doors are parallel with overhead channel when doors are in closed position.

END OF SECTION

STEEL WORKS

METAL LOUVERS

I - SCOPE

This section includes metal louvers as indicated in the Mechanical and Electrical Plans for Gen Set Room, complete.

III - DELIVERY, STORAGE AND PROTECTION

Materials shall be delivered to the site in an undamaged condition. Materials shall be carefully stored off the ground to provide proper ventilation, drainage and protection against dampness. Louvers shall be free from nicks, scratches and blemishes. Defective and/or damaged materials shall be replaced by the Contractor at no implementing body

III - MATERIALS

Metal louvers shall be fabricated from galvanized steel sheets to types, shapes and sizes, as indicated. Blades shall be accurately fitted and firmly secured to the frames. The edges of all louver blades shall be folded or bearded for rigidity and weatherproofing.

IV - SHOP FINISH ON STEEL MEMBERS

Members shall be hot-dipped galvanized, phosphate treated and epoxy shop primed. Top coating finish shall be spray-applied using two component polyurethane paint. Color as approved.

V - INSPECTION

1. Louvers shall be checked for warp and weave and true if necessary.
2. No work shall start until satisfactory conditions are corrected.

VI - INSTALLATION

1. Louvers shall be plumb and square without springing or forcing, and securely enclosed to walls.
2. The complete installation shall be rainproof and weather tight.

VII - SUBMITTAL REQUIREMENTS

Complete shop drawings showing all information necessary for fabrication and installation of louvers shall be submitted for approval. Drawings shall indicate materials, sizes, fastenings and profiles. Materials shall not be delivered to job site until shop drawings have been approved.

END OF SECTION

DRY WALL OFFICE PARTITIONS

I - SCOPE

This section includes low office partitions, complete.

II - GENERAL

Dry Wall Office Partitions shall be constructed according to the design, type and size as indicated on the drawings. Provisions shall be made, if indicated, for electrical wiring through vertical and horizontal members. Dry Wall Partitions shall be so constructed as to readily disassemble in part.

III - MATERIALS AND WORKMANSHIP

1. DRY WALL PANELS

The dry wall panels shall be constructed of gypsum board, wall covering finish – 12mm thick gypsum wallboard fastened on horizontal metal furrings gauge 22 and 2"x6"x2mm metal tubular vertical stud, spaced at 1.20 meter on center and horizontal metal furrings gauge 22 spaced at 400mm on center. Metal tubular and furrings bolted to slab with 87mm diameter bolt on expansion shields. At door openings, provide a wood key connector as indicated.

Dray wall panels shall have smooth, flush surfaces without any visible joints or seams on exposed surfaces stiles' edges. Tops of floor to ceiling dry wall gypsum panels shall have continuous cornices. Bottoms shall have vitrified tile baseboards. Where low partition occurs provide top of partition with exposed hardwood top as indicated.

IV - EXECUTION

1. INSTALLATION

The dry wall partitions shall be assembled and erected in a neat and professional manner with least possible drilling and cutting. Joints between units and sub-units shall be perfectly assembled to close-fitting and neat connections.

2. PATCHING AND CLEANING

After the installation of dry wall partitions has been completed, any hole, cut or imperfections made in the finished surfaces shall be properly repaired or otherwise resurfaced. Any abrasion or disfigurement of the

finish dry wall partition work or in any portion of the building where such abrasion or disfigurement is caused by the activities on the dry wall partition panel work shall be repaired and neatly finished to match adjacent work. Upon completion of the work, waste materials and debris shall be removed and the portions of the building in which any activities on dry wall partition panel work have occurred, shall be left broom-cleaned.

V - SUBMITTAL REQUIREMENTS

Sample finish and workmanship of dry wall "gypsum" partition panels shall be submitted for approval prior to fabrication, construction or installation.

END OF SECTION

DOORS and FRAMES

I - SCOPE

This section includes panel wooden doors and frames as indicated in the drawings or as specified herein, complete.

II - GENERAL

Wood doors & frames shall conform to the best commercial standard.

III - STORAGE AND PROTECTION

Wood panel doors and frames shall be protected against damage. Doors shall be stored under cover in a well-ventilated building where they will not be exposed to extreme changes in humidity. They shall not be brought into the building until painting is almost completed and is thoroughly dry.

All varnished wooden entrance panel doors, frames, and other works delivered to the site shall be stored and handled in a manner as to protect them from damage during the construction period. Installation shall commence only when all flooring finishes have been completed.

IV - MATERIALS

Wooden panel doors and frames materials shall conform to the best commercial standard as approved and as specified herein. Doors and frames shall be factory-fabricated conforming to specifications.

V - DOORFRAMES

Frames shall be of the design and size indicated. Frames shall be set plumb, true, and braced to prevent distortion. Frames in masonry or concrete walls shall be fastened as indicated. Frames shall be good grade hardwood.

Wooden hollow core doors and frames shall conform to the best commercial standard as approved and as specified herein. Hollow core doors and frames for governor's office and other general office areas shall be factory-fabricated conforming to specifications.

VI

Doors shall be wood and shall be of best commercial standard, manufactured by reputable sash company. Door shall be hollow core, panel or as indicated and shall be factory pre-fabricated, color and configuration, as approved..

VII - INSTALLATION

Hinged doors shall be hung plumb, and fitted accurately allowing 1.59mm clearance at the jambs and heads. Lock stiles of doors, 44mm thick or thicker, shall be levelled 3mm in 50mm. Knob locks and latches shall be installed 97cm from finished floors to the center knobs. Apply hardware with fastenings of the size, quality, quantity and finish to provide workable door system and as specifies in Section: Builder's Hardware.

VIII - PAINTING FINISHES

Entance panel doors and frames shall be varnished.

Hollow core doors shall be painted duco finish with acrylic automotive paint as indicated shall be beige, ivory or white as approved. Submit color swatches for preliminary approval.

Generator Room steel door and frame shall be provided with anti-corrosive primer and finished with acrylic enamel paint as indicated. Color shall be beige, ivory or white as approved.

IX - WORKMANSHIP

The finished item shall be firm, neat in appearance, and free from defects, warp, or buckle. Members shall be sharp in detail, straight and true. Corner joints shall be mitered, well formed, and in true alignment. Exposed joints shall be dressed smoothly.

X - SUBMITTAL REQUIREMENTS

Prior to fabrication and delivery-doors and frames catalog cuts and sample finishes shall be submitted for approval.

END OF SECTION

HARDWARE

I - SCOPE

This section includes provision of all builders' hardware, complete.

II - GENERAL

All items of finish hardware shall be furnished, packaged and labelled in sets as specified. All items of finish hardware of like kind and purpose shall be of the same manufacturer.

III - MATERIALS

1. BUTT HINGES

This shall be provided four pieces for each door. Butt hinges shall be heavy-duty, loose-pin type, 75mm x 75mm, and satin finish.

2. LOCKSETS

Locksets shall be supplied by a accredited manufacturer, type as recommended by the manufacturer on their specific use and as approved. Other factors being equal, preference will be given to the lockset offering the larger number of nonferrous components, of the types specified hereinafter. Knobs shall be located so that the centreline of the strike is 97cm (nominal) above the finished floor.

3. DOOR CLOSERS

Door closers shall be supplied by a accredited manufacturer or approve equivalent, right and left as may be required, with hold-open device at 90 degrees.

4. DOOR STOP

Door stop shall be heavy duty, wall-mounted, as indicated.

5. GOVERNOR'S OFFICE PANTRY and COUNTER CABINET DOORS

These shall be provided with concealed, SOSS-type hinges and approved door pulls approximately 10mm in diameter and 100mm long. All drawers shall be provided with corresponding drawer locks. 38mm high from bottom of drawer door, color, as directed.

6. GENERAL OFFICE AREAS – ALUMINUM SWING DOORS

Entrance aluminium swing doors for general office areas shall be provided with cylindrical lockset with dead bolt function. Doors shall provided with cylindrical lockset with dead bolt function. Doors shall have heavy mortise extension bolt: heavy 25mm throw, 150mm long, 20mm wide, non-ferrous, and located at the top and bottom of the door.

7. KEYING

All door locks shall be keyed individually and three such keys shall be furnished for each lock and submit to the Rizal provincial government representative properly identified.

IV - INSTALLATION OF HARDWARE

All hardware shall be installed in a neat, professional manner, following manufacturer's instructions. Except, as indicated or specified otherwise, fasteners furnished with the hardware shall be used to fasten hardware in place. After installation, protect hardware from paint, stains, blemishes and other damages until acceptance of the work. All hardware shall be adjusted properly and checked in the presence of the Project Manager, Architect, or Engineer, and all hinges, locks, bolts, pulls, closer and other items shall operate properly. After hardware is checked, keys shall be tagged, identified, and certified representative. All errors in cutting and fitting, and all damage to adjoining work shall be corrected, repaired and finished as directed.

1. APPLICATION OF BUTT HINGES

1. TOP HINGES

Top hinges shall be installed with the center of the hinge not more than 20cm below the top of the door.

2. BOTTOM HINGES

Bottom hinges shall be installed with the center of the hinge not more than 20cm above the finished floor.

3. TWO INTERMEDIATE HINGES

Two intermediate hinges shall be installed equidistant between the top and bottom hinges.

2. DOOR CLOSING DEVICES

Door closing shall be installed and adjusted in strict accordance with the templates and printed instructions supplied by the manufacturer of the devices. In so far as practicable, doors opening to or from halls and corridors shall have the closer mounted on the room side of the door.

V - PACKAGING AND MARKING

Items of hardware shall be delivered to the jobsite in their original individual containers, with the necessary appurtenances including screws, key, and instructions. Each individual container shall be marked with the manufacturer's name and catalog number.

VI - SUBMITTAL REQUIREMENTS

Prior to procurement, the contractor shall submit brochures/catalogs and schedule of application for door locks, door closets, butt hinges, door stop, mortise extension bolt, cabinet concealed hinges, drawer slide and door pull.

END OF SECTION

GLASS AND GLAZING

I - SCOPE

This section includes all windows and doors and other requirements, complete.

II - GENERAL

1. GLASS

Glass shall be provided in locations as indicated and the corresponding type specified on architectural drawings. All standard procedure on glass and glazing work must be implemented to ensure correct fitting and glazing in order to preserve the physical strength of the glass when used as intended on any building exterior and interior application.

2. GLAZING RABBETS

Glazing rabbets shall be rigid, true, plumb, square, properly primed, clean, dry and dust-free before glazing work is started. Protective coating shall be removed from metal rabbets with an approved solvent. Glazing work shall not be performed during damp or rainy weather. Sashes shall be glazed in a closed position and shall not be operated until the glazing compound has set. Glazing materials shall be mixed uniformly without the addition of thinners or other materials shall be mixed uniformly without the addition of thinners or other materials, and be used while still fresh.

3. DELIVERY AND STORAGE

Materials shall be delivered to the site in an undamaged condition and stored out of contact with the ground. Upon arrival at the jobsite, the glass shall be checked by the Contractor for damage. Glass found damaged, which, in the appearance of the Project Manager, Architect, or engineer, may affect appearance or aesthetic of the hallway glass curtain-wall system, and shall not be used in unopened containers, labelled plainly with the manufacturer's name and brands.

4. MATERIALS

Glass shall be as manufactured or distributed by an accredited manufacturer or approved equivalent.

1. GLASS

Each glass shall have the manufacturer's label showing the type, thickness, and quality of glass. Labels shall not be removed until the glazing work has been approved.

2. CLEAR GLASS

Clear glass shall be **supplied by a accredited manufacturer** heat strengthened tempered glass and 6mm thick shall be framed in aluminium hallway windows and swing doors.

3. GLAZING

a. Glazing Materials

Glazing materials shall comply with all pertinent codes and regulations including recommendations specified on approved standards. For reference, glazing codes and recommendations are based on industrial standard. The use of non-skinning compounds, non-resilient type pre-formed sealers, and pre-formed impregnated type gaskets will not be permitted. When flexible vinyl gasket channels are used, the material shall conform to commercial standard. Materials used with aluminium frames shall be aluminium colored, non-staining, and do not require painting. Other materials which will be exposed to view and unpainted shall be gray or neutral color. Glazing materials shall be as specified herein and as recommended by the glass the manufacturer as approved.

b. Glazing Sealant

Glazing sealant shall be single or two component silicone rubber or two-component polysulfide type.

c. Glazing Accessories

Glazing accessories as required to supplement the installation shall be provided on the items to be glazed and provide a complete work. These include glazing points, clips, angles, and beads, setting blocks, edge spacer, back up material, primer and masking tapes. Ferrous metal accessories which will be exposed in the

finished work shall have finish that will not corrode or stain while in service.

5. INSTALLATION

1. GENERAL

Work instructions on glass fitting and installation should strictly follow a standard precautionary measure to avoid damage or breakage on glass and to secure total work safety. Glazing and fitting methods shall depend on the type of frame and the glass to be used. Glazing on conventional frame section such as aluminium shall be glazing bead, glazing channel or sealant as caulking materials while glazing on concrete or metal channel support shall be sealant or glazing gaskets.

The sizes to provide for, be glazed may be field glaze, using glass of the quality and thickness specified or indicated. Preparation of glazing, unless otherwise specified, shall be in conformance with the details and general conditions governing glazing in the Glazing Manual. Aluminum doors, wood doors, and steel casement windows may be glazed in conformance with one of the glazing methods described in the standards under which they are produced, Beads or stops which furnished with the items to be glazed shall be used to secure the glass in place. Insulating units shall not have edges or corners' ground, nipped, cut, or fitted after leaving the factory, shall not be subjected to springing, forcing, or twisting during setting, and shall be handled so as not to strike setting frames or other objects.

6. CLEANING

Upon completion of the building, cracked, broken or imperfect glass, or glass which has been set improperly shall be replaced. Glass surfaces shall be thoroughly cleaned, with labels; paint spots, putty, and other defacements removed, and shall be clean at the time the work is accepted.

7. SUBMITTAL REQUIREMENTS

Prior to procurement of materials, brochures, catalog cuts and 12" square sample of glasses, glazing sealants and accessories shall be submitted for approval

END OF SECTION

WINDOWS AND FRAMES

I - SCOPE

This section includes hallway aluminium windows, complete.

II - STORAGE AND PROTECTION

Materials shall be stored out of contact with the ground and shall be arranged to avoid bending, warping or otherwise damaging the fabricated windows.

III - MATERIALS

1. ALUMINUM HALLWAY WINDOWS

Aluminum hallway fixed windows shall be horizontal-type; frames shall be standard sizes or as indicated with powder-coated finish. Glass shall be 12mm thick, tinted bronze or clear, as approved.

2. WEATHER STRIPPING

Weather stripping shall be the standard type of the manufacturer, as approved, and shall be easily replaced without special tools.

IV

1. HALLWAY WINDOWS

Hallway fixed glass windows shall be installed without forcing or distortion so that sills and heads are level and jumbs are plumb. Window frames shall be securely anchored into the supporting construction. Joints between aluminium windows and aluminium members including mullions shall be set in mastic of the type recommended by the manufacturer and as approved, to provide completely water-tight joints. After installation and glazing, each fixed glass window shall be checked and adjusted as necessary to provide an even edge contact. Aluminum powder coated surfaces shall be cleaned and any staining or discolouring of the finish shall be restored or the unit replaced.

V - SUBMITTAL REQUIREMENTS

Prior to fabrication and delivery, brochure, catalogs, or shop drawings, samples of aluminium frames, mullions, type of finish and glass shall be submitted for approval.

END OF SECTION

PLUMBING WORKS

I. SUMMARY

A. The General Conditions apply to all work under this section of the Specifications.

1.01 SCOPE OF WORK:

- A. Unless otherwise specified, the Contractor or his subcontractor shall furnish all materials, tools, equipment, apparatus, appliances, accessories, transportation, labor and supervision required for the complete installation and testing of the Plumbing System ready for use in accordance with the best practice of the Plumbing Trade as listed herein but not limited to the following:
1. The Plumbing Contractor is required to refer to all Architectural, Structural, Mechanical, Fire Protection, and Electrical plans and investigate all possible interference and conditions affecting his work.
 2. All work shall comply with the pertinent provisions of the Plumbing Code of the concerned city, the Code on Sanitation of the Phil., and / or the National Plumbing Code of the Philippines.
 3. Tapping from an existing water main of the building distribution system to include supply and installation of main water meter and gate valve.
 4. Water supply and distribution system for the building and ground.
 5. All building sanitary drains, waste and venting systems including floor drains.
 6. Sewage collection and disposal system including cleanouts up to septic tanks or sewer line.
 7. Building storm drainage system including deck and roof drains, canopy drains, plant boxes drains, catch basins and connection to street drainage.
 8. Kitchen waste and vent system.
 9. Supply and installation of all plumbing fixtures, fittings, trims and accessories.
 10. Supply and installation of transfer pumps, sump pumps and fire pump, water heater and grease traps.

11. Supply and installation of fire water lines, valves, fire hose cabinets, dry stand pipe and fire department connection including for table fire extinguishers.
12. Testing for leakages of all storm drainage, waste, sewer and venting system plus pressure testing and disinfection of the water supply and distribution system.
13. Securing of all permits and licenses as required to include water connection.
14. Excavation and backfilling in connection with the work shall be included.
15. Preparation and submittal of two (2) sets of As-built plans and one (1)-set of reproducible prints.
16. Furnishing of written one (1)-year warranty on the plumbing system

1.02 WORK NOT INCLUDED

- A. Construction of septic tank sump pit and cistern shall be by Civil Works.
- B. All electrical power wirings , except that furnished as an integral part of factory assembled except as otherwise specified herein.
- C. Painting except as required by the Plumbing Code and as specified herein.
- D. Deepwell drilling and construction to include deepwell pump and related works. (If required)
- E. Construction of elevated water tanks. (By Owner furnish)

1.03 NOTES ON DRAWINGS:

- A. The drawings show the general arrangement all pipings. However, where local and / or actual conditions at the jobsite necessitate a deviation or rearrangement, the Contractor shall prepare and submit the new arrangement for the approval.
- B. Small scale Drawings do not possibly indicate all offsets, fittings and other parts of the system required. The Contractor shall arrange such work accordingly, furnishing such fittings , traps valves and accessories as may be required to meet such conditions.

1.04 APPLICABLE SPECIFICATION CODES, ORDINANCES, PERMITS AND FEES:

- A. The work covered in this contract is to be installed according to the specs, codes, ordinances and requirements of the following:
 - 1. National Plumbing Code of the Philippines
 - 2. The Code on Sanitation of the Philippines
 - 3. National Pollution Control Commission
 - 4. Ordinances of concerned city or municipality
- B. All construction permits and fees required for the work shall be obtained by and at the expense of the contractor. The contractor shall furnish the Owner final certificates of inspection after the completion of the work.

1.05 WORKMANSHIP & COORDINATION WITH TRADES:

- A. All work shall be performed in first class and neat workmanship by mechanics skilled in their trades and such mechanics and their work shall be satisfactory to the Engineer.
- B. The Plumbing Contractor is required to refer to the General Conditions and to all Architectural, Structural, Electrical, Mechanical and Fire Protection plans and shall investigate all possible interference and conditions affecting his work.

II PRODUCT

2.01 GENERAL

- A. Except as specified, the Contractor shall submit for the Engineer's approval, four (4) copies of a complete list of manufacturer's name of all equipment and materials he proposes to use, within thirty (30)-days after award of contract.
- B. The Contractor shall assume the cost of and the entire responsibility for any change in the work as shown on contract drawings which may be occasioned by approval of materials other than those specified.

2.02 PIPES AND FITTINGS SCHEDULE

- A. ***Cold and Hot Water Lines*** – shall be Polypropylene Pipe PN 20 **supplied by a accredited manufacturer** or equivalent.
- B. ***Sewer Line*** – shall be polyvinyl chloride (PVC) pipe series 1000 II, approved by Project Manager. Fittings shall be solvent cement joint conforming to ASTM D2564.

C. **Waste Lines** – shall be polyvinyl chloride (PVC) pipe series 1000 II, approved by Project Manager or equivalent.

D. .. Fittings shall be solvent cement joint conforming to ASTM D2564.

Exposed soil, waste and vent stack shall be cast iron pipe, extra heavy.

E. **Vent pipes** - shall be polyvinyl chloride (PVC) pipe, series 1000 II, approved by Project Manager or equivalent. Fittings shall be solvent cement joint to ASTM D2564.

F. **Downspouts** – shall be polyvinyl chloride (PVC) pipe series 1000 II, approved by Project Manager or equivalent. Fittings shall be solvent cement joint conforming to ASTM D25640.

G. **Storm Drainage** – shall be polyvinyl chloride (PVC) pipe series 1000 II, “Emerald” brand or approved equal. Fittings shall be solvent cement joint conforming to ASTM D2564.

For outside building, concrete drain pipe (CDP), tonque and groove , mortar joints, reinforced for 300mm Ø and larger.

H. **Fire Water Line** – shall Galvanized Iron (G.I.) pipe, or approved by Project Manager.

2.03 VALVES

A. **Gate Valve** – 65mm and smaller, shall be rising stem, all bronze, female threaded, min. of 150 psig working connection. Approved by the Project Manager or equivalent.

B. **Check Valve** - 65mm and smaller, same except female threaded connection. Approved model “Bermad”, Kitz or approved equal

2.04 OTHER MATERIALS

A. **Drains** – as indicated or approved equal.

1. Roof	-	M-319-16, as indicated or approved
2. Floor / Shower	-	M-210-, as indicated or approved
3. Deck	-	M-319-36, as indicated or approved
4. Canopy	-	M-319-34 as indicated or approved
5. Trench Drain	-	M-319-34, as indicated or approved
6. Cleanout	-	M-240, as indicated or approved

C. **Water Meter** – (size as indicated on the plans) “Badger” or approved by MWSS for main meter, “ARAD”, “ASAHI” for sub-meters or MWSS approved.

- D. **Hose Bibb** – 20mm standard hose connection, male tapered threads , polished chromium plated.
- E. Outdoor Pipe Lines Appurtenances:
- F. **Drainage Junction Boxes** - 140 kg / sq. c.m. reinforced concrete with pre-cast reinforced concrete cover.
 - 1. Thrust Blocks – 140 kg. / sq.c.m. plain concrete.
 - 2. Sewer Junction Boxes – 140 kg. / sq. reinforced concrete with C.I. grating cover.
 - 3. Area Drain / Catch Basin – 140 kg. / sq. reinforced concrete with C.J. grating cover.

2.05 JOINTING

- A. Flanged Joint Gasket – as indicated or approved
- B. Screwed Joints – U.S. Federal Specifications GG-P-251
- C. PVC Pipes and Fittings – PVC cement or as per the Manufacturer's recommendations.
- D. Dissimilar Pipes – Adaptor fittings shall be used.
- E. Concrete Drain Pipe – Cement mortar.

III. IDENTIFICATION & APPROVAL OF MATERIALS

- A. Each length of pipe, fittings, traps, fixtures and device used in the Plumbing System shall have cast, tamped or marked on it, the manufacturer's trade mark or name, the weight, type and classes of product when so required by the Standard.
- B. Within thirty (30) days after award of the Contract, the Contractor shall submit for the approval, the names and / or samples of the materials if deemed necessary.
- C. Brand names mentioned in this Specifications are only for the purposes of indicating the desired quality and design.
- D.

IV SUBSTITUTION & TESTING OF MATERIALS:

- A. Materials intended to be substituted for those originally specified shall be accepted only after a formal request for substitution, accompanied by:
 - 1. Reasons for substitutions

2. Certificate of test indicating quality, compared to those originally specified.
 3. Cost comparisons with material originally specified. Request shall be submitted to the Project Manager for evaluation at least 15 working days before installation of subject materials is due, or at least 7 days before opening of bids.
- B. Cost of testing of materials, whether on originally specified items or on substitutions, shall be to the account of the Contractor.
- C. Results of tests shall be submitted to the Architect for evaluation at least 15 days before the material is due for installation on the job.

V SOIL, WASTE, DRAIN AND VENT PIPES:

5.01 GENERAL

- A. Underground soil, waste and water pipes and fittings shall be PVC pipes, unless specifically noted. Soil and waste pipes above ground shall be PVC pipes. Vent pipes shall be polyvinyl chloride (PVC) pipe. Fittings for pipings above ground shall be drainage pattern. Fittings for piping on all dry vents shall be polyvinyl chloride (PVC) pipe. All exposed stack shall be cast iron soil pipes, extra heavy grade.
- B. All cast iron soil and drainage pipes shall be pitched 6mm per 300mm but in no case flatter than 3mm per 300mm.

5.02 TRAPS

- A. Every plumbing fixtures shall be separately trapped by a vented water sealed trap as close to the fixture outlets as the conditions allow, but in no case at a distance greater than 600mm. In case of the upper or the only fixture on a soil pipe extended full size through the roof, a vent shall not be required when said fixture has its center stack. Traps shall be of the same diameter as the waste pipes from the fixtures which they shall serve, all traps shall have a water seal of at least 32 millimetres with a brass thumbscrew cleanout at the bottom of the seal.

5.03 VENT

- A. Vent shall be taken from the crown of the fixtures, except for water closet traps, in which case, the branch line shall be vented below and trap and above all small waste inlets, so connected as to prevent obstructions. Each vent pipe shall be run separately above the fixtures into the adjacent soil pipes, a distance not more than 1.50 meters. If more than this distance, the vent shall run immediately through the roof.

- B. A vent line shall be wherever practicable , direct extension of a soil or waste line.
- C. Main vent risers at 4.5 meters along or more shall be connected at the foot with the main water or soil pipes below the lowest vent outlet with a forty five degree (45) connection.
- D. All vertical soil or vent pipes shall be carried up at least 600mm above the roof of the building and the open side ends are to be entirely and securely covered with ga. 16 mesh copper cloth.
- E. Vent pipes in roof spaces shall be run as close as possible to the underside of roof with horizontal piping pitched down to stacks without forming traps. Where an end or circuit vent pipe from fixtures it shall be connected into the main vent or vent stack.

5.04 ROUGHING – IN

- A. Roughing-in for pipes and fixtures shall be carried along with the building construction. Correctly located openings of proper sizes shall be provided where required in the walls and floors for the passage of pipes all items to be embedded in concrete shall be thoroughly clean and free from all rust, scale and paint.

5.05 FITTINGS

- A. All changes in pipes sizes on soil, waste and drain lines shall be made with reducing fittings or reducers. All changes in direction shall be made by the appropriated use of forty five degrees (45) wyes, or long sweep bends, except that sanitary tees may be used on vertical stacks. Short quarter bends or elbows may be used in soil and waste lines where the change in direction is from the horizontal to the vertical and on the discharge from the water closet.

5.06 JOINTS AND CONNECTIONS

- A. All joints shall be air water tight. For joining pipes, the following shall be used.
 1. Galvanized wrought iron or steel pipe, screwed or threaded joints, use sealant.
 2. Concrete pipes: bell and spigot or tonque and groove,
 3. Polyvinyl chloride (PVC) pipes, socket type with PVC cement.

VI WATER DISTRIBUTION

6.01 METER

- A. Water meter shall be furnished by the Contractor and installed with the proper and complete piping arrangements for the system.
- B. The exact dimensions for setting the meter shall be as per requirements of the authorized agency.

6.02 INSTALLATION

- A. The pipings shall be extended to all fixtures, outlets and equipment from the gate valves installed in the branch near the riser.
- B. Unions shall be provided where required for disconnection.
- C. All pipes shall be cut accurately to measurements and shall be worked into place without springing or facing. Care shall be taken so as not to weaken the structural portions of the building.
- D. All service pipes valves and fittings shall be kept at sufficient distance from work to permit finished covering not less than 15mm from such work or from finished covering on the different service.
- E. Changes in pipes shall be made with reduring fittings.
- F. Accessible Contraction – Expansion joints shall be made wherein necessary. Horizontal runs of pipe over 15m in length shall be anchored to wall or the supporting structure about midway on the run to force expansion and contraction equally towards the ends.

VII EXCAVATING, PIPE LAYING AND BACKFILLING:

7.01 TRENCHES

- A. Trenches for all underground pipe lines shall be excavated to the required depths and grades. Bell holes shall be provided so that pipe will rest on well-tamped solid ground for its entire length. Where rock is encountered, excavation shall extend to a depth 150mm below the pipe bottom and other approved filling materials.

7.02 CONCRETE PROTECTION

- A. All pipes except concrete pipes and cast iron that will run underground shall be protected with Class B concrete casing, a minimum of 100mm around the pipe perimeter and 250mm below the finish grade.

7.03 MATERIALS

- A. Materials for backfilling shall be free of debris or big rocks. Backfill shall be placed in horizontal layers, properly moistened and compacted to an optimum density that will prevent excessive settlement and shrinkage.

VIII MISCELLANEOUS

8.01 CLEANOUTS

- A. Cleanout shall be of the same size as the pipe, the location of which is extended to an easily accessible place.

8.02 TRAPS

- A. Every plumbing fixture of equipment requiring connections to the drainage system shall be equipped with a trap.
- B. Each trap shall be placed as near as possible to the fixture. No fixture shall be double-trapped.

8.03 VALVES AND HOSE BIBBS

- A. Valves shall be provided on all water supplies to fixtures as specified.
- B. Hose bibbs shall be made of brass with 15mm male inlet threads hexagon shoulders and 20mm connections.

8.04 PIPE HANGERS INSERTS AND SUPPORTS

- A. Horizontal runs of pipe shall be hung with adjustable wrought iron or malleable iron pipe hangers spaced not over 3m apart, except hush and spigot soil pipes which shall have hangers spaced not over 1.52m apart and located near the hush.
- B. Hangers shall have short turn buckles or other approved means of adjustment.
- C. Inserts shall be of cast steel and shall be of type to receive a machine bolt or nut after installation.

- D. Vertical runs of pipe shall be supported by wrought iron clamps or collars spaced not more than 9m apart.
- E. Water and Vent Pipes – 65mm and larger, band type 6.4mm x 25mm flat mild steel or black iron with 15mm round rod with plates and nuts; 50mm and smaller split ring type with 10mm iron rods with inserts plates, toggle bolts, clamps or expansion shield.

8.05 PIPE SLEEVES

- A. Pipe sleeves shall be installed and properly secured in place at all joints where pipes pass through masonry or concrete.
- B. Pipe sleeves shall be of sufficient diameter to provide approximately 6.44mm clearance around the pipe of insulation.
- C. Pipe sleeves in walls and partitions shall be of cast iron, wrought iron or steel. Pipe sleeves in concrete beams or concrete slabs shall be wrought iron or steel pipe.
- D. Pipe sleeves on footings shall be cast iron or steel and shall be not less than 100mm larger in diameter than the pipe to be installed.
- E. Where pipe pass through waterproofing membrane, the sleeves shall be provided with an integral flange or clamping device to which a flashing shield can be soldered.
- F. The space between the pipes and sleeves shall be made water tight by inserting a picked oakum gasket and filling the remaining space with poured lead caulking thoroughly.

IX SITE PLUMBING UTILITIES

9.01 GENERAL

- A. The entire site plumbing utilities system shall be laid out and installed consistent throughout with the given slopes in the plans. Pipe joints and connections to area drains, catch basing, and junction boxes shall possess such leak-proof and seepage-proof integrity achievable with the works called for under this particular section of the Specifications.
- B. Junction Boxes for storm and sanitary (sewer) drainage lines outside the building shall be cast-in place reinforced concrete sections and pre-cast concrete over.
- C. Trench excavation and backfilling shall be as specified in excavation, trenching and backfilling for utility system.

D. Concrete Drainage Pipe:

1. Material, Pipe shall be reinforced concrete pipe (300mm dia. and larger) and non-reinforced concrete pipe 250mm dia. and smaller conforming to ASTM C-14-75.
2. Installation:
 - a. Bedding surfaces shall provide a firm foundation, carefully shaped true to line and grade.
 - b. Concrete pipe shall be laid carefully with hobs up and ends fully and closely joints. Joints shall be cement mortar. Cement mortar shall consist of one part Portland Cement and 1-1/2 parts clean sharp sand with only enough water for work-ability. A gasket of closely twisted hemp or oakum shall be placed around the pipe. The gasket shall be in one (1) piece of suitable diameter (not less than 19mm) and shall be lapped at the top. The gasket shall be saturated. With that cement before being placed and rammed. The joint shall be completely filled with cement mortar and rammed thoroughly with a wooden caulking tool. The joint shall then be overfilled and finished to a smooth level outside.

9.02 EXCAVATION FOR STORM & SANITARY (SEWER DRAINAGE SYSTEM)

- A. General. The Contractor shall do all excavation of whatever substances encountered below depth shown on drawings. Excavated materials not required for fill or backfill shall be removed from site as directed by the Engineer and disposed of by the Contractor. Excavation for accessories to have 300mm minimum and 60mm maximum clearance in all side. Excavation not carried below the required depth. Excess excavation below required level shall be backfilled at the Contractor's expense with earth, sand, gravel or concrete, as directed by Engineer, and thoroughly tamped unstable soil shall be removed and replaced with gravel or crushed stone, which shall be thoroughly tamped.

The Engineer shall determine the depth of removal of unstable soil. Ground adjacent to all excavation shall be graded to prevent water running. The Contractor shall removed by pumping or other means approved by the Engineer any water accumulated in excavation and keep trench unwatered until the bedding in complete.

- B. Trench excavation. Banks of trenches shall be vertical. Soft materials shall be reported to the Engineer. In rock, excavation shall be carried 200mm below bottom of pipe. Loose earth or gravel shall be used for backfill, and tapped thoroughly and rounded to received pipe as above.

- C. Bracing and Shoring. The Contractor shall do all bracing sheathing and shoring necessary to perform and protect all excavation as indicated on the plans, as required for safety, as directed or to conform to governing laws.

9.03 BACKFILLING

- A. Backfilling: After pipes have been tested and approved, backfilling shall be done with approved material free for large clods or stones.
 1. Trenches. Backfill material shall be placed evenly and carefully around and over pipe in 150mm maximum layers. Each layer shall be thoroughly and carefully rammed until 300mm of cover exists over pipe. The remainder of backfill material shall be placed, moistened and compacted. Water settling will not be permitted in clay soils. It may be required at the option of the Engineer in sandy soils.
 2. Trench under areas to be paved. Material shall be placed in 200mm maximum layers after filling 300 mm above pipe as previously described. Each layer shall be compacted to density equal to that of adjacent original material so that pavement can be placed immediately.
 3. Structures: All forms, trash, and debris shall be removed and cleared away. Approved backfill material may be from excavation or borrow, it shall be free from rock, lumber or debris. Backfill material shall be placed symmetrically on all sides in eight inch maximum layers. Each layer shall be moistened and compacted with mechanicals or hand tampers. In area to be paved, each layer shall be compacted to density equal to that of adjacent materials so that pavement can be placed immediately.
- B. Maintenance. The Contractor shall refill for resettlement all backfilled areas.
- C. Clean-up. The Contractor shall clean up and dispose of all excess materials, trash, wood forms and other debris.

X TEST AND DISINFECTION

10.01 DRAINAGE SYSTEM TEST

- A. The entire drainage and venting system shall have all necessary openings which can be plugged to permit the entire system to be filled with water to the level of the highest stack vent / or vent stack above the roof.

- B. The system shall hold this water for a full thirty (30) minutes during which time there shall be no drop more than 100mm.
- C. Each section of pipeline shall be slowly filled water and the specified test pressure, measured at the point of lowest elevation shall be applied by means of satisfactory to the Project Manager. During the filling of the pipe in and before applying the test pressure, all air shall be expelled from the pipe line. To accomplish this type shall be made if necessary, at point of highest elevation, and after completion of the test the taps shall be tightly plugged unless otherwise specified.

During the test, all expose pipes, fittings, valves joints and couplings will be carefully examined. If found to be cracked or defective, they shall be removed and replaced by the Contractor with sound materials at his won expense. The test shall be repeated until satisfactory results has been obtained.

10.02 PRESSURE TESTS FOR WATER LINES;

- A. After the pipe have been installed , the joints completed and with joints exposed for examination, all newly installed pipe or any valve section therefore, shall be subjected to hydrostatic pressure 1 ½ the designed working pressure of the system or as specified by the Project Manager.
- B. The duration of each pressure test shall be at least 10 minutes unless otherwise specified the Project Manager.
- C.
- D. Each section of pipeline shall be slowly filled water and the specified test pressure, measured at the point of lowest elevation, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Project Manager.. During the filling of the pipe and before applying the test pressure, all air shall be expelled from the pipe line. To accomplish this type shall be made, if necessary, at point of highest elevation, and after completion of the test the taps shall be tightly plugged unless otherwise specified.

During the test, all exposed pipes, fittings , valves, joints and couplings will be carefully examined. If found to be cracked or defective, they shall be removed and replaced by the Contractor with sound materials at his expenses. The test shall then be repeated until satisfactory results are obtained.

10.03 DEFECTIVE WORK:

- A. If the inspection or test shows any defect, such defective work or material shall be replaced and the test shall be repeated until satisfactory to the Project Manager..
- B. All repairs to piping shall be made with new material at the expense of the Contractor.
- C. No. caulking of screwed joints of holes will be accepted.

10.04 DISINFECTION OF WATER DISTRIBUTION SYSTEM AND WATER TANKS (as per AWWA C-601)

- A. The entire water system shall be thoroughly flushed and disinfected with chlorine before it is placed on operation. Water tanks shall be washed and swabbed.
- B. Chlorination materials shall be liquid chlorinated or hypochlorite , as specified and shall be introduced into the water lines in a manner approved by the Engineer. Tanks shall be thoroughly cleaned of all debris, dirt or dust before swabbing.
- C. The chlorine dosage shall be such as to provide not less than fifty parts per million (50ppm) or available chlorine.
- D. Following a contact period of not less than sixteen (16) hours, the heavily chlorinated water shall be flushed from the system with clean water until the residual chlorine content is not greater than two tenth (0.20 ppm). All valves in water lines being sterilized shall be opened and closed several times during the 16 hour chlorinating period.

XI CLEANING

- A. All exposed metal surfaces shall be free of grease, dirt or other foreign materials.
- B. Chrome or nickel plated pipings, fittings and trimmings shall be polished upon completion.
- C. All plumbing fixtures shall be properly protected from use and damage during the construction stage. The fixtures shall be cleaned to the satisfaction of the Architect upon completion and prior to acceptance of work.

- D. All equipment, pipes, valves and fittings shall be cleaned of grease and sludge which may have accumulated. Any clogging, discoloration or damage to other parts of the building due to the system shall be repaired by the Contractor.

XII PAINTING AND PROTECTION:

- A. All exterior of pipings to be installed in or through concrete floor fill or fill floors and underground shall be given one coat of acid resisting paint having a bituminous base.
- B. Pipe hanger supports and all other iron work in connected spaces shall be painted with one coat of asphalt.
- C. Exposed galvanized iron pipes and fittings that are asphalt coated shall be given two coats of shellac prior to application of two coats of oil paint as directed by the Project Manager or his authorized representative.

XIII COLOR CODE FOR EXPOSED PIPES

- A. All exposed pipings shall be adequately and durably identified by distinctive colored paints as follows:

ITEM	COLOR CODE
Cold Water Pipe	Blue
Storm Water Pipe	Aluminum
Sewage Pipe	Black
Vent Pipe	Green
Waste Pipe	Gray
Fire Line	Red

XIV WARRANTY & “AS-BUILT “ PLANS

- A. All works, equipment and fixtures shall be guaranteed by the Contractor for satisfactory service for a minimum period for one (1) year.
- B. The Contractor shall submit to the Owner, in reproducible form plus three (3) sets of white prints, the complete plans of the entire system as actually built. The cost of those shall be borne by the Contractor. Submittal of “AS BUILT” Plans shall be a condition to final payment.

- C. Equipment that should have the Owner (s) your minimum guaranteed against defective designs, materials and workmanship.

XV RESPONSIBILITY

- A. The general Contractor shall be responsible for the coordination among the different trades on the job in order to finish the work in the least possible time, in strict accordance with the Plans and Specifications.
1. Throughout the construction period open ends of all installed pipe lines shall be kept closed by temporary plugs.
 2. Drainage lines shall not be used to conduct dirty construction washwater especially those with cement mixes to avoid possible clogging.
 3. A temporary fire protection system shall be provided by the Contractor during the construction period. This shall be of sufficient capacity to put out any fire that may break out at any floors due to construction operations. This is in addition to temporary fire extinguisher required.
 4. A temporary potable water supply shall be made available to construction workers at every floors as construction progresses.
 5. A temporary human excreta disposal system shall be provided by the Contractor to serve the workers during the construction period.

*** END OF SPECIFICATIONS***

ELECTRICAL WORKS

I. BASIC ELECTRICAL MATERIALS AND METHODS

A. DESCRIPTION

1. This section includes specifications for basic materials and methods for electrical works.
2. Whenever conflicting standards arise during the project implementation, the provisions of the latest edition of Philippine Electrical Code shall govern. When detailed specifications lack, the standards of the Bureau of Product Standards shall be referred to.
3. Other standards herein indicated shall be the latest editions of the issuing organizations and bureaus.
4. All materials incorporated in this Works shall bear the product seal of approval of the Bureau of Product Standards and/or Import Commodity Clearance of the Department of Trade and Industry.
5. Brands and Manufacturers, other than those specified in the Contract, shall be submitted for approval of the assigned Project Management Officers.
6. Drawings show wiring runs schematically and do not show bends, offsets, accessories and fittings. Installer shall investigate the field conditions of particular installation and shall re-route and provide accessories as conditions may require.
7. Shop Drawings shall be submitted for details not specified in the Construction Plans.

B. INTERFACE AND COORDINATION

1. Interface and coordinate with other crafts and specialties. Determine areas where works may conflict. Coordinate with Contractors of previous works, if there is any. Conduct inventory and secure existing equipments and materials installed by other Contractors and turn-over such to Owner.
2. Coordinate with Public Utilities, discuss Works covered by this contract, and determine compliable rules and standards for connection with them.
3. Project Management Conferences represented by Stakeholders shall be scheduled at pre-defined intervals and dates.

C. REFERENCE STANDARDS

1. Philippine Electrical Code (PEC)
2. National Electrical Manufacturers Association (NEMA)
3. Underwriters Laboratories (UL)
4. American National Standards Institute (ANSI)
5. American Society for Testing and Materials (ASTM)

D. SUBMITTALS

1. Submission of Shop Drawings for details on particular works not defined by schematics.
2. List materials within allowable time period from Pre-Construction Conferences and Commencement of Works.

3. Where equipments and materials require conformity with the standards of organizations, submit evidence of such conformance for review and record purposes.
4. Labels and listing of specified agencies may support as additional evidence of conformity to rules.
5. Submit shop drawings for review showing the exact locations of facilities and equipments. Include diagrams of equipments and manner of installation.

II. PRODUCTS

A. GENERAL REQUIREMENTS

1. Furnish materials and equipment design, sizes and ratings as specified.
2. Furnish materials and equipment bearing label of classification of testing of recognized testing laboratories and organizations.
3. Methods of fabrication, assemblies, installation, operating parameters (humidity, power, temperature etc).
4. Submit manufacturers' recommended installation procedure and operating environment.

B. CONDUIT

1. Method of wiring shall be through Rigid Conduits (PVC, RSC, etc.).
2. PVC pipes shall be heavy/thick wall, high impact and rigid conforming to the requirements of PNS 14 and EPC-40-PVC.
3. PVC pipes shall be made of virgin PVC materials with fire retarding properties, with the following properties: ASTM D368 at 78°: 6000 psi, ASTM D790: 11000 psi, ASTM D695: 8500 psi, ASTM D2240: 77, ASTM D149: 1100, UL 561.
4. Installation supports shall be spaced not less than those specified at PEC. More rigid supports maybe specified by manufacturers and shall be installed when proof of such shall be submitted for review and approval.
5. Conduits and raceways embedded in concrete and other concealment shall be approved by Technical Professionals of Related Crafts (Structural, Civil, etc).
6. Use approved conduit fittings and factory manufactured boxes.
7. Metallic fittings and boxes shall have been treated for corrosion (primer, enamel, etc).
8. Fabricated hangers shall be formed from 2 or more steel hangers suspended on threaded bolts and fastened by approved expansion bolts. Hanger assembly shall be rigid, shall not sway on normal pressure exerted by indoor ventilation and airconditioning, all full welded at metal joints, and primered and enamel finished.
9. Fabricated hangers shall be able to support 120% of maximum load plus the 60 kg. equivalent to one maintenance personnel who may use the hangers as maintenance platform.
10. Stress at the root thread of hanger rods shall not exceed 65 Mpa as design load. Size the horizontal metallic members to maximum of 85 Mpa as design load.

C. OUTLETS, JUNCTION AND PULL BOXES

1. Provide boxes conforming to the latest edition of Philippine Electrical Code.
2. Volume of wires and devices inside boxes shall be limited to volumes by the Code.
3. Provide electrical boxes of the material, finish, type and size indicated and as required for the location of installation, kind of service, number of wires and function. All holes shall be machined and reamed.
4. Provide boxes with accessible covers designed for ease of maintenance.
5. Boxes below 1600 cubic cm in size shall be cast metal. Boxes in excess of 1600 cubic cm shall be fabricated in compliance with the latest edition of NFPA 70 and NEMA standards.
6. For embedded boxes, the protrusion from the concealment shall consider the depth of plastering and architectural finishes.
7. Boxes embedded in concrete shall be factory fabricated and treated with applicable anti-corrosive finish.
8. Where applications are outdoor type and exposed to the elements, boxes shall be provided with gaskets conforming to IP standards for splash-proofed devices.
9. All metal folds shall be through bender, drill holes threaded, frame rigid and can carry minimum weight of wires and equipment inside, plus 20% of the of the load.

D. CONNECTOR AND INSULATING TAPES

1. Splice and terminal connectors shall conform to NEMA standards and UL 486 listed.
2. Terminations 5.5mm² shall be by pressure twisting. Wires 8mm² shall use tool-applied compression connectors. Bigger wires shall be by barrel type compression connectors.
3. Plastic insulating tape shall be vinyl, pliable at temperature minus 18°C to 105°C. Tapes shall have been tested for ASTM D3005. Tape properties are as follows:
 4. Elongation: 200%, Dielectric Strength, 10KV/mil, Insulation Resistance: 10MΩ, Breaking Strength: 25 kg. per cm.
 5. Rubber Electrical Insulating Tape shall have been tested per ASTM D1000 with minimum properties as follows: Elongation: 500%, Tensile Strength, ASTM D1682: 50 lbs. per inch. Thermal Conductivity, ASTM D1518: .0478 Btu/hr./sqft/°F. Electrical arc resistance: 200 ampere arc for 40 seconds. Packaging shall indicate shelf life. Storage shall be temperature controlled.

E. SWITCHES

1. Light Control Switches shall be full rated to the current and voltage ratings of the current interrupt device serving the circuit. Min: 20A @ 250V.
2. Minimum requirements shall be UL 20. Outdoor installations shall be weatherproof.
3. Materials shall be fire retarding, thermal insulating, non-brittle plastics and all electrical grade components.
4. One-way switches, single or ganged, shall have scratch-proof marking showing its ON state.

F. RECEPTACLES

1. Shall conform to UL 498 and NEMA WD 1 for heavy duty use.
2. Fire resistant, non-absorptive hot molded phenolic bodies and bases and with protrusions for attachment to boxes.
3. Shall conform to NEMA 20R configuration single or ganged as indicated.
4. Live terminals shall be double-grip bronze with spring steel back up clips, grounding type with built-in grounding terminal.
5. Special receptacles shall be rated to the rating of the current and voltage ratings of the interrupt device serving the circuit.
6. Provide cover plates for each receptacle, switches and special outlets. Plate and device to be selected to have at least the minimum variation of color to the wall surface for ease of locating the outlets.
7. Wall plates shall be clip/screw type to be able to withstand normal bumping pressure without breaking nor detaching from the outlet box.
8. Heavy duty receptacles shall conform to NEMA 12 standard for industrial duty enclosures, with name plates, permanent catalog number and applicable electrical ratings.

III. EXECUTION

A. INSTALLATION

1. Electrical construction supervisory personnel (engineers, master electricians and foreman) shall have at least 6 years of supervisory experience in electrical installation works. Curriculum vitae of personnel maybe requested for verification.
2. Install devices, wiring, raceways, and fittings rigid and secure, plumb and level, aligned and related with adjoining works. No vertical raceway runs shall be installed other than 90% of alignment. Where offsets maybe required, boxes and fittings shall be installed. Such fittings and boxes shall be reflected in the As-Built Plans.
3. Mounting heights as indicated or as verified at field.
4. No welding of devices, raceways and boxes to steel frames and supports. Attachments shall be bolts and approved fittings only.
5. Whenever raceways for electrical installed in close proximity with the other crafts, raceways and conduits shall be permanently marked with the types of service at 2.00m interval (power, fdas, voice, etc.).
6. Electrical conduits shall be separated from other crafts at distances specified with the respective regulations.
7. Regular coordination meetings with other crafts shall be held at intervals set by the Project Management.
8. All bends shall be through Long Electrical Elbows, factory made, or heat-bent conduits with internal diameter retained, and visually inspected to determine worthy of use.
9. Electrical project management shall be present during concrete pouring operations and concealment/closing of walls and ceilings.
10. Install supporting members, fasteners, hangers, bracings and bolts in accordance with Seismic Zone 4, Earthquake Resistant Structures, ASEP 1991.
11. Trade sizes and types of raceways shall be indicated or as specified.

12. No explosive driven fasteners shall be used.
13. Construction execution plans shall be made available for comments. Actual raceways routes shall be marked in the construction execution plans for the preparation of as-built plans.
14. No installation methods maybe used which shall result to permanently attaching devices and raceways to hangers and fittings.
15. When field cutting of conduits were required, all splices shall conform to this specifications Section II.D.
16. Supports to raceways shall be spaced in accordance to the minimum spacing required by the Philippine Electrical Code. More rigid spacing maybe required by this Specification's standards. Field conditions may require spacing variation supported by Contractor's submitted shop drawings.
17. Other standards herein indicated shall be the latest editions of the issuing organizations and bureaus.
18. All materials incorporated in this Works shall bear the product seal of approval of the Bureau of Product Standards and/or Import Commodity Clearance of the Department of Trade and Industry.
19. Brands and Manufacturers, other than those specified in the Contract, shall be submitted for approval of the assigned Project Management Officers.
20. This section includes specifications for basic materials and methods for electrical works.
21. Drawings show wiring runs schematically and do not show bends, offsets, accessories and fittings. Installer shall investigate the field conditions of particular installation and shall re-route and provide accessories as conditions may require.
22. Conduits shall be rigid. Short Loopwires maybe allowed to be through flexible conduit subject to submitted and approved Shop Drawings.
23. Boxes embedded in concrete shall be placed so not to interfere with the reinforcing bars. Volume of boxes and raceways embedded in slabs and walls shall be approved in writing/shop drawing by the Supervising Structural Engineer.
24. Protrusion between walls and floor slabs shall be approved by the Project Safety Engineer/ Plumbing Engineer for compliance with Fire Code of the Philippines and NFPA rules on fire isolation between floors.
25. Voltage drops shall be computed for wire runs of considerable distance from the power source. Voltage Drops at circuit level shall not exceed 3%. System Voltage Drops shall not exceed 5%.
26. Electrical panels and boxes shall not be installed below cold water, sewer, ACU condensate lines and storm drains. Electrical facilities in close proximity to said services shall be properly shielded from liquid intrusions.

B. WIRING

1. Submit unbroken standard coils or reels with labels showing the manufacturers' name, trade sizes of wires, and the UL label for 600 Volts Wire.
2. No wires shall be allowed to be installed showing manufacture date of more than 6 months ago.

3. Delivered items shall be tested for insulation integrity using Megger Insulation Tester or equivalent equipment.
4. No wires shall be bent to radii less than 12 times the wire's diameter. Bends shall conform to NFPA 70 and NEMA WC 7, Appendix N.
5. Reeled wires shall be straightened by hand only, no wires shall be straightened by slamming with floor and hard objects. Rubber mallet shall be allowed for arrangement of wires in panels and control centers only.

C. WIRING DEVICES

1. Wiring devices shall be mounted as indicated in the plans. Shop Drawings shall be approved for locations requiring special mounting heights.
2. Attach devices to boxes by means of 2 stainless steel screws.
3. For exterior and damp locations, installed devices shall be outdoor type, with NEMA/IP ratings as indicated in the plans.

IV. WIRES AND CABLES

A. SUBMITTALS

1. Before installation of wires and cables, submit the following data for each type of wires and cables for review: 1. Manufacturer, 2. Certificate of Compliance, 3. Conductor insulation composition, 4. Minimum insulation resistance.

B. DELIVERY, STORAGE AND HANDLING

1. Ship each unit securely wrapped, packaged and labeled for safe handling.
2. Store wires and cables in secure and dry storage. Observe manufacturer's recommended stacking height.

C. PRODUCTS

1. Conductor Materials per ICEA stranded or solid, copper, meeting ASTM B3, soft drawn.
2. Insulation Rating: 600V, meeting current ratings per PEC 2009.
3. Fire Retardant properties per IEEE 383 and shall have minimum circuit time of five minutes in flame test per IEEE 383.
4. Fixture Wires: type SF-2 Silicone Rubber Insulated.
5. Color Coding of Conductor: A: Black, B: Red, C: Blue, Neutral: White, Ground: Green.

D. INSTALLATION

1. Provide wiring complete as indicated. Provide ample slack for loops, service connections, and extensions.
2. Bundle cables and conductors neatly, using nylon cable ties, in panels and cable trays.
3. Provide pull boxes at spaces along wire runs to facilitate ease of wire pulling.

E. IDENTIFICATION

1. Where different circuits housed in single cable tray, bundle each wire and tagged with permanently marked vinyl or PVC tags.

F. FIELD QUALITY CONTROL

1. Perform indicated tests in the presence of the concerned members of Project Management and Owner's Designated Engineer.
2. Prepare tabulated test results, signed and sealed by duly registered engineer(s).
3. Test parameters for cables shall conform to PEC 2009, UL and IEC standards.

V. GENERATOR

A. SCOPE

1. Generator shall be Japan or equivalent North American brand. Units manufactured outside preferred sources shall be licensed by companies of preferred countries of origin.
2. Preference shall be accorded to ISO Registered Manufacturers and Resellers.
3. Unit shall be new, with at least 1 full year of warranty, distributed by a local company with at least 5 years in generator sale, maintenance and distribution.
4. Quarterly preventive maintenance of the unit during warranty period.
5. List of installed/supplied units shall be submitted for verification.
6. Generator shall be outdoor type with soundproofing enclosure, anti-skid footing installed in 150mm thick reinforced concrete base.
7. Brief technical seminar for Owner's operator shall be conducted.
8. Supply to include operating, preventive maintenance manuals and panel software package when applicable.
9. Instrumentation shall include Pressure Gages for Fuel and Oil, Temperature indicators for Cooling Water In and Out, Lube Oil in and Out, Emergency Stop, Electrical Parametered Units (Amps, Volts, Line Currents, Etc).
10. Unit to include Current Interrupting Device and Starting Batteries complete with extensions for charging under normal power conditions.

VI. FIRE DETECTION AND ALARM SYSTEM

A. SCOPE

1. The works shall include the furnishing of labor, equipments, wiring, fittings, programming, operator training and associated activities in the installation of Fire Alarm System.
2. The system shall have 2 zones, general alarm with option for drills and conventional type.
3. FACP shall have the option to be connected to the local fire protection agency via wireless means.
4. Panel shall show zone(s) that triggered alarm conditions.
5. Supply shall include brief operation training and manuals.

B. QUALITY ASSURANCE

1. All materials shall be new and conform to the technical specifications.

2. All items incorporated in the system shall be the UL listed and have been approved for use in the Philippine under latest edition the Fire Code of the Philippines.
3. The equipments shall have passed the applicable tests by the Bureau of Product Standards.
4. The system shall have the capability of recalling alarms and troubles in chronological order to up to 100 events. Alarm history shall be in the form of non-volatile memory and cannot be affected by battery failures.

C. INSTALLATION

1. FDAS wiring shall be through conduits and raceways separate from other building wiring system.
2. Conduit and raceways shall be separated from power line circuits at distances specified by IEC, NFPA 72 and applicable regulations.
3. Conduits shall be embedded in concrete. Where embedded conduit may not be allowed due to structural considerations, conduits shall be firmly fastened at spacing not less than that specified by PEC 2009.
4. Completed system shall be tested in accordance with NFPA 72H by the System Supplier in the presence of the Owner and his technical representative.
5. Warranty of the system is 1 year from the date of completion and certified tests.

VII. MECHANICAL WORKS

A. APPLICATION

1. This applies to the specifications of the Airconditioning and Ventilation System for the said project.

B. DESCRIPTION OF WORKS

1. Mechanical Works shall include the installation of Split Type AC Units, Window Type AC units, its piping and control lines, and condensate drain pipes.
2. All works are recommended to be simultaneous with the building construction. Whenever this works may not be included in the building construction, all related pipes (refrigerant, control, drain) shall be included in the rough-in. Window type units shall have the prepared slots and frames. Slots with un-installed units shall be temporarily covered, painted and have same waterproofing as the building finishes.
3. Split Type ACs shall have prepared protrusion of not 110mmØ PVC pipes, heat bent end, and outward slope to prevent rainwater intrusion.
4. Split Type ACs' locations shall be initially identified, marked, provided with manholes if practicable.
5. All refrigerant piping shall be rubber insulated and wrapped in its entire length.
6. Works, for both rough-ins and unit installations, shall be supervised by a duly registered Mechanical Engineer.
7. All condensate drain pipes shall not be tapped to downspouts and shall have separate downward drains.
8. All supports and frames shall be finished to match the color of the building.

9. When practicable, no Air Cooled Condensing Units shall be installed at the building frontage.

C. QUALIFICATIONS OF SUPPLIER

1. Installer shall be a licensed mechanical installer of at least 6 years in the business, and staffed with skilled installers and maintenance crew.
2. The works shall be supervised by a Registered Mechanical Engineer of at least 6 years of experience in AC works.
3. The company shall submit (at least) a partial list of existing clients and recent installations for verification.
4. The company shall submit Shop Drawings for the different type of ACs to be installed. The drawings shall show dimensions, specifications of equipments, piping, and elevations.
5. Equipment diagrams, product literatures, performance and curves shall be submitted for evaluation.

D. DELIVERY AND STORAGE

1. Equipments and materials shall be delivered and stored in accordance with manufacturer's recommendations. Damaged or defective items shall be replaced at supplier's costs.

E. WARRANTIES

1. Warranty Period shall be 1 year from the final completion and acceptance of installation. Supply to include 4 quarterly cleaning of the units during the warranty.

VIII. VOICE/DATA WIRING

A. DESCRIPTION OF WORKS

1. The works shall include the installation of Wall and Floor Outlets, WIFI Outlets, wiring, conduits and accessories, grounding, Main Distribution Frame with internal components as indicated.
2. Type of wiring shall be IEC Cat 6 for UTP Twisted Pair Wiring.

B. INSTALLATION

1. Wiring materials shall initially tested, in reel, for compliance with Cat 6 parameters.
2. Equipments that require power shall be provided with power outlets of ample capacities.
3. Power outlets for Voice/Data shall be prioritized for generator connection.
4. All circuits, readily used or otherwise, shall be tested for connectivity in accordance with IEC standards.
5. Whenever practicable, all powerlines rated 5KW and above shall be separated from this wiring with at least 30cm.
6. Other types of wiring that during tests, will show unacceptable interferences, shall be separated from this wiring works at separation specified by IEC.
7. All Cat 6 parameters shall be attained by all circuits.

8. Electrical grade PVC conduits shall be used, marked for this service at spacing of not less than 1.5moc.
9. All brands, other than specified, shall submitted with accompanying certified test results.
10. All faceplates shall be of durable plastic with sturdy finish, matching the finishes of the walls of installation.

IX. ELECTRONIC ROUGH-INS

1. All electronic rough-ins, as indicated, shall be incorporated in the works.
2. Conduits shall be inserted with pull wires. Boxes shall be covered and marked.
3. Conduits and boxes for these rough-ins shall be electrical grade, marked for the intended service with permanent markings (tags, etc) at 1.5moc spacing.
4. Shop drawings shall be submitted for approval.
5. Test sets shall be provided to detect potential interference with other building services.
6. Boxes for electronic rough-ins shall be marked for the intended purpose.
7. Recommendations from suppliers maybe sought if these facilities came in close proximity to electrical panels and devices. Consultation costs shall be borne by the contractor.

*** END OF SPECIFICATIONS***

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