



Republic of the Philippines

## Tourism Infrastructure & Enterprise Zone Authority

### PROJECT SPECIFICATIONS

#### I. GENERAL CONDITIONS

The work to be undertaken shall include the furnishing of labor, materials, tools and equipment for the **OLONGAPO MUSEUM** located at **Subic Bay Metropolitan Authority, Zambales**.

##### A. Scope of Work

The construction work must be executed strictly in accordance with the plans and specifications. The following principal items of work shall include but not limited to the following:

##### SCOPE OF WORKS:

1. General Requirements
  - a. Temporary Barracks
  - b. Health and Safety Program
  - c. Project Signboard
2. Demolition Works
3. Extension Building
4. Lobby
5. Proposed Stair at Museum Gallery
6. Retrofitting of Existing Concrete Floor Slab
7. Masonry Works
8. Plumbing Works
9. Finishing Works
10. Re-Roofing of Existing Building
11. Proposed Ceiling
12. Doors and Windows
13. Electrical Works
14. Mechanical
15. other items or works as maybe required by plans and related contract documents necessary to satisfactorily complete the project

The construction procedures shall be done in accordance with the DPWH Standard Specifications, and in full compliance with the approved plans and specifications.

All items not specifically mentioned in the specifications or noted on the plans but which are obviously necessary for the completion of the work shall be included.

#### II. SITE WORKS

##### A. Scope of Work

Furnish all materials and equipment and perform labor required for the disposal of surplus excavated materials, rubbish and debris resulting from site clearing, stripping, site grading and trenching, demolition, removal and foundation excavation.

**B. Clearing the Site**

The building site shall be leveled according to the plans and cleared of rubbish, roots and other perishable and objectionable matters to a suitable sub-grade.

Surplus materials not required or suitable for fill or backfill and all debris and other materials resulting from demolition work shall be immediately removed from the site premises by the contractor and be disposed off in areas provided by the contractor. Debris and rubbish shall be removed and transported in a manner that will prevent spillage on streets or adjacent areas. In cases of spillage, clean up the streets and adjacent areas that were affected.

**C. Staking out the Building Lines**

The building lines shall be staked out and all the lines and grades shown in the drawing established before any excavation is started. Batter boards and reference marks shall be erected at place where they will not be disturbed during the excavation. Construct two permanent benchmarks of previously known elevations near the site of construction.

**III. EARTHWORKS**

**A. Scope of Work**

1. This item shall consist of the necessary excavation for foundation of building structures, and other structures not otherwise provided for in the Specifications. Except as otherwise provided for pipe culverts, the backfilling of completed structures and the disposal of all excavated surplus materials, shall be in accordance with these Specifications and in reasonably close conformity with the Plans or as established by the Engineer.

**B. Excavation**

**1. Structural Excavation**

- a. Structural excavation shall be to the grade, whichever, is lower. The indicated depth is the minimum requirement for excavation. In case suitable bearing materials are encountered at elevations other than those specified or shown on the drawings, the Engineer at his discretions may direct in writing the excavations above or below those indicated on the drawings.
- b. No extra excavations shall be done without the written approval of the Engineer. In no case shall footings rest on fill.
- c. All structural excavations shall be inspected and approved by the Engineer before pouring any concrete, laying underground services or placing backfill materials.
- d. All structural excavations shall extend to a sufficient distance from walls and footings to allow the proper erection and dismantling of forms, installation of service lines and for inspection.

- e. Control the grading in the vicinity of all excavated areas to prevent surface drainage running into excavations. Remove accumulated water in excavated area by pumping or by other approved methods.

## 2. Excavation for drainage structures

Excavation for drainage structure shall be made accurately to the lines, grades and elevations shown or as directed. Dimension and elevation of footings and foundation excavations shown are only approximate and may be changed if necessary to assure adequate foundation support. Trenches and foundation pits shall be of sufficient size to permit the placement and removal of forms for the full length width of structural footings and foundations as shown. Rock or other hard foundation material shall be cleaned of loose debris and cut to a firm surface, either level, stepped or serrated, as shown, or as direct loose disintegrated rock and thin strata shall be removed. When concrete is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade shall not be made until just before the concrete is to be placed.

## 3. Shoring

- a. Excavation shall be shored and braced by members of suitable sizes where necessary to prevent danger to persons, injury or erosions.
- b. Shoring, bracing and sheeting shall be removed as the excavations are backfilled in a manner such as to prevent injurious caving.

## C. Backfilling

- a. All fillings shall be placed on layers not exceeding four (4) inches in thickness each layer being thoroughly wetted and compacted by approved machine or hand tampered to a density of optimum moisture as determined by the modified ASSHTO T 180, Method D. All compaction tests shall be at the expense of the Contractor.
- b. No footing shall rest on fill and the soil bearing capacity shall not be less than 3000 psf.
- c. After forms have been removed from the footings and piers, the materials from excavation shall be used for backfilling ground. All trash wood chips and other debris shall be removed from areas to be backfilled. The filling shall be made in layers not exceeding 4" thick, each layer thoroughly tamped.
- d. No backfill shall be placed against walls or other vertical surfaces until they have been inspected and backfilling is authorized.
- e. Any excess material resulting from the finish grading operations not required or unsuitable for fill or backfill, shall be disposed by the contractor at his expense.

## IV. CONCRETE WORKS

### A. Scope of Work

1. This includes all labor, materials, equipment and incidentals necessary for the construction of all concrete work including reinforcing steels, forms, water stops and miscellaneous related items such as walls, shelves, anchor bolts and embedded items. Placing and finishing of concrete shall be in accordance with this specification and

conforming to the lines, grades and dimensions shown on the approved plans. Concrete shall consist of a mixture of Portland cement, fine aggregates, coarse aggregates, and water.

## B. General Provisions

1. Minimum concrete strength  $f'c$  is 3,000 psi.
2. No hand mixing shall be allowed, except in case of emergency such as mixer breakdown during pouring operations and shall stop at the first allowed construction joints. All concrete shall be machine mixed for at least 1-1/2 minutes after all materials including water are in the mixing drum.
3. The mixer shall be of an approved size and type which will ensure a uniform distribution of material throughout the mass. It shall be equipped with a DEVICE FOR ACCURATELY MEASURING AND CONTROLLING THE AMOUNT OF MIXING WATER IN EACH BATCH.
4. Placing of material in mixer shall be done in such a way that first batch of concrete materials placed in the mixer shall contain sufficient excess of cement, sand and water to coat the inside of the drum without reducing the cement content of the mix to be discharged.
5. Re-tempering of concrete shall not be allowed.
6. All testing shall comply with the latest applicable ASTM Test Methods (ASTM Standard). Samples of aggregate and concrete as placed will be subjected in the work shall conform to the approved samples.

## C. Materials

1. Cement shall be Portland Cement of a brand approved by the Project Engineer and conforming to ASTM C150, Type I or Type II.
2. Aggregates

Fine aggregate shall be washed with natural sand conforming to ASTM Standard and shall range in size within the following limits of US Standard Sieve sizes.

Sieve Designation	Percent (%) Passing
No. 4	95-160
No. 8	80-100
No. 16	45-70

Maximum Silt Content – 2%

Coarse Aggregate shall be well-graded, crushed stone or washed gravel conforming to ASTM Standard having the following maximum size:

- 25mm – for plain concrete
- 20mm – for reinforced concrete sections
- 19mm – for concrete piles

Maximum Silt Content – 1%

3. Water shall be potable, clean, and free from deleterious amounts of acids, alkalis, oils or organic matter. Seawater must not be used.
4. Admixtures for ready-mixed concrete

An approved water reducing aspect conforming to ASTM Standard, Type A or D, shall be used and shall entrain 3.0 to 5.0 percent air in the resultant concrete. Proportioning and mixing shall be as recommended by the manufacturer.

D. Quality of Concrete

1. The actual development of mix proportions composed of Portland cement, Admixtures Aggregates and water to produce concrete which conforms to the specific requirements shall be determined by means of prior laboratory tests performed by the contractor with the approved constituents to be used in the work.
2. Proportioning

Well in advance of placing any concrete the contractor shall discuss with the Project Engineer the source of materials and concrete mixture proposes to use. Representative samples of aggregate and cement and their test results shall be furnished to the Project Engineer. A pouring permit signed by the Project Engineer should be presented by the contractor prior to pouring of concrete.

The contractor shall allow ample time to develop a proposed design mix or to modify the proposed design mix within the limits of these specifications whenever in the opinion of the Engineer it becomes or desirable.

Consistency of the concrete as measured by the requirements of ASTM Standard shall be as shown in Table B below:

Table B

TYPE OF STRUCTURE	SLUMP (mm) RECOMMENDED	RANGE
Pavement and slabs on ground	50	28-75
Heavy reinforced foundation walls & footing	50-75	50-100
Plain footings, gravity walls, slabs & beams	50-75	25-100
Thin reinforced walls & columns	75	75-100

3. No excessive wet concrete will be permitted. Concrete delivered to the site having slump in excess of that specified in Table B will be rejected.
4. The temperature of the concrete at the time of placement shall normally be 30 degrees centigrade. The contractor will be responsible for employing whatever measures are necessary to comply with these temperature requirements.
5. Formworks

The contractor shall design, furnish and install all formworks and supports required to confine the concrete and shape it to the lines shown as the drawings. Form design shall conform to ACI 347. Forms shall have sufficient strength to withstand the pressure

resulting from placement and vibration of the concrete and shall be sufficiently tight to prevent loss of mortar from the concrete.

Forms shall be made of either steel or new approved lumber and shall be free from roughness and imperfections.

## 6. Placing of Concrete

No concrete shall be placed until the forms, reinforcement steel, pipes, conduits, sleeves, anchors and other embedded items have been inspected and approved by the Project Engineer.

Pipes, conduits, dowels and other ferrous items required to be embedded in concrete construction shall be positioned and supported prior to placement of concrete such that there will be a minimum of 50mm clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding it to reinforcement will not be permitted.

Before depositing any concrete, all debris, dirt and water shall be removed from the forms. The surfaces of previously placed concrete, such as horizontal or vertical construction joints, shall be roughened, cleaned from foreign matter and laitance to expose a fresh face and saturated with water at least two hours before and again shortly before the new concrete is placed. Immediately before the new concrete is placed, all hardened surfaces shall receive thorough coating of next cement slurry mixed to consistency of very thick paste at least 50mm thick which shall first be well scrubbed-in by means of stiff bristle brushes. The new concrete then shall be placed before the next cement sets up.

Concrete shall be uniformly placed as near as possible to its final location in the forms. The placing of concrete in forms shall not exceed 0.60m vertical rise per hour.

## 7. Curing and Protection

- a. It is the latest of those specifications to obtain properly cured concrete. The basic requirement of proper curing is to maintain continuous moist surface from the time of placing the concrete until the end of the curing period. The use of curing compounds may be acceptable but shall require prior approval in writing by the Project Engineer.
- b. All exposed surfaces including finished surfaces shall be treated immediately after concrete has been poured to provide continuous moist curing for at least 7 days. Walls and vertical surfaces may be covered with continuously saturated burlap or kept moist by other approved means.
- c. Formed surfaces shall be thoroughly soaked with water at least twice a day until the forms are removed.

## 8. Removal of Forms

- a. The contractor shall not remove any forms for at least 48 hours or until the concrete has attained a strength of at least 30% of the ultimate strength.
- b. Forms for beams and slabs shall not be stripped for at least 150-day degrees and supports shall not be removed until the concrete has attained at least 60% of the specified 28-day strength and is capable of safety supporting its own weight.

Constructive loads shall not be placed until concrete has attained its specified 29-day strength – 3000 psi (20.68 MPa).

- c. Forms shall be stripped such that they will not damage the concrete.

#### E. Concrete Reinforcements

##### 1. Scope of Work

This includes the furnishing, fabrication and installation of all steel bars and steel tie wires, clips, supports, chairs and spaces required for the reinforcement of concrete as shown on the drawings and/or specified herein.

##### 2. Standard Specifications

- a. All reinforcing steel bars shall be 40,000 psi Intermediate Grade unless otherwise specified.
- b. The following standards are required to:

ASTM A 82	Cold drawn steel wire fabric for concrete reinforcements
ASTM A 497	Welded deformed steel wire fabric for concrete reinforcements
ASTM A 615	Deformed billet steel bars for concrete reinforcements
ASTM A 315	Manual of standard practice for detailing reinforce concrete structures

##### 3. Shop Drawings

- a. The contractor shall submit three (3) sets of completely detailed working drawings and schedules of all reinforcement for review to the Project Engineer. The bending diagrams and bar lists shall be detailed in accordance with ACI 315.
- b. Fabrication of steel reinforcement steel shall not proceed until the construction joint locations and the shop drawings have been reviewed by the Project Engineer.

##### 4. Substitutions

- a. The following reinforcing steel bar sizes shall be used for reinforced concrete design:

Nominal Diameter (mm)	Approx. Cross Section Area (sq. mm)	Approx. Unit Wt (kg/m)
#10	78	0.616
#12	113	0.888
#16	201	1.579
#20	314	2.466
#25	492	3.854
#28	615	4.833

- b. Should the contractor wish to use reinforcing steel bars having areas different from those shown, all proposed changes shall be submitted to the Project Engineer for approval.

##### 5. Products

a. Materials

Reinforcement steel shall be deformed, new billet steel bars conforming to ASTM A 615, grade 40 for 10mm to 28mm diameter bars, substantially free from mill, scale, rust, grease or other foreign matters.

Rail steel bars will not be permitted in the work.

Reinforcement steel shall bear a mill identification symbol, and shall be tagged with the size and mark number so that different types may be identified and shall be stored off the ground to protect the steel moisture and dirt, until placed in final position.

Steel wire for tying reinforcing bars and water stops shall conform to ASTM A 82. Welded wire fabric for concrete reinforcement shall conform to 5ASTM A 497.

6. Fabrication of Reinforcement

a. Reinforcement steel shall be accurately formed to the dimensions shown on the shop drawings and bar schedules.

b. All reinforcing bars shall be bend cold around a pin with a free revolving collar having a diameter proportional to the diameter of the bar of not less than the following:

- Two to stirrups
- Six times for bars up to and including 25mm diameter
- Eight times for bars over 25mm diameter

c. Reinforcement steel shall not be straightened nor re-bent. Bars with kinks or bends not shown on the drawings will be accepted

7. Installation of Reinforcement

a. Reinforcement bars shall be accurately placed as shown on the drawings, and in accordance with the shop drawings and schedules. The reinforcing bars shall be secured against displacement with annealed iron wire ties of minimum 1.5mm diameter or suitable clips at the intersection.

b. Except as otherwise indicated on the drawings, reinforcement steel shall be installed with a clearance for concrete cover as follows:

Concrete placed directly on earth	75mm
Formed surfaces in contact with the soil, water or exposed to weather	50mm
Concrete cover of main reinforcement for columns and beams	50mm
All other slab surfaces	25mm

c. No reinforcing bars shall be welded.

V. MASONRY WORKS

A. Scope of Work



1. This includes the furnishing of all labor, materials, equipment required to construct all concrete masonry unit walls as shown on the drawings and as specified herein.
2. The work under this section shall include but not be limited to the following:
  - a. Concrete hollow blocks
  - b. Masonry reinforcing bars for concrete blocks
  - c. Grouting
  - d. Connecting wall anchors, ties, bolts and related embedded items

B. Standard Specification

1. The following standards are referred to:

ASTM C33	Concrete Aggregates
ASTM C90	Hollow Load-Bearing Concrete Masonry Units
ASTM C144	Aggregate for Masonry Mortar
ASTM C150	Portland Cement
SAO #15-2	Standardization of Concrete Hollow Blocks

C. Protection of Materials

1. All materials for the work of this section shall be delivered, stored and handled so as to preclude damage of any nature.

D. Materials

1. Cement

Portland cement shall conform to ASTM Specification C150, Type I.

2. Sand for Mortar

Sand shall be clean, durable particles, free from injurious amounts of organic matter. The sand shall conform to ASTM specification C144 or C33 as required.

3. Water

Water shall be free from injurious amounts of oils, acids, alkalis, organic matter, and shall be clean and fresh.

4. Concrete Hollow Blocks (CHB)

Concrete block shall conform to ASTM C90, Grade N, and/or to the Phil. Bureau of Standards SAD No. 15-2.

Use 4" concrete hollow blocks (see Section "A & B") with 10mmØ vertical reinforcing bars spaced at 0.60m on center.

E. Mortar Mixes

1. Masonry mortar for setting blocks shall be in the proportion of one part cement to 3 parts sand or as otherwise approved by the Project Engineer. Mortars shall be mixed with water in an amount compatible with workability.

2. Mixing shall be done immediately before usage.

#### F. Execution

1. All masonry shall be laid plumb and true to lines and built to the thickness and bond required with courses level and joints and bond uniform. Masonry shall be carried up in a uniform manner.
2. Concrete blocks shall be laid in running bond, unless otherwise indicated with joints not exceeding 10mm and uniform throughout and finished slightly concave and smooth. All blocks shall be laid in a full bed of mortar applied to shell and webs.
3. All necessary block cutting shall be neatly done by saws.
4. Control joints shall be installed at the locations noted and detailed on the drawings.

#### G. Lintels, Ties and Miscellaneous Items

1. The contractor shall build in all miscellaneous items specified in other sections to be set in masonry including frames, lintels, reinforcing steel, electrical boxes and fixtures, sleeves, grilles, anchors and other miscellaneous items. All anchorage, attachments, and bonding devices shall be set so as to prevent slippage and shall be completely covered with mortar.

#### H. Grouting

1. Grout and cement mortar for setting structural columns, railings, frames in walls and where otherwise required shall be done with mortar of 1 part cement to 1 part sand. Before placing grout, thoroughly clean all surfaces. Grout shall be tamped into place with a blunt tool to fill the entire void.

### VI. CARPENTRY WORKS

#### A. Scope of Work

1. Furnish materials and equipment and perform labor required to complete wooden framings and related rough carpentry works as indicated in the plans and/or specified herein.
2. Include in the works nailing strips, scaffoldings, plates, straps, joists, hangers, rods, dowels, rough hardware, fasteners, and other miscellaneous iron and steel items pertinent to rough carpentry work.

#### B. Materials

1. Lumber shall be of approved quality of the respective kinds required for the various parts of the work, well seasoned, thoroughly dry, straight and free from large, loose or unsound knob, sap shakes or other imperfections impairing its strength, durability or appearance.
2. Framing lumber shall be of rough dimensions shown on drawings.
3. All exposed woodwork shall be smoothly dressed and well sand papered.

4. Moisture content shall not exceed 18% unless otherwise specified.
5. All lumber, excluding scaffoldings, are to be pressure treated, conforming to 67% stress grade lumber in accordance to the requirements of the Phil. National Building Code, latest edition.
6. Fastening shall be common nails, glue as specified flat head wood screws, round head wood screws, bolts or log screws where specifically called for.
7. Conceal fastenings as far as possible, where not possible, locate them in inconspicuous place, where nailing is permitted through woodwork face conceal nail heads.
8. Use 6" x 6" hardwood wooden post, 2" x 8" lauan girts / purlins or approved hardwood equivalent for Pergola. All wood shall be treated with any preservative prior to installation and sealed with clear gloss.

C. Substitution of Lumber

1. Any lumber equally good for the purpose intended may be substituted for kinds specified provided however, that the substitution be authorized in writing by the Project Engineer.

D. Rough Hardware and Metal Fasteners

1. Plates, straps, nails, spikes, bolts, joists, hangers, rods, dowels, fasteners and miscellaneous iron and steel items shall be of sizes and types to rigidly secure member in place.

## VII. STEEL WORKS

A. Scope of Work

1. Furnish all materials and equipment and perform labor and services required to complete fabrication and erection of all structural steel and other miscellaneous steel in accordance with the plans.

B. Materials

1. Structural steel shall conform to American Society of Testing Materials (ASTM) A-36, with  $F_y$  of 248 MPa.
2. Electrodes for welding shall conform to the latest requirements of the American Welding Society (AWS).
3. Use only approved brand of red lead paint and linseed oil for all shop painting for structural steel.

C. Execution

1. Tighten all bolts to a bolt tension not less than the proof load given in the applicable ASTM Specifications for the type of bolt used.
2. Never let compression members deviate from straightness by more than 1/100 of the axial length between points which are to be laterally supported.

3. Let completed members free from twists, bends, and open joints. Sharp kinks or bends shall be the cause of rejection of materials.
4. Give all steelwork, except those to be encased in concrete, one coat of shop paint.
5. Make all work well formed to shape and size shown and assemble as detailed in the plans.
6. Weld or bolt connections as indicated in the plans. Make all details of assembly strong with sufficient stiffness. Form joints exposed to weather in a manner that excludes water.
7. Provide all work with proper clearances. Fabricate and install in a manner to provide for expansion and contraction but will ensure rigidity and provide close fitting of sections.
9. Provide a protective coating which is resistant to alkaline, mortar and plaster to be applied to all sections after fabrication.

## VIII. DOORS AND WINDOWS

### A. Scope of Work

1. This item includes furnishing all the materials, hardware, tools, labor and services necessary for the complete fabrication and installation of doors and windows in accordance with the Plans and the specifications. Provide shop drawings of fabricated items showing sizes of all members, details of connections, fabrication, and installation and submit corner section samples for doors and jambs all for the approval of the Architect/Contractor.

### B. Doors

1. Erect all frames square and true to line and level with secure fastening to structures and anchors. Install formed steel stiffeners and reinforcement within frames at all points where top screw fastenings are used in connections with embedded strap anchorage.
2. All ladders for wooden doors including door bars, cabinet and closet doors and all woodwork of similar nature shall be kiln-dried with not more than 14% moisture content.
3. Have all pre-fabricated doors installed by authorized representative of the manufacturer, but not before all plastering are completed.
4. Cut, trim, and fit each door to its frame and hardware accurately.
5. Give allowance for painter's finish and possible swelling or shrinkage.
6. Clean all surfaces and test all framing and hardware. Make all repairs and adjustment to the work, leaving it in a satisfactory condition.
7. All doors shall operate freely and watertight and all hardware shall be properly installed and functioning.
8. All doors must be guaranteed against warping, twisting, and cracking. The contractor is obligated to replace entirely any or all defective doors.

C. Windows

1. Factory fabricate all frames for pre-fabricated windows in accordance with the design and dimensions indicated in the plans.
2. Set and anchor frames as shown in details and/or in approved shop drawings.
3. Set frames plumb and square and brace where necessary to prevent distortion.
4. Adjust all frames and attach hardware before glazing.
5. Secure all windows to be watertight and all hardware operating free and easy.

D. Hardware

1. Furnish all the hardware necessary for the installation and completion of doors and windows.
2. Submit samples of locksets, hinges, door pulls, door stops, door closers, and other finish hardware and accessories for Architect's/Contractor's approval.

**IX. ROOFING**

A. Scope of Work

1. Furnish materials and equipment and perform labor required to complete fitting and installation of roofing, flashing components, strap and rivet units as well as the application of supplementary materials to make the roof watertight and leak-proof.

B. Execution

1. Care should be exercised in the proper anchorage of all roofing frames.
2. Installation of roofing including valleys, hips, ridge, and flashings shall be as per manufacturer's installation procedure.
3. Side lap fasteners shall be done by rivets and washers paced from 12" to 18" on centers.
4. Provide gutter, flashings, and counter flashings, gauge 0.600mm pre-painted galvanized sheets or any approved equivalent at all critical points where water may seep through.

**X. FINISHING**

A. Tile Works

1. Scope of Work

- a. Furnish materials and equipment and perform labor required to complete all types of tile works as indicated and scheduled on the plans.
- b. Samples of each type of tiles including all required beads, moulding, and trim units shall be submitted for the approval of the Architect/Contractor.

2. Execution

- a. All surfaces receive tile work shall be cleaned of loose materials and given proper surface preparation prior to tile work. Tiles shall not be installed on surfaces that are unsuitable and will prevent proper installation of tiles.
- b. Keep tile joints parallel and straight over the entire area by using straight edges.
- c. Lay tiles from center lines outward and make adjustments at walls.

## B. Cement Plaster Finish

### 1. Scope of Work

- a. Furnish all materials and equipment and perform labor needed to complete all cement plaster finishes.

### 2. Materials

- a. Fine aggregates shall be clean, washed sharp and free from dirt, clay, organic matter or other deleterious substances.
- b. Mortar mixture shall be freshly prepared and uniformly mixed in proportion by volume of one part Portland cement to three (3) parts sand.

### 3. Execution

- a. Provide all wall indicated with three coats of cement plaster (scratch coat, brown coat, and finish coat). Mix each coat in the proportion of one part Portland cement to three parts sand by volume.
- b. Apply the scratch coat with sufficient material and pressure to ensure a good bond and the scratch to a rough surface. Provide a thickness of 3/8" for scratch coat. Dampen with water before applying brown coat.
- c. Apply brown coat, one day after applying scratch coat, with a thickness of 3/8" and level to a flat even surface. When stiff enough, trowel with a wooden float and cross hatch or bottom lightly and evenly to secure a good mechanical bond for the finish coat. Wet the surface and keep from drying out for at least three (3) days.
- d. Apply finish coat seven (7) days after the application of brown coat. Provide thickness of 1/8", keep the finish coat damp but not saturated for a period of seven (7) days.

## C. Painting

### 1. Scope of Work

- a. This item consists of furnishing all paint materials, varnish, and other related products, tools, equipment, and labor required in undertaking the proper application of painting, varnishing, and related works indicated on the plans. See drawings for location, quantity, and extent of surfaces to receive paint and varnish.

### 2. Materials

- a. Tinting color shall be first grade quality, pigment bound in alkyd resin that disperses and mixes easily with paint to reduce the color desired. Use the same brand of paint and tinting color to effect good paint body.
- b. Concrete neutralizer shall be first grade quality concentrate diluted with clean water and applied as surface conditioner of new interior and exterior walls thus improving paint adhesion and durability.
- c. Silicon water repellent shall be transparent water shield especially formulated to repel rain and moisture on exterior masonry surfaces.
- d. Patching compound shall be fine powder type material like calcimine that can be mixed into putty consistency, with oil base primers and paints to fill minor surface dents and imperfections.
- e. Varnish shall be a homogeneous solution of resin, drying oil, drier and solvent. It shall be extremely durable clear coating, high resistant to wear and tear without cracking, peeling, whitening, spotting.
- f. Sanding sealer shall be quick drying lacquer, formulated to provide quick dry, good holdout of succeeding coats, and containing sanding agents to allow dry sanding of sealer.
- g. Glazing putty shall be alkyd-type product for filling minor surface unevenness.
- f. Painting Schedule:  
For New Concrete/ Masonry Surfaces:  
One coat of Acrylic Flat base paint  
Two coats of Acrylic Semi-Gloss base paint

### 3. Execution

- a. All paints shall be evenly applied. Coats shall be of proper consistency and well brushed out so as to show a minimum of brush marks.
- b. All coats shall be thoroughly dry before the succeeding coat is applied.
- c. Where surfaces are not fully covered or cannot be satisfactorily finished in the number of coats specified such preparatory coats and subsequent coats as may be required shall be applied to attain the desired evenness of surface without extra cost to the owner.
- d. Where surface is not in proper condition to receive the coat the Engineer shall be notified immediately. Work on the questioned portion(s) shall not start until clearance be proceed is ordered by the Engineer.
- e. Hardware, lighting fixture and other similar items shall be removed or protected and re-installed after completion of the work.

## XI. PLUMBING WORKS

### A. Scope of Work

- 1. Furnish all materials, tools, equipment, and fixtures as required in the plans for the satisfactory performance of the entire plumbing system and perform labor in accordance with the latest edition of the National Plumbing Code, Mechanical Code of the Philippines, and this specification.

2. All sanitary/plumbing works shall be done under the supervision of a Mechanical/Sanitary Engineer and in strict accordance with these specifications and of the methods as prescribed by the latest edition of the Philippine Plumbing Code, Sanitary Code of the Philippine and the Mechanical Code of the Philippines.

#### B. Materials

1. Soil and waste pipe shall be "Branded" conforming to ASTM-D1784 and made from class 12454 with dimensions of pipe and fitting conforming to ISO 161/1 and ISO 3606 and furnished in standard cutting length of 3 meters with sockets designed for rubber O-ring seal.
2. Galvanized iron piping shall be schedule 40, type ERW ASTM A-120 or A-53 and fitting ASTM A-126.
3. Gate valves and hose bibs shall be bronze as per ASTM B-62 "Great Volume".
4. Faucets shall be chrome plated with stem length suitable for its intended location. Faucets and other accessories shall be approved brand.
5. Trap each fixture trap, except those cast integral or in combination with fixture in which the top seal is readily accessible for is the trap is removable shall have an accessible brass trap screw of ample size.
6. Clean-out shall be of the same size and materials as soil and waste pipe.
7. Pipe sleeves shall be galvanized iron pipe schedule 40.
8. Pipe support shall be fabricated from flat bar, round bar or angular bar of approximate sizes.

#### C. Installation

1. Install all plumbing fixtures free and open in a manner to afford access in cleaning.
2. Water piping shall intended to all fixtures, outlets and equipment from the gate valve installed in the branch near the riser.
3. All piping above ground shall run parallel with the line of the buildings unless otherwise shown in the drawings.
4. All soil and drainage pipe shall be pitched at 2% but in no case flatter than 1%.
5. All joints shall be air and water tight.
6. Roughing-in for pipes and fixtures shall be carried along the line of building constructor correctly located opening of proper sizes shall be provided where required in the wall and floor for the passage of the pipes. All items to be embedded in concrete shall be thoroughly clean.
7. Every plumbing fixture or equipment requiring connection to the drainage system shall be equipped with a trap, which shall be placed as near to the fixture as possible. No fixture shall be double trapped.



## XII. ELECTRICAL WORKS

### A. Scope of Work

1. The work of the contractor consists of furnishing of all tools, labor, equipment, and materials and performing all operations in connection with the electrical and fire alarm system shown on the drawing, their test and inspection, complete and in accordance with these specifications and drawings and subject to the terms and conditions of the contract, and all other labor and materials not specifically mentioned under sections, to bring the electrical system to operating conditions and be ready for use by the Owner.

### B. Applicable Documents

1. The works covered by these specifications shall be governed by the requirements of the Philippine Electrical Code, US Federal Specifications, NEMA standards.

### C. Materials

1. Rigid steel conduit shall be hot-dipped galvanized mild steel pipe and shall 3m lengths including coupling.
2. PVC electrical conduit shall be supplied in standard effective lengths of 3.0m.
3. Wires and cables shall be insulated for 600 volts. Feeder and branch circuit wires and cables shall be type TW or THHN as manufactured.
4. Conduits fittings shall be US Underwriters Laboratories (UL) listed or approved local equivalent.
5. Outlet boxes shall be hot-dipped galvanized or case metal as required. Thickness of pressed steel boxes shall be less than gauge #16.
6. Circuit breakers for panel boards shall be molded case circuit breaker with quick-make, quick-break, trip-free mechanisms. They shall meet US Federal Specifications and NEMA standard.
7. Panel board shall be as manufactured by bolt-on type NEMA or approved equal.
8. Wiring devices such as switches and convenience outlets shall have ratings of 15 amperes, 250V and 16 amperes, 250V, respectively.

### D. Installation

#### 1. Grounding

The following shall be grounded in accordance with the drawings and the requirements of the Philippine Electrical Code with standards grouping practices:

Metallic conduit and raceway system including gutters, cabinets and boxes.

Non-current carrying metal parts of all electrical equipment including fixtures and motors.

#### 2. Feeders

Distribution voltage shall be 230V, 1-phase, 3-wire feeder conductors and conduit shall be installed as shown on the drawing and no change in size shall be made without consent of the Owner. Feeder conductors shall be continuous and without splices between terminals.

### 3. Branch Circuit

The drawing indicates the general methods of installations of all circuit wiring and the outlet which are to be supplied from this circuit. Branch circuit conduits shall be run from outlets to panel boards as directed as the building conditions will allow. Circuit allocations shall be indicated on the drawings where it becomes necessary to correct any outlet to circuit other than shown on the drawings. This shall be done without extra charge and only upon written consent of the Owner. No wire smaller than 2.0mm<sup>2</sup> (#14AWG) and 3.5mm<sup>2</sup> (#12 AWG) shall be used for any lighting and power circuits, respectively.

### 4. Panel boards and cabinets

Panel boards shall be mounted with their centers at 1.40m above the floor unless otherwise indicated by field conditions.

### 5. Locations of outlets and switches

The approximate location of each fixture receptacle, special purpose outlet and switch is indicated on the drawings. The exact location is to be determined later at the site as the work progresses.

### 6. Wires and boxes

No wire shall be drawn into the raceway until works, which may cause injury to the wires, is completed and until permission is given by the Owner in writing. Only powdered lubricant not injurious to cable insulation and raceways shall be used only when lubrication is necessary.

### 7. Splices

Branch circuit splices shall be soldered or joined by used insulated splicing device (wire nuts). All soldered joints shall be made mechanically strong before soldering and shall be carefully soldered without the use of acid, then taped with rubber tape to a thickness equal to that of the insulation and with a covering of friction tape of two layer. . Where solid conductors are to be connected directly to devices without the use of lugs, such as lighting switches and plug receptacles, the wires shall be formed into a clockwise loop fitted around the screws.

### 8. Outlets, switches and junction boxes

The contractor shall install standard boxes at all outlets for lights, appliances and switches and other point as required by the constructions.

### 9. Conduit System

Not more than four 90 degrees bend shall occur in any run. When it becomes necessary to have more than four 90 degrees bends in any run, an intermediate pull box shall be installed to facilitate pull-in wires. All conduits run shall as called for on the drawings. Conduits shall be installed in such manner as not to weaken or interfere with the structure or the building. No horizontal runs embedded conduit shall be permitted in solid wall and partitions. Conduits below grade line shall be encased in concrete

enveloped with minimum thickness of 50mm (2") or embedded in floor slab. Exposed conduit shall run parallel or at right angles with lines of the buildings and shall be securely fastened in place by means of approved fastening. Conduits support shall be fastened to walls by means of screws or bolts with expansion sleeves. The use of wooden or lead plug is not permitted. Conduits shall be cut by hacksaw, the ends shall be reamed after being firmly attached to cabinets or boxes by means of locknuts.

#### 10. Lighting Fixtures

The Contractor shall furnish and install all lighting fixture as indicated on the drawings, including mounting channels and supports.

#### 11. Testing

##### a. Ground test

The entire installation shall be free from improper ground and from short circuits. Each panel shall be tested with means connected. Lamps removed or omitted from the sockets and all switches closed. Each individual power equipment shall be connected for proper and intended operation. In no case shall the resistance be less than that allowed by the Regulations for electrical equipment of building. Failures shall be corrected in any manner satisfactory to the Architect and Engineer.

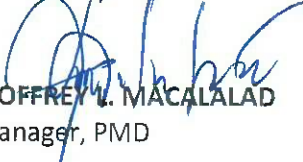
##### b. Performance test

The electrical contractor shall test all system of entire electrical installation for proper operational conditions. These conditions shall apply to the power and lighting installation, voltage drop, grounding defects.

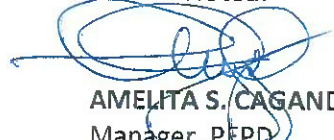
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