




Republic of the Philippines  
Department of Agriculture  
Western Visayas  
Iloilo City


**UPGRADING OF GOAT HOUSE**  
WESVIARC, Hamungaya, Brgy. Buntatala, Jaro, Iloilo City

**TECHNICAL SPECIFICATIONS**

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# **TENDER AND CONTRACT DOCUMENTS**

## **TECHNICAL SPECIFICATIONS**

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## PART I - GENERAL REQUIREMENTS

### SIGNBOARD/BILLBOARD (1-4'x8' and 1-8'x8')

#### SCOPE

The Contractor shall furnish all materials, labor, equipment, tools and install such signages and billboard is necessary until the completion of the Contract Work. Establishment of Project Sign, Board and CCA Bill Boards prior to the start of project construction, and it shall be located near the project site and visible to the community. Standard materials, size and dimension of such signages are specified in the Plans. It shall be made of printed canvass (Tarpaulin Materials) and stick-on the plywood with wooden frame and batter board. The project marker shall be made of 60cm x 60cm granite tile. All designs and Letters shall be done by laser printer. The DA-Western Visayas Logo shall be made of stainless steel. All designs and letters shall be done by laser printer. The dimensions of DA-WV Logo were specified in the plans.

### CONSTRUCTION SAFETY AND HEALTH

#### SCOPE

The Contractor shall provide and maintain throughout the duration of the Contract, a medical room together with all necessary supplies to be sited in the Contractor's main area. The medical room shall be waterproof; it could be a building or room designated and used exclusively for the purpose and have a floor area of at least 15 square meters and a glazed window area of at least 2 square meters.

The Contractor shall employ permanently on the site a fully trained Medical Aide who shall be engaged solely from medical duties. The location of the medical room and any other arrangements shall be made known to all employees by posting on prominent locations suitable notices in the Site.

The Contractor's arrangement to comply with this Section shall be subject to the approval of the Engineer and also to the approval of any qualified Medical Officer designated by the Government to supervise medical arrangements on the Site.

The contractor shall provide the standard Personal Protective Equipment (PPE) to all of the workers at site including those visitors and inspectors at the time of inspection and supervision.

### MOBILIZATION/DEMOBILIZATION

#### SCOPE

The work consists of the mobilization and demobilization of the contractor's forces and equipment necessary for performing the work required under the contract. It does not include mobilization and demobilization for specific items of work for which payment is provided elsewhere in the contract. Mobilization will not be considered as work in fulfilling the contract requirements for commencement of work.

Mobilization shall include all activities and associated costs for transportation of contractor's personnel, equipment, and operating supplies to the site; establishment of offices, buildings, and other necessary general facilities for the contractor's operations at the site; premiums paid for performance and payment bonds including coinsurance and reinsurance agreements as applicable; and other items as approved by the NRCS representative. Demobilization shall include all activities and costs for transportation of personnel, equipment, and supplies not required or included in the contract from the site; including the disassembly, removal, and site cleanup of offices, buildings, and other facilities assembled on the site specifically for this contract. This work includes mobilization and demobilization required by the contract at the time of award. If additional mobilization and demobilization activities and costs are required during the performance of the contract as a result of changed, deleted, or added items of work for which the contractor is entitled to an adjustment in contract price, compensation for such costs will be included in the price adjustment for the item or items of work changed or added.

## PART II – UPGRADING OF GOAT HOUSE

### DEMOLITION WORKS

#### SCOPE

The work under this Section shall include demolition, removal and disposal, in a manner approved by DA Western Visayas, of all rubbish and objectionable or undesirable matters within the entire demolition area. The stockpile area for demolished materials may be directed by the Project Engineer or disposed to the designated area with the approval of the recipient of the project.

### CLEARING AND LAYOUT

#### SCOPE

The work under this Section shall include clearing, grubbing and disposal, in a manner approved by DA Western Visayas, of all vegetation, trees, stumps, roots, brush, rubbish and all objectionable or undesirable matters within the entire dam site, construction camp site borrow areas, road surfacing materials sources, stockpile areas and elsewhere as may be directed by the Project Engineer; all in accordance with Drawings and this Specifications or as directed by the Project Engineer.

#### METHOD

The areas over which the structure and appurtenances shall be constructed, side borrow areas, borrow haul areas, aggregate sources and stockpile areas shall be cleared of all vegetation, trees and all other matters, except such trees or shrubs which the DA-WV may ordered to preserved. All trees or shrubs ordered to be preserved including all existing adjacent shall be protected from injury or damage resulting from the Contractor's operations. All combustible materials from clearing operations shall be burned thoroughly or removed from the site of work or otherwise disposed to designated areas as directed by the Project Engineer.

All materials to be burned shall be piled nearby and when in a suitable condition shall be burned thoroughly. Piling for burning shall be done in such a manner and in such locations as to cause the least fire risk. The Contractor shall at all times take special precautions to prevent fire from spreading and shall have available at all times suitable equipment and supplies for use in preventing and fighting fires. No clearing shall be done on any areas where there are standing crops until such crops have been harvested or unless the Contractor shall have secured written permission from DA-WV.

Grubbing shall consist of the removal of all trees, stumps, roots, brush and rubbish from the above-mentioned work areas. It shall include to a surface to a depth not more than 10cm by effective means to remove all objectionable materials or organic matters from the said work areas. Stripping beyond the 10cm. limit shall be subject to approval by the Project Engr. And payment thereof shall be considered under Excavation.

### EXCAVATION

#### SCOPE

The work under this Section shall include excavation and trimming of foundation as required for the construction of permanent structure foundation that specified in the plans. All excavation works should be done manually.

Foundations shall be excavated according to the outline of the footings and floors of structure as shown on the Drawings or as directed by the DA-WV Project Engineer, and shall be of sufficient size to permit free movement of workers.

On excavation of common materials, the foundation bed upon which structures are to be placed shall be finished accurately to the established lines and grades after a thorough compaction and trimming of the foundation with the use of suitable tools and equipment.

If at any point, material is excavated beyond the lines and grades any part of the structure, the over excavation shall be filled with selected materials approved by the DA-WV Project Engineer and shall be placed in layers of not more than 20 cm thick, moistened and thoroughly compacted by special roller, mechanical tampers or by other approved methods. The cost of filling over-excavation ordered by the DA-WV Project Engineer shall be borne by the Contractor.

On excavation of rock materials, the bottom and side surfaces of excavated rock excavation upon or against which concrete and wall holes are to be placed shall conform to the required grades and dimensions as shown on the drawings or as established by the DA-WV Project Engineer. If at any point, materials are excavated beyond the required limits, the over excavation shall be filled with concrete at the expense of the Contractor including the cost of all materials required.

All foundations for other types of structures on soft ground not requiring piling shall be excavated to a depth of 50 centimeters below the proposed bottom of concrete shown on the Drawings and to a maximum width of 60 centimeters of the outermost lines

of said base and should be backfilled with selected materials in layers not exceeding fifteen (15) centimeters in thickness. Such layers shall be rammed firmly in place and the final surface shall be thoroughly wetted before any concrete is placed thereon.

#### **EMBANKMENT/BACKFILLING (Compacted)**

##### **SCOPE**

The contractor shall supply, place and compact random fill embankment/backfill, in the locations shown on the Drawings or instructed.

##### **MATERIAL REQUIREMENTS**

Random embankment/backfill shall be obtained from approved sources and shall be free from stumps, roots, rubbish, topsoil and other objectionable matter. Random fill placed within 1.0m of structures shall be selected materials containing rocks not larger than 75mm in maximum dimension and shall be placed carefully so as to damage the structure.

Random Embankment/Backfill shall be deposited in horizontal layers not more than 150mm thick after being compacted and shall be brought to the moisture content required for the purpose of compaction, and the moisture content shall be uniform throughout each layer. The density of compacted random embankment/backfill shall not be less than ninety percent (90%) maximum dry density of the material as determined by AASHTO T180.

Vibratory Plate Compactor/Power Tampers. Compaction of material where it is impractical to use vibratory rolled shall be performed by the use of Vibratory/Power Tampers weighing not less than 80 kilograms.

#### **FORMWORKS & FALSE WORK**

##### **SCOPE**

The work under this item shall include furnishing and placing appropriate forms and scaffolds in accordance with these Specifications and as directed by the DA-WV Project Engineer.

##### **METHODS OF CONSTRUCTION**

All forms and scaffolds shall be of wrought plywood, lumber and bamboo poles and shall be built tight and of sufficient rigidity to prevent distortion due to the pressure of the concrete and other loads incident to the construction operations. Forms shall be constructed and maintained so as to prevent warping and the opening of joints due to shrinkage of the plywood and lumber.

The forms shall be substantial and unyielding and shall be so designed that the finished concrete will conform to the proper dimensions and contours. The Contractor shall take into consideration the effect of vibration on the formwork, and shall be responsible for any damage or default resulting thereof.

The number of spacing of the form struts and braces shall be such that the forms will be and uniformly lock joints between form sections shall be free from play or movement. The shape, strength rigidity, water tightness and surface smoothness of re-used forms shall be maintained at all times. Any warped or bulged lumber must be resized before being re-used. Forms which are unsatisfactory in any respect shall not be re-used.

In the determining of the time for removal of forms, consideration shall be given to the location and character of the structure, the weather and other conditions influencing the setting of the concrete and the materials used in the mix. In general, the forms of any positions of the structure shall not be removed until the concrete is strong enough to prevent injury to the concrete when the forms are removed.

Method of form removal likely to cause overstressing of the concrete shall not be used. In general, the forms shall be removed from the bottom upwards. Forms and their supports shall not be removed without the written approval of the Engineer. Supports shall be removed in such a manner as to permit the concrete to uniformly and gradually take the stresses due to its own weight.

#### **REINFORCED CONCRETE**

##### **SCOPE**

This item shall consist of the general description of the materials, equipment, workmanship and construction requirements of concrete structures and the concrete portions of composite structures conforming to the alignment, grades, design, dimensions and details shown on the Plans and in accordance with the Specifications for reinforced concrete and other related materials. The class of concrete to be used in the structure or part of the structure shall be as specified in Item.

## MATERIAL REQUIREMENTS

All cement requirements of concrete works for the contract shall be contractor-furnished. The form to the requirements of the standard specifications for Portland Cement (ASTM: C150 Type 1). All cement shall be stored in suitable weatherproof and approved storage sheds which will protect the cement from dampness. Cement shall be used in the order of its delivery to site, new deliveries shall not be used unless the cement from earlier deliveries has been completely used.

The term "Fine Aggregates" is used to designate aggregates in which the maximum size of particles is 3/16 of an inch (6 millimeters). As a means of providing moisture control, the Contractor may be required to stockpile the fine aggregates over porous drain to get rid of excess water and to stabilize the moisture content.

Fine aggregates shall conform to the requirements of ASTM C-33 and shall consist of hard, tough, durable uncoated rock particles. The Contractor shall exercise every possible precaution in transporting, washing and screening operations to prevent contamination of sand particles. Fine Aggregate from different sources of supply shall not be mixed or stored in one pile nor used alternately in the same class of construction or mix.

The term "Coarse Aggregate" is used to designate aggregates of such sizes as to fall within the range of 3/16 inch to 1 1/2 inches (0.5 cm to 3.75 cm.) or any size or range of sizes within such limits. Coarse aggregate for concrete shall be furnished by the Contractor and shall consist of crushed rock or mixture of natural gravel and crushed rock. Coarse aggregate as delivered shall have uniform and stable moisture content. Any rewashing found necessary to provide clean aggregates shall be done prior to finish screening. Rewashing shall not be performed in finish screens. Coarse aggregates shall conform to the requirements of ASTM C-33 and shall consist of hard, dense, uncoated durable rock fragments.

The mixtures of concrete and concrete materials shall conform to the requirements in Structural Concrete. Unless otherwise shown on the Plans or specified in Special Provisions, concrete shall be of Class A or 3500psi compressive strength at the age of twenty-eight (28) days.

The Contractor shall provide the required samples of concrete to Engineer without cost. Sampling will in all cases, be performed by or under the direct supervision of the Project Engineer and Contractor shall provide without cost to DA-WV all available tools and labor as may be required. Concrete sampling shall be carried on during concrete placement at the rate of one standard sample for each 75 cubic meters of concrete or fraction thereof placed during each continuous placing operation but in no case shall there be less than one sample for each day concreting. Each standard sample shall consist of three (3) standard cylinders 6-inch diameter and 12-inch high. The Contractor shall keep a record of the samples and the portion of the structures and volume represented which shall be available to DA on demand.

Sampling shall conform to ASTM Designations C-172, preparation, storage and curing to ASTM Designation C-31 and testing to ASTM Designation C-39. The samples are to be tested by an approved testing laboratory at the expense of the Contractor.

All reinforcing steel bars shall be Grade as specified in the plans, deformed type and conforming to the requirements of ASTM Designation A-615 or its latest revision. The nominal dimensions and unit weights of bar designation shall be in accordance with the following table:

Bar Designation Number	Unit Wt. (kg/m)	Diameter (mm)	Nominal Dimensions Cross-Section Area (mm <sup>2</sup> )	Perimeter (mm)
10 mm	0.616	10	78.54	31.42
12 mm	0.888	12	113.1	37.7
16 mm	1.579	16	201.1	50.27
20 mm	2.466	20	314.2	62.83

Bar number are based on the number of weights of a millimeter included in the nominal diameter of bars. The nominal diameter of a deformed bar is equivalent to the diameter of a plain bar having the same kilogram per meter of the deformed bar.

All reinforcing steel bars will be furnished in commercial standard lengths and the Contractor shall cut and bend reinforcing steel bars to the details and dimensions shown on the Drawings.

## METHODS OF CONSTRUCTIONS

### Reinforcements

All reinforcement shall be placed strictly in accordance with the drawings and as instructed in writing by the Engineer. Nothing shall be allowed to interfere with the required disposition of the reinforcement, and the contractor shall ensure that all parts of reinforcement are placed correctly in position and are temporarily fixed where necessary to prevent displacement before or during the process of tamping and ramming the concrete in place. The ties, links or stirrups connecting the bars shall be taut so that the bars are properly braced around which they are intended to fit. The Length of each size of reinforcing steel bars to be furnished is computed by taking the theoretical length of steel bars shown in the Drawings multiplied by 1.07 to get the actual length required

for the work. Placed correctly in position and are temporarily fixed where necessary to prevent displacement before or during the process of tamping and ramming the concrete in place.

All reinforcement shall be furnished in the full lengths indicated on the drawings. Splicing bars, except where shown on the drawing, will not be permitted without the written approval of the Engineer. Splices shall be staggered as far as possible. Additional splices, other than those shown on the drawings; and allowed by the Engineer, shall be at the contractor's own expense.

Steel reinforcement shall be protected at all times from injury. When placed in the work, it shall be free from dirt, detrimental scale, paint, oil, loose, rust, grease or other foreign substances. Reinforcement in any member shall be placed and then inspected and approved by the Engineer before the placing of concrete. All steel reinforcement shall be accurately placed in the position shown on the drawings and firmly held during the placing and setting of concrete. Concrete placed in violation of this provision may be rejected and its removal is required.

#### Handling and Placing Concrete

Concrete shall not be placed until forms and reinforcing steel have been checked and approved by the Engineer. In preparation for the placing of concrete all sawdust, chips and other construction debris and extraneous matter shall be removed from inside the formwork, struts, stays and braces, serving temporarily to hold the forms in correct shape and alignment, pending the placing of concrete at their locations, shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. These temporary members shall be entirely removed from the forms and not buried in the concrete. The concrete shall be placed as nearly as possible to its final position and the use of vibrators for moving of the mass of fresh concrete shall not be permitted.

#### Compaction of Concrete

Concrete during and immediately after placing shall be thoroughly compacted. The concrete in walls, beams, columns and the like shall be placed in horizontal layers not more than 30 cm thick except as hereinafter provided. When less than a complete layer is placed in one operation, it shall be terminated in a vertical bulkhead. Each layer shall be placed and compacted before the preceding layer has taken initial set to prevent injury to the green concrete and avoid surfaces of separation between the layers. Each layer shall be compacted so as to avoid the formation of a construction joint with a preceding layer.

#### Casting Columns, Slabs and Beams

Concrete in columns shall be placed in one continuous operation, unless otherwise directed. The concrete shall be allowed to set for at least 20 hours before the caps are placed. Unless otherwise permitted by the Engineer, no concrete shall be placed in the superstructure until the column forms have been stripped sufficiently to determine the condition of the concrete in the column. The load of the superstructure shall not be allowed to come upon the bents until they have been in place at least 14 days, unless otherwise permitted by the Engineer. Concrete in slab spans shall be placed in one continuous operation for each span unless otherwise provided.

Concrete in Beam spans shall be placed in one continuous operation unless otherwise directed. If it is permitted to place the concrete in two separate operations, each of the operations shall be continuous: first, to the top of the beam slabs, and second, to completion. If the contractor wishes to place the concrete in two separate operations, he shall, with his request for permission to do so, submit plans and proposals of the required changes to the reinforcement, which plans and proposals shall be subject to the approval of the Project Engineer. The concrete in the webs and the top slab shall be placed in one continuous operation unless otherwise specified. If it is permitted to place the concrete in more than one operation, the requirements for beam shall apply.

#### Construction Joints

Construction joints shall be made only where shown on the Plans or called for in the pouring schedule, unless otherwise approved by the Project Engineer. Shear keys or reinforcement shall be used, unless otherwise specified, to transmit shear or to bond the two sections together. Before depositing new concrete on or against concrete which has hardened, the forms shall be retightened. The surface of the hardened concrete shall be roughened as required by the Project Engineer, in a manner that will not leave loose particles of aggregate or damage concrete at the surface. It shall be thoroughly cleaned of foreign matter and laitance. When directed by the Project Engineer, the surface of the hardened concrete which will be in contact with new concrete shall be washed with water to this satisfaction, and to insure an excess of mortar at the juncture of the hardened and the newly deposited concrete, the cleaned and saturated surfaces, including vertical and inclined surfaces shall first be thoroughly covered with a coating of mortar of the same proportion of sand and cement as the class of concrete used against which the new concrete shall be placed before the grout or mortar has attained its initial set. The placing of concrete shall be carried continuously from joint to joint. The face edges of all joints which are exposed to view shall be carefully finished true to line and elevation.

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

#### Curing Concrete

All newly placed concrete shall be cured in accordance with this Specification, unless otherwise directed by the Engineer. The



water curing method shall apply. The concrete shall be kept continuously wet by the application of water for a minimum period of 7 days after the concrete has been placed. The entire surface of the concrete shall be kept damp by applying water with an atomizing nozzle. Cotton mats, rugs, carpets, or earth or sand blankets may be used to retain the moisture. At the expiration of the curing period the concrete surface shall be cleared of the curing medium.

#### Acceptance of Concrete

The strength of concrete shall be deemed acceptable if the average of 3 consecutive strength test results is equal to or exceeds the specified strength and no individual test result falls below the specified strength by more than 15 %. Concrete deemed to be not acceptable using the above criteria may be rejected unless contractor can provide evidence, by means of core tests, that the quality of concrete represented by the failed test results is acceptable in place. Three (3) cores shall be obtained from the affected area and cured and tested in accordance with AASHTO T24. Concrete in the area represented by the cores will be deemed acceptable if the average of cores is equal to or at least 85 % and no sample core is less than 75 % of the specified strength otherwise it shall be rejected.

### ROOF FRAMING & METAL FRAME EXTENSION

#### SCOPE

The work under this Item shall consist of furnishing all required materials, fabricated steel work, tools, equipment and labor and performing all operations necessary for the satisfactory completion of all under this item of works in strict accord with applicable drawings, details and these Specifications.

#### MATERIALS AND METHODS OF CONSTRUCTION

This work shall consist of the joining of structural steel members with welds of the type, dimensions, and design shown on the Plans and in accordance with the Specifications.

- Rafter  
– 1.5mm thk. 50mm x 150mm G.I. Tubular
- Purlins  
– 1.5mm thk. 50mm x 75mm G.I. C-Channel, space at 0.60m
- Fascia Frame  
– 3.0mm thk. 25mm x 25mm Flat Bar, 3.0mm thk. 25mm x 25mm Angle Bar
- Metal Frame Extension  
– 5.0mm thk. 65mm x 65mm Angle Bar  
– 5.0mm thk. 50mm x 50mm Angle Bar

Conform structural steel and shapes to ASTM Designation A-33 with a specified yield point of 33,000psi. Conform welding electrodes for manual shielded metal arc-welding to E60 series of ASTM Specifications A-33 and to AWS Specifications A-5.1 & A-5.5. Conform bolts to the specification for Low Carbon Steel Externally and Internally Threaded Standard Fasteners, ASTM A-307.

Conform the technique of welding employed, the appearances and quality of welds made, the methods used in correcting defective work to the requirements of the Standard Code for Welding in Building Construction of the American Welding Society.

All surfaces to be welded are free of scale, slug, rust, grease, paint and any other foregoing material except that mill scale which withstands vigorous wire brushing may remain. Align all abutting parts to be welded carefully. Correct misalignment greater than one-eighth inch (1/8") and in making the correction, never draw parts into slope sharper than 2 degrees. Position the work for flat welding whenever practicable. In assembling and adjoining parts of a members, avoid needless distortion and minimize shrinkage stresses in the closing welds of a rigid assembly. Welding of Structural Steel shall be done only when shown on the Plans or authorized in writing by the Engineer.

Make all works well formed to shape and size shown on the Detailed Plans. Provide all work with proper clearances. Fabricate and install as directed by the Project Engineer. Provide a protective clear coating which is resistant to alkaline, mortar and plaster to be applied to aluminum sections and fabrications.

All metal works exposed exterior surfaces unless otherwise specified, shall be primed with epoxy primer paint before the final coat of epoxy paint is applied. Metal members to be immersed in water or metal members or parts have started to rust before paint is applied, such areas shall be thoroughly cleaned with steel brush or sand-blasting before the primer is applied.

## ROOF CLADDING AND BENDED ACCESSORIE

### SCOPE

The work under this Item shall consist of furnishing all required materials, fabricated steel work, tools, equipment and labor and performing all operations necessary for the satisfactory completion of all under this item of works in strict accord with applicable drawings, details and these Specifications.

### MATERIALS AND METHODS OF CONSTRUCTION

#### Pre-Painted Hi-Rib Roofing 0.5mm thickness (Green Color)

Pre-painted roofing sheets shall be fabricated from cold rolled galvanized iron sheets specially tempered steel for extra strength and durability. It shall conform to the material requirements defined in PNS 67: 1985. Profile section in identifying the architectural molded rib to be used are as follows: Regular corrugated, Quad-rib, Tri-wave, Rib-wide, twin-rib, etc. Desired color shall be subject to the approval of the DA-WV Project Engineer.

Flashing and Fascia shall be fabricated from gauge 24 (0.500 mm thick) cold-rolled plain galvanized iron sheets specially tempered steel. Profile section shall be as indicated on the Plans.

Fastening hardware shall be of hot-dip galvanized (2 1/2") Tor screw and standard aluminum blind rivets.

Before any installation work is commenced, the Contractor shall ascertain that the top faces of the purlins are in proper alignment. Correct the alignment as necessary in order to have the top faces of the purlins on an even plane

Sheets shall be handled carefully to prevent damage to the paint coating. Lift all sheets or sheet packs on to the roof frame with the overlapping down-turned edge facing towards the side of the roof where installation will commence, otherwise sheets will have to be turned end-to-end during installation.

Start roofing installation by placing the first sheet in position with the downturned edge in line with other building elements and fastened to supports as recommended. Place the downturned edge of the next sheet over the edge of the first sheet, to provide side lap and hold the side lap firmly in place. Continue the same procedure for subsequent sheets until the whole roofing area is covered.

In cutting pre-painted steel roofing sheets and accessories to place the exposed color side down. Cutting shall be carried out on the ground and not over the top of other painted roofing product. Power cutting or drilling to be done or carried out on pre-painted products already installed or laid in position, the area around holes or cuts shall be masked to shield the paint from hot filings.

## PLUMBING WORKS

### SCOPE

This Item shall consist of furnishing all materials, tools, equipment and fixtures required as shown on the Plans for the satisfactory performance of the entire plumbing system including installation in accordance with the latest edition of the National Plumbing Code, and this Specification.

### MATERIAL REQUIREMENTS

All piping materials, fixtures and appliances fitting accessories whether specifically mentioned or not but necessary to complete this Item shall be furnished and installed. Items of these Specifications. Inlet and outlet pipes shall conform to the latest edition of the National Plumbing Code.

#### Plumbing Fixtures and Fittings

All fittings and trimmings for fixtures shall be chromium-plated and polished brass unless otherwise approved. Exposed traps and supply pipes for fixtures shall be connected to the roughing in, piping system at the wall unless otherwise indicated on the Plans. Built-in fixtures shall be watertight with provision of water supply and drainage outlet, fittings and trap seal. Unless otherwise specified.

#### Accessories

- a. Drains shall be made of stainless-steel beehive type, measuring 100mm x 100mm, and provided with detachable stainless strainer, expanded metal lath type.
- b. Faucet(s) shall be made of stainless steel for interior use.

#### Roof Drains, Downspout, Catch Basin, Overflow Pipes and Steel Grating

The Contractor shall provide, fit and/or install necessary drains with strainers, where shown on the Plans. Each drain with strainer shall fit the size of the corresponding downspout (or roof leader) over which it is to be installed.

## METHODS OF CONSTRUCTION

The Contractor before any installation work is started shall carefully examine the Plans and shall investigate actual structural and finishing work condition affecting all his work. Where actual condition necessitates a rearrangement of the approved pipe layout, the Contractor shall prepare Plan(s) of the proposed pipe layout for approval by the Engineer.

## ELECTRICAL WORKS

### SCOPE

This item shall consist of the furnishing and installation all wires and wiring devices consisting of electric wires and cables, wall switches, convenience receptacles, heavy duty receptacles and electrical conduits; conduit boxes such as junction boxes, pull boxes, utility boxes, octagonal and square boxes; conduit fittings such as couplings, locknuts and bushings, and other electrical materials needed to complete the item of work of this project.

### MATERIAL REQUIREMENTS

All materials shall be standard, new and shall be of the approved type meeting all the requirements of the Philippine Electrical Code and bearing the Philippine Standard Agency (PSA) mark.

#### Conduits

Conduits shall be standard rigid steel, zinc coated or galvanized. Intermediate metal conduit may be used if shown or specified on the approved Plans.

#### Conduit Boxes

All conduit boxes shall be RSC. In general, outlet boxes shall be at least 100 mm square or octagonal, 53 mm deep and 16 mm minimum gauge.

#### Wires and Cables

Wires and cables shall be of the approved type meeting all the requirements of the Philippine Electrical Code and bearing the PSA mark. Unless specified or indicated otherwise, all power and lighting conductors shall be insulated for 600 volts.

All wires shall be copper, soft drawn and annealed, smooth and of cylindrical form and shall be centrally located inside the insulation. All wiring devices shall be standard products of reputable electrical manufacturers.

#### Switches

Wall switches shall be rated at least 1 OA, 250 volts and shall be spring operated, flush, tumbler type. Duplex convenience receptacles shall be rated at least 15A, 250 volts, flush, polarized type. Single heavy-duty receptacles shall be rated at least 20A, 250 volts. 3-wire, flush, polarized type.

#### Main Circuit Breaker

The main circuit breaker shall be draw-out type, manually or electrically operated as required with ratings and capacity as shown on the approved Plans. The main breaker shall include insulated control switch if electrically operated, manual trip button, magnetic tripping devices, adjustable time over current protection and instantaneous short circuit trip and all necessary accessories to insure safe and efficient operation.

Main and branch circuit breakers for panel boards shall have the rating, capacity and number of poles as shown on the approved Plans. Breakers shall be thermal magnetic type. Multiple breakers shall be of the common trip type having a single operating handle. For 50-ampere breaker or less, it may consist of single-pole breaker permanently assembled at the factory into a multi-pole unit.

#### Feeder Circuit Breakers

There shall be as many feeder breakers as are shown on the single line diagram or schematic riser diagram and schedule of loads and computations on the plans. The circuit breakers shall be draw out or molded case as required. The circuit breakers shall each have sufficient interrupting capacity and shall be manually operated complete with trip devices and all necessary accessories to insure safe and efficient operation. The number, ratings, capacities of the feeder branch circuit breakers shall be as shown on the approved Plans.

#### Lighting Fixtures

The contractor shall install the lighting as shown on the approved plans. The standard double LED tube 48W with luminaire set and ceiling light LED of 12W shall be installed. All light fixtures shall be in accordance with the Philippine National Standard.

## METHODS OF CONSTRUCTION

All works throughout shall be executed in the best practice in a workmanlike manner by qualified and experienced electricians under the immediate supervision of a duly licensed Electrical Engineer.

### Conduits

Conduits should be cut square with a hacksaw and reamed. Bends shall be made with the required radius. In making bends only conduit bending apparatus will be used. The use of a pipe tee or vise for bending conduits shall not be permitted. Conduits which have been crushed, deformed or flattened shall not be installed. No running thread shall be allowed. Conduit runs crossing construction joints of the building shall be provided with standard expansion fittings of the approved type.

No conduits shall be used in any system smaller than 12 mm diameter electric trade size nor shall have more than four (4) 90-degree bends in anyone run and where necessary, pull boxes shall be provided.

All ends of conduits which are left empty in cabinets and conduit boxes shall be plugged with lead or approved pipe caps and to prevent the entrance of white ants and dirt within the conduit system. Pull wires shall be inserted in the empty ducts before they are closed with lead or pipe caps and shall be left therein for future use.

On exposed work, all pipes and outlet boxes shall be secured by means of galvanized metal clamps which shall be held in place by means of machine screws. When running over concrete surfaces, the screws shall be held in place by means of expansion sleeves for big pipes and rolled lead sheet for small pipes. All pipes shall be run at right angles to and parallel with the surrounding walls. No diagonal run shall be allowed and all bends and offsets shall be avoided as much as possible. Conduits shall be supported at 1,500 mm intervals maximum.

### Conduit Boxes & Fittings

Provide conduit boxes for pulling and splicing wires and outlet boxes for installation of wiring devices. As a rule, provide junction boxes or pull boxes in all runs greater than 30 meters in length, for horizontal runs. For other lengths, provide boxes as required for splices or pulling. Pull boxes shall be installed in inconspicuous but accessible locations. Support boxes independently of conduits entering by means of bolts, rod hangers or other suitable means

Conduit boxes shall be installed plumb and securely fastened. They shall be set flush with the surface of the structure in which they are installed where conduits are run concealed.

All convenience and wall switch outlet boxes for concealed conduit work shall be deep, rectangular flush type boxes. Four inch octagonal flush type boxes shall be used for all ceiling light outlets and shall be of the deep type where three or more conduits connect to a single box. Floor mounted outlet boxes required shall be waterproof type with flush brass floor plate and brass bell nozzle.

### Wires and Cables

Conductors or wires shall not be drawn in conduits until after the cement plaster is dry and the conduits are thoroughly cleaned and free from dirt and moisture. In drawing wires into conduits, sufficient slack shall be allowed to permit easy connections for fixtures, switches, receptacles and other wiring devices without the use of additional splices.

All conductors of convenience outlets and lighting branch circuit home runs shall be wired with a minimum of 3.5 mm in size. Circuit home runs to panel boards shall not be smaller than 3.5 mm but all home runs to panel board more than 30 meters shall not be smaller than 5.5 mm. No conductor shall be less than 2 mm in size.

No splices or joints shall be permitted in either feeder or branch conductors except within outlet boxes or accessible junction boxes or pull boxes. All joints in branch circuit wiring shall be made mechanically and electrically secured by approved splicing devices and taped with rubber and PVC tapes in a manner which will make their insulation as that of the conductor.

All wall switches and receptacles shall be fitted with standard Bakelite face plate covers. Device plates for flush mounting shall be installed with all four edges in continuous contact with finished wall surfaces without the use of nails or similar devices. Plaster fillings will not be permitted. Plates installed in wet locations shall be gasketed. When more than one switch or device is indicated in a single location, gang plate shall be used.

### Power Load Center

The Contractor shall install the Power Load Center Unit Substation and Panel boards at the locations shown on the approved Plans. Standard panels and cabinets shall be used and assembled on the job. All panels shall be of dead front construction furnished with trims for flush or surface mounting as required.

### REFERENCES:

STANDARD SPECIFICATIONS FOR PUBLIC WORKS STRUCTURES VOLUME III

[https://procurement-notices.undp.org/view\\_file.cfm?doc\\_id=69348](https://procurement-notices.undp.org/view_file.cfm?doc_id=69348)