



Republic of the Philippines
Department of Agriculture
Western Visayas
Iloilo City

CONSTRUCTION OF RICE PROCESSING CENTER III


Brgy. Cordova Sur, Tigbauan, Iloilo
Brgy. Poblacion 5, Hamtic, Antique
Brgy. Taloc, Bago City, Negros Occidental
Brgy. Caradio-an, Himamaylan City Negros Occidental
Brgy. Tabangka, Numancia, Aklan

TECHNICAL SPECIFICATIONS

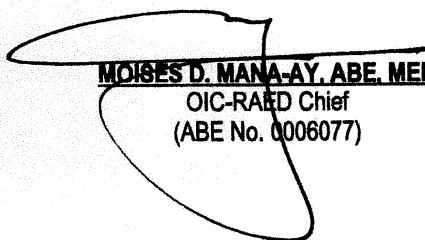
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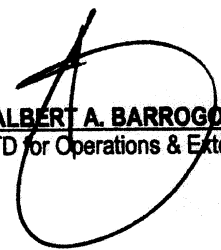
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TENDER AND CONTRACT DOCUMENTS

TECHNICAL SPECIFICATIONS

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PART I - GENERAL REQUIREMENTS

SPL1 – GEOTECHNICAL EXPLORATION & STRUCTURAL ANALYSIS

SCOPE

The Contractor shall be responsible of Geotechnical Exploration or Standard Sub-Surface Soil Investigation and Laboratory Tests minimum of two (2) holes. Also, the contractor shall be responsible to recalculate of the building integrity using structural analysis and seismic analysis, Electrical Analysis (if applicable) and Plumbing and Sanitary as required documents for the building permits. That includes signing and sealing of Detailed Engineering Design Plans, Estimates and Program of Works.

MEASUREMENT AND BASIS OF PAYMENT

The quantities determined as provided above shall be paid for at the appropriate contract unit price and payment shall constitute full compensation for furnishing such item.

SPL2 - PERMITS & CLEARANCES

SCOPE

The Contractor shall be responsible of securing the required permits and clearances, that includes Building Permit, Fire Permit, Electrical Permit and Plumbing and Sanitary Permit. Others documentary requirement will be provided by RAED- DA-WV. The contractor shall have the permits prior to the commence of the construction.

MEASUREMENT AND BASIS OF PAYMENT

The quantities determined as provided above shall be paid for at the appropriate contract unit price and payment shall constitute full compensation for furnishing such item.

SPL3 – TEMPORARY FIELD OFFICE

SCOPE

The Contractor shall provide and maintain temporary field office, including all the necessary electricity, water and drainage for the use of the Engineers. The office shall have at least the floor area prescribed on the Plans and shall contain the equipment, supplies and furnishings specified in the Contract. Their location shall require the approval of the Engineer prior to the start of construction. It is the intent of this Specification to locate the field office in government owned lots so that the use by the government of these facilities can be maximized even after the completion of the project. However, if no government lot is available, and these structures are to be erected on private property, it is the responsibility of the Contractor to make the necessary arrangements with the landowner(s) regarding the use of the lot for the Engineer's office and to remove and/or transfer, if so, required under the Contract, the improvements thereon, including all appurtenances upon completion of the Works. All facilities provided by the Contractor shall be near the job site, where necessary and shall conform to the best standard for the required types. On completion of the Contract, the facilities provided by the Contractor shall be demolished. The Contractor shall provide suitable utilities and services, such as potable water, electricity, sewerage and security on a 24-hour basis.

MEASUREMENT AND BASIS OF PAYMENT

The quantities determined as provided above shall be paid for at the appropriate contract unit price, for each of the particular pay items shown in the Bill of Quantities which price and payment shall constitute full compensation for furnishing and maintaining such items.

SPL4 – SIGNBOARD/BILLBOARD (1-4'x8' and 1-8'x8') & PROJECT MARKER

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 COA 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.

MEASUREMENT AND BASIS OF PAYMENT

The item measured as provided above shall be paid at the contract unit price in Lump Sum in the Bill of Quantities which price and payment shall constitute full compensation for furnishing all labor, tools, equipment, supplies and all incidentals or subsidiary works.

SPL5 – 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.

SPL6 – 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.

MEASUREMENT AND BASIS OF PAYMENT

Payment will be made as the work proceeds, after presentation of paid invoices or documentation of direct costs by the contractor showing specific mobilization and demobilization costs and supporting evidence of the charges of suppliers, subcontractors, and others. When the total of such payments is less than the lump sum contract price, the balance remaining will be included in the final contract payment. Payment of the lump sum contract price for mobilization and demobilization will constitute full compensation for completion of the work. Payment will not be made under this item for the purchase costs of materials having a residual value, the purchase costs of materials to be incorporated in the project, or the purchase costs of operating supplies.

PART II – SITE DEVELOPMENT & EARTHWORKS

2.1 - SITE CLEARING, GRUBBING 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.

METHOD OF MEASUREMENT

The area to be measured for payment shall be within the limit of the entire right-of-way as shown on the Drawings or as staked during construction operations. Measurement shall be made by the square meters and shall be computed based on the projection on a horizontal plane of the dimension of all acceptably cleared and grubbed areas.

2.2 – SCRAPING

SCOPE

The work under this Section shall include removing scrapping of top soil at the minimum depth of 0.15 meter with the area specified approved plans, drawings and program of works. This requires proper equipment such as excavator to accomplish this item of work. Proper disposal of the waste material shall be observed and as directed by the Project Engineer.

BASIS OF PAYMENT

The accepted quantities measured shall be paid for at the contract unit price for each of the Pay Items listed in the Bill of Quantities which price and payment shall be full compensation for the removal and disposal of excavated materials including all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this Item.

2.3 – EMBANKMENT/BACKFILLING (Compacted)

SCOPE

The contractor shall supply, place and compact random the embankment/backfill to the lines, grades and dimensions for the various structures included in the works and 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.

METHOD OF MEASUREMENT

Embankment will be measured by the number of cubic meters of approved materials satisfactorily compacted and acceptably placed and computed based on the neat lines of construction drawings prepared by the Contractor and approved the Project Engineer.

2.4 – EXCAVATION (Mechanical)

SCOPE

The work under this Section shall include excavation and trimming of foundation as required for the construction of permanent structure foundation, lined canal or pipes and other structure specified in the plans. It shall also include whenever necessary all coffer-damming temporary diversions and protection works. All excavation works should be done of both mechanical and manual.

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 weep holes are to be placed shall conform to the required grades and dimensions as shown on the drawing 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.

METHOD OF MEASUREMENT

The cost of excavation of material which is incorporated in the Works or in other areas of fill shall be deemed to be included in the Items of Work where the material is used. Measurement of Unsuitable or Surplus Material shall be the net volume in its original position. For measurement purposes, surplus suitable material shall be calculated as the difference between the net volume of suitable material required to be used in embankment corrected by applying a shrinkage factor or a swell factor in case of rock excavation, determined by laboratory tests to get its original volume measurement, and the net volume of suitable material from excavation in the original position. Separate pay items shall be provided for surplus common, unclassified and rock material. The Contractor shall be deemed to have included in the contract unit prices all costs of obtaining land for the disposal of unsuitable or surplus material.

BASIS OF PAYMENT

The accepted quantities measured shall be paid for at the contract unit price for each of the Pay Items listed in the Bill of Quantities which price and payment shall be full compensation for the removal and disposal of excavated materials including all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this Item.

2.6 - SOIL POISONING & TERMITES CONTROL

SCOPE

This Item shall consist of furnishing and applying termite control chemicals, including the use of equipment and tools in performing such operations in accordance on these Specifications.

MATERIAL REQUIREMENTS

Termite control chemicals or toxicants shall be able to immediately exterminate termites or create barriers to discourage entry of subterranean termites into the building areas. The toxicants may be classified as Liquid Termicide Concentrate. This type of toxicant shall be specified for drenching soil beneath foundations of proposed buildings. The concentrate shall be diluted with water in the proportion of 1 liter of concentrate material to 65 liters of water or as specified by the Manufacturer.

METHODS OF APPLICATION

At the time soil poisoning is to be applied, the soil to be treated shall be in friable condition with low moisture content so as to allow uniform distribution of the toxicant agents. Toxicant shall be applied at least twelve (12) hours prior to placement of concrete which shall be in contact with treated materials. Treatment of the soil on the exterior sides of the foundation walls, grade beams and similar structures shall be done prior to final grading and planting or landscaping work to avoid disturbance of the toxicant barriers by such operations. Areas to be covered by concrete slab shall be treated before placement of granular fill used as capillary water barrier at a rate of 12 liters per square meter with Type I working solution after it has been compacted and set to required elevation. Additional treatment shall be applied as follows:

In critical areas such as utility openings for pipes, conduits and ducts, apply additional treatment at the rate of 6 liters per linear meter in a strip 150 mm to 200 mm wide.

Along the exterior perimeter of the slab and under expansion joint, at the rate of 2.5 liters per linear meter in a strip 150 mm to 200 mm wide in a shallow trench.

BASIS OF PAYMENT

The accepted quantities measured shall be paid for at the contract unit price for each of the Pay Items listed in the Bill of Quantities which price and payment shall be full compensation for the soil poisoning and termites control including all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this Item.

2.7 – LEVELING COARSE (Compacted)

SCOPE

This item shall consist of approved granular fill material furnished and placed as required to replace unsuitable material encountered below foundation elevation of concrete structures, pipes, and concrete posts.

MATERIALS AND METHOD OF CONSTRUCTION

The leveling course shall be of coarse aggregate of sizes 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 a 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.

Gravel beddings shall consist of natural or processed aggregates such as gravel, sand or stone fragments, which shall conform to the following grading requirements:

Requirements for Grading		Percent by Weight Passing		
Sieve Size	(mm)			
		Grading A	Grading B	Grading C
75.00		100	100	100
5.00		35-70	40-90	50-100
0.075		0.20	0.25	0.30

After the unsuitable material has been removed as required by the DA-WV Project Engineer, gravel blanket shall be placed in thoroughly compacted layers, not exceeding those specified in the Drawing or as directed by the Project Engineer.

METHOD OF MEASUREMENT

Leveling Coarse will be measured by the number of cubic meter of materials acceptably placed and computed based on the neat lines of construction drawings prepared by the Contractor and approved the Project Engineer.

BASIS OF PAYMENT

The volume measured as provided above will be paid for at the contract unit price per cubic meter, which price and payment shall constitute full compensation for furnishing all labor, tools, equipment, supplies and materials and all incidentals or subsidiary works necessary for the successful completion of the work.

2.8 – 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.

METHOD OF MEASUREMENT

The quantity of forms and scaffolds installed shall be measured in square meter. The Contractor shall include in his prices for any formwork which may have to be left in position due to the impossibility of removal of the same.

BASIS OF PAYMENT

The accepted quantities measured shall be paid for at the contract unit price for each of the Pay Items listed in the Bill of Quantities which price and payment shall be full compensation including all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this Item.

PART III – REINFORCE CONCRETE WORKS

3.0 – 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 items which constitute the completed structure. 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 be 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 operations 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 33, 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 (mm²)	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 were 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 begins. 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 stems, 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 protection shall be removed from all surface 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 exceed 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 result 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.

METHOD OF MEASUREMENT

The quantity of concrete to be paid shall be the quantity shown in the Bid Schedule, unless changes in design are made in which case the quantity shown in the Bid Schedule will be adjusted by the amount of the change for the purpose of payment. No deduction will be made for the volume occupied by the pipe less than 101 mm (4") in diameter nor for reinforcing steel, anchors, or expansion materials.

BASIS OF PAYMENT

The accepted quantities of reinforced concrete completed in place will be paid for at the contract unit price for cubic meter as indicated on the Bid Schedule.

PART IV – MASONRY WORKS, WALL FRAMING & CLADDING

4.1 – MASONRY WORKS

SCOPE

Furnish materials and equipment and perform labor required to complete masonry work as shown in the drawings and specified in the summary of materials.

MATERIALS AND METHODS OF CONSTRUCTION

All non-load bearing concrete hollow blocks shall be used in non-load bearing masonry and shall conform to ASTM Specification C129-39 with a minimum compressive strength of 700psi.

- 4" x 8" x 16"
- 6" x 8" x 16" – maximum weight of 25lbs/block

Mortar shall conform to ASTM Specifications C476-71, 2500psi in 28 days. One-part Portland cement, one-fourth part hydrated lime, to three parts loose, damp sand plus water.

Reinforcement structural grade billet steel deformed bars conforming to ASTM Specifications A615 with yield strength of 230Mpa.

Water used in mixing mortar shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials or other substances that may be deleterious to concrete and steel.

All grout shall be machine-mixed in accordance with ASTM C94 and shall consist of one-part Portland cement, two-and one-half-part sand, two parts pea gravel and adequate water to produce a concrete of approximately ten inches slump and shall have an ultimate compressive strength of 2000psi in 28 days.

Use mechanical mixer of one bag minimum capacity. Mix mortar at least three minutes after all materials have been added. The actual mixing time shall not be used in one hour after the water has been first mixed into the batch. Mix only as much mortar as can be used in one hour after the water has been first mixed into the batch.

Lay all walls in running bond, plumb level, and true to the lines and dimensions indicated on the drawings. Do not use chipped or broken units; if any such units are discovered in the finished wall the Project Engineer may require their immediate removal and replacement with new units at no additional cost.

Place all units in mortar with full shoved bed and head joints. Align all vertical cells to maintain a clear unobstructed system of flues. Provide cleanouts until they have been inspected and approved by the DA-WV Project Engineer.

Install all reinforcements as indicated on the drawings. embed reinforcement in grout, not in mortar or mortar joints. Reinforcement shall be done in accordance with the structural plan as to size, spacing and other requirements of this item of work. All reinforcement shall be clean and free from loose, rust, scale and any coating that will reduce bond.

Perform wall grouting in strict accordance with the provisions for high lift grouting as described in Chapter 24 of the Uniform Building Code, 1970 edition.

MEASUREMENT & BASIS OF PAYMENT

The work to be paid for this Item shall be the number of square meters of masonry units that are satisfactorily accept and completed.

4.2 – WALL FRAMING

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 on 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.

- G.I. Tubular 1.5mm Thk. 50mm x 50mm
- G.I. Tubular. 2.0mm Thk. 40mm x 100mm

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 except cast-iron unless otherwise specified, shall be primed with epoxy primer paint before a final coat of coal tar 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.

MEASUREMENT & BASIS OF PAYMENT

The work to be paid for this Item shall be in kilogram basis that are satisfactorily accept and completed.

4.3 – WALL CLADDING

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 Long Span 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.

Fastening hardware shall be of two- and one-half inch (2 ½") Tex screw and standard aluminum blind rivets.

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 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 cladding area is covered.

In cutting pre-painted steel 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 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 fillings.

METHODS OF MEASUREMENTS

The work done under this Item shall be measured by actual area covered or installed with pre-painted Hi-Rib and/or walling in square meters and accepted to the satisfaction of the Project Engineer.

PART V – ROOF FRAMING & CLADDING WORKS

5.1 – ROOF FRAMING

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.

- Truss & Strut
 - Top & Bottom Cord – 6mm thk. 63mm x 63mm Angle Bar
 - Members – 5mm thk. 50mm x 50mm Angle Bar
- Girt
 - Top & Bottom Cord – 6mm thk. 75mm x 75mm Angle Bar
 - Members – 5mm thk. 50mm x 50mm Angle Bar
- Purlins – 1.9mm thk. 50mm x 200mm C-Channel, space at 0.60 meter
- Fascia Frame – 3.0mm thk. 25mm x 25mm Flat Bar, 3.0mm thk. 25mm x 25mm Angle Bar
- Canopy (Rafter)
 - Top & Bottom Cord – 4mm thk. 50mm x 50mm Angle Bar
 - Members – 3mm thk. 40mm x 40mm Angle Bar
 - Purlins – 1.5mm thk. 50mm x 100mm C-Purlins
- Tension Rod – 16mmØ bar with standard turn-buckle
- Sagrod – 12mmØ plain bar with threaded at both ends

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 except cast-iron unless otherwise specified, shall be primed with epoxy primer paint before a final coat of coal tar 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.

MEASUREMENT & BASIS OF PAYMENT

The work to be paid for this Item shall be in kilogram basis that are satisfactorily accept and completed.

5.2 – FASCIA & GUTTER/ 5.3 – ROOF CLADDING

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 two- and one-half inch (2 ½") Tex 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 fillings.

MEASUREMENTS & BASIS OF PAYMENT

The work done under this Item shall be measured by actual area covered or installed with pre-painted steel roofing and/or walling in square meters and accepted to the satisfaction of the Project Engineer. The unit bid or contract unit price which payment shall constitute full compensation including labor, materials, tools and incidents necessary to complete this Item.

PART VI – PLUMBING & SANITARY 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.

MEASUREMENTS & BASIS OF PAYMENT

The work done under this Item shall be quantified per length and/or number of units as provided in the Bill of Quantities, tested and accepted to the satisfaction of the Engineer. The quantified items, installed in place shall be the basis for payment based from the unit bid price for which prices and payments shall constitute full compensation including labor, materials and incidentals necessary to complete this Item.

PART VII – ELECTRICAL WORKS & PHOTOVOLTAICS

7.1 – CONDUITS, BOXES & FITTINGS, 7.2 – WIRES AND WIRING DEVICES, 7.3 – POWER LOAD CENTER, SWITCHGEAR & PANEL BOARDS

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 brand 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. Rigid Steel Conduits (RSC) and it shall be Schedule 40. Enamel coated steel conduits and conduits with rough inner surfaces are not acceptable.

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, parallel slots. Single heavy-duty receptacles shall be rated at least 20A, 250 volts. 3wire, 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.

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 so as 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, red 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 coiled wire 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.

BASIS OF PAYMENT

The Items measured and determined as provided shall be paid for in lump-sum basis which payment constitute full compensation of materials, labor and incidentals necessary to complete this Item.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
7.1	CONDUITS, BOXES & FITTINGS	Lot
7.2	WIRES AND WIRING DEVICES	Lot
7.3	POWER LOAD CENTER, SWITCHGEAR & PANEL BOARDS	Lot

7.4 – TRANSFORMER (3-167kVA)

SCOPE

This specification covers the supply, delivery installation and testing performance of the three phase, 50Hz, 3 – 167kVA distribution power transformer with accessories.

MATERIAL REQUIREMENTS

All transformers shall have separate primary and secondary windings and be hermetically sealed, oil immersed with natural oil and air cooling (ONAN). The design of the tank, fittings, bushings, etc. shall be such that it will not be necessary to keep the transformer energized to prevent deterioration as the transformers may be held in reserve. The continuous rating of the Transformer shall be 167kVA. Each Transformer shall be capable of supplying its rated power being the product of rated voltage and rated current on the line side winding expressed on kVA.

The transformer shall also be capable of delivering rated current at an applied voltage equal to 105% of the rated voltage. Likewise, each transformer shall be capable of supplying its rated power continuously under ambient temperature conditions without the temperature rise of the top oil exceeding 50 °C and without the temperature rise of the windings as measured by resistance exceeding 55 °C

The transformer shall be capable of operating in accordance with the loading guidelines of IEC 60354 without exceeding the normal daily use of life and without the transformer winding hot spot temperature exceeding 140 °C. The guaranteed value of Impedance measured at 75 °C for the tap and center tap shall be 4% for the transformer of 167kVA capacity and it shall be subject to the tolerance specified in IEC 60076.

The resistance component of impedance measured at 75°C on the center tap shall not exceed 25% for 167 kVA ratings

The transformer shall be capable of withstanding the thermal and dynamics effects of short circuits. The short circuit characteristics shall be as follows;

- 1. The X/R ratio shall conform to HD 398/HD 428
- 2. The initial winding hot spot temperature shall be 98°C
- 3. . the final winding hot spot temperature shall be 250°C

The ability to withstand the thermal and dynamic effects of a short circuit shall be demonstrated in accordance with IEC 60076 and IEC 60354.

The flux density at any point of the magnetic circuit when the transformer is connected on the center tap and operating at normal voltage and frequency shall not exceed 1.65 Tesla. Saturation must not occur at 10% over voltage.

The average noise level of the transformers shall not exceed the values given in IEC 60551. The measurement shall be carried out in accordance with the above standard at a distance of 300 mm from the envelope of the transformer.

All transformer shall be subject to the approval of the local Electric Cooperative in the area of installation.

METHODS OF CONSTRUCTION

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

BASIS OF PAYMENT

The quantified items, installed in place shall be the basis for payment based from the unit bid price for which prices and payments shall constitute full compensation including labor, materials and incidentals necessary to complete this Item.

7.5 – SOLAR STREET LIGHTS

SCOPE

Work under this Item shall consist of furnishing, placing, welding, aligning of structural post required for the solar street light.

MATERIALS AND METHOD OF CONSTRUCTION

Post and Solar Light

See drawings and schedules for size, details, material use and location of required work or verify with the Project Engineer.

BASIS OF PAYMENT

Payment of works under this item shall be in unit of assembly of works installed as shown in the Bid Proposal of the Contractor which price shall constitute the cost of labor, equipment and all other incidentals incurred by the Contractor in the fabrication, delivery and installation of these items of works.

7.6 – SOLAR PHOTOVOLTAICS

SCOPE

Work under this Item shall consist of furnishing, placing, welding, aligning of aluminum railing and clamps, and installation of inverter as required for the solar photovoltaics module.

MATERIALS AND METHOD OF CONSTRUCTION

Aluminum Railings

The Rail should be of Aluminum 6005 T-5 1.4mm thk. 70mm x 95mm or its equivalent. The rail shall be fixed using aluminum fixing clamp and bolted side by side to the rack structure as shown in the plan.

Solar Panel

The Solar Modules shall be aligned, fixed and bolted on the aluminum rail using aluminum mid-clamps and end clamps as shown in plans. The solar modules should have the minimum specifications as follows:

1. 39,600 WP total Solar Power Modules, 88 pcs. Solar Modules @ 450 Wp, or its equivalent (minimum)
2. Manufactured in ISO 9001- Certified Factories
3. Must be CE marked
4. Must have TUV Certification (IEC 61215)
5. Cell type: Monocrystalline

Inverter (25kVA), Breakers, Wirings & Devices

The Inverter Controller shall be aligned, fixed on the wall as specified by the Project Engineer. The inverter controller should have the minimum specifications as follows:

1. Brand New – 25kVA
2. Input power and alarm protection indication for; overvoltage, over temperature and overload
3. Maximum Power Point Tracking (MPPT)
4. AC/DC compatibility
5. Overcurrent Protection

6. No load protection
7. Operating History Memory
8. Enclosure Class IP66
9. Sine wave Filter
10. RS485 / Ethernet Capability

Warranty

The solar panel and inverter shall have a minimum of three (3) years warranty from the date of acceptance by the DA-Western Visayas.

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. PVC conduit if required shall be Schedule 40. Enamel coated steel conduits and conduits with rough inner surfaces are not acceptable.

Conduit Boxes

All conduit boxes shall be Code gauge steel and galvanized. Outlet boxes shall be galvanized pressed steel of standard make. In general, outlet boxes shall be at least 100 mm square or octagonal, 53 mm deep and 16 mm minimum gauge.

Conduit Fittings

All conduit fittings such as locknuts and bushings shall be galvanized of standard make.

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. 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, parallel slots. Single heavy-duty receptacles shall be rated at least 20A, 250 volts. 3wire, flush, polarized type.

BASIS OF PAYMENT

Payment of works under this item shall be in unit of assembly of works installed as shown in the Bid Proposal of the Contractor which price shall constitute the cost of labor, equipment and all other incidentals incurred by the Contractor in the fabrication, delivery and installation of these items of works.

PART VIII – FINISHING TOUCHES AND ATTACHMENTS

8.1 – PLASTERING (SMOOTH FINISH)

SCOPE

This Item shall consist of furnishing all cement plaster materials, labor, tools and equipment required in undertaking cement plaster finish as shown on the Plans and in accordance with this Specification.

MATERIALS AND METHODS OF CONSTRUCTION

Manufactured materials shall be delivered in the manufacturer's original unbroken packages or containers which are labelled plainly with the manufacturer's name and trademark.

Sand shall conform to ASTM Specifications 35-67, Portland cement shall conform to ASTM Specifications C-150-67, Type 1,. The water must be clean and free of deleterious substances.

Mortar mixture for brown coat shall be freshly prepared and uniformly mixed in the proportion by volume of one part Portland Cement, three (3) parts sand and one fourth (1/4) part hydrated lime.

Finish coat shall be pure Portland Cement properly graded conforming to the requirements of these Specifications. Hydraulic Cement and mixed with water to approved consistency and plasticity.

After removals of formworks reinforced concrete surfaces shall be roughened to improve adhesion of cement plaster. Surfaces to receive cement plaster shall be cleaned of all projections, dust, loose particles, grease and bond breakers. Before any application of brown coat is commenced all surfaces that are to be plastered shall be wetted thoroughly with clean water to produce a uniformly moist condition.

Brown coat mortar mix shall be applied with sufficient pressure starting from the lower portion of the surface to fill the grooves and to prevent air pockets in the reinforced concrete/masonry work and avoid mortar mix drooping. The brown coat shall be lightly broomed/ or scratch before surface had properly set and allowed to cure.

Finish coat shall not be applied until after the brown coat has seasoned for seven days and corrective measures had been done by the Contractor on surfaces that are defective. Just before the application of the finish coat, the brown coat surface shall be evenly moistened with potable water. Finish coat shall be floated first to a true and even surface, then troweled in a manner that will force the mixture to penetrate into the brown coat. Surfaces applied with finish coat shall then be smooth with paper in a circular motion to remove trowel marks, checks and blemishes. All cement plaster finish shall be 10 mm thick minimum on vertical concrete and/or masonry walls. Wherever indicated on the Plans to be "Simulated Red Brick Finish", the Contractor shall render brick design on plaster surface before brown coat had properly set and then allowed to dry.

Cement plaster shall not be applied directly to:

- Concrete or masonry surface that had been coated with bituminous compound and,
- Surfaces that had been painted and previously plastered.

Cement plaster finish shall be true to details and plumb. Finish surface shall have no visible junction marks where one (1) Day's work adjoins the other. Where directed by the Engineer or as shown on the Plans vertical and horizontal groove joints shall be 25 mm wide and 10 mm deep.

Plastering shall not be commenced until the background has been suitably prepared. Block work joints shall be deeply raked out, efflorescence brushed off and all dust and foreign matter removed. The finished surface shall be true and shape and angle even in all directions, with straight rises free of cracks and trowel marks and to the entire satisfaction of the Engineer.

BASIS OF PAYMENT

The work quantified and determined as provided in the Bill of Materials shall be paid for at the Contract Unit Price which price constitutes full compensation including labor, materials, tools and equipment and incidentals necessary to complete this Item.

8.2 – PAINTING WORKS

SCOPE

This Item shall consist of furnishing all paint materials and other related products, labor, tools, equipment and plant required in undertaking the proper application of painting, varnishing and related works indicated on the Plans and in accordance with this Specification.

MATERIAL REQUIREMENTS

Paint Materials

All types of paint material, varnish and other related product shall be subject to the approval of the project engineer. (Use the following approved brand name: Boysen, Davies, Dutch Boy, Fuller O'Brien, or any approved equal).

Tinting Colors

Tinting colors shall be first grade quality, pigment ground in alkyd resin that disperses and mixes easily with paint to produce the color desired. Use the same brand of paint and tinting color to effect good paint body.

Concrete Neutralizer

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.

METHODS OF APPLICATION

The Contractor prior to commencement of the painting and related work shall examine the surfaces to be applied in order not to jeopardize the quality and appearances of the painting varnishing and related works.

All metal works except cast-iron unless otherwise specified, shall be primed with epoxy primer paint before a final coat of coal tar 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.

Surface Preparation

Concrete and masonry surfaces shall be coated with concrete neutralizer and allowed to dry before any painting primer coat is applied. When surface is dried apply first coating. Hairline cracks and unevenness shall be patched and sealed with approved putty or patching compound. After all defects are corrected apply the finish coats as specified on the Plans (color scheme approved).

Application

Paints when applied by brush shall become non-fluid, thick enough to lay down as adequate film of wet paint. Brush marks shall flaw out after application of paint. Paints made for application by roller must be similar to brushing paint. It must be nonstick when thinned to spraying viscosity so that it will break up easily into droplets. Paint is atomized by high pressure pumping rather than broken up by the large volume of air mixed with it. These procedures change the required properties of the paint.

Mixing and Thinning

At the time of application paint shall show no sign of deterioration. Paint shall be thoroughly stirred, strained and kept at a uniform consistency during application. Paints of different manufacture shall not be mixed together. When thinning is necessary, this may be done immediately prior to application in accordance with the manufacturer's directions, but not in excess of 1 pint of suitable thinner per gallon of the paint.

BASIS OF PAYMENT

The accepted work shall be paid at the unit bid price, which price and payment constitute full compensation for furnishing all materials, labor, equipment, tools and other incidental necessary to complete this Item.

8.3 – STEEL SLIDING DOOR

SCOPE

This Item shall consist of furnishing and installing all fabricated steel sliding door and frames equipped with fixing accessories and locking devices in accordance with the Plans and/or shop drawings and as herein specified.

MATERIAL REQUIREMENTS & METHOD OF CONSTRUCTION

All door cladding plates or panels shall be formed from 2.00mm thick G.I. sheet prime quality steel. The materials used shall conform to the specification requirement of ASTM-A505. The assembled frames shall be finished square and flat on the same plane.

Tubular Door (Casement)

Hollow steel doors shall be custom built of size and details as indicated on the Plans and/or shop drawings. Cladding of doors shall be flush or louver type. Frames shall be formed from 2.00mm thick 50mm x 100mm G.I. Tubular and 2.00mm thick 50mm x 50mm G.I. Doors shall be hung to the guide bearing roller 400kg/unit capacity as specified in the Plans.

Anchors and Fasteners

Anchors shall be steel, zinc coated or coated or painted with rust inhibitive paint, of sizes, shapes and design per manufacturer's standards.

BASIS OF PAYMENT

The accepted work shall be paid at the unit bid price, which price and payment constitute full compensation for

furnishing all materials, labor, equipment, tools and other incidental necessary to complete this Item.

8.4 – DOORS, WINDOWS & STEEL LOUVERS

SCOPE

This Item shall consist of furnishing and installing all fabrication of doors, windows and steel louvers its frames equipped with fixing accessories in accordance with the Plans and/or shop drawings and as herein specified.

MATERIAL REQUIREMENTS

Steel Door
Frame: 2.0mm thick 40mm x 40mm G.I. Tubular
Cladding: Bended G.I. sheet gauge 20 with vent

Wooden Door
Panel door w/Jam

PVC Door
PVC door w/ PVC w/ Jam

Windows
Aluminum Sliding and Awning window / 6mm thick smoke glass

Steel Louvers
Bended G.I. Sheet Gauge 20 w/ aluminum screen and frame

METHODS OF CONSTRUCTION

All works under this item shall be handle skillfully by contractor. All necessary accessories needed for the satisfactory accomplishment of this work items shall be built-in with the unit.

BASIS OF PAYMENT

The accepted work qualified and provided in the Bill of Quantities shall be paid for at the unit Bid price which constitutes full compensation for furnishing all materials, labor, tools, equipment and other incidentals necessary to complete this Item.

PART IX – MULTI-PURPOSE DRYING PAVEMENT

[Refer to the same Item of work on these Specifications]

REFERENCES:

STANDARD SPECIFICATIONS FOR PUBLIC WORKS STRUCTURES VOLUME III

https://procurement-notice.undp.org/view_file.cfm?doc_id=69348