



Republic of the Philippines  
**DEPARTMENT OF AGRICULTURE WESTERN VISAYAS**  
Hamungaya, Brgy. Buntatala, Jaro, Iloilo City  
westernvisayas@mail.da.gov.ph | (033) 336-4221

## TECHNICAL SPECIFICATIONS

### ESTABLISHMENT OF BRGY. GENERAL MALVAR SOLAR POWERED IRRIGATION SYSTEM (SPIS)

Brgy. General Malvar, Pontevedra, Negros Occidental


Prepared by:

  
**ROMMEL JON L. CUIZON, ABE**  
Technical Staff (License No. 0009937)

Recommending Approval:

  
**MARIA TERESA T. SOLIS**  
OIC- RTD for Operations

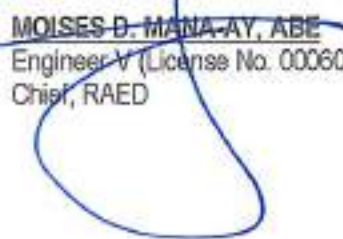
Reviewed by:

  
**YVONNE GRACE H. SUR, ABE**  
Engineer III (License No. 0005970)  
Head, EPDSS

Approved by:

  
**DENNIS R. ARPIA**  
Regional Executive Director

Submitted by:

  
**MOISES D. MANAY, ABE**  
Engineer V (License No. 0006077)  
Chief, RAED

## TABLE OF CONTENTS

<b>ITEM NO. I –GENERAL REQUIREMENTS</b> .....	<b>2</b>
A.1.1 (8)– PROVISION OF TEMPORARY FACILITY (RENTAL BASIS) .....	2
B.5. – COA BILLBOARD, AND PROJECT SIGNBOARD .....	2
B.9 - MOBILIZATION & DEMOBILIZATION .....	2
SPL 1 – WELL CONSTRUCTION (WITH PUMPING TEST)- Includes Labor, Equipment, and Materials.....	3
<b>ITEM NO. II – SOLAR PUMP, SOLAR ARRAY, MOUNTING STRUCTURE, INVERTER ENCLOSURE &amp; STANDPIPE</b> .....	<b>4</b>
800(1) – CLEARING, GRUBBING, AND LAYOUT .....	4
803(1)a – STRUCTURAL EXCAVATION.....	5
804(1)b – EMBANKMENT (BACKFILL FROM STRUCTURE EXCAVATION).....	6
804(4) – GRAVEL FILL (GRAVEL BEDDING) .....	6
900(1)C1 – CONCRETE WORKS (CLASS A, 28 DAYS) .....	7
902(1)a1– REINFORCING STEEL (DEFORMED, GRADE 40) .....	10
903(2)- FORMWORKS .....	11
SPL 2- SOLAR POWER MODULE MOUNTING STRUCTURE & INVERTER ENCLOSURE (INCLUDING PAINTING WORKS) .....	12
SPL 3- SOLAR POWER MODULES (3,300 WP, MINIMUM) .....	12
SPL 4- INVERTER AND CONTROLLER-4KW, MINIMUM W ACCESSORIES (BREAKERS, WIRINGS, PANELS & CONDUITS) .....	13
SPL 5- SUBMERSIBLE PUMP (2HP, MINIMUM) .....	14
SPL 6- VALVES, PIPES, FITTINGS & OTHER ACCESSORIES .....	15
<b>ITEM NO. III – ELEVATED STORAGE TANK</b> .....	<b>16</b>
803 (1)a – STRUCTURAL EXCAVATION.....	16
804(1)b– EMBANKMENT (BACKFILL FROM STRUCTURE EXCAVATION) .....	16
804(4) – GRAVEL FILL (GRAVEL BEDDING) .....	16
900(1)C1 – CONCRETE WORKS (CLASS A, 28 DAYS) .....	16
902(1)a1– REINFORCING STEEL (DEFORMED, GRADE 40) .....	16
903(2)- FORMWORKS .....	16
1201 (9)c- INSTALLATION OF OVERHEAD STORAGE TANK (POLYETHYLENE, 2000 LITERS CAPACITY- VERTICAL TYPE) .....	16
SPL 7- ELEVATED STORAGE TANK METAL STAND (INCLUDING PAINTING WORKS) .....	17
<b>REFERENCES:</b> .....	<b>17</b>

## ITEM NO. 1 –GENERAL REQUIREMENTS

### A.1.1 (8)– PROVISION OF TEMPORARY FACILITY (RENTAL BASIS)

#### SCOPE

The Contractor shall furnish all materials, labor, equipment, tools and install such temporary works as are necessary for the successful completion of the Contract Work. The Contractor shall negotiate the site for his construction camp, office, and work areas.

These temporary works and construction plan shall include but shall not be limited to the following:

1. Construction camp for housing, feeding and accommodation for all the Contractor's employees. The Contractor shall also, with-in close proximity of his camp, provide an office and sleeping quarter for DA-RAED 6 monitoring employees, complete with facilities and shall have a minimum floor area of 48 sq.m.
2. Facilities such as haul roads, potable water, supply, drainage, lighting, sewage disposal system, sanitation, first aid and fire protection facilities.
3. Workshops, laboratory, warehouses, site offices, stockpile areas, storage areas for materials, equipment, spare parts, fuel and oil.
4. All other temporary facilities not specifically listed but nevertheless required for the proper functioning of the camp set-up and construction activities.

Temporary works shall conform to all government standards and codes and shall meet the sanitary requirements of the Department of Health.

#### 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.

Pay Item Number	Description	Unit of Measurement
A.1.1 (8)	Provision of Field Office for the Engineer (Rental Basis)	Lot

### B.5. – COA BILLBOARD, AND PROJECT SIGNBOARD

#### 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 better board.

#### 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.

Pay Item Number	Description	Unit of Measurement
B.5	COA Billboard, and Project Signboard	Lot

### B.9 - MOBILIZATION & DEMOBILIZATION

#### SCOPE

The Contractor shall mobilize and move into the Project Site (in accordance with his approved Construction Program and Equipment Moving-in and Utilization Schedule) the required construction equipment needed for the successful completion of the Contract Work immediately after receipt of the approved Construction Program. Notwithstanding the approved Equipment Moving-in and Utilization Schedule, the initial equipment required to be mobilized by the Contractor to the Project Site within twenty (20) calendar days after date of receipt of the approved Construction Program are listed below:



## MINIMUM EQUIPMENT REQUIREMENT FOR SOLAR-POWERED IRRIGATION PROJECT

Description	No. of Unit
1. Concrete Mixer 1 bagger	1 unit
2. Bar Cutter & Bender	1 unit
3. Service Vehicle	1 unit
4. Welding Machine	1 unit
5. Concrete Vibrator	1 unit

If for the reasons or causes other than "major calamities", the Contractor fails to mobilize fully the initial equipment required within said period, and all other equipment listed in his approved Equipment Moving-in and Utilization Schedule, at the discretion of the Secretary/Director, he may be given an extension of time to mobilize them fully but in no case shall it exceed thirty (30) calendar days. Failure to fully mobilize the required construction equipment within said period will be a ground for contract rescission.

Demobilization shall include dismantling and removal from the site of Contractor's Construction Plant, materials and equipment and all temporary facilities with the exception of some facilities which DA- Western Visayas shall consider to remain and which shall be handled over to DA- Western Visayas at the time of demobilization shall also include clean-up of the site after completion of the Contract Work as approved by DA- Western Visayas and transportation from the site of Contractor's employees.

## 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.

Pay Item Number	Description	Unit of Measurement
B.9	Mobilization and Demobilization	Lot

## SPL 1 – WELL CONSTRUCTION (WITH PUMPING TEST)- Includes Labor, Equipment, and Materials

### SCOPE

This item shall consist of furnishing all plant, labor, equipment, appliances, and materials and performing all operations in connection with drilling, sampling, constructing, developing, and testing the well.

### Construction Requirements

Cutting must be carefully collected for every meter of penetration or at every change of lithology. Penetration rate shall be closely monitored so as to have supplemental data in the evaluation of the hydraulic parameters of the lithology encountered.

Rotary drill is recommended to pave way for electric logging after the drilling exploratory well. Electric logging is used to locate the exact aquifer zone(s). When aquifer zones have been properly located, it is recommended that aquifer testing should be conducted to determine the aquifer characteristics such as maximum yield, before the final well-design be constructed.

Drilling shall be done up to 15 meters (minimum) below the ground surface. Submersible pump must be at the most applicable level inside the casing. Please see attached geo-resistivity results.

Well perforations should have slot opening of at least 15% of the surface area of the pipe.

### Stages of Well Development

#### 1. Jetting

After the well is installed, it is jetted starting from the bottom of the perforated pipe to remove the trapped mud and fine aquifer materials.

#### 2. Pumping at low discharge

After the jetting fluid significantly clears up, well development is continued by pumping. Initially the pump is operated at a very low and controlled discharge until the water clears and pumping is stopped for at least ten minutes after which pumping is resumed.

3. Pumping at intermediate and higher discharge. The well should be developed at intermediate discharges, and up to a pumping rate that is 50% or more above the designed pump discharge.

#### Scope of Work

- a. Site preparation and Rig Set-up
- b. Drilling and Installation of Surface casing
- c. Drilling of Pilot Hole
- d. Electric logging and Preparation of Well Design
- e. Reaming from 0 m. to 15.00m (15.00 m.) 4" dia.
- f. Installation of Casing and Screen with Centralizer
- g. Installation of Gravel Pack Materials
- h. Development by Bailing
- i. Treatment with Sodium Hexametaphosphate
- j. Development by High Velocity Jetting
- k. Development by Surging including Bailing Out of Sediments
- l. Development by Air-lift Method Using Air Compressor
- m. Well Development by Pumping
- n. Step-drawdown pumping test with five (5) steps at one-hour duration each
- o. Discharge rate increasing in equal fraction of the expected maximum yield
- p. Continues Constant Discharge Pumping Test
- q. Grouting

#### NOTE

- Pump testing shall be conducted to determine if the designed discharge is applicable. The size of submersible pump may be changed depending on the result of the discharge test
- Must be AMTEC Tested (System Test).

#### BASIS OF PAYMENT

Payment for structural backfill will be made at the contract unit price per cubic meter, backfill in the Bid Proposal, which payment shall constitute full compensation for furnishing all labor, equipment, and other incidentals necessary to complete the item.

Pay Item Number	Description	Unit of Measurement
SPL 1	Well Construction (with Pumping Test)	Lot

## ITEM NO. II – SOLAR PUMP, SOLAR ARRAY, MOUNTING STRUCTURE, INVERTER ENCLOSURE & STANDPIPE

### 800(1) – CLEARING, GRUBBING, AND LAYOUT

#### SCOPE

This item shall consist of clearing, grubbing, layout, removing and disposing all vegetation and debris as designated in the Contract, except those objects that are designated to remain in place or are to be removed in consonance with other provisions of this Specification. The work shall also include the preservation from injury or defacement of all objects designated to remain.

The Engineer will establish the limits of work and designate all trees, shrubs, plants and other things to remain. The Contractor shall preserve all objects designated to remain.

Clearing shall extend one (1) meter beyond the toe of the fill slopes or beyond rounding of cut slopes as the case maybe for the entire length of the project unless otherwise shown on the plans or as directed by the Engineer and provided it is within the right of way limits of the project, with the exception of trees under the jurisdiction of the Forest Management Bureau (FMB).

All surface objects and all trees, stumps, roots and other protruding obstructions, not designated to remain, shall be cleared and/or grubbed, including mowing as required, except as provided below:



In areas covered by cogon/ talahib, wild grass and other vegetation, top soil shall be cut to a maximum depth of 150 mm below the original ground surface or as designated by the Engineer, and disposed outside the clearing and grubbing limits as indicated in the typical roadway section.

If perishable material is burned, it shall be burned under the constant care of component watchmen at such times and in such a manner that the surrounding vegetation, other adjacent property, or anything designated to remain on the right of way will not be jeopardized. If permitted, burning shall be done in accordance with applicable laws, ordinances, and regulation.

Materials and debris which cannot be burned and perishable materials may be disposed of by methods and at locations approved by the Engineer, on or off the project. The disposal areas shall be seeded, fertilized and mulched at the Contractor's expense.

#### **BASIS OF PAYMENT**

The accepted quantities, shall be paid for at the Contract unit price for each of the Pay Items listed below that is included in the Bill of Quantities, which price and payment shall be full compensation for furnishing all labor, equipment, tools and incidentals necessary to complete the work prescribed in this item.

Pay Item Number	Description	Unit of Measurement
800(1)	Clearing, Grubbing, and Layout	Square Meters (sq.m.)

### **803(1)a – STRUCTURAL EXCAVATION**

#### **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.

Foundations shall be excavated using 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 below that is included 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.

Pay Item Number	Description	Unit of Measurement
803(1)a	Structural Excavation	Cubic Meters (cu.m.)

## **804(1)b-- EMBANKMENT (BACKFILL FROM STRUCTURE EXCAVATION)**

### **SCOPE**

Work under this Item shall consist of furnishing, placing, blending, conditioning and compaction (25% rate) of random fill and structural backfill where required for the various structures included in the works.

### **MATERIAL REQUIREMENTS**

Materials for the various fills and backfills shall be obtained from required excavations and from borrow areas designated by the DA-WV Project Engineer. There is no guarantee that all the materials in any borrow area will be suitable for use in the fills and the Contractor shall move or modify his operations, as directed, to avoid unsuitable material. The Contractor shall move or modify his operations, as directed to avoid unsuitable material. The Contractor shall maintain and operate sufficient excavating and hauling equipment so that an adequate amount of fill material from all sources will be available as required. Operations in borrow areas should not endanger roads, buildings and other existing structures. Borrow areas shall be graded to provide ready drainage from all parts of the excavated areas. When operations in a borrow area have terminated, the area shall be dressed to a neat appearance with adequate drainage to the satisfaction of the DA-WV Project Engineer.

Materials for structural backfill shall consist of compactable soil taken from foundation or channel excavations. Any additional materials needed shall be obtained from borrow areas mentioned above.

The suitability of fill or backfill materials shall be subject to the approval of the Project Engineer. Materials containing brush, roots, and others organic matter will not be considered suitable for fill or backfill. Unsuitable material to be wasted will be specifically designated by the DA-WV Project Engineer at the time the material is excavated. Materials for structural backfill shall consist of compactible soil approved by the DA-WV Project Engineer. It shall not contain individual particles larger than ten (10) centimeters.

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**

Structural backfill 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.

### **BASIS OF PAYMENT**

Payment for structural backfill will be made at the contract unit price per cubic meter, backfill in the Bid Proposal, which payment shall constitute full compensation for furnishing all labor, equipment, and other incidentals necessary to complete the item.

Pay Item Number	Description	Unit of Measurement
804(1)b	Embankment (Backfill from Structure Excavation)	Cubic Meters (cu.m.)

## **804(4) – GRAVEL FILL (GRAVEL BEDDING)**

### **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

Sieve Size(mm)	Percent by Weight Passing		
	Grading A	Grading B	Grading C
75.00	100	100	100
5.00	35-70	40-60	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 Course 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.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
804(4)	Gravel Fill (Gravel Bedding)	Cubic Meters (cu.m.)

### 900(1)C1 – CONCRETE WORKS (CLASS A, 28 DAYS)

#### 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 reinforcing steel, structural steel, structural 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 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 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.

## **METHODS OF CONSTRUCTIONS**

### **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 projection 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 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 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 structural concrete completed in place will be paid for at the contract unit price for cubic meter as indicated on the Bid Schedule.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
900(1)C1	Structural Concrete (Class A, 28 days	Cubic Meters (cu.m.)



## 902(1)a1- REINFORCING STEEL (DEFORMED, GRADE 40)

### SCOPE

All reinforcing steel bars required for the works as detailed in the Construction Drawings or as directed by the Project Engineer shall be furnished by the DA Western Visayas unless otherwise specified in the Bill of Quantities.

### MATERIAL REQUIREMENTS

All reinforcing steel bars shall be Grade 40, 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 CONSTRUCTION

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.

### METHOD OF MEASUREMENT

Measurement for payment for reinforcing steel bars will be made on the weight of reinforcing steel bars actually placed with the concrete structure in accordance with the Drawings and Bar Schedule approved by DA-WV or as directed by the Project Engineer and weights will be computed based on the published manufacturer's weights or in the absence thereof, on the weights specified in the table presented on these Item.

Steel bars in laps of splices indicated in the approved reinforcement Drawings as required by DA-WV will be measured for payment. Additional steel bars in laps which are authorized for the convenience of the Contractor and such items as wires, clips, chairs, or other devices for securing the steel bars in place will not be measured for the payment. Where weld splices are specified on the Drawings, weld splices will not be measured for payment but the weight for its equivalent lap splices will be measured for payment instead.

Where Contractor chooses to weld reinforcement bars for his convenience and welding is not specified, no separate payment will not be made for such welds, but instead the weight for the lapped spliced shown on the Drawings will be measured for payment.

#### **BASIS OF PAYMENT**

Payment for installation of reinforcing steel bars measured as provided above, will be paid for at the contract unit price per kilogram of material installed which price and payment shall constitute full compensation for furnishing all materials, labor, tools, equipment and all incidentals and subsidiary works necessary for the successful handling and placing the materials.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
902 (1)a1	Reinforcing Steel (Deformed, Grade 40)	Kilograms (kgs.)

### **903(2)- FORMWORKS**

#### **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 area measured as provided above will be paid for at the contract unit price per square 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.

Pay Item Number	Description	Unit of Measurement
903(2)	Formworks and Falseworks	Square Meters (sq.m.)



## **SPL 2- SOLAR POWER MODULE MOUNTING STRUCTURE & INVERTER ENCLOSURE (INCLUDING PAINTING WORKS)**

### **SCOPE**

The work will include the furnishing, fabricating, hauling, erecting, and welding of structural metals called for in the Special Provision or shown on the Plans. Structural metals will include structural steel and welding, this work will also include any incidental metal construction not otherwise provided for, all in accordance with these Specifications, Plans, and Special Provisions.

### **MATERIALS REQUIREMENTS**

#### **Mounting Structure**

- |                             |  |
|-----------------------------|--|
| • Concrete Pedestal         | 0.30m x 0.30m Reinforced Concrete  |
| • Post                      | 2 ½" GI Pipe Schedule 40   |
| • Frame                     | 4" x 2" x 2.0mm Thk. GI Tubular w/ end cap<br>2" x 2" x 2.0mm Thk. GI Tubular w/ end cap |
| • Brace                     | 2" x 2" x ¼" thk. Angle Bar  |
| • Base Plate & Gusset Plate | 8mm thk. Mild Steel Plate  |
| • Anchor Bolts              | ¾" L- type w/ nut and washers  |

#### **Inverter Enclosure**

- |                              |   |
|------------------------------|---|
| • Frame                      | 2" x 2" x ¼" thk. Angle Bar   |
| • Covering                   | ½" thk. Solid PVC board (top & rear)<br>12mmØ Plain Round Bar (sides & front) |
| • Pre-fabricated Barrel bolt | 12mmØ Plain Round Bar   |

### **CONSTRUCTION REQUIREMENTS**

1. Before installation, all steel components must be rust- free or thoroughly cleaned using sanding or rust converter.
2. All exposed steel materials must be applied with two coats of epoxy primer (gray) and painted with two coats of aluminum paint (silver).
3. Metal steel connections must be fully welded.

### **METHODS OF MEASUREMENT**

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

### **BASIS OF PAYMENT**

The accepted quantity, measured as prescribed in method of measurement shall be paid for the contractor unit price, which price and payment shall include the cost of furnishing all labor, materials and equipment necessary to complete the work.

Pay Item Number	Description	Unit of Measurement
SPL 2	Solar Power Module Mounting Structure & Inverter Enclosure (including painting works)	lot

## **SPL 3- SOLAR POWER MODULES (3,300 WP, MINIMUM)**

### **SCOPE**

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

## **MATERIALS REQUIREMENTS**

### **Brand New**

1. 3,300-Watt Peak Total Solar Power Modules (6 pcs. Solar Modules @ 550 Watts, or its equivalent)
2. Manufactured in ISO 9001- Certified Factories
3. Must be CE marked
4. Must have TUV Certification (IEC 61215)
5. Cell type: Mono-crystalline

## **CONSTRUCTION REQUIREMENTS**

All works shall be installed by experienced personnel qualified to do this particular specialty trade.

The number of panels may change based on the actual power of the pump used. Solar Power Modules shall be clamped properly to the mounting structure. The installation of solar power modules shall be in accordance with the approved Plans or agreed by the Project Engineer of the implementing agency (DA-Western Visayas). Solar power modules shall have a minimum of Five (5) years warranty from the date of acceptance by the DA- Western Visayas.

## **METHODS OF MEASUREMENT**

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

## **BASIS OF PAYMENT**

The accepted quantity, measured as prescribed in method of measurement shall be paid for the contractor unit price, which price and payment shall include the cost of furnishing all labor, materials and equipment necessary to complete the work.

Pay Item Number	Description	Unit of Measurement
SPL 3	Solar Power Modules (3,300 WP, Minimum)	lot

## **SPL 4- INVERTER AND CONTROLLER-4KW, MINIMUM W/ ACCESSORIES (BREAKERS, WIRINGS, PANELS & CONDUITS)**

### **SCOPE**

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

## **MATERIALS REQUIREMENTS**

1 Unit- 4 kW or must be compatible with the offered pump (may varies/change if the pump power used changed) inverter with system monitoring.

### **Brand New**

1. Pump is running
2. Input power and alarm indication for; service needed in case of no contact to pump, overvoltage, over temperature and overload and dry running.
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

The Inverter shall have a minimum of Five (5) years warranty from the date of acceptance by the DA-WV.

## **CONSTRUCTION REQUIREMENTS**

All works shall be performed by experienced personnel qualified to do this particular specialty trade.



## METHODS OF MEASUREMENT

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

## BASIS OF PAYMENT

The accepted quantity, measured as prescribed in method of measurement shall be paid for the contractor unit price, which price and payment shall include the cost of furnishing all labor, materials and equipment necessary to complete the work.

Pay Item Number	Description	Unit of Measurement
SPL 4	Inverter and Controller-4KW, minimum w/ Accessories (Breakers, Wirings, Panels & Conduits)	lot

## SPL 5- SUBMERSIBLE PUMP (2HP, MINIMUM)

### SCOPE

This Item shall consist of furnishing all jalousie window materials, labor, tools and equipment required as shown on the Plans and undertaking the proper installation in accordance with this Specification.

### MATERIALS REQUIREMENTS

#### Brand New

Pump power may change/varies based on the pumping test result, drilling and actual total dynamic head of site. *Must be AMTEC Tested (System Test).*

#### Pump

- 1 unit – 4.0 kW Submersible Pump
- Capacity : 73.20 cu.m/day
- Total Dynamic Head : 18.99 m (62.30 ft)
- Pump Efficiency : 76%

#### Motor Specification: Built into Pump

1. Built-in frequency converter
2. Can be supplied by either DC or AC voltage source
3. Inverter and control unit must be integrated in the motor
4. Built-in maximum power point tracking (MPPT)
5. Enclosure class: IP68

#### Motor protection

The built-in electronic unit must protect the motor in case of: (as standard, without additional equipment)

1. Dry running sensor
2. Over and under voltage
3. Overload
4. Over-temperature

### CONSTRUCTION REQUIREMENTS

Float switch or any equivalent water level control accessories must be provided inside storage tank. All works shall be performed by experienced personnel qualified to do this particular specialty trade.

The design system for the 5 hp pumps corresponds to the Watt Peak (WP) of the Solar Power Module. Any design higher than these specifications requires additional WP and inverter capacity to correspond to the design. The additional requirements to meet the specifications of the agency shall be at the expense of the contractor.

Electrical cables/wiring must be free from any defects. Wires and cables shall be of approved type meeting all the requirements of the Philippine Electrical Code bearing the PSA mark. All wires shall be copper, soft drawn and annealed, smooth and cylindrical form, and shall be centrally located inside the insulation. All wiring devices shall be standard products of reputable electrical manufacturers.

The Electric Motor Submersible Pump and surface pump shall have a minimum of Five (5) years warranty from the date of acceptance by the DA-WV.

#### **METHODS OF MEASUREMENT**

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

#### **BASIS OF PAYMENT**

The accepted quantity, measured as prescribed in method of measurement shall be paid for the contractor unit price, which price and payment shall include the cost of furnishing all labor, materials and equipment necessary to complete the work.

Pay Item Number	Description	Unit of Measurement
SPL 5	Submersible Pump (2HP, Minimum)	lot

### **SPL 6- VALVES, PIPES, FITTINGS & OTHER ACCESSORIES**

#### **SCOPE**

This item shall consist of furnishing and installation of all pipes, fittings, closure pieces, bolts, nuts, gaskets, jointing materials, flanges and appurtenances as shown and specified on the drawings, and as required by the designated assigned Engineer for a complete and workable piping system.

#### **MATERIALS REQUIREMENTS**

Materials shall be in accordance with the approved Plans. Materials used must be brand new and in good condition. All materials shall conform to AWWA and ISO specification for valve installation.

#### **PIPELINE:**

- Well Casing: 4"Ø GI Pipe Schedule 40- 15 Linear Meters
- Discharge Pipe: 2"Ø GI Pipe Schedule 40- 25 Linear Meters
- Delivery Pipe: 2"Ø HDPE Pipe SDR 17- 150 Linear Meters
- Stand Pipe: 1 ½"Ø GI Pipe Schedule 40- 5 Linear Meters
- Fittings: HDPE SDR 17 Compression Fittings, Couplings, Reducing Tee (if Applicable), Saddle Clamp, Tee, Elbow
- Flow Control: 2"Ø & 1 ½"Ø Gate Valve (Brass)
- Accessories: Pipe Clamp- as required on site.

#### **CONSTRUCTION REQUIREMENTS**

All works shall be performed by experienced personnel qualified to do this particular specialty trade.

After a section of a pipe has been lowered into the prepared trench and immediately before joining the pipe, the ends of the pipe to be joined shall be cleaned, and the rubber gasket lubricated, with a vegetable compound soap all in accordance with the pipe manufacturer's instructions. Assembly of the pipe length shall be in accordance with the recommendation of the manufacturer of the type of the joint used. All special tools and appliances required for joining the pipe shall be provided by the Contractor. When cutting or machining of the pipe is necessary, only tools and methods recommended by the pipe manufacturer and approved by the Engineer shall be employed.

Valves shall be installed as specified herein and as shown on the drawings. All valves shall be new and of current manufacture.

#### **METHODS OF MEASUREMENT**

The work to be paid for this Item shall be in Lump Sum basis that are satisfactorily accepted and completed.

#### **BASIS OF PAYMENT**

The accepted quantity, measured as prescribed in method of measurement shall be paid for the contractor unit price, which price and payment shall include the cost of furnishing all labor, materials and equipment necessary to complete the work.



Pay Item Number	Description	Unit of Measurement
SPL 6	Valves, Pipes, Fittings & other Accessories	lot

## ITEM NO. III – ELEVATED STORAGE TANK

### 803 (1)a – STRUCTURAL EXCAVATION

*[Refer to Item II, 803(1)a – STRUCTURAL EXCAVATION]*

### 804(1)b– EMBANKMENT (BACKFILL FROM STRUCTURE EXCAVATION)

*[Refer to Item II, 804(1)b– EMBANKMENT (BACKFILL FROM STRUCTURE EXCAVATION)]*

### 804(4) – GRAVEL FILL (GRAVEL BEDDING)

*[Refer to Item II, 804(4)- GRAVEL FILL (GRAVEL BEDDING)]*

### 900(1)C1 – CONCRETE WORKS (CLASS A, 28 DAYS)

*[Refer to Item II, 900(1)C1 – CONCRETE WORKS (CLASS A, 28 DAYS)]*

### 902(1)a1– REINFORCING STEEL (DEFORMED, GRADE 40)

*[Refer to Item II, 902(1)a1– REINFORCING STEEL (DEFORMED, GRADE 40)]*

### 903(2)- FORMWORKS

*[Refer to Item II, 903(2)- FORMWORKS]*

### 1201 (9)c- INSTALLATION OF OVERHEAD STORAGE TANK (POLYETHYLENE, 2000 LITERS CAPACITY- VERTICAL TYPE)

#### SCOPE

The work will include the furnishing & installation of Storage Tanks in accordance with the plans/drawings or as directed by the Engineer.

#### MATERIAL REQUIREMENT

Storage Tank shall be a 2000 liters capacity Dark Color Vertical Type Polyethylene Tank, as shown on the plans. It must be brand new.

#### CONSTRUCTION REQUIREMENT

Tank must be installed properly ensuring stability during operation. Pipe connection to tank must be applied with sufficient amount of sealant to avoid leaking.

#### METHODS OF MEASUREMENT

The work to be paid for this Item shall be in Lump Sum basis that are satisfactorily accepted and completed.

#### BASIS OF PAYMENT

The accepted quantity, measured as prescribed in method of measurement shall be paid for the contractor unit price, which price and payment shall include the cost of furnishing all labor, materials and equipment necessary to complete the work.

Pay Item Number	Description	Unit of Measurement
1201 (9)c	Installation of Overhead Storage Tank (Polyethylene, 2000 Liters Capacity- Vertical Type)	lot

## **SPL 7- ELEVATED STORAGE TANK METAL STAND (INCLUDING PAINTING WORKS)**

### **SCOPE**

The work will include the furnishing, fabricating, hauling, erecting, and welding of structural metals called for in the Special Provision or shown on the Plans. Structural metals will include structural steel and welding, this work will also include any incidental metal construction not otherwise provided for, all in accordance with these Specifications, Plans, and Special Provisions.

### **MATERIALS REQUIREMENTS**

#### **Mounting Structure**

- |                             |   |
|-----------------------------|---|
| • Concrete Pedestal         | 0.30m x 0.30m Reinforced Concrete                                       |
| • Post                      | 4" GI Pipe Schedule 40  |
| • Frame                     | 3" x 3" x 1/4" thk. Angle Bar   |
| • Brace                     | 3" x 3" x 1/4" thk. Angle Bar   |
| • Base Plate & Gusset Plate | 8mm thk. Mild Steel Plate   |
| • Anchor Bolts              | 3/4" L- type w/ nut and washers   |
| • Railing                   | 1 1/2" GI Pipe Schedule 40  |
| • Ladder Rung               | 1 1/2" GI Pipe Schedule 40- Main Frame<br>16mmØ Plain Round Bar - Steps |

### **CONSTRUCTION REQUIREMENTS**

4. Before installation, all steel components must be rust-free or thoroughly cleaned using sanding or rust converter.
5. All exposed steel materials must be applied with two coats of epoxy primer (gray) and painted with two coats of aluminum paint (silver).
6. Metal steel connections must be fully welded.

### **METHODS OF MEASUREMENT**

The work to be paid for this item shall be in Lump Sum basis that are satisfactorily accept and completed.

### **BASIS OF PAYMENT**

The accepted quantity, measured as prescribed in method of measurement shall be paid for the contractor unit price, which price and payment shall include the cost of furnishing all labor, materials and equipment necessary to complete the work.

Pay Item Number	Description	Unit of Measurement
SPL 7	Elevated Storage Tank Metal Stand (including painting works)	lot

### **REFERENCES:**

- STANDARD SPECIFICATIONS FOR PUBLIC WORKS STRUCTURES VOLUME III
- DPWH DO NO. 56, SERIES OF 2005
- STANDARDIZED PAY ITEMS OF WORK FOR CONSTRUCTION OF INFRASTRUCTURE PROJECTS VOLUME II & III
- DPWH STANDARD SPECIFICATIONS FOR PUBLIC WORKS AND HIGHWAYS, 2004 EDITION: VOLUME II, HIGHWAYS, BRIDGES AND AIRPORTS