




Republic of the Philippines
Department of Agriculture
Western Visayas
Parola, Iloilo City

TECHNICAL SPECIFICATIONS

ESTABLISHMENT OF POBLACION ILAYA SOLAR- POWERED IRRIGATION SYSTEM (SPIS)

Brgy. Poblacion Ilaya, Dao, Capiz

PREPARED BY:

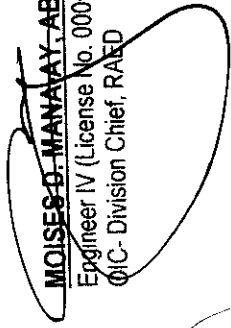

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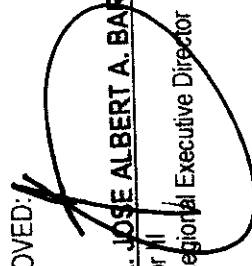


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I. GENERAL ITEM

SPL1. TEMPORARY FACILITY

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. River diversion system including construction of cofferdam.
5. 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.

SPL2. PROJECT SIGNBOARD, COA BILLBOARD, AND PROJECT MARKER

Project Marker made of concrete hollow blocks and reinforced with steel bars, plastered finished in a 0.88m x 1.4m dimension and with concrete foundation underneath, marker information sees on the approved plans / drawings.

Commission on Audit (COA) Billboard printed of white tarpaulin, 8 ft x 8 ft dimension; resolution 70 DPI; Font: Helvetica; Font Size: Main information – 3 inches; Sub. Information – 1 inches; and Font color: Black.

Department of Agriculture (DA) Billboard shall be on standard billboard measuring 1.2m x 2.4m (4ft x 8ft) using ½ inch plywood or Tarpaulin posted on 3/16-inch plywood. Billboard shall be installed in front of project site.

SPL3. MOBILIZATION/ DEMOBILIZATION

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. Dump Truck	1 unit
3. Concrete Vibrator	1 unit
4. Backhoe	1 unit,
5. Bar Cutter & Bender	1 unit
6. Service Vehicle	1 unit
7. Welding Machine	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.

II. SOLAR PUMP/ ARRAY/MOUNTING STRUCTURE

803 STRUCTURE EXCAVATION

The work under this Section shall include clearing removal, hauling and disposal of all excavated materials tamping and trimming of foundation bed required for the construction of permanent structure.

Trimming the sides of excavations to the required profiles and levels as well removing all loose material should be executed prior to consecutive process.

Bottoms of excavations shall be approved by the Engineer’s Representative before any concrete is laid.

404 REINFORCING STEEL BARS

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. 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 reinforcing steel bars shall be Grade 40 or PS 275, 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 Number	Designation	Unit (kg/m)	Wt.	Diameter (mm)	Nominal Cross-Section Area (mm ²)	Perimeter (mm)
10 mm		0.616		10	78.54	
12 mm		0.888		12	113.10	

Wire for bending reinforcement bars shall be of soft black annealed mild steel wire. The diameter of the Wire shall not be less than 16 S.W.G. (1.6mm) and the binding shall be twisted tight with proper pliers. The free ends of the binding wire shall be bent inwards.

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.

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

414

FORMWORKS

All forms shall be of wrought plywood 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 always maintained. 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 take the stresses due uniformly and gradually to its own weight.

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 same.

CONCRETE WORKS

This section describes and specifies work required for plain and reinforced concrete, including formwork intended to be used for the Project under the Contract in accordance with the Drawings, Bills of Quantities and as directed by the Engineer.

At the beginning of each month, the Contractor shall submit to the Engineer his concreting programme for that month, stating the pouring dates, so that adequate checking and supervision can be provided before and during the pouring operation. No pouring shall be allowed unless the Engineer has been given a week-advanced notice of the intention to pour.

All the applicable provisions of the latest revision of the ACI Building Code (ACI- 318 -85) and American Society for Testing Materials (ASTM) shall govern in all cases not specifically provided for herein.

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 for all classes of concrete shall be designed by the Contractor and approved by the Engineer to obtain the 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 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.

1705 STRUCTURE BACKFILL (25% compaction)

Backfill and fill shall be a structurally sound material such as gravel or native soil free of rocks with size more than 5cm, lumps, vegetables and other organic materials obtained from suitable excavated material and/or from approved borrow pits.

SPL4 SOLAR POWER MODULE MOUNTING STRUCTURE

1. Concrete pedestal 0.30m x 0.30m with post 2 1/2" diameter G.I. pipe schedule 40 welded to the reinforcement.
2. Support beam- 2"x4"x5mm G.I. Tubular Pipe (cleaned from rust and primed with red oxide).
3. Bracings- 2"x2"x5mm Angle Bar (cleaned from rust and primed with red oxide)
4. Railings- 2"x3"x3mm C- Channel (cleaned from rust and primed with red oxide)

SPL5 SOLAR POWER MODULES (21,600 WP, Minimum)

1. 21,600 WP Total Solar Power Modules (Minimum)
72 pcs. Solar Modules @ 300 WP, 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

SPL6 INVERTER AND CONTROLLER (20.0 HP, Minimum)

1 Unit- 20.0 HP (Minimum) inverter with system monitoring:

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

SPL7 SUBMERSIBLE PUMP (15.0 HP, Minimum)

Pump

1. 1 unit – **15.0 hp (Minimum)** Submersible Pump
2. Single Stage, Centrifugal Pump of Closed Couple (Monobloc)
3. Suction Flange: DN150
4. Capacity : 128.41 cu.m/hr (566 gpm), Minimum
5. Total Dynamic Head: 29.10 m (95.36 ft), Minimum
6. Pump Efficiency : 79%, Minimum

Motor Specification: Built into Pump0

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
2. Over and under voltage
3. Overload
4. Over- temperature

III. POWER HOUSE

803	STRUCTURE EXCAVATION	(Refer to Item II, 803- Solar Pump/Array/Mounting Structure)
414	FORMWORKS	(Refer to Item II, 414- Solar Pump/Array/Mounting Structure)
405	CONCRETE WORKS (3,000 PSI)	(Refer to Item II, 405- Solar Pump/Array/Mounting Structure)
404	REINFORCING STEEL BARS	(Refer to Item II, 404- Solar Pump/Array/Mounting Structure)

704.3 **MASONRY**

CONCRETE HOLLOW BLOCKS

Cement for solid or hollow blocks and mortar shall be Ordinary Portland Cement ASTM 150-74 and white cement ASTM: C 91-71.

Concrete blocks shall be hard, sound, durable, sharp, rectangular shape, clean with well define arises free from racks and flaws or other defects. Concrete blocks shall be either obtained from an approved local factory.

Blocks manufactured on the site shall be cured in the shade by being kept thoroughly moist with water applied by sprinklers or other approved means for a period of at least seven (7) days. The blocks shall be stocked on a clean and level platform free from earth or other impurities during the curing process and shall be stocked in honey-comb fashion after curing. The blocks shall not be used prior to one (1) month after the date of manufacture.

Concrete blocks (solid or hollow) shall be of the following dimensions: -

- Height = 200 mm + 1 % Tolerance
- Length = 400 mm + 1 % Tolerance
- Width = as required + 1 % Tolerance
- Web thickness = not less than 20 mm for block (40*20*10)

Cement and sand mortar (1:3) mix, shall be composed of one part cement to three parts of sand by volume.

Cement mortars shall be used within thirty (30) minutes after mixing. Hardened mortars shall not be used in the work and shall, upon the request of the Engineer, be immediately removed from the site.

1027 **PLASTERING**

This section of the specifications covers plaster work related with the drawings, bill of quantities, and as directed by the engineer. The contractor shall attend upon other trades and protect all work specified under this section from damage during subsequent operations, make good any defects, clean away debris upon completion and throughout leave all work in perfect condition to Engineer's satisfaction.

Damaged or defective materials shall not be used in the works. Any defective materials or materials damaged during or after installation shall be removed and replaced at the contractor's expense.

All materials shall be of approved make, and samples shall be submitted for engineer's approval. These materials shall include but not be limited to all kinds of cements, sand and additives.

The mixing shall be done manually/mechanically. It is important to note that the quantity of water used shall be carefully controlled. The required amount of water shall be placed in the pail and the plaster added gradually and allowed to soak for 5 minutes. It shall then be stirred to a uniform consistency free from lumps and no more material shall be mixed than can be used in half an hour.

All plastering shall be executed in a neat workman like manner. All races except circular work shall be true and flat and angles shall be straight and level or plumb. Surfaces of undercoats shall be well scratched to provide a key for finishing coats.

All tools, implements, vessels and surfaces shall always be kept scrupulously clean and strict precautions shall be taken to prevent the plaster or other materials from being contaminated by pieces of partially set material which would tend to retard or accelerated the setting time.

All surfaces, to be plastered, shall be clean and free from dust, loose mortar and all traces of salts are to be- thoroughly sprayed with water, but all free water shall be allowed to dry and disappear from the surface before the plaster is applied.

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 arises free of cracks and trowel marks and to the entire satisfaction of the Engineer.

1708 LEVELING COURSE

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.

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 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 (mm)	Size	Percent by Weight Passing		
		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 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.

403 PREFABRICATED DOOR

Doors/ windows shall be fabricated in the shop and transported to the project site when needed for installation. All welded connections shall be 6-mm. continuous fillet welds done in accordance with AWS shielded arc welding. Anchor bolts in concrete shall be embedded to the depth and in shapes as shown on the Drawings. Nuts and washers shall be secured in place and nuts shall be tightened as specified by the Project Engineer.

All metal works except cast-iron unless otherwise specified, shall be primed with red lead-oxide anti-rust 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 sandblasting before the primer is applied.

1705 STRUCTURAL BACKFILL (Refer to Item II, 1705- Solar Pump/Array/Mounting Structure)

1032 PAINTING WORKS

All surfaces shall be free from dust and other dust generating activities. Prior to commencement of painting and finishing works, thoroughly examine substrates scheduled to receive coatings.

Substrates shall not be coated whose condition will adversely affect execution, permanence, or quality of work and which cannot be put into an acceptable condition through preparatory work specified herein.

All substrates shall be sound, non-dusting, and free of grease, oil, dirt, and other matter detrimental to adhesion and appearance of coatings. Minimum temperature shall be 8 °C.

All works and substrates shall be repainted or refinish indicated as requiring repainting or refinishing in schedules, drawings, or specifications.

- Color Scheme for DA- Western Visayas Logo: Combination of four (4) colors (Light Gray, Yellow Mango, Forest Green, Earth Brown).
- Minimum of three (3) coatings application.

IV. INTAKE, SUMP, CONCRETE STEPS, STILLING POOL, & CANAL

1700 SITE CLEARING AND GRUBBING

The work under this item shall consist of the removal, safety and proper disposal, in a manner approved by the Project Engineer, of all vegetation, trees, stumps, roots, brush, rubbish and all objectionable matters within the right-of-way for the Project Construction, all in accordance with the plans, drawings and specifications or as directed by the Project Engineer.

803 STRUCTURE EXCAVATION (Refer to Item II, 803- Solar Pump/Array/Mounting Structure)

1705 STRUCTURAL BACKFILL (Refer to Item II, 1705- Solar Pump/Array/Mounting Structure)

414 FORMWORKS AND SCAFFOLDINGS

FORMWORKS

All forms shall be of wrought plywood 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 always maintained. 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 take the stresses due uniformly and gradually to its own weight.

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 same.

SCAFFOLDINGS

No scaffolds shall be erected, moved, dismantles, or altered except under the supervision of competent persons or the supervising engineer.
Scaffolds and their components must be capable of supporting without failure 4 times the maximum intended load.

Steel scaffolding shall be used in accordance with manufacturers recommendations, proper seating and locking of all connections, using the corrective devices.

During setting up and dismantling of scaffolds, warning signs, safety Gordon and other safety measures shall be provided to ensure safety.

405	CONCRETE WORKS (3,000 PSI)	(Refer to Item II, 405- Solar Pump/Array/Mounting Structure)
404	REINFORCING STEEL BARS	(Refer to Item II, 404- Solar Pump/Array/Mounting Structure)
1708	LEVELING COURSE	

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.

Gravel blanket 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	40-90	50-100
0.075	0.20	0.25	0.30

After the unsuitable material has been removed as required by the 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.

1710 GROUTED RIPRAP

The work under this Section shall include furnishing and placing appropriate sizes of stones or spalls for riprap and grouting the riprap with cement mortar, in accordance with these Specifications and as directed by the DA/BSWM Project Engineer. The stones and spalls shall be obtained from quarry areas or stockpile areas designated by the DA/BSWM Project Engineer and shall be placed at the road bank adjacent to the reservoir's normal water level limit. Specific areas to be protected with grouted riprap shall be determined by the DA/BSWM Project Engineer first before the Contractor works on them.

Stones for riprap shall be at least 15 cm. in diameter and shall be sound, tough, durable, dense and resistant to the action of air and water with a specific gravity of at least two and six tenths (2.6).

Mortar for grouted riprap shall consist of one (1) part cement to three (3) parts sand by volume and sufficient water to produce a thick and creamy mixture conforming to the provisions of Section 19, Concrete.

The bed for grouted riprap shall be excavated to the required elevation and then properly tamped and trimmed. The stones shall be well laid with close joints by hand. The stones shall be well arranged in such a manner that the stones can resist appreciable disturbances. If big spaces occur between stone and foundation bed, said spaces shall be filled with spalls of appropriate sizes of stones. The spaces between the stones shall be completely filled with grout from bottom to top and the surface swept with stiff broom. The grouted riprap shall be cured with water like concrete for a minimum period of three (3) days.

Grouted riprap 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.

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 described under this Section. Excavation involved under this item is not considered a subsidiary work, hence, it will not be measured for payment under this Section. Rather, it will be measured and paid for under, Excavation works.

SPL8 TRASHRACK

All materials shall be new, free from defects and shall be the best available for the purpose for which they are intended, considering strength, ductility, suitability for the intended service and best engineering practice. All steel or materials needed for the works shall be furnished complete by the Contractor. All other materials covered by this Section shall be furnished by the Contractor.

Trasrack shall be fabricated in the shop and transported to the project site when needed for installation. All welded connections shall be 6-mm. continuous fillet welds done in accordance with AWS shielded arc welding. Anchor bolts in concrete shall be embedded to the depth and in shapes as shown on the Drawings. Nuts and washers shall be secured in place and nuts shall be tightened as specified by the Project Engineer.

All metal works except cast-iron unless otherwise specified, shall be primed with red lead-oxide anti-rust 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.

1719 PVC PIPE (WEEPHOLES WITH GRAVEL FILTER)

Filter drains shall include furnishing, excavation and hauling, placing on approved subgrade and compacting graded sand and gravel filters and drains in layers and to the thickness and dimensions indicated on the Drawings, including construction of weep holes where needed to provide outlet for filters all in accordance with the specifications on the detailed plan.

Filter materials shall consist of unweather sand and gravel and cobblestones obtained from river bed deposit of designated quarries. To meet the gradation requirements, crushing, screening and washing shall be required. The materials shall be reasonably free from thin, flat and elongated pieces and shall be well graded between the limits of the filter distribution in accordance to the sound design procedures.

The bed for the filter drain shall be excavated to the required elevation and dimensions and then properly compacted as required. The materials shall be dumped and on the prepared bed and each layer shall be compacted by a suitable compactor to the required degree of compaction or as approved by the DA Project Engineer. Placement of succeeding layers will be allowed only after the proper placement and required compaction of the preceding layer has attained or as directed by the DA Project Engineer. When concrete is to be placed directly on the filter, the entire surface upon which concrete is to be placed shall be covered with a layer of reinforced building paper before concrete is placed.

V. PERIMETER FENCE

800(1) SITE CLEARING AND GRUBBING

This item shall consist of clearing, grubbing, 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. Paint required for cut or scarred surface of trees or shrubs selected for retention shall be an approved asphaltum base paint prepared especially for treesurgery.

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

803	STRUCTURE EXCAVATION	<i>(Refer to Item II, 803- Solar Pump/ Array/Mounting Structure)</i>
1705	STRUCTURAL BACKFILL	<i>(Refer to Item II, 1705- Solar Pump/ Array/Mounting Structure)</i>
414	FORMWORKS	<i>(Refer to Item II, 414- Solar Pump/ Array/Mounting Structure)</i>

- 405 CONCRETE WORKS (2000 PSI)** *(Refer to Item II, 405- Solar Pump/ Array/Mounting Structure)*
- 404 REINFORCING STEEL BARS** *(Refer to Item II, 404- Solar Pump/ Array/Mounting Structure)*

1708 LEVELING COURSE *(Refer to Item III, 1708- Pump House)*

403 STRUCTURAL STEEL

This work shall consist of steel structures and the steel structure portions of composite structures, constructed in reasonably close conformity with the lines, grades and dimensions shown on the Plans or established by the Engineer.

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

Welding shall be done in accordance with the best modern practice and the applicable requirements.

The parts shall be accurately assembled as shown on the working drawings and any match marks shall be followed. The material shall be carefully handled so that no parts will be bent, broken or otherwise damaged. Hammering which will injure or distort the members shall not be done.

All surfaces of new structural steel which are to be painted shall be blast cleaned unless otherwise specified in the Special Provisions or approved in writing by the Engineer.

1032 PAINTING WORKS *(Refer to Item II, 1032- Pump House)*

SPL9 SOLAR FLOOD LIGHT

Solar Flood Light (including 60 Watt- Solar Panel, Battery, Remote & Brackets: 5 Sets

V. PIPES, FITTINGS, AND OTHER ACCESSORIES

SPL8 DELIVERY PIPE (6"Ø G.I. PIPE, SCH. 40), FITTINGS, AND OTHER ACCESSORIES

1. Delivery Pipe: 6" dia. G.I Pipe, Sch. 40
2. Fittings (Couplings, Elbows): G.I Pipe, Sch. 40

PIPE LAYING AND INSTALLATION

Before laying and installing, the pipe shall be excavated cleared levelled at design slope. Pipe shall be laid and covered. All pipes shall be connected by coupling band and supported by concrete collar.

***Note:**

- Must be AMTEC Tested (System Test).