Calamba Water District
Lakeview Subdivision, Halang, Calamba, Laguna
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PROJECT TITLE : **INSTALLATION OF ISOLATION VALVES ON WATERLINES**
LOCATION : **BUCAL PUMPING STATION, BGRY. BUCAL, CALAMBA CITY**

I. SCOPE OF WORKS AND SPECIFICATIONS

FOR THE SUPPLY OF LABOR , MATERIALS AND SUPERVISION FOR THE ABOVE PROJECT TITLE

A. VALVE VAULT

A.1 EARTHWORKS

☐ 1 Removal of Existing Pavement: All concrete pavement surfaces to be removed shall be scored with concrete sawing equipment; provided, that any Portland cement concrete base under asphaltic mix surface will not be required to be scored by sawing. Asphaltic concrete pavement shall be removed to clean straight lines.

☐ 2 Concrete sidewalks, curbs and gutter required to be removed shall be cut to the nearest score marks.

☐ 3 The walls and faces of all excavations in which workers are exposed to danger from unstable ground shall be guarded against by a shoring system, sloping of the excavation, or some other applicable method. The contrary shall furnish, install, and maintain such sheeting, bracing, etc., as may be necessary to protect the workers and prevent any movement of earth which could injure or delay the work or endanger adjacent structures. In excavations which workes may be required to enter , excavated or other materials shall be effecively stored and retained at 600mm or more from the edge of excavation. All excavation and terenching operations shall conform to any and all national, provincial and local safety requirements.

☐ 4 Excavation beneath proposed structures. Except where otherwise specified for a particular structure ordered by the engineer, excavation shall be carried to the grade of the bottom of the footing or slab. Where shown and ordered, areas beneath proposed structures shall be over-excavated. When such over-excavation is shown in the drawings, both over-excavation and subsequent backfill to the required grade shall be performed by the contractor at his own expense. When such over-excavation is not shown but is ordered by the engineer, such over-excavation and any resulting backfill will be paid for under a separate unit price bid item if such bid item has been established: otherwise payment will be made in accordance with negotiated prices. After the required excavation or over-excavation has been completed, the exposed surface shall be scarified to the depth of 150 mm (6 in.) brought to optimum moisture content, and rolled with heavy compaction equipment to 95% of maximum density.

☐ 5 Excavation beneath areas to be paved : Excavation under areas to be paved shall extend to the bottom of the aggregate base, if such base is called for; otherwise it shall extnd to the bottom of paving. After the required excavation has been completed, the exposed surface shall be scarified, brought to optimum moisture content, and rolled with heavy compcation equipment to 90% of maximum.

☐ 6 Disposal of excess Excavated Material: Remove and dispose all excess excavated material in manner approved by Engineer.

☐ 7 Rock excavation shall include removal and disposal of any kind of rock which cannot be excavated without blasting or the use of rippers, and all boulders or other detached stones each having a volume of 0.25 cubic meter or more as determined by physical measurements by the Engineer.

A.2 CONCRETE AND REINFORCED CONCRETE

☐ 1 Preparation of Equipment : All the equipment for mixing and transporting concrete shall be clean. Debris shall be removed from spaces to be occupied by concrete. Forms shall be properly coated. Masonry filler units that will be in contact with concrete shall be well drenched. Reinforcement shall be thoroughly clean or deleterious coatings. All latiance and other unsound material shall be removed before additional concrete is placed against hardened concrete.

☐ 2 Mixing, Placing, and Curing of Concrete : All concrete shall be mixed until there is uniform distribution of materials and shall be discharged completely before mixer is recharged. Curing shall be maintained above 10ºC and moist condition for at least first 7 days after placement.

☐ 3 Formworks Design and Removal : Forms shall result in the final structure that conforms to shapes, lines, and dimension of members as required by the design drawings and specifications. It should be tight to prevent to prevent leakage of mortar; also it shall be properly braced and tied together to maintain position and shape. Form shall be removed in such manner as not to impair safety and serviceability of the structure. All concrete shall have sufficient strength not to damaged thereby.

☐ 4 Reinforcement : At time concrete is placed steel reinforcement shall be free from coating that would destroy or reduce bond. Steel reinforcement shall be cut to its desired length as specified on the plan.

☐ 5 General Procedures : All concrete work shall be done in accordance with the “Standard Specifications of Concrete

and Reinforced Concrete" as adopted by the Philippine Government and the current American Concrete Institute "Building Code Requirements for Reinforced Concrete" (ACI 318-63) in so far as they do not conflict or are not inconsistent with the specific provisions specified herein.

☐ 6 Testing : Testing of masonry materials shall be done by applicable government bodies or their authorized agencies, according to testing procedures and other relevant requirements needed for such tests. In absence of the above, testing shall be bed one in accordance with ASTMC 140-70, Method of Test for Concrete Masonry Units.

A.3 BACKFILL/RESTORATION

☐ 1 After the forms have been removed from footings, wall foundations, beams, etc., and when the concrete work is hard enough to resist pressure resulting from fill, the materials from excavations shall be used for backfilling around them fill for general grading purposes and backfill materials shall be as approved by the, free from roots, refuse and vegetable matter. Fill and backfill shall be placed in layers not exceeding six (6) inches and compacted thoroughly while being sprinkled or moistened with water. No materials having plasticity index greater than 6 shall be used for fill or backfill, under slab.

☐ Barricades and warning lights satisfactory to the Engineer shall be provided and maintain for all in which case of heavy steel plates, adequately braced bridges or other type of crossing capable of supporting vehicular traffic shall be furnished.

☐ 2 Concrete pavement shall be replaced with the same kind or better material in conformance with the latest specifications, rules and regulation, and subject to the inspection and approval of the agency having jurisdiction.

A.4 MATERIALS SPECIFICATIONS

Manhole Frame

☐ 1 The manhole frame and cover shall be round manufactured from cast iron or ductile iron conforming to ASTM A-126, Class B or ASTM A-536-80, Class 400 respectively.

☐ 2 The frame depth shall not exceed 200mm and four (4) bolt holes shall be provided for anchoring purposes.

☐ 3 The cover shall be 800mm – 1000mm in diameter. The face of the cover shall include the name and/or logo of Calamba Water District. The name/logo shall be cast into the cover during manufacture.

☐ 4 The cover shall be connected to the frame with a hinged. A locking mechanism shall be included to prevent unauthorized access.

☐ 5 The cover shall be one-man operable and shall be designed for a maximum highway loading.

☐ 6 Certification: The manufacturer shall furnish a sworn statement that the inspection and metallurgical and pressure tests have been results thereof comply with the requirements of the applicable Standard(s) herein specified. A copy of the Certification shall be submitted to Calamba Water District.

Concrete

☐ 1 Portland cement: Cement shall conform to the Standard Specifications for READY MIXED CONCRETE, ASTM C-94. An air-entraining admixture, conforming to ASTM C-260, shall be added to Type I, Type II or Type III Portland Cement.

☐ 2 Aggregates: All aggregates used for concreting shall conform to ASTM-33 and shall be checked daily for any variances in moisture current. Said variances shall be corrected and/or taken into consideration for each batch.

☐ a. Coarse Aggregates: Shall be uniformly and evenly graded for each application in accordance A.C.I. Standard 318. Unless otherwise approved, aggregate shall be sound, crushed, angular grantic stone. Smooth or rounded stone (river rock) shall not be acceptable.

☐ b. Fine Aggregates: Shall consist of natural sand, manufactured sand or a combination thereof.

B. VALVE INSTALLATION

☐ 1 The Contractor shall install all valves as shown on the Drawings.

☐ 2 The distance between two flange adaptor should be checked to assure sufficient clearance for valve installation.

☐ 3 Existing pipe outside wall surfaces and flange adaptor should be cleaned of any foreign materials such as scale, metal shaving or slags.

☐ 4 Appropriate material handling equipment should be available to lift larger valves into the position.

☐ 5 Valves, non coated pipings/flanged adaptor should be covered with Petrolatum Tape

☐ 6 Butterfly valves including flange adaptor to be installed per manufacturer's recommendation.

B.1 MOTORIZED VALVE SPECIFICATIONS

1. Butterfly Valves

☐ a Butterfly valves shall conform with the "AWWA Standard for Rubber-Seated Butterfly Valves" (AWWA C504) subject to the following requirements: Valves Shall be of 150B and unless otherwise shown may either be short-bodied or long-bodied.

☐ b Valves shall be rated for 150 psi service.

☐ c Valves shall be double flanged with worm type manual operating gear and with stem cap for valves underground and hand wheel for valves above ground or with electrical actuator including worm gear.

☐ d They shall be manufactured from the following materials.

☐	Body and Flange	Ductile Iron or Grey Cast Iron
☐	Disc	Fully polished Duplex Stainless Steel

☐	Internal Body Lining	EPDM Rubber bonded by vulcanizing process
☐	Shaft/Shaft Pin	Duplex Stainless Steel
☐	Shaft Bearing	Self Lubricating Type with EPDM O Ring Seals or Dry design having no wetness by line media
☐	External Coating	Epoxy Coating(Blue Color), Primer shall be applied, Average thickness shall be 300 micron.

☐ e The flange valves shall be supplied complete with flange gaskets and stainless steel nuts, bolts and washers of grade 316L. Bolts and nuts shall be supplied with 2 washers per bolt.

☐ f Butterfly valves shall be supplied complete with extension spindles and appurtenances such that the square nut operation is within 500 mm of the top of the chamber cover slab. It shall be Stainless Steel or Aluminum Bronze

☐ g All butterfly valves shall be designed suitable for installation of electrical actuators.

☐ h Gear Spindle and extension for butterfly valve shall be 50 mm dia.

☐ i All the valves shall be designed for no leakage under flow from either direction tested at a differential pressure across the seal of rated working pressure. Each valve shall be subject to a body pressure/leakage test of 1.5 times the design pressure before leaving the manufacturer's works. Test certificate by the manufacturer is to be submitted.

☐ j The manufacturer shall furnish a sworn statement that the inspection and metallurgical test and pressure test have been results thereof comply with the requirements of the applicable Standard(s) herein specified. A copy of the Certification including compliance with NSF/ANSI 61 shall be submitted to Calamba Water District.

2. Worm Gearbox

☐ a Worm gearbox must be designed for manual operation as well as for operation with electric actuator.

☐ b Within its torque range, a gearbox must be capable to provide the torque required for opening or closing the driven valve with a considerable safety margin.

☐ c The gearbox shall be self-locking.

☐ d The gearbox shall be of worm wheel type, consisting of worm wheel and a worm shaft including adjustable mechanical end stop.

☐ e The gearbox housing shall be made out of GG (grey cast iron) or GGG (ductile iron). Housing materials such as aluminium shall not be allowed.

☐ f The gearbox housing shall be completely filled with gear grease to guarantee proper lubrication in any mounting position.

☐ g Special dry bearings shall protect the worm shaft from radial forces. An axial ball bearing shall carry the resulting thrust.

☐ h Worm wheels shall be made of bronze material.

☐ i Enclosure shall be minimum IP 68 against submersion up to 6m head of water for 72 hours. The O-Ring sealed to enable easy dismantling for repair and maintenance.

3. Electric Valve Actuators

☐ a All actuators must be suitable for mounting in any position.

☐ b The design must provide simple setting, testing, maintenance and repair.

☐ c The design must allow removing the actuator from the valve without disturbing the function of the valve.

☐ d Electrical connection of actuators shall be made to allow quick disconnection in case of maintenance or repair.

☐ e In order to prevent loss of screws, all covers, which can be opened for setting and service, shall be equipped with captive screws.

☐ f Depending on valve application, actuators shall be self-locking. Self-locking shall remain active even if the actuator is switched into manual (hand wheel)-operation-mode.

☐ g The bigger size hand wheel must be provided in such a way, to allow easy manual operation of the output drive.

☐ h Actuator painting must be performed in such a way, that no corrosion takes place under the local ambient conditions and extreme aggressive atmosphere. All outside screws or bolts shall be made out of stainless steel grade A2 / 304.

☐ i Enclosure shall be minimum IP 68 against submersion up to 6m head of water for 72 hours. The O-Ring sealed to enable easy dismantling for repair and maintenance.

4. Electric Motors

☐ a All motors shall be specifically designed for valve-actuator operation, which is characterised by high starting torque to facilitate unseating of valve, low stall torque and low inertia.

☐ b Motors must be thermally protected by thermal contacts, which shall be embedded in the motor windings.

☐ c Motors must be totally separated from the lubricant-filled part of the actuator, allowing the replacing of a motor without loosing any lubricant regardless of mounting position.

☐ d All precautions shall be taken to avoid any type of corrosion and electrochemical effects, taking place between different kinds of metals.

☐ e Motor-insulation must be in accordance with IEC 85 Class F (155° C).

☐ f Actuator motors must develop full torque as soon as power is applied. All motors shall be of the high starting torque type to facilitate unseating of the valve.

☐ g Power Supply should be 220v/1ph/60hz.

☐ h Torque and limit setting devices must be easily accessible for adjustment without the need for any special tools or

instruments.

☐ i The torque sensing shall be independently settable for 'OPEN' and 'CLOSE' direction.

☐ j Torque sensing shall also be active when the actuator is being operated via the hand wheel.

☐ k Enclosure shall be minimum IP 68 against submersion up to 6m head of water for 72 hours. The O-Ring sealed to enable easy dismantling for repair and maintenance.

5.Wiring and Terminal Boxes

☐ 1 All cable entries shall be shipped with metal plugs. Appropriate cable entries shall be made available as per the cabling requirement.

☐ 2 Control unit shall be wall mounted with cable between control unit and actuator. This shall be for underground installation of Butterfly Valve.

☐ 3 Each actuator shall provide an adequately sized connection for earthing.

C. PUMP INSTALLATION

C.1 GENERAL SPECIFICATIONS

☐ 1 The work under this division consist of furnishing all materials, equipment, tools, labor and other services necessary to complete and make ready for operation of submersible pump as shown in the drawing.

☐ 2 Piping Installation from pump discharge pipe to existing drainage system

C.2. MATERIALS SPECIFICATIONS

Submersible Pump

☐ 1 Submersible pump is shall be used to dewater the valve vault to ensure the actuators and other electrical components cannot be submerged into water for a long period of time.

2 Operating Requirement

☐ a. Capacity = 9.75 lps

☐ b. Head = 6.0 meters

☐ c. Speed = 1800 rpm

☐ d. HP Rating = 1.5

☐ e. Power Supply = 220v/1ph/60hz

☐ f. Service factor = 1.15

3 Material of Construction.

☐ a. Housing = Cast Iron

☐ b. Impeller = Cast Iron

☐ c. Shafting = Stainless Steel

☐ d. Shaft Seal = Mechanical Seal

☐ e. Motor = Squirrel, Submersible induction type

Galvanized Iron Pipes

☐ 1 Pipe Description: Pipes shall conform to the requirements of the ASTM A53/A53M or ASTM A120 and shall be Schedule 40.
Pipe fittings shall conform to the requirements of ASME/ANSI B16.3 (Malleable Iron Threaded Fittings Class 150 and 300) and shall be Class 150.

☐ 2 Pipe Construction: The pipe shall be practically straight and both ends of the pipe shall be at right angle to the axis of the pipe. The inside and outside surfaces of the pipe shall be free from injurious defects. Unless otherwise specified, the length of the pipe shall be 6 meters. The tolerance shall be plus 6 meters without negative tolerance. Pipes shall be clearly marked with Trademark, Nominal Size, Length and Class of Pipe.

☐ 3 The pipe threads shall be made according to American Standard Pipe Taper Thread (NPT) with taper angle equal to 1°47'.

☐ 4 Pipe shall be coated with zinc, both inside and outside surfaces, in accordance to
ASTM A153/A153M-05 (Standard Specification for Zinc Coating (Hot – Dip) on Iron and Steel Hardware)

☐ 5 Pipe Dimensions: Pipe shall conform to the following dimensions and weights:

Nominal Pipe Size,	½	¾	1	1¼	1 ½	2	3	4
Nominal Diameter,	15	20	25	32	40	50	75	100
Outside Diameter,	21.3	26.7	33.4	42.2	48.3	60.3	88.9	114.3
Wall Thickness, mm	2.8	2.9	3.4	3.6	3.7	3.9	5.49	6.02
Tolerance (outside diameter,	±0.397	±0.397	±0.397	±0.397	±0.397	±1%	±1%	±1%
Tolerance (wall thickness,	-12.5%	-12.5%	-12.5%	-12.5%	-12.5%	-12.5%	-12.5%	-12.5%
Weight per meter,	1.27-1.34	1.68-1.78	2.50-2.62	3.38-3.55	3.75-4.23	5.00-5.43	10.3-11.3	14.5-16.1

☐ 6 Pipe Thread: The pipe threads shall be made according to "American Standard Pipe Taper Thread (NPT) with taper angle equal to 1°47'.

Nominal Pipe Size,	½	¾	1	1¼	1 ½	2
Nominal Diameter,	15	20	25	32	40	50
Thread per inch	14	14	11 ½	11 ½	11 ½	11 ½
Pitch, in	0.071	0.071	0.087	0.087	0.087	0.087

☐ 7 Coatings: Pipes shall be coated with zinc both inside and outside surfaces.

☐ 8 Random Testing: For every size, two (2) sample pipes representing each lot of one hundred (100) pieces or less shall be tested for compliance with this specification. Any visible defect or failure to meet the quality standards herein will be grounds for rejecting the entire order.

☐ 9 Certification: The manufacturer shall furnish a sworn statement that the inspection and metallurgical and pressure tests have been results thereof comply with the requirements of the applicable Standard(s) herein specified. A copy of the Certification shall be submitted to Calamba Water District.

Galvanized Iron Fittings

☐ 1 Fitting Description: All pipe fittings shall conform to the requirements of "MALLEABLE IRON THREADED FITTINGS CLASS 150 AND 300 (ASME/ANSI B16.3)" and shall be Class 150.

☐ 2 Fitting Dimensions: Fittings shall conform to the following dimensions:

Nominal Pipe Size, in	1/2	3/4	1	1 1/4	1 1/2	2	3	4
90° Elbow								
Length	28.45	33.27	38.1	44.45	46.74	57.15	78.23	96.27
Weight, kg	0.11	0.18	0.29	0.43	0.56	0.79	2.34	4.0
45° Elbow								
Length	22.35	24.89	28.45	32.77	36.32	42.67	55.12	66.29
Weight, kg	0.07	0.10	0.15	0.38	0.52	0.77	2.11	3.46
St. Elbow								
Length, ME	40.89	48.01	54.1	61.98	67.82	83.06	114.55	114.27
Length, FE	28.45	33.02	38.10	44.45	49.28	57.15	78.23	96.27
Weight, kg	0.11	0.18	0.29	0.49	0.66	1.06	2.99	4.94
Tee								
Length	28.45	33.27	38.10	44.45	49.28	57.15	78.23	96.27
Weight, kg	0.16	0.25	0.41	0.59	0.78	1.19	3.22	5.12
Cross Tee								
Length	28.45	33.27	38.10	44.45	49.28	57.15	78.23	96.27
Weight, kg	0.20	0.29	0.44	0.72	0.86	1.33	3.70	6.76
Coupling								
Length	34.04	38.61	42.42	49.02	54.61	64.26	80.77	93.73
Weight, kg	0.09	0.13	0.22	0.34	0.45	0.66	1.5	2.56
Union Patente								
Length	43.69	51.31	55.63	57.4	62.74	69.85	89.92	97.79
Weight, kg	0.21	0.26	0.41	0.54	0.74	1.09	2.47	4.31
Thickness, mm	2.54	3.05	3.30	3.56	3.81	4.32	5.84	6.60
Tolerance								
Dimension, CF, mm	±1.50	±1.50	±1.80	±1.80	±2.00	±2.00	±2.50	±3.00
Thickness	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10

Note:

1. All dimensions are in millimeters except where otherwise shown.
2. Center-to-face dimensions apply to elbows, tees and crosses
3. Face-to-face dimensions apply to couplings, unions, etc.
4. ME – Male End, FE – Female End, CF – Center-to-Face

☐ 3 Fitting Thread: All pipe fittings shall be female thread made according to "American Standard Pipe Taper Thread" (NPT).

☐ 4 Coatings: Fittings shall be coated with zinc in accordance to "STANDARD SPECIFICATION FOR ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE (ASTM A153/A153M-05)".

D. ELECTRICAL WORKS

D. 1. GENERAL SPECIFICATIONS

☐ 1 The work under this division consist of furnishing all materials, equipment, tools, labor and other services necessary to complete and make ready for operation the electrical power described and/or indicated in the electrical plan and specification in accordance with the latest edition of the Philippine Electrical Code with the local requirements of the utility companies concerned and with the local government.

☐ 2 Submersible shall be equipped with float switch with 3m cable and balance weight. Submersible pump, electric valve actuator and float switch cables shall be royal cord. Control Panel shall be installed in the BPS control room.

☐ 3 Cable sizes are selected by applying appropriate de-rating factors for ambient conditions of installation as per PEC.

☐ 4 Power factor for all loads is assumed 0.80.

☐ 5 Size of grounding wire will be based on PEC table 3.10.1.16

☐ 6 Ampacities of feeders supplying continuous loads are taken with as 125% of full load current as per PEC

☐ 7 All electrical materials shall be new and listed with the underwriters laboratories inc. shall meet their requirements and shall bear their label whatever standards have been established and label service is regularly furnished by that agency.

8 Wiring methods shall be as follows:

☐ a. Poly vinyl chloride (PVC) or unplasticized poly vinyl chloride(uPVC) - used when embedded in concrete wall or masonry and can be laid underground within 500 mm deep from earth grade.

☐ b. Rigid Steel Conduit(RSC) - used when in exposed/wet location andcan be laid underground within 20 mm deep from earth grade.

☐ 9 All works herein shall be done under the supervision of a duly License Electrical Engineer.

D.2. CONTROL PANEL SPECIFICATIONS

☐ 1 All electrical components incorporated in a panel must comply with the requirement of the current edition of Philippines Electrical Code

☐ 2 Cabinet type enclosures made of galvanized sheet steel in sizes and NEMA types as indicated, code-gauge, minimum 16-gauge thickness. Construct with multiple knockouts and wiring gutters. Provide fronts with adjustable indicating trim clamps, and doors with flush locks and keys, all panel board enclosures keyed alike, with concealed door hinges and door swings Equip with interior circuit-directory frame, and card with clear plastic covering. Provide POWDER COATED GRAY finish.

☐ 3 Wet location panel boards shall be NEMA 4 enclosures.

☐ 4 Use NEMA 1 enclosures for indoor use, primarily to provide a degree of protection against limited amounts of falling dirt.

☐ 5 Control Panel shall have a nameplate installed and mounted to the front cover.

II. REFERENCE DRAWINGS

BSPI 1 - Location Plan
BSPI 2 - Distribution Plan View
BSPI 3 - Detailed Drawings

BSPI 4 - Vault for 700mm Ø Isolation Valve (Phase 1)
BSPI 5 - Vault for 350mm Ø Isolation Valve (Phase 2)
BSPI 6 - Proposed Concrete Valve Vault for 700mm Ø Pipe
BSPI 7 - Proposed Concrete Valve Vault for 350mm Ø Pipe

IV. ACCEPTANCE

☐ 1. No Leaks
☐ 2. Proper Waste/Debris Disposal
☐ 3. Proper Concrete Restoration

V. OTHERS

☐ 1. Contractor should submit all the necessary documents such as Materials Mill Certificate or equivalent prior to inspection/delivery, Detailed Daily Schedule of Activities during Kick off Meeting, etc...

☐ 2. Consruction Safety and Good Housekeeping must be observed at all Times.
☐ 3. Contractor should include product catalogue of materials in their proposal for evaluation purposes.

☐ 4. Actuators, valve spindle and gear boxes should be properly supported.

NOTES :
Reference - LWUA TECHNICAL STANDARDS and CWD EXISITING STANDARDS.