

TERMS OF REFERENCE (TOR)

SUPPLY, DELIVERY, INSTALLATION, TESTING, AND COMMISSIONING OF ONE (1) UNIT HORIZONTAL SPLIT-CASE PUMP AND ELECTRIC MOTOR ASSEMBLY FOR BUCAL PUMP STATION

1. OBJECTIVE

The Calamba Water District (CWD) intends to procure **One (1) Unit High-Efficiency Horizontal Split-Case Centrifugal Pump complete with Direct-Coupled Electric Motor, fabricated steel baseplate, accessories, installation, testing, commissioning, training, and related services** to replace the existing deteriorated pump assembly at the Bucal Pump Station.

The project aims to:

- Ensure continuous and reliable water supply;
- Improve pumping efficiency and reduce energy consumption;
- Increase operational reliability and equipment service life;
- Minimize downtime due to equipment failure;
- Support the long-term operation of the Bucal Water Supply System.

2. SCOPE OF WORK

The winning bidder shall provide all labor, supervision, materials, equipment, tools, transportation, lifting equipment, consumables, testing instruments, and incidentals necessary to complete the project on a turnkey basis.

The scope of work shall include, but not be limited to, the following:

A. Supply and Delivery

Supply and deliver one (1) complete Horizontal Split-Case Centrifugal Pump with matching Premium Efficiency Electric Motor and all accessories to the Bucal Pump Station, Calamba City, Laguna.

B. Supply of Equipment and Accessories

The supply shall include, but not be limited to, the following:

- One (1) Horizontal Split-Case Centrifugal Pump
- One (1) Premium Efficiency Electric Motor
- One (1) Heavy-duty fabricated structural steel common baseplate (bedplate), factory machined and drilled, complete with lifting lugs, leveling pads, grout openings, anchor bolt holes, and epoxy protective coating
- One (1) Heavy-duty flexible coupling
- One (1) Coupling guard
- One (1) Set casing wear rings (spare unit)
- One (1) Set flexible rubber expansion joints or approved equivalent (spare unit)

- Stainless steel bolts, nuts, washers, and fasteners
- Anchor bolts
- Foundation bolts
- Gaskets
- Alignment shims
- Lubricants
- Nameplates
- All other accessories necessary for complete installation and successful operation

C. Removal of Existing Equipment

The Contractor shall:

- Disconnect the existing pump and motor assembly;
- Remove the existing pump, motor, coupling, and accessories;
- Transfer the removed equipment to a location designated by CWD;
- Restore the work area after completion.

D. Installation

The Contractor shall perform:

- Mechanical installation
- Electrical installation
- Pump and motor mounting on the common baseplate
- Baseplate leveling
- Anchor bolt installation
- Non-shrink grout installation (where required)
- Piping connection
- Installation of expansion joints
- Coupling installation
- Initial laser shaft alignment
- Final laser alignment after piping connection
- Verification of motor rotation
- Electrical reconnection to the existing control system and Variable Frequency Drive (VFD)
- Cleaning of the work area after installation

E. Testing and Commissioning

The Contractor shall conduct complete testing and commissioning including:

- Insulation resistance test
- Continuity test
- Verification of phase sequence

- Voltage measurement
- Current measurement
- Direction of rotation verification
- Dry run
- Bearing temperature measurement
- Vibration analysis
- Noise level verification
- Shaft alignment verification
- Flow measurement
- Pressure measurement
- Pump performance testing
- Verification of Total Dynamic Head
- Verification of pump efficiency
- Continuous operational test for not less than eight (8) hours
- Final acceptance test witnessed by CWD representatives

The completed installation shall operate without abnormal vibration, excessive noise, leakage, cavitation, overheating, or mechanical defects.

3. TECHNICAL SPECIFICATIONS

A. Horizontal Split-Case Pump

Description	Minimum Requirement
Pump Type	Single-Stage Horizontal Split-Case Centrifugal Pump
Operating Speed	1788–1800 RPM
Rotation	Counterclockwise
Capacity	Minimum 835 m ³ /hr
Minimum Continuous Flow	565.8 m ³ /hr
Total Dynamic Head	Minimum 50 meters
Maximum Head	55.9 meters
Pump Efficiency	Minimum 80% at the design operating point
Maximum Working Pressure	0.5472 MPa
Ambient Temperature	-20°C to +55°C
Suction Connection	DN300
Discharge Connection	DN250
Flange Rating	DIN PN16
Casing Material	Cast Iron EN-GJL-250 or approved equivalent
Impeller Material	Stainless Steel EN 1.4308 or approved equivalent
Shaft Material	Stainless Steel EN 1.4021 or approved equivalent
Wear Rings	Bronze or Brass

Mechanical Seal	BBQE or approved equivalent
Coupling	Heavy-Duty Flexible Pin and Bush Type or approved equivalent
Baseplate	Heavy-duty fabricated structural steel common baseplate with epoxy coating
Bearings	Heavy-duty anti-friction bearings with minimum L10 bearing life of 50,000 operating hours
Impeller Balancing	Dynamically balanced in accordance with ISO 21940 Grade G6.3 or better
Paint System	Factory-applied epoxy primer and polyurethane finish suitable for C3/C4 corrosion environment

B. Electric Motor

Description	Minimum Requirement
Motor Type	Three-Phase Squirrel Cage Induction Motor
Rated Output	160 kW
Voltage	460 V
Frequency	60 Hz
Number of Poles	4
Rated Speed	Approximately 1,800 RPM
Efficiency	IE4 Super Premium Efficiency
Protection	IP55
Insulation Class	Class F
Temperature Rise	Class B
Duty	S1 Continuous Duty
Cooling Method	IC411
Mounting	IM B3 Foot Mounted
Housing	Heavy-duty Cast Iron
Rotation	Bidirectional
Vibration Grade	Grade A
Motor Protection	Three (3) PTC Thermistors
Earthing Terminal	Required
Condensation Drain	Required
Paint Finish	Factory standard epoxy coating
VFD Compatibility	Suitable for continuous operation with Variable Frequency Drive (VFD), including inverter-duty insulation system

4. PERFORMANCE REQUIREMENTS

The supplied equipment shall:

- Operate continuously on a 24-hour basis.
- Be suitable for potable water pumping applications.

- Be fully compatible with the existing Variable Frequency Drive (VFD).
- Operate without cavitation at the specified duty point.
- Maintain vibration levels within ISO 10816 (or the latest equivalent ISO standard).
- Maintain rated performance and efficiency at the specified operating conditions.
- Be free from excessive leakage, overheating, abnormal noise, and excessive bearing vibration.

5. DOCUMENTARY REQUIREMENTS

The successful bidder shall submit:

- Manufacturer's Technical Data Sheet
- Certified Pump Performance Curve
- Efficiency Curve
- NPSH Curve
- General Arrangement Drawing
- Certified Dimension Drawing
- Motor Data Sheet
- Factory Performance Test Report
- Factory Hydrostatic Test Report
- Motor Routine Test Certificate
- Certificate of Origin
- ISO 9001 Certificate of Manufacturer
- Installation Manual
- Operation and Maintenance Manual
- Spare Parts Catalogue
- Warranty Certificate

6. DELIVERY SCHEDULE

- Delivery Period: Within **Sixteen (16) Calendar Weeks** from receipt of the Notice to Proceed.
- Delivery Location: Bucal Pump Station, Calamba City, Laguna.

7. INSTALLATION REQUIREMENTS

The supplier shall provide:

- Qualified Mechanical Engineer
- Qualified Electrical Engineer
- Certified Service Technicians
- Appropriate lifting equipment
- Laser shaft alignment equipment
- Calibrated testing instruments
- Complete safety equipment and PPE

All installation works shall comply with:

- Philippine Electrical Code (PEC)
- Occupational Safety and Health Standards (OSHS)
- Manufacturer's Installation Manual
- Applicable industry standards

8. WARRANTY

The supplier shall provide:

- Minimum one (1) year warranty from the date of Final Acceptance;
- Free replacement of defective parts due to manufacturing defects;
- Free labor and technical services during the warranty period;
- On-site technical support as required;
- Availability of genuine spare parts for a minimum of ten (10) years after installation.

9. TRAINING

The supplier shall conduct on-site training for CWD personnel covering:

- Pump operation
- Pump performance curves
- Preventive maintenance
- Lubrication procedures
- Shaft alignment checking
- Mechanical seal replacement
- Bearing inspection
- Troubleshooting
- VFD operation
- Recommended spare parts management

Training shall be completed prior to Final Acceptance.

10. ACCEPTANCE CRITERIA

Final acceptance shall be subject to:

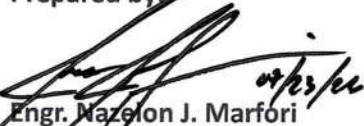
- Complete delivery of all equipment and accessories;
- Successful installation;
- Satisfactory testing and commissioning;
- Completion of an eight (8)-hour continuous operational test without abnormal vibration, leakage, overheating, cavitation, or electrical faults;
- Submission of all required manuals, test reports, certificates, and warranty documents;
- Completion of personnel training;
- Issuance of a Certificate of Final Acceptance by the CWD Inspection Committee.

11. TERMS OF PAYMENT

Payment shall be made in accordance with applicable government accounting and auditing rules, and only upon:

- Complete delivery of all equipment and accessories;
- Successful installation;
- Passing of testing and commissioning;
- Submission of all documentary requirements;
- Issuance of the Certificate of Final Acceptance by Calamba Water District.

Prepared by:



04/03/16

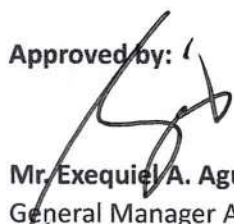
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