Republic of the Philippines
Province of Bukidnon
CABANGLASAN WATER DISIRICT
P-10, Poblacion, Cabanglasan, Bukidnon

PROCUREMENT OF INFRASTRUCTURE PROJECT

CONSTRUCTION OF WATER SUPPLY SYSTEM FOR CABANGLASAN WATER DISTRICT

(Cabanglasan, Bukidnon Water Supply System Improvement Program)

Project Identification No.:
2023-10-029

Sixth Edition

October 2023

TABLE OF CONTENTS

Glossary of Terms, Abbreviations, and Acronyms

ABC – Approved Budget for the Contract.
ARCC – Allowable Range of Contract Cost.
BAC – Bids and Awards Committee.

Bid – A signed offer or proposal to undertake a contract submitted by a bidder in response to and in consonance with the requirements of the bidding documents. Also referred to as *Proposal* and *Tender.* (2016 revised IRR, Section 5[c])

Bidder – Refers to a contractor, manufacturer, supplier, distributor and/or consultant who submits a bid in response to the requirements of the Bidding Documents. (2016 revised IRR, Section 5[d])

Bidding Documents – The documents issued by the Procuring Entity as the bases for bids, furnishing all information necessary for a prospective bidder to prepare a bid for the Goods, Infrastructure Projects, and/or Consulting Services required by the Procuring Entity. (2016 revised IRR, Section 5[e])

BIR – Bureau of Internal Revenue.
BSP – Bangko Sentral ng Pilipinas.
CDA – Cooperative Development Authority.

Consulting Services – Refer to services for Infrastructure Projects and other types of projects or activities of the GOP requiring adequate external technical and professional expertise that are beyond the capability and/or capacity of the GOP to undertake such as, but not limited to: (i) advisory and review services; (ii) pre-investment or feasibility studies; (iii) design; (iv) construction supervision; (v) management and related services; and (vi) other technical services or special studies. (2016 revised IRR, Section 5[i])

Contract – Refers to the agreement entered into between the Procuring Entity and the Supplier or Manufacturer or Distributor or Service Provider for procurement of Goods and Services; Contractor for Procurement of Infrastructure Projects; or Consultant or Consulting Firm for Procurement of Consulting Services; as the case may be, as recorded in the Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

Contractor – is a natural or juridical entity whose proposal was accepted by the Procuring Entity and to whom the Contract to execute the Work was awarded. Contractor as used in these Bidding Documents may likewise refer to a supplier, distributor, manufacturer, or consultant.

CPI – Consumer Price Index.

DOLE – Department of Labor and Employment.

DTI – Department of Trade and Industry.

Foreign-funded Procurement or Foreign-Assisted Project – Refers to procurement whose funding source is from a foreign government, foreign or international financing institution as specified in the Treaty or International or Executive Agreement. (2016 revised IRR, Section 5[b]).

GFI – Government Financial Institution.

GOCC – Government-owned and/or –controlled corporation.

Goods – Refer to all items, supplies, materials and general support services, except Consulting Services and Infrastructure Projects, which may be needed in the transaction of public businesses or in the pursuit of any government undertaking, project or activity, whether in the nature of equipment, furniture, stationery, materials for construction, or personal property of any kind, including non-personal or contractual services such as the repair and maintenance of equipment and furniture, as well as trucking, hauling, janitorial, security, and related or analogous services, as well as procurement of materials and supplies provided by the Procuring Entity for such services. The term "related" or "analogous services" shall include, but is not limited to, lease or purchase of office space, media advertisements, health maintenance services, and other services essential to the operation of the Procuring Entity. (2016 revised IRR, Section 5[r])

GOP – Government of the Philippines.

Infrastructure Projects – Include the construction, improvement, rehabilitation, demolition, repair, restoration or maintenance of roads and bridges, railways, airports, seaports, communication facilities, civil works components of information technology projects, irrigation, flood control and drainage, water supply, sanitation, sewerage and solid waste management systems, shore protection, energy/power and electrification facilities, national buildings, school buildings, hospital buildings, and other related construction projects of the government. Also referred to as *civil works or works*. (2016 revised IRR, Section 5[u])

LGUs – Local Government Units.

NFCC – Net Financial Contracting Capacity.

NGA – National Government Agency.

PCAB – Philippine Contractors Accreditation Board.

PhilGEPS - Philippine Government Electronic Procurement System.

Procurement Project – refers to a specific or identified procurement covering goods, infrastructure project or consulting services. A Procurement Project shall be described, detailed, and scheduled in the Project Procurement Management Plan prepared by the agency which shall be consolidated in the procuring entity's Annual Procurement Plan. (GPPB Circular No. 06-2019 dated 17 July 2019)

PSA – Philippine Statistics Authority.

SEC – Securities and Exchange Commission.

SLCC – Single Largest Completed Contract.

UN – United Nations.

Section I. Invitation to Bid

Republic of the Philippines
Province of Bukidnon
CABANGLASAN WATER DISIRICT
P-10, Poblacion, Cabanglasan, Bukidnon

Invitation to Bid for the
PROCUREMENT OF INFRASTRUCTURE PROJECT FOR THE CONSTRUCTION OF WATER SUPPLY SYSTEM FOR CABANGLSAN (BUKIDNON) WATER DISTRICT
(Cabanglasan, Bukidnon Water Supply System Improvement Program)

1. The **Cabanglasan Water District (CWD)**, through the *RA No. 10717 (FY 2012 NG),* intends to apply the sum of ***Six Million Eight Hundred Sixty-Eight Thousand One Hundred Twenty-Seven Pesos & 48/100 (₱ 6,868,127.48)*** being the Approved Budget for the Contract (ABC) to payments under the contract for ***PROCUREMENT OF INFRASTRUCTURE PROJECT: CONSTRUCTION OF WATER SUPPLY SYSTEM FOR CABANGLASAN WATER DISTRICT*** and *Project Identification Number 2023-10-029*. Bids received in excess of the ABC shall be automatically rejected at bid opening.

2. The **Cabanglasan Water District CWD**, through the **Bids and Awards Committee of Quezon Bukidnon Water District (QBWD)**, now invites bids for the above Procurement Project. Completion of the Works is required in ***Three Hundred (300) calendar days***. Bidders should have completed a contract similar to the Project. The description of an eligible bidder is contained in the Bidding Documents, particularly, in Section II (Instructions to Bidders).

3. Bidding will be conducted through open competitive bidding procedures using non-discretionary "*pass/fail*" criterion as specified in the 2016 revised Implementing Rules and Regulations (IRR) of Republic Act (RA) No. 9184.
    a. Bidding is restricted to Filipino citizens/sole proprietorships, partnerships, or organizations with at least sixty percent (60%) interest or outstanding capital stock belonging to citizens of the Philippines, and to citizens or organizations of a country the laws or regulations of which grant similar rights or privileges to Filipino citizens, pursuant to RA No. 5183.

4. Interested bidders may obtain further information from ***QBWD- BAC Secretariat with office address at Government Complex, Purok 2 Libertad, Quezon, Bukidnon*** and inspect the Bidding Documents at the address given below from *8:00 AM – 5:00 PM.*

5. A complete set of Bidding Documents may be acquired by interested bidders on **October 12, 2023** from given address and website/s below and upon payment of the applicable fee for the Bidding Documents, pursuant to the latest Guidelines issued by the GPPB, in the amount of ***Ten Thousand Pesos Only (Php 10,000.00).*** The Procuring Entity shall allow the bidder to present its proof

of payment for the fees in person, facsimile, or through any other electronic means.

6. The ***CWD***, through the Bids and Awards Committee (BAC) of **QBWD** will hold a Pre-Bid Conference[i] on **October 19, 2023,10:00 am** at **Ria Ruby Pension House, Poblacion, Quezon, Bukidnon** which shall be open to prospective bidders.

7. Bids must be duly received by the BAC Secretariat through manual submission at the office address as indicated below on or before **9:00 AM on October 31, 2023**. Late bids shall not be accepted.

   The complete schedule of activities is listed, as follows:

Activities	Schedule
1. Advertisement	October 12, 2023
2. Issuance of the Bidding Documents	October 12, 2023 until 9:00 AM of October 31, 2023
3. Pre-Bid Conference	October 19, 2023
4. Deadline for the Pre-qualification, Submission, and Opening of Bids	October 31, 2023-9:00 AM (PST)
5. Evaluation of Bids	October 31, 2023-01:00 PM
6. Post-qualification of Bids	November 3-6, 2023

8. All bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in **ITB** Clause 16.

9. Bid opening shall be on ***October 31, 2023, 10:00 AM (PST)*** at the given address below. Bids will be opened in the presence of the bidders' representatives who choose to attend the activity.

10. The **Cabanglasan Water District**, through the **Bids and Awards Committee of Quezon Bukidnon Water District (QBWD)**, reserves the right to reject any and all bids, declare a failure of bidding, or not award the contract at any time prior to contract award in accordance with Sections 35.6 and 41 of the 2016 revised Implementing Rules and Regulations (IRR) of RA No. 9184, without thereby incurring any liability to the affected bidder or bidders.

11. For further information, please refer to:

    JUVIE QUEEN S. DEGAMO
    BAC Secretariat
    Quezon Bukidnon Water District
    PD Government Complex, Purok 2 Libertad, Quezon, Bukidnon
    Tel. No. (033) 316-2250
    quezonwaterdistrict@yahoo.com

    And

MR. RUEL P. PADREQUIL
General Manager, CWD
P10, Poblacion, Cabanglasan, Bukidnon
Email Address: **cabanglasanwd@yahoo.com**

12. You may visit the following websites:

    For downloading of Bidding Documents:

    https://qwdbukidnon.gov.ph/invitation-to-bid/

JANICE MAY P. MAMPAWA
Bids and Awards Committee
Chairperson

Section II. Instructions to Bidders

1. Scope of Bid

The Procuring Entity, ***Cabanglasan Water District (CWD)***, through the ***Bids and Awards Committee of Quezon Bukidnon Water District (QBWD)***, invites Bids for the *PROCUREMENT OF INFRASTRUCTURE PROJECT: THE CONSTRUCTION OF WATER SUPPLY SYSTEM FOR CABANGLASAN WATER DISTRICT*, with Project Identification Number *2023-10-029.*

The Procurement Project (referred to herein as "Project") is for the construction of Works, as described in Section VI (Specifications).

2. Funding Information

2.1. The GOP through the source of funding as indicated below for R.A. No. 10717 (FY 2012 NG) in the amount of ***₱16,165,427.00***.

2.2. The source of funding is: NGA, the General Appropriations Act or Special Appropriations.

3. Bidding Requirements

The Bidding for the Project shall be governed by all the provisions of RA No. 9184 and its 2016 revised IRR, including its Generic Procurement Manual and associated policies, rules and regulations as the primary source thereof, while the herein clauses shall serve as the secondary source thereof.

Any amendments made to the IRR and other GPPB issuances shall be applicable only to the ongoing posting, advertisement, or invitation to bid by the BAC through the issuance of a supplemental or bid bulletin.

The Bidder, by the act of submitting its Bid, shall be deemed to have inspected the site, determined the general characteristics of the contracted Works and the conditions for this Project, such as the location and the nature of the work; (b) climatic conditions; (c) transportation facilities; (c) nature and condition of the terrain, geological conditions at the site communication facilities, requirements, location and availability of construction aggregates and other materials, labor, water, electric power and access roads; and (d) other factors that may affect the cost, duration and execution or implementation of the contract, project, or work and examine all instructions, forms, terms, and project requirements in the Bidding Documents.

4. Corrupt, Fraudulent, Collusive, Coercive, and Obstructive Practices

The Procuring Entity, as well as the Bidders and Contractors, shall observe the highest standard of ethics during the procurement and execution of the contract. They or through an agent shall not engage in corrupt, fraudulent, collusive, coercive, and obstructive practices defined under Annex "I" of the

2016 revised IRR of RA No. 9184 or other integrity violations in competing for the Project.

5. Eligible Bidders

5.1. Only Bids of Bidders found to be legally, technically, and financially capable will be evaluated.

5.2. The Bidder must have an experience of having completed a Single Largest Completed Contract (SLCC) that is similar to this Project, equivalent to at least fifty percent (50%) of the ABC adjusted, if necessary, by the Bidder to current prices using the PSA's CPI, except under conditions provided for in Section 23.4.2.4 of the 2016 revised IRR of RA No. 9184.

A contract is considered to be "similar" to the contract to be bid if it has the major categories of work stated in the **BDS**.

5.3. For Foreign-funded Procurement, the Procuring Entity and the foreign government/foreign or international financing institution may agree on another track record requirement, as specified in the Bidding Document prepared for this purpose.

5.4. The Bidders shall comply with the eligibility criteria under Section 23.4.2 of the 2016 IRR of RA No. 9184.

6. Origin of Associated Goods

There is no restriction on the origin of Goods other than those prohibited by a decision of the UN Security Council taken under Chapter VII of the Charter of the UN.

7. Subcontracts

7.1. The Bidder may subcontract portions of the Project to the extent allowed by the Procuring Entity as stated herein, but in no case more than fifty percent (50%) of the Project.

The Procuring Entity has prescribed that: Subcontracting is not allowed.

8. Pre-Bid Conference

The Procuring Entity will hold a pre-bid conference for this Project on the specified date and time and either at its physical address as indicated in paragraph 6 of the **IB.**

9. Clarification and Amendment of Bidding Documents

Prospective bidders may request for clarification on and/or interpretation of any part of the Bidding Documents. Such requests must be in writing and received

by the Procuring Entity, either at its given address or through electronic mail indicated in the **IB**, at least ten (10) calendar days before the deadline set for the submission and receipt of Bids.

10. Documents Comprising the Bid: Eligibility and Technical Components

10.1. The first envelope shall contain the eligibility and technical documents of the Bid as specified in **Section IX. Checklist of Technical and Financial Documents**.

10.2. If the eligibility requirements or statements, the bids, and all other documents for submission to the BAC are in foreign language other than English, it must be accompanied by a translation in English, which shall be authenticated by the appropriate Philippine foreign service establishment, post, or the equivalent office having jurisdiction over the foreign bidder's affairs in the Philippines. For Contracting Parties to the Apostille Convention, only the translated documents shall be authenticated through an apostille pursuant to GPPB Resolution No. 13-2019 dated 23 May 2019. The English translation shall govern, for purposes of interpretation of the bid.

10.3. A valid PCAB License is required, and in case of joint ventures, a valid special PCAB License, and registration for the type and cost of the contract for this Project. Any additional type of Contractor license or permit shall be indicated in the **BDS**.

10.4. A List of Contractor's key personnel (e.g., Project Manager, Project Engineers, Materials Engineers, and Foremen) assigned to the contract to be bid, with their complete qualification and experience data shall be provided. These key personnel must meet the required minimum years of experience set in the **BDS**.

10.5. A List of Contractor's major equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership, certification of availability of equipment from the equipment lessor/vendor for the duration of the project, as the case may be, must meet the minimum requirements for the contract set in the **BDS**.

11. Documents Comprising the Bid: Financial Component

11.1. The second bid envelope shall contain the financial documents for the Bid as specified in **Section IX. Checklist of Technical and Financial Documents**.

11.2. Any bid exceeding the ABC indicated in paragraph 1 of the **IB** shall not be accepted.

11.3. For Foreign-funded procurement, a ceiling may be applied to bid prices provided the conditions are met under Section 31.2 of the 2016 revised IRR of RA No. 9184.

12. Alternative Bids

Bidders shall submit offers that comply with the requirements of the Bidding Documents, including the basic technical design as indicated in the drawings and specifications. Unless there is a value engineering clause in the **BDS**, alternative Bids shall not be accepted.

13. Bid Prices

All bid prices for the given scope of work in the Project as awarded shall be considered as fixed prices, and therefore not subject to price escalation during contract implementation, except under extraordinary circumstances as determined by the NEDA and approved by the GPPB pursuant to the revised Guidelines for Contract Price Escalation guidelines.

14. Bid and Payment Currencies

14.1. Bid prices may be quoted in the local currency or tradeable currency accepted by the BSP at the discretion of the Bidder. However, for purposes of bid evaluation, Bids denominated in foreign currencies shall be converted to Philippine currency based on the exchange rate as published in the BSP reference rate bulletin on the day of the bid opening.

14.2. Payment of the contract price shall be made in: Philippine Pesos.

15. Bid Security

15.1. The Bidder shall submit a Bid Securing Declaration or any form of Bid Security in the amount indicated in the **BDS**, which shall be not less than the percentage of the ABC in accordance with the schedule in the **BDS**.

15.2. The Bid and bid security shall be valid for ***one hundred twenty (120) calendar days from receipt of bids.*** Any bid not accompanied by an acceptable bid security shall be rejected by the Procuring Entity as non-responsive.

16. Sealing and Marking of Bids

Each Bidder shall submit one copy of the first and second components of its Bid.

The Procuring Entity may request additional hard copies and/or electronic copies of the Bid. However, failure of the Bidders to comply with the said request shall not be a ground for disqualification.

If the Procuring Entity allows the submission of bids through online submission to the given website or any other electronic means, the Bidder shall submit an electronic copy of its Bid, which must be digitally signed. An electronic copy that cannot be opened or is corrupted shall be considered non-responsive and, thus, automatically disqualified.

17. Deadline for Submission of Bids

The Bidders shall submit on the specified date and time and either at its physical address or through online submission as indicated in paragraph 7 of the **IB.**

18. Opening and Preliminary Examination of Bids

18.1. The BAC shall open the Bids in public at the time, on the date, and at the place specified in paragraph 9 of the **IB**. The Bidders' representatives who are present shall sign a register evidencing their attendance. In case videoconferencing, webcasting or other similar technologies will be used, attendance of participants shall likewise be recorded by the BAC Secretariat.

In case the Bids cannot be opened as scheduled due to justifiable reasons, the rescheduling requirements under Section 29 of the 2016 revised IRR of RA No. 9184 shall prevail.

18.2. The preliminary examination of Bids shall be governed by Section 30 of the 2016 revised IRR of RA No. 9184.

19. Detailed Evaluation and Comparison of Bids

19.1. The Procuring Entity's BAC shall immediately conduct a detailed evaluation of all Bids rated "*passed*" using non-discretionary pass/fail criteria. The BAC shall consider the conditions in the evaluation of Bids under Section 32.2 of 2016 revised IRR of RA No. 9184.

19.2. If the Project allows partial bids, all Bids and combinations of Bids as indicated in the **BDS** shall be received by the same deadline and opened and evaluated simultaneously so as to determine the Bid or combination of Bids offering the lowest calculated cost to the Procuring Entity. Bid Security as required by **ITB** Clause 16 shall be submitted for each contract (lot) separately.

19.3. In all cases, the NFCC computation pursuant to Section 23.4.2.6 of the 2016 revised IRR of RA No. 9184 must be sufficient for the total of the ABCs for all the lots participated in by the prospective Bidder.

20. Post Qualification

Within a non-extendible period of five (5) calendar days from receipt by the Bidder of the notice from the BAC that it submitted the Lowest Calculated Bid,

the Bidder shall submit its latest income and business tax returns filed and paid through the BIR Electronic Filing and Payment System (eFPS), and other appropriate licenses and permits required by law and stated in the **BDS**.

21. Signing of the Contract

The documents required in Section 37.2 of the 2016 revised IRR of RA No. 9184 shall form part of the Contract. Additional Contract documents are indicated in the **BDS**.

Section III. Bid Data Sheet

Bid Data Sheet

<table>
<tr><th>ITB Clause</th><th></th></tr>
<tr><td>5.2</td><td>For this purpose, contracts similar to the Project refer to contracts which have the same major categories of work, which shall be:
a) Construction of Water Supply System
b) Completed within Three (3) years prior to the deadline for the submission and receipt of bids
c) The following documents must appear as attachment for the Single Largest Completed Contract, to wit:
➢ Contract Agreement
➢ Statement of Work Accomplished (SWA)
➢ Certificate of Final Acceptance or Constructors' Performance Evaluation System (CPES) Final Rating</td></tr>
<tr><td>10.1</td><td>I. The first envelope shall contain the eligibility and technical documents stated in the ITB clause and Section VIII of this bidding document. For this bidding, the following legal documents must also be present in addition to the Philgeps Registration Certificate:
a.) Registration certificate from Securities and Exchange Commission (SEC), Department of Trade and Industry (DTI) for sole proprietorship, or Cooperative Development Authority (CDA) for cooperatives or its equivalent document
b.) Mayor's or Business permit issued by the city or municipality where the principal place of business of the prospective bidder is located
c.) Tax clearance per E.O. No. 398, s. 2005, as finally reviewed and approved by the Bureau of Internal Revenue (BIR)
II. Other Documentary Requirements
a.) Affidavit of Site Inspection</td></tr>
<tr><td>10.3</td><td>Valid Philippine Contractors and Accreditation Board (PCAB) license and registration:
Classification: General Engineering
License category: Category C & D
Size Range: Small B; with Specialization in Water Supply; in accordance with PCAB Board Resolution No. 201, Series of 2017</td></tr>
<tr><td>10.4</td><td>The key personnel must meet the required minimum years of experience set below:
<table><tr><th>Well Drilling Team</th><th>Manpower Requirement</th><th>Minimum years of Experience</th></tr><tr><td>Project Engineer</td><td>1</td><td rowspan="4">3 years</td></tr><tr><td>Electromechanical Technician</td><td>1</td></tr><tr><td>Foreman</td><td>1</td></tr><tr><td>Carpenter</td><td>1</td></tr></table>
List of contractor's personnel <u>shall be submitted under oath and notarized.</u></td></tr>
</table>

<table>
<tr><td>10.5</td><td>The minimum major equipment requirements are the following:
<table><tr><th>Equipment</th><th>Number of Units</th></tr><tr><td>Back Hoe</td><td>1</td></tr><tr><td>Air Compressor</td><td>1</td></tr><tr><td>30 Hp Submersible pump</td><td>1</td></tr><tr><td>Compactor Plate</td><td>1</td></tr><tr><td>1 Bagger Concrete Mixer</td><td>1</td></tr><tr><td>75 KVA Generator Set</td><td>1</td></tr></table>
List of contractor’s equipment units <u>shall be submitted under oath and notarized.</u></td></tr>
<tr><td>12</td><td>No further instructions.</td></tr>
<tr><td>15.1</td><td>The bid security shall be in the form of a Bid Securing Declaration or any of the following forms and amounts:
<table><tr><th>FORM OF BID SECURITY</th><th>AMOUNT OF BID SECURITY (BASED ON THE ABC)</th></tr><tr><td>Cash, cashier’s/manager’s check, bank draft/guarantee or irrevocable letter of credit;</td><td>2%</td></tr><tr><td>Surety Bond callable upon demand issued by the surety or insurance company</td><td>5%</td></tr><tr><td>Bid Securing Declaration</td><td>No percentage required.</td></tr></table>
a. Original Bid Security shall be submitted as part of the technical component of the bidder’s eligibility documents, otherwise the bid shall be rejected or disqualified.
b. Bid Security in the form of cash should be paid over-the-counter, direct bank deposit, or any other electronic means. Original QBWD Official Receipt shall be submitted as part of the technical component of the bidder’s eligibility documents.
c. Bid Security in the form of Cashier’s/ Manager’s Check should be made payable to Quezon Bukidnon Water District.
d. The Bid Securing Declaration must be original and should follow standard form.
e. Bid Security exceeding the required amount is not ground for disqualification.</td></tr>
<tr><td>16</td><td>a. Each Bidder shall submit One (1) original and One (1) copy of the first and second components of its bid.
b. All Pre – Qualification/Eligibility Documents should be TAGGED/LABELLED in accordance with the order as presented in Section VIII. Checklist of Technical and Financial Documents.</td></tr>
<tr><td>19.2</td><td>Partial bids are not allowed.</td></tr>
</table>

20	No further instructions.
21	The following additional contract documents relevant to the Project are required: a. Construction schedule and S-curve, b. Manpower schedule, c. Construction methods, d. Equipment utilization schedule, e. Construction safety and health program approved by the DOLE. f. PERT/CPM or other acceptable tools of project scheduling g. Contractor's All Risk Insurance Policy (CARI)

Section IV. General Conditions of Contract

1. Scope of Contract

This Contract shall include all such items, although not specifically mentioned, that can be reasonably inferred as being required for its completion as if such items were expressly mentioned herein. All the provisions of RA No. 9184 and its 2016 revised IRR, including the Generic Procurement Manual, and associated issuances, constitute the primary source for the terms and conditions of the Contract, and thus, applicable in contract implementation. Herein clauses shall serve as the secondary source for the terms and conditions of the Contract.

This is without prejudice to Sections 74.1 and 74.2 of the 2016 revised IRR of RA No. 9184 allowing the GPPB to amend the IRR, which shall be applied to all procurement activities, the advertisement, posting, or invitation of which were issued after the effectivity of the said amendment.

2. Sectional Completion of Works

If sectional completion is specified in the **Special Conditions of Contract (SCC)**, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date shall apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).

3. Possession of Site

4.1. The Procuring Entity shall give possession of all or parts of the Site to the Contractor based on the schedule of delivery indicated in the **SCC,** which corresponds to the execution of the Works. If the Contractor suffers delay or incurs cost from failure on the part of the Procuring Entity to give possession in accordance with the terms of this clause, the Procuring Entity's Representative shall give the Contractor a Contract Time Extension and certify such sum as fair to cover the cost incurred, which sum shall be paid by Procuring Entity.

4.2. If possession of a portion is not given by the above date, the Procuring Entity will be deemed to have delayed the start of the relevant activities. The resulting adjustments in contract time to address such delay may be addressed through contract extension provided under Annex "E" of the 2016 revised IRR of RA No. 9184.

4. The Contractor's Obligations

The Contractor shall employ the key personnel named in the Schedule of Key Personnel indicating their designation, in accordance with **ITB** Clause 10.3 and specified in the **BDS**, to carry out the supervision of the Works.

The Procuring Entity will approve any proposed replacement of key personnel only if their relevant qualifications and abilities are equal to or better than those of the personnel listed in the Schedule.

5. Performance Security

5.1. Within ten (10) calendar days from receipt of the Notice of Award from the Procuring Entity but in no case later than the signing of the contract by both parties, the successful Bidder shall furnish the performance security in any of the forms prescribed in Section 39 of the 2016 revised IRR.

5.2. The Contractor, by entering into the Contract with the Procuring Entity, acknowledges the right of the Procuring Entity to institute action pursuant to RA No. 3688 against any subcontractor be they an individual, firm, partnership, corporation, or association supplying the Contractor with labor, materials and/or equipment for the performance of this Contract.

6. Site Investigation Reports

The Contractor, in preparing the Bid, shall rely on any Site Investigation Reports referred to in the **SCC** supplemented by any information obtained by the Contractor.

7. Warranty

7.1. In case the Contractor fails to undertake the repair works under Section 62.2.2 of the 2016 revised IRR, the Procuring Entity shall forfeit its performance security, subject its property(ies) to attachment or garnishment proceedings, and perpetually disqualify it from participating in any public bidding. All payables of the GOP in his favor shall be offset to recover the costs.

7.2. The warranty against Structural Defects/Failures, except that occasioned-on force majeure, shall cover the period from the date of issuance of the Certificate of Final Acceptance by the Procuring Entity. Specific duration of the warranty is found in the **SCC**.

8. Liability of the Contractor

Subject to additional provisions, if any, set forth in the **SCC**, the Contractor's liability under this Contract shall be as provided by the laws of the Republic of the Philippines.

If the Contractor is a joint venture, all partners to the joint venture shall be jointly and severally liable to the Procuring Entity.

9. Termination for Other Causes

Contract termination shall be initiated in case it is determined *prima facie* by the Procuring Entity that the Contractor has engaged, before, or during the implementation of the contract, in unlawful deeds and behaviors relative to contract acquisition and implementation, such as, but not limited to corrupt, fraudulent, collusive, coercive, and obstructive practices as stated in **ITB** Clause 4.

10. Dayworks

Subject to the guidelines on Variation Order in Annex "E" of the 2016 revised IRR of RA No. 9184, and if applicable as indicated in the **SCC**, the Dayworks rates in the Contractor's Bid shall be used for small additional amounts of work only when the Procuring Entity's Representative has given written instructions in advance for additional work to be paid for in that way.

11. Program of Work

11.1. The Contractor shall submit to the Procuring Entity's Representative for approval the said Program of Work showing the general methods, arrangements, order, and timing for all the activities in the Works. The submissions of the Program of Work are indicated in the **SCC.**

11.2. The Contractor shall submit to the Procuring Entity's Representative for approval an updated Program of Work at intervals no longer than the period stated in the **SCC.** If the Contractor does not submit an updated Program of Work within this period, the Procuring Entity's Representative may withhold the amount stated in the **SCC** from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program of Work has been submitted.

12. Instructions, Inspections and Audits

The Contractor shall permit the GOP or the Procuring Entity to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors of the GOP or the Procuring Entity, as may be required.

13. Advance Payment

The Procuring Entity shall, upon a written request of the Contractor which shall be submitted as a Contract document, make an advance payment to the Contractor in an amount not exceeding fifteen percent (15%) of the total contract price, to be made in lump sum, or at the most two installments according to a schedule specified in the **SCC**, subject to the requirements in Annex "E" of the 2016 revised IRR of RA No. 9184.

14. Progress Payments

The Contractor may submit a request for payment for Work accomplished. Such requests for payment shall be verified and certified by the Procuring Entity's Representative/Project Engineer. Except as otherwise stipulated in the **SCC**, materials and equipment delivered on the site but not completely put in place shall not be included for payment.

15. Operating and Maintenance Manuals

15.1. If required, the Contractor will provide "as built" Drawings and/or operating and maintenance manuals as specified in the **SCC.**

15.2. If the Contractor does not provide the Drawings and/or manuals by the dates stated above, or they do not receive the Procuring Entity's Representative's approval, the Procuring Entity's Representative may withhold the amount stated in the **SCC** from payments due to the Contractor.

Section V. Special Conditions of Contract

Special Conditions of Contract

GCC Clause	
2	The **Intended Completion Date** is ***Three Hundred (300)*** calendar days upon receipt of the formal Notice to Proceed.
4.1	The Procuring Entity shall give possession of all parts of the site/s to the Contractor at the start of the project.
6	The site investigation reports are: Affidavit/Certificate of Site Inspection
7.2	The Warranty shall be ***Five (5) years***, reckoned from the date of issuance of the Certificate of Final Acceptance by the Procuring Entity.
10	No dayworks are applicable to the contract.
11.1	No further instructions.
11.2	No further instructions.
13	The amount of the advance payment is fifteen percent (15%) of the total contract price. Recoupment shall start upon 20% accomplishment of the Project.
14	No further instructions.
15.1	Operating & Maintenance Manual and As-built plans and Construction Report shall be submitted before the final payment is made.
15.2	Final Progress payment will be withheld for failing to produce Complete “as built” drawings and/or operating and maintenance manuals.

Section VI. Specifications

(Refer to LWUA STANDARD SPECIFICATIONS FOR WATER SUPPLY SYSTEM CONSTRUCTION- Volume II)

Notes: **LWUA Standard Specifications**

The revised "LWUA Standard Specifications for Water System Construction" (formerly Volume 2 of 2 of the Bidding Documents) shall be part of the Technical Specifications.

Any conflict or discrepancies between the herein Section VI – Technical Specifications of the Bidding Documents and the "LWUA Standard Specifications for Water System Construction" and/or specifications called for under the herein Section VI – Technical Specifications shall govern over the "LWUA Standard Specifications for Water System Construction".

TECHNICAL SPECIFICATIONS

DIVISION 00 – GENERAL TERMS OF REFERENCE

- The construction of water supply system is to promote convenient and comfort to all concessionaires located at or near the project area are among the program intended to supply the system's users with the amount of water demanded and with adequate pressure that the Cabanglasan Water District set for implementation.
- Cabanglasan Water District (CWD) has an approved Program of Work (POW) for the Php 16,165,427.00 improvement project on its water supply system in Cabanglasan. One of the items in the approved POW is the construction of a deep well. The CWD has completed the well's construction, but the well is unproductive. In order to continue the implementation of the project, Cabanglasan Local Government Unit (LGU) has donated an existing well located at Brgy. Iba. Based on the collected data from the LGU, the well has a discharge capacity of 13 liters per second (lps), but it has not been used since completion. To ensure that the collected data is correct, the contractor must perform a well test. The well test includes a constant discharge for 72 hours without interruption and a step drawdown test. Once the data are confirmed to be correct, the contractor may now

proceed to the next item, which is civil works.

- The pipe laying components of these projects shall be implemented in accordance with the established standard set by LWUA. While the backfilling, compaction, restoration and concreting works shall follow the Department of Public Works & Highways (DPWH) Standard Specifications for public works & highways following its Schedule of Minimum Test Requirements.
- The minimum number samples for testing stipulated in the bill of quantities is the ceiling for said pay item, in case more tests shall be necessary, the contractor shall shoulder the cost of testing fees without any reimbursement from the Cabanglasan Water District.
- Prior to backfilling, the contractor must present to the project engineer the materials tests results as provided for under the chapter on earthworks, sub-base, base course and surface course of the Schedule of the Minimum Test Requirements Governing Items of Work of the DPWH Standard Specifications Volume II.
- The contractor cannot proceed with the next work item unless he can present that the materials in deed passed the testing requirements, in which case, the project engineer has the right to demand from the contractor.
- The bill of quantities prevails in all issues relating to pay items of work.
- It is a matter of requirement that the contracting company must have its own materials engineer, who shall be at the premises of the principal office of the contracting company during inspection. Appropriate licenses and documents shall be readily available.
- It is mandatory upon the contractor to provide reflectorize signage, barricades, early warning devices enclosing the area where work is on-going. The project engineer has the right to order the stoppage of work by reason of insufficiency of these devises or non- compliance thereof, while the period to complete the project shall continue to run.
- Any accident or mishap that may happen during project implementation shall be the sole responsibility of the contractor.
- The contractor shall be liable for all damages that may be incurred during the construction of the project. Leakages on the existing pipeline of the district shall be immediately reported to the Cabanglasan Water District for repair, if it is the contractor that caused said leakage, materials and cost of repair therefore shall be made chargeable against the contractor and in no case shall it be a reason for stoppage of work. It shall be the responsibility of the contractor to complete the project amidst any impediment that will arise during the implementation phase. Only force majeure shall be sufficient reason for time extension.
- The equipment requirements for this project must be made available at the premises of the principal office of the contractor-bidder at the time of inspection. The contractor bidder must be able to present receipts/proof of ownership of the required equipment; otherwise the contractor-bidder must show documents/undertaking that the equipment shall be dedicated for use of this project during project implementation. Even though the contractor-bidder does not

own the equipment, still the equipment must be available at the time of inspection.

- This project includes the decommissioning of the existing pipelines. All costs thereof shall be to the account of the contractor regardless of degree of complexity of the works called for by reason of conditions of Cabanglasan Water District pipelines whether known or unknown, foreseen or unforeseen.

- The contractor must provide steel plates (¾"x4'x8') to cover open trenches and for concrete curing during restoration activities, the Project Engineer has the right to determine the quantity requirement during construction period, and demand compliance there from. The non-compliance of this provision shall give rise to the order of work stoppage, in which case the period to complete the project under the contract shall continue to run.

- The cost for upgrading pipeline projects will cover the labor and materials, trenching, concrete encasement, backfilling, pipe disinfection, air release and blow- off assemblies, standpipes, pavement demolition and restoration, and all surface that will be excavated during construction.

- All concrete works including concrete pavement restorations must be supplemented with concrete admix/accelerator.

- A visual warning tape, 0.30m from the top of pavement, must be installed to prevent damages to pipe from future excavations. Detectable Underground Warning Tape must also be installed along the pipeline trench that can be located using standard cable and pipe locators.

- All necessary permits, ECC, clearances and other documents necessary for the implementation of the project to include incidental expenses shall be borne by Cabang lasan Water District.

METHODOLOGY:

(a) Minimize impacts to freight mobility with in the vicinity by placing a high priority on maintenance of traffic and public safety.

(b) Implement the Project in a manner sensitive to the communities and landscape, and achieve enhanced environmental performance and comprehensive environmental compliance.

(c) Stimulate the local economy by maximizing local business participation in delivering the Project.

(d) Maximize use of minority or local business enterprises.

(e) Proactively engage communities and Stakeholders in execution of the Project from planning to construction. Develop and implement an effective Quality Program.

(f) Achieve rapid initiation and timely completion of construction.

(g) Provide cost-effective solutions and cost-containment methodologies.

(h) Increase Work Zone safety with engineering improvements and Enhanced awareness through public information.

(i) Minimize life-cycle cost of the product.

(j) Any additional project goals will be identified in the Special Provisions.

Main Responsibilities of the Contractor in Design, Construction, and Quality Management - The contractor shall be responsible for furnishing all labor, material, plant, equipment, services and support facilities for the following:

(a) Construction of all Project components, including utility relocations.

(b) Project Construction management.

(c) Project-related Public Information activities.

(d) Coordination with Project stakeholders, other contractors, and utility owners.

(e) Construction Quality and Workmanship.

(f) Environmental permitting, resource agency consultations, mitigation and compliance monitoring.

(g) Additional environmental investigations, documentation, and monitoring associated with or resulting from Design-Builder's actions.

(h) Maintenance and protection of traffic and access to properties (both temporary and permanent access).

(i) Project safety and security.

(j) Preliminary Engineering (PE), such as surveys and geotechnical investigations, not provided by Agency.

(k) Harmful and hazardous materials remediation (design and construction).

(l) Drainage and erosion control.

(m) Construction waste disposal and handling.

(n) Acquisition of required clearances, licenses, construction easements, and permits for the Design-Builder's Work, Work sites, and storage areas, on or offsite.

(o) Ancillary Work, such as access roads, driveways, temporary fencing, relocation of drainage, Work sites, and temporary works.

(p) Location, acquisition, permits, and transportation for material.

(q) Coordination and relocation of utilities and municipal drainage facilities (when required).

(r) Site clearance and restoration.

(s) Administration of the Project during the Contract period.

(t) Implementation and Administration of LWUA policy for Project design and construction Work, as applicable. The Contractor will be required to plan, implement, and maintain a Quality Plan for the Work. The Quality Plan will detail how the Contractor will establish and operate its quality program management structure, independent from design and construction production, and document its procedures pertaining to all aspects of the work.

Team composition of manpower network:

1.	Project Engineer	1
2.	Electro-mechanical technician	1
3.	Foreman	1
4.	Carpenter	1

List of minimum unit/set owned construction equipment in good condition required for the project:

1.	Back Hoe	1
2.	30 Hp Submersible Pump	1
3.	Air Compressor	1
4.	Compactor Plate	2
5.	1 bagger Concrete Mixer	1
6.	75 KvA Generator set	1

Technical Specifications for Civil Works

DIVISION 01–PIPING

01.01 GENERAL

a. The contractor shall furnish and install all pipes, fittings, closure pieces, supports, bolts, nuts, gasket, joining materials, and appurtenances as shown and specified, and as required for a complete and workable piping system shall be furnished in accordance with the LWD/LWUA Standards.

b. All exposed piping shall be adequately supported with devices of appropriate design where details are shown, the support shall conform there to and shall be placed as indicated; provided that support for all piping shall be complete and adequate regardless of whether or not

supporting devices are specifically shown.

c. All pipes shall be laid in uniform profile as shown in the drawings.

01.02 SMALL STEEL PIPE

Unless otherwise shown, galvanized steel pipe in sizes less than 100mm (4in.) in diameter and smaller shall conform with the requirements of the "specification for black and hot-dipped Zinc-coated (galvanized) Welded and seamless Steel pipe for ordinary Uses" (ASTMA-120) and shall be schedule40. Galvanized steel pipe shall not be cement mortar–lined unless otherwise shown. Fittings for galvanized steel pipe shall be of galvanized malleable iron. Galvanized and black steel pipe shall not be used for buried service except where shown on the drawings.

Galvanized steel pipe for service connections shall be allowed only as specifically shown on the drawings. The pipe shall be wrapped with a 500-micron thick PVC tape shall be of type approved by the engineer and shall be applied in accordance with manufacturer's recommendations.

01.03 UPVC (POLYVINYLCHLORIDE) PIPE

This standard specifies the requirements for unplasticized polyvinyl chloride (uPVC) pipes with nominal outside diameter of 63mm to 500mm intended for the conveyance of potable water under pressure of temperature up to 45ºC for use below ground.

The pipe shall conform with requirements of the Philippine National Standard Specification for Unplasticized Polyvinyl Chloride (uPVC) pipes for Potable Water Supply (PNS 65:1993) except as otherwise specified herein.

a. Definitions

For the purpose of this standard, the following definitions shall apply:

1. Nominal Pressure (PN) – The normal maximum internal pressure that the pipes can sustain continuous use. This is expressed in megapascals (MPa) at28ºC.

2. Design maximum induced stress – The estimated maximum tensile stress on the wall of the pipe along the transverse axis due to internal pressure to which the pipe can be subjected continuously without failure. This is used in calculating the wall thickness of the pipe. For the purpose of this standard, the maximum induced stress is 8.5 MPa at 28ºC.

3. Pipe series (s) – It is used in classifying the pipe, which is ratio of the design maximum induced stress to the nominal pressure of the pipe. The pipe series number maybe rounded off to the nearest whole number.

4. Nominal Dimension – Nominal Dimension and values indicated herein are minimum limits as defined in this standard.

5. Unplasticized polyvinyl chloride (uPVC) pipe. A pipe produced basically from an exclusion grade PVC material of high molecular weight which does not contain any plasticizer.

6. Rework material PVC plastic from a processor's own production that has been reground, palletized or solvated after having been previously processed.

b. Classification

Pipes shall be classified in accordance with the pipe series and/or the nominal pressure as follows:

1. Series 10 (PN 0.86 Mpa)
2. Series 8 (PN 1.03 Mpa)
3. Series 7 (PN 1.25 Mpa)
4. Series 5 (PN 1.60 Mpa)

In designing the maximum nominal pressure of the uPVC pipe under ambient temperatures other than 28ºC, Table1– Maximum Induced Stress for other Temperatures maybe utilized in arriving at the maximum induced stress to be used. The said table may also be used in derating the nominal pressures of the pipe specified in this standard.

Table 1
Maximum Induced Stress for Other Temperatures

Water temperature, t, ºC	Coefficient to be applied to the Maximum Induced Stress
0 < t < 25	1.00
25 < t < 35	0.80
35 < t < 45	0.63

c. Requirements

1. Materials

a. The material from which the pipes are made shall consist substantially of polyvinyl chloride that conforms to PNS 291, to which may be added only those additives necessary to facilitate the manufacture of quality pipes of good surface finish and sound physical, mechanical and chemical properties.

b. None of the additives shall be used separately or together in qualities sufficient to constitute a toxic, organoleptic or microbial growth hazard or to impair the fabrication or welding properties of the product, or to impair the chemical, mechanical, and physical properties (particularly the long- term hydrostatic and impact strength) as defined in this standard.

c. The use of manufacture's own clean rework material produced during the manufacture and production testing of the products conforming to this standard is permissible. No other rework material shall be used.

2. Dimensions

a. Standard Configurations – are the standard configuration of uPVC pipes with elastomeric sealing ring rocket ends (size 63mm to 500mm).
b. Dimension and Tolerances – The outside diameters, socket depths, socket diameter, minimum wall thicknesses, effective lengths of different pipe series/nominal pressures and the tolerances as indicated in Table 2.
c. Length – unless otherwise specified by the purchaser, the length of the pipe shall be taken to mean the effective length. The minimum effective lengths are indicated in Table2. A tolerance of +20 mm is allowable.

3. Physical Characteristics

a. Appearance – the pipe shall be homogenous throughout and free from cracks, holes, encrustations and other foreign inclusions. Excessive die lines and/or stress marks (particularly in the socket and bell groove) as well as discernible material marking are not allowed. The ends of the pipe shall be cleanly cut and square to the axis of the pipe.

b. Color – the color of the pipe shall be blue nearest to RAL 5012 and shall be uniform throughout the entire surface of the pipe.

c. Effect of Materials on Water Quality – When used under the conditions for which they are designed, non-metallic materials in contact with, or likely to come into contact with potable water shall not constitute a toxic hazard, shall not support microbial growth and shall not rise to unpleasant taste or odor, cloudiness or discoloration of the water.

Concentration of substances, chemicals and biological agents leached from materials in contact with potable water, and

measurements of the relevant organoleptic/physical parameters shall not exceed the maximum values recommended by the World Health Organization in its publication “Guidelines for Drinking Water Quality” Vol. 1 “Recommendations (WHO, Geneva, 1984).

If load or mono/di-alkyl tin compounds are permitted to be used as stabilizers, the quantities of the lead or tin measured as metals shall be determined in accordance with the method described in PNS 966/ISO 3114. The Permitted levels shall not exceed the limit specified in Table 3.

Table 3 - Maximum Levels of Toxic Substances

Toxic Substances	Extraction		Total Concentration of 3 Extracts
	1st	3rd	
Lead, mg/L	1.00	0.05	
Di-alkyl Tin, C4 and other higher monologues measured as tin, mg/L		0.02	
Cadmium, mg/L			0.01
Mercury, mg/L			0.001

d. Physical Properties - The pipe shall conform to the Physical properties specified in Table 4.

Table 4 - Physical Properties

Property	Value	Test Method
Vicat Softening Temperature, ºC, minimum	76	PNS 952/ISO 2507
Longitudinal Reversion, % max.	5	PNS 952/ISO 2505
Water Absorption, g/m², max.	40	PNS 953/ISO 2508

e. Resistance to Acetone - The pipe shall not show signs of delamination or disintegration when immersed with acetone. Flattening and/or swelling of the pipe shall not be deemed to constitute failure when tested in accordance with PNS 978/ISO 4372.

f. Resistance to Sulfuric Acid - The mass of the specimen shall not

increase by more than 0.316g when tested in accordance with PNS 979/ISO 3474.The effect of the acid on the surface appearance of the specimen (roughening, bleaching or blackening) shall be ignored.

g. Markings - PVC pipes must be marked Series 8 class150 DMS 65 BPS Logo – DOT Manufactured Sn No. per pipe.

4. Mechanical Properties

The pipes shall confirm with the applied pressure for the hydrostatic pressure test indicated in Table 5 of PNS G5, 1993 when tested in accordance with PNS 509/ISO 1167.

Table 5 Applied Pressure for Pressure Test at 280

Series	Unit: MPa			
	10	8	7	5
Burst Pressure	3.80	4.56	5.49	7.10
Short Term Pressure	3.60	4.30	5.20	6.70
Long Term Pressure	2.50	3.00	3.60	4.65

For specific calculation, the following formula for deriving the applied pressure may be used.

$$p = \frac{2 \times S \times {}^{t}\text{min}}{{}^{D}\text{m} - {}^{t}\text{min}}$$

Where:

P is the applied pressure, MPa
S is the design stress at 28°C, MPa
tmin is the minimum wall thickness, mm
Dm is the maximum mean outside diameter, mm

5. Hydrostatic Pressure Test Requirement

a. Burst Pressure – The pipe shall with stand the applied pressure for at least 60 seconds without failure. The value for the induced stress used in calculating pressure requirement is 35.7 MPa at 28ºC.

b. Short term Pressure – The pipe shall withstand the applied pressure for at least one hour without failure. The value for the induced stress used in calculating pressure requirement is 35.7 MPa at 28ºC.

c. Long Term Pressure – The pipe shall withstand the applied for at least 1000 hours without failure. The value for the induced stress in calculating pressure requirement is 24.6 MPa at 28ºC.

d. Resistance to External Blows – The true impact of the batch at28ºC shall not exceed10% when tested in accordance with PNS 967/ISO 3127.

NOTE: The true impact rate is the total number of broken test pieces divided by the number of blows, expressed as percentage as if the whole batch had been tested. In practice, tests are drawn at random from batch and only estimate of the true impact rates are obtained. Flattening – The pipe shall not allow evidence of splitting, cracking and breaking when flattened to a minimum of 40% of its outside diameter when tested in accordance with 800/ASTM D2241.

6. Joints

MACHINE-INSTALLED INTEGRATED SEAL OF EPDM RUBBER WITH METAL REINFORCEMENT joints shall be used for sizes 63mm up to 500mm. The **EPDM RUBBER** shall conform with PNS 1008/ISO 4633.

7. Sampling and Testing

a. At least one piece or set (depending on the quantities specified by the test method) of sample/s per production shift, whichever is shorter) shall be taken at random for testing in accordance with the methods and procedures specified in this standard.

b. The pipes shall be tested in accordance with the methods prescribed in this standard.

c. The frequency of sampling and testing of pipes is shown in Table 6.

8. Marking

The pipe shall be **ENGRAVED** with the following information spaced at intervals of not more than one meter for effective monitoring and traceability.

a. Name of Product
b. Nominal outside diameter, mm
c. Series and/or Nominal pressure, MPa
d. Manufacturer's name and/or its recognized trademark
e. The words "Made in PHL or Made in the Phil."

f. The words “For Potable Water”

9. The pipe manufacturer shall be certified with ISO 14001:2015 and ISO 9001:2015 issued during the last **3 YEARS** by a certifying body accredited by the Phil Accreditation Board of the DTI.

Table 6 –Sampling and Testing Schedule for Assessment of Compliance

Clause	**Requirements**	**Minimum Frequency**
	General Requirements	
10.7d2(b)	Diameter and Wall Thickness	Hourly
10.7d2(c)	Length	Every 8 hours
10.7d3(a)	Appearance	Every pipe
	Type Test	
10.7d1	Material	Once every 6 months or every change of formulation
10.7d3(c)	Effect of Materials on Water Quality	- do -
10.7d3(d)	Vicat Softening	- do -
10.7d3(d)	Water Absorption	- do -
10.7d3(d)	Resistance to Sulfuric Acid	- do -
10.7d4(a)(3)	Long Term Pressure	- do -
10.7d5	Joints	- do -
	Quality Control Test	
10.7d3(d)	Longitudinal Reversion	Every 8 hours
10.7d3(e)	Resistance to Acetone	- do -
10.7d4(a)(1)	Burst Pressure	- do -
10.7d4(a)(2)	Short Term Pressure	Every 24 hours
10.7d4(b)	Resistance to External Blows	Every 8 hours
10.7d4(c)	Flattening	- do -

ABBREVIATIONS:

ASTM – American Society for Testing and Materials
ISO – International Organization for standardization
PNS – Philippine National Standard

01.04 PE (POLYETHYLENE) PLASTIC PIPE

a. Materials

Polyethylene pipe shall be manufactured from type IV, Class C, Grade P34 extrusion compound as defined by ASTM D1248 with hydrostatic design stress of 630 psi. Alternate polyethylene pipe extrusion compound PE 3408 according to Plastic Pipe Institute (PPI) with hydrostatic design stress of 800 psi may be used. All compound used shall be virgin plastic. Clean rework material from the manufacturers own pipe production maybe used so long as the original was virgin material of the same type, class and grade as required above. The pipe shall meet the requirements of the National Sanitation Foundation for potable water use as tested by the National Institute of Science and Technology or other approved testing laboratories and shall be made from non–toxic, non-lead-based plasticizer approved by the engineer.

b. Dimension

When measured according to the methods as described in ASTM D2122, polyethylene pipe shall conform with either of the following dimension depending on the pipe of extrusion compound as stipulated above.

1. Extrusion Compound Type IV, Class C, Grade P34 (according to ASTM D1248)

Nominal Size		Outside Diameter	Wall Thickness	
(mm)	(in)		Min.	Max.
75	3	90	10.14	11.52
110	4	100	12.39	14.08
150	6	160	18.03	20.49
200	8	225	25.35	28.80

2. Extrusion Compound PE 3408(According to PPI Technical Report 4-8- 78)

Nominal Size		Outside Diameter	Wall Thickness	
(mm)	(in)		Min.	Max.
75	3	90	8.18	9.30
110	4	100	10.00	11.36
150	6	160	14.55	16.53

200	8	225	20.45	23.24

c. Rating

All polyethylene shall be rated for use with water at 23ºC and at a minimum working pressure of 1.1MPa (160psi).

d. Testing

Inspection and Testing of pipe shall be conducted by the manufacturer in accordance with ASTM D1248 and D2239 as follows:

(a) Sustained pressure test based on design fiber stress of 9.2MPa at23ºC.

(b) Minimum burst pressure test based on design fiber stress of17.4MPa at23ºC. Field hydrostatic test for polyethylene pipe shall be in accordance with Division 3 – Pressure and Leakage Testing and Disinfecting.

e. Burst Pressure Requirement

The minimum burst pressure requirement for polyethylene pipe when supplied under these specifications shall be 4.3 MPa (650 psi) when determined in accordance with ASTM D–1599 the time of testing of each specimen shall be between 60 and 70 seconds.

Other requirement with respect to workmanship, mechanical properties and testing shall be in accordance with ASTM D–2239.

f. Marking

All PE pipes shall be clearly marked at intervals of not more than1.0 LM with nominal size, type of material, manufacturer's trade name and production code.

g. Installation

All PE pipes when supplied under these specifications shall be joined, employing either of the following methods.

1. Butt-Fusion

When the pipes supplied under these specifications are installed and joined by this method, the work shall be carried out only by well-qualified personnel who adhere strictly to prescribed working

conditions, using tools and procedure recommended by the manufacturer and approved by the Engineer.

a. Equipment – The equipment needed shall be as described in ASTM D–2657.

b. General Procedure – The following procedure shall be followed when making a butt–fusion joint:

i. Wipe each pipe – end clean, inside and out to remove dirt, water, grease, and other foreign material.

ii. Square the end of each pipe section to be fused using a facing tool. Remove cuttings and burrs from pipe ends.

iii. Check line – up of pipe ends infusion machine to see that pipe ends meet squarely and completely over the entire surface to be fused. Two clamps should be used on each end of pipe to be fused for sizes 100 mm above.

iv. Insert the heater plate between the aligned pipe ends. Bring and hold the pipe ends in contact with heater plate. Maintain contact and allow pipe to heat and soften until a bead of molten plastic rolls back form the ends. This bead will be about 1.5 mm on all sizes up to plastic rolls back form the end of the pipe depending on size. Soften approximately 1.5mm on all sizes up to 75mm to150 mm heat to 3 mm and for the above150mm heat to 5mm. softening can be judged by the appearance of the pipes end as the materials softens. Both surfaces of the heater plate shall be clean and the temperature maintained at 346 ºC – 260 ºC (475 ºF to 500 ºF).

v. Carefully move the pipes ends away from the heater plate and remove the plate. If the softened materials stick to the heater plate, discontinue the joint. Clean heater plate, require pipe ends and start over.

vi. Bring the heated pipe ends together with the specified pressure to form a uniform double bead about 3mm to 5mm wide around the entire circumference of the pipe.

vii. Allow the joint to cool and solidify while maintaining the pressure forth specified time. Inspect the joint for a uniform non–porous appearance. If the joint appears faulty, cut the joint out and repeat the procedure.

01.05 PE (POLYETHYLENED) PLASTIC TUBING

a. Materials

The extrusion compound shall be either grade 33, class C or grade 34 class C or Grade 34 Class C (PE 3306 or PE 3406) as defined by ASTM D–1248 or polyethylene pipe extrusion compound PE 3405 according to the plastic pipe institute (PPI)with a hydrostatic design stress of 5.5MPa (800psi).

All compounds used shall be virgin plastic except that clean rework material form the manufacturers own tubing production may be used so long as the original was virgin material. The pipe shall meet the requirements of the National Sanitation Foundation (NSF) for potable water used as tested by the National Institute of Science and Technology or other approved testing laboratories and shall be made from non –toxic, non–lead based plasticizer approved by the Engineer.

b. Dimensions

Polyethylene tubing shall conform with either of the following dimension depending on the type of extrusion compound used as stipulated above.

1. Extrusion Compound PE 3306 and PE 3406 (SDR9)

Nominal Pipe Size		Outside Diameter	Maximum Wall Thickness	Tolerance
(mm)	(in.)	(mm)	(mm)	(t)
20	½	20	2.3	0.5
25	¾	25	2.8	0.5
32	1	32	3.6	0.6
50	1½	50	5.6	0.8

2. Extrusion Compound PE3408 (SDR11)

Nominal Pipe Size		Outside Diameter	Maximum Wall Thickness	Tolerance
(mm)	(in.)	(mm)	(mm)	(t)
20	½	20	1.9	0.3
25	¾	25	2.3	0.5
32	1	32	2.9	0.6
50	1½	50	4.6	0.7

c. Rating

All service tubing shall be rated for use with water at 23.0ºC (73.4ºF) and a minimum working pressure of 1.1 MPa (160) psi. Other requirements shall be in accordance with ASTM D2737.

d. Marking

All tubings shall be clearly marked at intervals of not more than 0.6m with nominal size, type of materials (PF 3306, PE 3406 or PE 3408), standard Dimension ratio (SDR 9 or SDR 11) manufacturer's trade name and production code, and the seal of approval from an accredited testing laboratory.

e. Testing

Inspection and testing of pipe shall be conducted by the manufacturer in accordance with ASTM D1248 and D2737 as follows.

1. Sustained pressure test based on fiber stress of 9.10MPa for PE 3306 and 3406 and 11.0MPa for 3408 at 23ºC.

2. Minimum burst pressure test based on fiber stress of 17.4MPa at 23ºC.

f. Installation

The installation and method of end connections of PE plastic tubings shall be compression type as shown on the drawings and as specified in section Service lines. All procedure and tools used shall comply with recommendation of the manufacturer and be approved by the Engineer.

01.06 SERVICE LINES

GENERAL

Transfer of service connection from tapping point must conform to the approved LWD standard for individual service connections as well as for those under cluster services. All service connection materials must be inspected by the project engineer prior to installation. The LWD has the right to order stoppage of work by reason of non-compliance thereof, in which case the running of the period to complete the project shall not be tolled.

a. Materials

The service line piping 50mm (2in.) and smaller shall be made of polyethylene or Polybutylene tubing and as specified herein and in the sizes shown on the drawings. Service pipings having diameter larger than 50mm (2in.) shall be constructed of the same materials approved for water mains of smaller sizes.

Small tubing – size service lines shall have plastic or brass fittings using compression type connections with compressive force applied on the outside surface of the tubing. However, stainless steel or brass inserts may be utilized for bigger sizes.

Plastic fitting shall be injection–molded, compression type and suitable for use with polybutylene (PB) or Polyethylene (PE) tubings conforming in dimensions and tolerances to ISO 161/1 and ISO 3607, respectively.

Plastic service connection fittings shall be molded from Acrylomitrile – Butadiene – Syrene (ABS), Polypropylene (PP), Polyvinylchloride (PVC), polyethylene (PE) or other suitable materials. The compounds uses in the manufacture of plastic fittings shall be virgin and shall be made from non–toxic materials and shall be certified as suitable for potable water by the food and drug Administration (FDA) or any accredited testing laboratories.

All plastic shall meet the requirements of the National Testing Laboratories for potable water and shall be designed to hold a working pressure of 1.1MPa and resist a minimum pull-out force of 20kg.

Brass service connection fittings shall be manufactured according to AWWA standardC-800 “Threads for Underground Service Line Fittings” and shall be similar in quality to those manufactured by Mueller Co., Decatur, III., U.S.A. James Jones Co., EL Monte, California, U.S.A., or Ford meter box company, inc., wash bush, Indiana ,USA.

The fittings shall be clearly and nearly finished and free from burrs or other defects likely to damage or score the pipe, and the bore shall be free from irregularities which restrict the free flows of fluid. The internal and external surface of fittings shall be clean and free from grooves, pin holes, or other defects likely to affect the performance and service of the system.

The fittings shall be designed by the sizes of the connecting pipes/tubing.

Where saddles are required, as shown on the drawings, they shall conform with the provision of section service saddle.

Welded outlets on steel pipe shall be insulated from brass fittings with nylon bushings approved by the engineer.

b. Testing and Acceptance

Inspection and testing of plastic fittings shall be done by the manufacturer in accordance with ASTM 2146, D1598 and D1599 for PP, ASTM 2581 and D2666 for PB, ASTM D2239 for PF, and AWWA C 900 for PVC as fitting materials. For materials other than those mentioned, manufacturer shall provide the specific existing ASTM, AWWA, ISO, PSA or other internationally accepted standards used to identify procedures by which test can be conducted and results can be evaluated.

All plastic fittings shall be free of cracks or other injurious defects and shall be smooth and clean before inspection.

For every 100pieces of any sizes of fittings, at least three pieces shall be chosen at random and subjected to a pressure of 1.1MPa at 23ºC. If any sample tested cracks or leaks, the lot represented will be rejected.

01.07 SERVICE SADDLE

a. Materials

Where saddles are required as shown on the drawings, they shall be constructed of one or a combination of the following materials and complying with the requirements as hereunder indicated.

1. Brass

   Leaded red brass, copper alloy with commercial designation 85-5-5-5 in accordance with ASTM B584, UNS no. 83000.

2. Bronze

   Silicon bronze in accordance with ASTM B584, UNS No, 87200.

3. Ductile Iron

   Grade 60-40 in accordance with ASTM A536.

4. Cast Iron

   Grey iron in accordance with ASTM A48, Class 30.

5. Plastic

   Acrylonitrile Butadiene Syrene (ABS), Polypropylene (PP), Polyvinyl Chloride (PVC), Polyethylene (PF) or other internationally accepted standard specifications.

b. Manufacture

Service saddles shall be supplied either with:

1. Clamp or single strap of at least 50mm (2 in.) wide, bolted on each side, or bolted one side and hinged on the other side. Bolts and nuts shall 18- 8stainless steel, brass or bronze as specified above.

2. Double or single strap, as shown on the drawings, each with a width not less than 20 mm (3/4 in).

3. Straps or clamps shall be made of any of the materials listed above or of 18-8 stainless steel.

All parts of the service saddle including the clamp or strap shall comply with the following minimum thickness requirements:

Pipe Nominal Diameter	Thickness
50mm	8mm
100mm	8mm
150mm	10mm
200mm	12mm
250mm	15mm
300mm	15mm

Saddles shall be shaped to the various pipe diameter to which they are to be fitted and shall be provided with an approved resilient neoprene rubber gasket with a minimum bearing width of 12mm (1/2in.).

The tapping thread shall be at least 30mm deep and drilled in accordance with iron pipe (I.P.) thread dimension.

4. Shop drawing for plastic service saddle shall be first submitted for approval prior to manufacture.

01.08 MECHANICAL TYPE COUPLING

Mechanical–type coupling shall be designed for water working pressure not less than the design Pressure of the pipe on which they are they are to be installed, and equipped with Grade H rubber gaskets. Couplings shall be Gustin-Bacon or victaulic style 44 when pipe ends are banded, and Gustin-Bacon or Victaulic style 77 when pipe ends are grooved. Buried or submerged couplings shall be coated in accordance with LWD/LWUA Standards.

01.09 SLEEVE-TYPE COUPLING

Sleeve-type coupling shall be provided where shown and shall be Smith-Blair, style 441 or style 412, equipment styles manufactured by dresser, or approved substitute.

Couplings shall be of steel with steel bolts, without pipe stop, and shall be of sizes to fit the pipe and fitting shown. The middle ring shall not less than 6mm (1/4 in.) in thickness and shall be 125 to175 (5 in. to 7 in.) long for standard steel couplings, and 400 mm (16 in.) long for long-sleeved couplings. Bolts for exposed couplings shall be hot-dip galvanized. Buried bolts and sleeve-type couplings shall be coated in accordance with LWD / LWUA Standards.

01.10 GASKET AND BOLTS

a. Except as otherwise provided, gasket for flanged joints shall be 1.5mm (1/16 in.) thick laminated asbestos fiber.

b. Wherever blind flanges are shown, the gasket shall consist of 3mm (1/8 in.) thick cloth inserted rubber sheet which shall be cemented to the surface of the blind flange.

c. Except as otherwise provided, bolts shall confirm with the requirements.

01.11 PRESSURE GAUGES

Pressure gauges shall have 89mm (3-1/2in.) dials 6mm (14in.) threaded connections and shut-off cocks. Gages shall be calibrated to read 1.0MPa (150psi), unless otherwise shown on the drawings. The pressure element of the gauge shall be protected against excessive pulsation and surges by an external pressure number.

01.12 WARNING TAPE

a. Material

The Contractor shall furnish and install for each pipe above or equal to 50mm on Alum-Foil warning detection tape (minimum width is 5cm) with the words “Attention Water Main” marked in a continuous manner.

b. Installation

The tape shall be laid flat on top of an intermediate layer of backfill, after compaction of same and prior to backfilling and compacting the final to player. The depth of laying the tape will therefore be about 0.30m from the finish surface or at about:

1. 0.45m from top of pipes with sizes equal to or under 250mm diameter except for Asbestos Cement Pipes.

2. 0.60m above the top of pipes with sizes equal to or larger than 300mm diameter and for AC pipes of all sizes.

01.13 PIPELINE TRENCH EXCAVATION

1. General

Unless otherwise shown or ordered, excavation for pipelines shall be open- cut trenches. The bottom of the trench, including any shoring shall

have a minimum width equal to the outside diameter of the pipe plus 300mm (12 in.) and a maximum width equal to the outside diameter of the pipe plus 600mm (24in.). Except when otherwise shown or ordered by the Engineer, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe. The trench bottom shall be given a final trim using a string line for establishing grade, such that each pipe section when first laid will be wholly in contact with the ground or bedding along the extreme bottom of the pipe. Rounding out the trench to form a cradle will not be required. The maximum length of open trench permitted at any one time and in one location shall be 300meters or the length necessary to accommodate the amount of pipe installed in a single day, whichever is greater. All newly laid pipes shall be back filled at least 150mm (6in.) above the top of the pipe at the end of each day. The remainder of the trench shall be back filled not later than the following day. Barricades and warning lights satisfactory to the Engineer shall be provided and maintained for all trenches left open overnight except at intersections and driveways in which case heavy steel plates, adequately braced or other type of crossing capable of supporting vehicular traffic shall be furnished as directed by the Engineer.

2. Trench Over-Excavation Where Shown

The trenches shall be over-excavated where shown, to the depth shown, then backfilled to the grade of the bottom of the pipe with suitable selected granular material or with sand. Sand backfill shall be brought to the optimum moisture content and compacted to ninety-five percent (95%) of maximum density under proposed structures, and ninety (90%) elsewhere. Work specified in this subsection shall be performed by the Contractor at his own expense.

3. Trench Over-Excavation to Clear Obstruction

Trenches shall be over-excavated to a depth approved by the Engineer for pipeline clearance of obstructions. All works specified in this subsection shall perform by the Contractor at his own expense when the over-excavation plus the cover of the pipe measured to existing ground section does not exceed 1.5 meters, when the additional over-excavation plus the cover of the pipe measured to existing ground surface exceeds 1.5meters additional payment will be made to the Contractor for that portion of work located below said depth. Said additional payment will be made under separate unit price bid items for over-excavation if such bid items have been established, otherwise, payment will be made in accordance with negotiated prices.

4. Trench Over-Excavation When Ordered

Trenches shall be over–excavated beyond the depth shown when ordered by the engineer. Such over-excavation shall be to the depth ordered. The

trench shall be refilled to the grade of the bottom of the pipe with either selected granular material obtained from the excavation, sand, or crushed rock, at the option of the engineer. When crushed rock bedding is ordered, well graded material of 40mm maximum size shall be used. Bedding materials shall be placed in layers, brought to optimum moisture content, and compacted to 95% of maximum density where the pipeline trench passes understructures, and 90% elsewhere. Payment will be made under separate unit price bid item for furnishing and installing bedding and backfill if such bid items had been established, otherwise, payment will be made in accordance with negotiated prices.

5. Over-Excavation Not Ordered, Specified or Shown

Any over-excavation carried below the grade ordered, specified, or shown shall be refilled to the required grade with suitable selected granular material by the Contractor at his own expense. Such material shall be moistened as required and compacted to ninety-five percent (95%) of maximum density understructures and ninety percent (90%) elsewhere.

6. Disposal of Excess Excavated Material

The Contractor shall remove and disposed all excess excavated material at his expense and in manner approved by the Engineer.

7. Excavation in Lawn Areas

When pipeline excavation occurs in the lawn area, the sod shall be carefully removed and stockpiled top reserve it for replacement. Excavated material from the trench may be placed on the lawn provided a drop cloth or other suitable method is employed to protect the lawn from damage. The lawn shall not remain covered for more than seventy-two (72) hours. Immediately after completion of backfilling and testing of the pipeline, the sod shall be replaced in a manner so as to restore the lawn as near as possible to its original condition.

8. Excavation in Vicinity Trees

Except where trees are shown in the drawings to be removed, trees shall be protected from injury during the construction operations; and no tree is to be removed without written permission from the Engineer. Not tree roots over 50mm (2in.)in diameter shall be cut without the permission of the Engineer. Trees shall be supported during excavation as may be directed by the Engineer.

9. Rock Excavation

Rock excavation shall include the removal and disposal of any kind of rock which cannot be excavated without blasting or 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.

01.14 BACKFILL

a. General

Backfill shall not be dropped directly upon any structure or pipe. Materials used for backfill shall be selected material, free from grass, roots, brush or other vegetation, or rocks having maximum dimension larger than150mm(6in.). Material placed within 150mm (6in.) of any structure or pipe shall be free of rocks or unbroken masses or earth materials having maximum dimension larger than 75mm (3in.). Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed. Backfill around water- retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.

b. Backfill Around and Beneath Proposed Structures and Paved Areas

Except where otherwise specified for a particular structure or ordered by the Engineer, backfill placed around and beneath proposed structures and paved areas, shall be placed in horizontal layers not to exceed 200 mm (8 in.) in thickness, as measured before compaction, where compaction is attained by means of sheep foot rollers, pneumatic type rollers or any heavy compaction equipment approved by the Engineer. Where the use of heavy compaction equipment is impractical, the layers shall not exceed 150mm (6in.) in thickness before compaction, and compaction shall be attained by means of hand-operated power-driven tampers. The backfill shall be brought up evenly, with each layer moistened and compacted by mechanical means to ninety-five percent (95%) of maximum density beneath proposed structures, and ninety percent (90%) of maximum density around the sides of structures and beneath proposed paved area.

c. Pipeline Trench Backfill

1. Pipeline Trench shall be backfilled to a level of 150mm (6inches) above the top of the pipe with selected material obtained from the excavation, provided that the material is suitable. The suitability shall be on the following parameters.

    i. For Polyvinyl Chloride, polyethylene pipe and coal tar enamel coated steel pipe it shall be free of rock so run broken masses of earth material having maximum dimension larger than 15mm (3/4 inch) for pipe 900mm and smaller, and 75mm (3inches) for pipe larger than

900mm.

ii. For Concrete Pipe, Cast or Ductile Iron Pipe, and cement mortar coated steel pipe, it shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 25mm (1inch) for pipe 900mm and smaller, and 75mm (3inches) for pipe larger than 900mm.

Barrow Material, when ordered by the Engineer, 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 the negotiable price. Selected material shall first be brought to mid-diameter of the pipe and compacted; then the remainder of the backfill to150mm (6 in.) above the pipe may be placed and compacted. Such material shall be compacted to ninety-five percent (95%) of the maximum density when the trench is located under the proposed structure, and ninety percent (90%) of maximum density elsewhere. Compaction shall be obtained by tamping in not more than 150mm (6in.) layers or by using excess water and passing a concrete vibrator between the pipe and the side of the trench, in case of sand formation as determined and allowed by the Engineer.

2. After the initial portion of the backfill has been placed as specified above, the remainder of the trench shall be backfilled. When compaction of the initial portion of backfill is obtained with excess water, not less than four hours shall have elapsed between the placement of the initial backfill and subsequent backfill. The remainder of backfill shall be selected material obtained from excavation and shall be placed in horizontal layers. Each layer shall be no more than150mm (6in.) in depth. Layer shall be moistened, tamped, paddled, rolled, or otherwise compacted to:

   a. Ninety-five percent (95%) of maximum density where the trench is located under proposed structures.
   b. Ninety percent (90%) of maximum density where trench is located under existing or proposed asphalt or concrete surfaces.
   c. Eighty percent (80%) of maximum density where the trench is located under unpaved shoulders, gravel roadways or dirt roads;
   d. One hundred percent (100%) of natural density of the surrounding areas where the trench is located in unimproved right-of-way.

   If the backfill material is sandy or granular in nature and the trench is not located under a structure, the layer construction may be eliminated; and compaction may be obtained by flooding and jetting, provided this latter method is approved by the agency having jurisdiction over the highway or street. If flooding and jetting are permitted, the remaining backfill shall be placed in layers not

exceeding 900mm (36in.) thickness. Each layer shall be flooded, jetted and rodded to secure complete saturation of the material before placing the next layer.

DIVISION 02 - VALVES

02.01 GENERAL

a. The contractor shall furnish and install all valves as specified herein and as shown on the drawings. All valves shall be new of current manufacture.

b. Flanged valves may be plain faced with serrated gasket surface or raised. Flanges of valves for water working pressure of 1.2MPa (175psi) or less shall be faced and drilled to 125-lb American standard dimension; flanges of valves for water working pressure greater than 1.2 MPa (175psi) shall be faced and drilled to 250-lb American Standard dimensions.

c. Each valve body shall be tested under a test pressure equal to twice its design water working pressure.

d. All valves shall be provided with an exterior protective coating in accordance with the provision of division 5- Paintings and Coatings.

e. When the operating nut of a buried valve is located more than 1.5 meters (5ft) below the ground surface, the contractor shall provide and install in the valve box a stem extension. The bottom of the extension shall be securely fastened to the operating nut of the valve, and the top of the extension shall be centered in the valve box.

f. The contractor shall furnish a minimum of six (6) tee – handle valve keys of variable lengths sufficient to permit operation of all buried valves regardless of depth, by operators of average height working in normal position. Where the number of valves to be provided exceeds thirty (30) units, the contractor shall provide one (1) valve key for every five (5) additional valves or a fraction thereof.

g. Operating nut shall turn counter-clockwise to open.

h. Shop drawings for all valves shall be furnished in accordance with section 7.02- shop drawings.

02.02 GATE VALVES

a. Valves

This section applies to gate valves 50mm (2in.) through 300mm (12in.) in sizes. All valves shall confirm with the “Standard for Resilient seated Gate Valves” (AWWA C509). Gate valves where the pipeline design pressure is 1.0MPa (150psi) or less shall be designed for a minimum water working pressure of 1.0

MPa (150psi) and shall be cast iron bodied, the resilient seats applied to the body or gate. Discs shall be cast iron with bronze disc rings, and the seat shall be bronze and replaceable. The valve shall be non-rising stem with a minimum of two “0” ring seal as (at least one above the stem collar), or rising stem when shown on the drawings. The valves shall havea50 mm (2in.) square operating nut with a cast arrow showing direction in which the nut is to be turned to open the valve. Valves shall be constructed to permit there placement of the “O” rings above the stem collar under full working water pressure with the valves in the full open position. The valves shall be coated in accordance with Division 5 – Painting and Coatings.

b. Testing Requirements

1. Operation Test – Each valve shall be operated in the position for which it was designed to ensure free and perfect functioning of all parts in the intended manner. Any defects of workmanship shall be corrected and the test repeated until satisfactory performance is demonstrated.

2. Shell Test – A hydrostatic test pressure equal to twice the rated working pressure of the valve shall be applied to the body with the gate in the open position. The test shall show no leakage through the metal, flanged joints, or stem seals.

3. Seal Test – A test shall be made at rated working pressure to prove the sealing ability of each valve from both directions of flow. The test shall allow no leakage through the metal, pressure-containing joints, or past the seat.

4. Hydrostatic Test – One prototype valve of each size and class of a manufacturer’s design shall be hydrostatically tested with twice the specified rated pressure applied to one side of the gate and zero pressure on the other side. The test is to be made in each direction across the gate. Under this hydrostatic test, the manufacturer may make special provisions to prevent leakage past the seats. No part of the valve or gate shall be permanently deformed by the test.

5. Torque test – A prototype of each size should be over torque in the closed and open positions to demonstrate no distortion of the valve stem or damage to the resilient seat as evidenced by failure to seal at rated pressure. The applied torque shall be 250 ft-lb for 3 and 4 NRS valves, and 350 ft-lb for 6,8,10, and 12 NRS valves (1.0 ft-lb=0.736 Newton-meter=0.66 kg-m).

6. Leakage Test – Two prototype valves of each size chosen by the LWUA quality control inspector to represent the extremes of seat compression shall be fully opened and closed to a seal or 500 complete cycles with sufficient flow that the valve is at 200 psi pressure differential at the point of opening and closing. The valves shall be drop tight under rated pressure differential applied alternately to each side of the gate after completion of the tests.

7. Pressure Test – One prototype of each valve size shall be tested to 500 psi with the closure member in the position. There shall be no rupture or cracking of the valve body, valve bonnet, or seal plate. Leakage at pressure-containing joints shall not be a cause for failure of the test.

02.03 AIR VACUUM VALVES

Air vacuum valves of sizes up to and including75mm (3in.) in diameter shall have threaded connections except where otherwise shown on the drawings. The bodies shall be of high strength cast iron, and the float shall of stainless steel. All internal parts such as float guides, bushings, and baffle retaining screws, etc., shall be either stainless steel or bronze. Seat washer sand gaskets shall be of a material insuring water tightness with a minimum of maintenance. Valves shall be designed for a water working pressure of not less than 1.0 MPa (150psi). All valves be designed to automatically operate so that they will: (a) positively open under atmospheric pressure (as water drains from the body of the valve, it will allow air to flow in to the pipe while it is being emptied); (b) positively close as water, under low head, fills the body of the valve; and (c) not blow shut under high velocity discharge.

02.04 AIR RELEASE VALVES

Air release valves up to and including 75mm (3in.) in diameter shall have threaded connections, except where otherwise shown on the drawings, and shallow be designed for a water working pressure of 1.0MPa (150psi). The body shall be of high strength cast iron and the float shall be of stainless steel. All internal parts, except the seat, shall be of stainless steel or bronze. The seat shall be of material insuring water tightness with a minimum maintenance. The valve shall be designed to automatically permit the escape of accumulated air under pressure while the pipe is in operation. The valves shall be either director lever operating.

02.05 PRESSSURE REDUCING VALVES

The pressure reducing valve shall be of the diaphragm type equipment with a pilot spring to provide a range of downstream pressure settings. The pressure reducing valve shall be designed for a minimum water working pressure of 1.0 MPa (150 psi) and shall be factory tested under a hydrostatic pressure of at least 2.0 MPa (300 psi). The valve body and cover shall be cast iron meeting the requirements of ASTM A48. The valve shall have flanged ends, and the valve disc shall be non-metallic and renewable. The main valve shall be of bronze as specified in ASTM specification B62, and the valve seat shall be replaceable. The pilot control system shall be of brass with type 18-8 stainless steel trim. the diaphragm shall be of heavily reinforced synthetic rubber and shall be fully supported by the valve body. the valve shall be coated as required in Clause 14 - Painting and Coating.

02.06 MISCELLANEOUS VALVES

Valves 50mm (2in.) and smaller, unless otherwise shown, shall be all bronze or brass with threaded connections designed for a water working pressure not less than 1.0 MPa (150psi). Material specifications for brass valves shall have a commercial designation of 85-5-5-5 in accordance with ASTM B584, UNS No. 83000. Valves for service connections shall be ball valve type with locking.

02.07 PLUG VALVES

Plug valves shall be lubricated 50mm (2in.) semi-steel straight way valves with a working pressure of 175lb. the valves shall wrench-operated, two-bolt cover type with screwed ends. A complete locking device assembly shall be provided for each valve were indicated on the drawings.

DIVISION 03 – PRESSURE AND LEAKAGE TESTING AND DISINFECTING

03.01 GENERAL

The Contractor shall furnish all equipment, labor and materials, including taps, valves, and bulkheads as required and exclusive of water and water meter for testing and proper disinfection of the pipelines and steel reservoir. The water and any water meter used for testing shall be furnished by the Owner, but the Contractor shall provide the facilities necessary to convey the water from the Owner – designated source to the points of use. All testing and chlorinating operations shall be done in the presence of the Engineer.

03.02 PIPELINE TESTING

All pipelines shall be thoroughly flushed out with water prior to testing. The Contractor shall test the pipeline in sections prior to permanent resurfacing after the trench is backfilled, but with joints exposed for examination except in heavily traveled roadways. Maximum length of test sections shall be 500meters for distribution mains and 1,000 meters for transmission mains unless otherwise approved by the Engineer. Where test sections are approved which exceed the above maximum lengths, the allowable leakage for the lengths in excess of the maximum allowable shall be reduced by fifty percent (50%). The pipeline shall not be filled with water until the following periods have elapsed.

Description	Minimum Allowable Time
1. Cement Mortar Linings	14 days
2. Cement Mortar at Joints	8 hours
3. Concrete Thrust Block	

a.	Standard Cement	7 days
b.	High Early Strength Cement	36 hours

The pipeline shall be prepared for testing by closing valves when available, or by placing temporary bulkheads in the pipe and filling the line slowly with water. During the filling of the pipe and before the application of the specified test pressure, all air shall be expelled from the pipeline. To accomplish this, taps shall be made, if necessary, at points of highest elevation and after completion of the test; and taps shall be tightly plugged unless otherwise specified. After the line or section thereof has been completely filled, it shall be allowed to stand under as light pressure for a minimum of forty eight (48) hours to allow the escape of air from any air pockets and allow the pipe or mortar lining to absorb as much water as possible.

During this period, all exposed pipes, fittings, valves, joints, and coupling shall be examined for leaks. If found to be cracked or defective, they shall be removed and replaced by the contractor with sound material at his own expense. The pipeline shall then be refilled and all bulkheads, joints and connections shall be examined for leaks. If any are found, these shall be stopped. The test shall consist of holding the test pressure on each sections of the line for a period of two (2) hours. The test pressure at the lowest point shall be 690KPa or 1.0 MPa according to the class of pipe installed, class 100 or class 150, and as approved by the Engineer. Pressure gauges shall also be provided at all ends of the section tested. The water necessary to maintain the pressure shall be measured through ammeter or by other means satisfactory to the Engineer. The Leakage shall be considered the amount of water entering the pipe line during the two-hour test period. The allowable leakage for cast iron pipe or ductile pipe shall not exceed the values listed in Table3 of the AWWA Standard for Installation of Cast Iron Water Main (AWWAC600). All other types of pipes shall have an allowable leakage not exceeding 1.85 L/mm of diameter of pipe per kilometer (mile) per day. Should any test of a section of pipeline disclose joint leakage greater than that permitted, the Contractor shall, at his own expense, locate and repair or replace the defective pipe, fittings, joint, coupling or other appurtenance. The test shall be repeated until the leakage is within the permitted allowance.

Closure pieces between newly installed and existing mains shall be tested after the pipe has passed the pressure and leakage test specified above. The test shall include subjecting the joint to a pressure of 345Kpa (50psi) for a period of five (5) minutes and visually checking for leakage. All visible shall be repaired by the Contractor at no expense to the owner.

03.03 PIPELINE DISINFECTING

Before being placed in service, and before certification of completion by the Engineer, all new domestic water mains or extension to existing systems, or valve section of such extension or any replacement in the existing water system shall be disinfected with chlorine in accordance with AWWA Standard C601

"Standard for Disinfecting Water Mains". Disinfection shall be completed not more than three (3) days prior to placing the pipeline into service unless otherwise approved by the Engineer and care shall be taken to prevent recontamination of the pipeline. A bacteriological test shall be taken, at the expense of the Owner, prior to acceptance of the pipeline disinfected.

The amount and concentration of chlorine solution applied shall be such as to provide a dosage of not more than fifty milligrams per liter (50 mg/L) and shall be introduced into the lines as directed by the Engineer. After a contact period of twenty-four hours, the chlorine residual of samples taken at service connections or sampling points along the entire length of the pipelines shall not be less than twenty-five milligrams per liter (25mg/L) as determined by the Engineer. The system shall then be flushed with clear water until the residual chlorine is not greater than 0.75 mg/L but not less than 0.20 mg/L. All valves and appurtenances in the pipeline being disinfected shall be operated several times during the chlorine contact periods.

The preferred points of application of the chlorinating agent are at the beginning of the pipe line extension or any valve section and through a corporation shop inserted on the top of the laid pipes.
Should the initial treatment fail to result in the conditions stipulated above, the chlorination procedures shall be repeated until satisfactory results are obtained.

Where connections are to be made to existing water mains, HTH shall be added at points of inter connections as directed by the Engineer.

DIVISION 04 – SURFACE RESTORATION AND PAVING

04.01 GENERAL

The Contractor shall furnish all materials, labor, plant, and equipment for the removal of all pavement, sidewalks, curbs and gutters, fences, poles, driveways, walks other property, and surface structures that are necessary for the proper prosecution of the work, but only upon approval of the parties having jurisdiction thereof and of the Engineer. Unless otherwise shown, the Contractor shall restore at his own expense all property removed or destroyed by his operation at least equal to conditions prior to work under this Contractor to the satisfaction of the property owner.

04.02 REMOVAL OF EXISTING PAVEMENT

a. In cutting or breaking up street surfacing required for the performance of the work, the Contractor shall not use equipment which will damage the adjacent pavement. All concrete pavement surfaces to be removed shall be scored with concrete sawing equipment, provided, that any Portland cement concrete based under an asphaltic mix surface will not

be required to be scored by sawing. Asphaltic-concrete pavement shall be removed to clean straight lines.

The Contractor shall remove the pavement and road surfaces as part of the trench excavation, and the amount removed shall not exceed the maximum width of trench for pipelines as indicated on the drawings, unless otherwise ordered in writing by the Engineer.

The width and length of the pavement area required to be removed for the installation of valves, valve chambers, spirals, or other structures shall not exceed the maximum linear dimensions of such structures by more than o.30 meters on each side.

The width of the pavement area required to be removed or the installation of service connections shall not exceed the maximum width as shown on the drawings.

b. Concrete sidewalks, cubs, and gutters required to be removed in connection with performing the work under the Contract shall be cut to the nearest score marks and shall be replaced with the same kind or better material by the Contractor in conformance with the latest specifications, rules, and regulations, and subject to the inspection and approval of the agency having jurisdiction.

04.03 RESTORATION OF DAMAGED SURFACE AND PROPERTY

Except where shown on the drawings or otherwise specified, any pavement, trees, shrubbery, fences, poles or other property and surface structures which have been damaged, removed, or disturbed by the Contractor, whether deliberately or Specification involving “measurement” and “payment” are not applicable to the work performed under this Contract.

a. Borrow

When sufficient suitable material is not available from the roadway excavations, additional “barrow” materials shall be obtained from other sources. This “borrow” material shall be in accordance with Item 102 of the DPWH referenced Standard Specification of 2013.

b. Sub-grade Preparation

This item shall consist of the preparation and conditioning of the sub-grade to the full width of the roadbed in accordance with Item 105 of the DPWH referenced Standard Specifications of 2013 and in conformity with the lines, grades, and cross sections as shown on the plans.

c. Aggregate Base Course

This item shall consist of a foundation for the surface course, composed of gravel or Crushed stone and filler materials in accordance with Item 201 of the DPWH reference Standard Specifications of 2013.

d. Bituminous Concrete Surface Course

This item shall consist of pavement composed of bituminous concrete on a prepared base in accordance with Item 310 of the DPWH reference Standard Specifications of 2013.

e. Portland Cement Concrete Pavement

This item shall consist of a pavement composed of Portland Cement concrete on a prepared base in accordance with Item 311of the DPWH reference Standard Specifications of 2013.

DIVISION 05–PAINTING AND COATINGS

05.01 GENERAL

The work included in this Section consists of the furnishing off all labor, materials, apparatus, scaffolding, and all appurtenant work in connection with painting and coating in accordance with these Specifications. Any subcontractor for painting and coating shall be approved by the Engineer.

05.02 SCOPE

The following surfaces are to be painted, except where otherwise specified or shown:

a. above ground piping and other metal surfaces
b. all submerged metal surfaces
c. all exposed concrete excluding concrete reservoirs
d. all structural and miscellaneous steel
e. all equipment furnished without factory finished surfaces
f. all exposed steel mullions, tubular frames, door frames, steel sash, and metal windows
g. all sheet metal and ferrous metal trim
h. all buildings, interior and exterior
i. all exposed concrete block masonry
j. all plain and corrugated G.I. sheets
k. steel tank shell exterior and interior surfaces

The following surfaces are not to be painted:

a. Ferrous metals having approved plating or factory applied final paint finishes;

b. Non-ferrous metals, unless otherwise noted or indicated; galvanized metal shall not be considered anon-ferrous metal; and
c. Equipment with factory finished surface unless otherwise noted.

In no case shall any concrete, wood, metal, or any other surface requiring protection be left unpainted even though not specifically defined herein.

05.03 RIGHTOF REJECTION

No exterior painting or interior finishing shall be done under conditions which may jeopardize the appearance or quality of the painting or finishing in any way. The Engineer shall have the right to reject all material or work that is unsatisfactory and require the replacement of their or both at the expense of the Contractor.

05.04 PROTECTION OF THE WORK

The Contractor shall take the necessary steps to protect the work of others during the time his work is in progress. The Contractor shall be responsible for any and all damage to the work. Paint shall be applied only during period of favorable weather.

05.05 WORKMANSHIP

All work shall be first class and in accordance with best standard practices of the trade.

The Contractor shall examine carefully all surfaces to be painted and, before beginning any of his work, shall see that the work of other trades has been left or installed in workmanlike condition to receive paint.

Metal surfaces shall be clean, dry, and free from mill scale, rust, grease, oil, or any other substances which could affect the quality of the painting.

Each coat of paint shall be applied at proper consistency and brushed evenly, free of brush marks, sags, runs, and with no evidence of poor workmanship. Care shall be exercised to avoid lapping of paint on glass or hardware. Paint shall be sharply cut to lines and finished paint surfaces shall be free from defects or blemishes.

Protective covering shall be used to protect floors, fixtures, and equipment. Care shall be exercised to prevent paint from being spattered on to surfaces which are not to be painted. Surfaces from which such paint cannot be removed satisfactorily shall be painted or repainted, to produce a finish satisfactory to the Engineer.

No painting shall be done under conditions of weather, moisture, or temperature unsuited to good work, not until previous coat is hard and dry.

All painting materials shall be used in strict accordance with manufactures directions, spread or flowed on smoothly with proper film thickness and without runs, sags, or other defects.

05.06 STORAGE OF MATERIALS

The Contractor shall store all painting materials and equipment not in immediate use in a room approved by the Engineer for that purpose. The receiving and opening of all paint materials and mixing shall be done in this room.

Necessary precautions shall be taken to prevent fire. Rags, waste, etc., soiled with paint shall be removed from the premises at the end of each day's work, or stored in metal containers with metal covers.

Technical Specifications for Electro-Mechanical Works

DIVISION 30 - MECHANICAL WORKS

30.01 GENERAL

a. The Contractor shall furnish, deliver, install and test at site all mechanical equipment as shown on the Drawings and/or specified herein. He shall provide the necessary supervision, tools, materials, supplies and appurtenances for the proper installation, testing and operation of the completely assembled equipment. The contractor shall accomplish the work in a complete and finished manner in keeping with good supervisory practice in accordance with the drawings, manufacturer's recommendations and to the satisfaction of the Engineer.

b. All equipment furnished and installed shall be brand new and non-obsolete model (at most three years ex-stock), unused and guaranteed from defects in material, design and/or workmanship. No equipment nor material shall be delivered for installation on site prior to:

1. The return of acceptable shop drawings submitted by the Contractor in accordance with Division 7. Shop drawings of imported items which are ex-stock, shall be accompanied with importation papers to prove conformity with the three-year ex-stock requirement;

2. The equipment successfully passing the laboratory test to be conducted at the manufacturer's plant in the presence of authorized LWUA or Water District representatives. For imported equipment, certified copies of the performance test shall be furnished to the Engineer in accordance with Clause 7.02 prior to shipment. In no case shall the Contractor be allowed to deliver and install any equipment until satisfactory laboratory tests have been conducted.

3. Submission of a certificate of availability of parts and service locally for five (5) years, for all equipment supplied herewith to ensure operational viability of the installation within the said period.

   All cost incidental to the above pre-delivery requirement shall be borne entirely by the Contractor.

c. Upon completion of the contract work, the Contractor shall arrange that a field testing be conducted on the installed equipment;

d. In the presence of authorized LWUA or Water District Engineers, the test shall be made to show that the installed equipment satisfies its specifications and operational requirements.

e. In the event of failure of the equipment to meet the guaranteed performance or to operate to the Engineer's satisfaction, the Contractor shall make such modifications, repairs and/or replacements and shall receive no additional compensation thereof. Failure of the equipment to meet the contract requirements in three (3) official field tests shall be a ground for rejection of the unit. Expenses to be incurred, including the travel expenses of LWUA or Water District Engineers, during the second, third and any subsequent official field test of the same equipment shall be charged to the Contractor/Supplier. The contract work will not be accepted, and final payment will not be recommended until satisfactory test has been made. The test run shall be made within thirty (30) days upon receipt of the Contractor's request for such testing. Provided, however, that if the Engineer/s fail to appear and witness the test within the said period the field test shall not further delay the acceptance of the work.

f. Above field test shall be made only after the Contractor has furnished the Engineer, a copy of satisfactory results of his initial or preliminary tests on the equipment as part of his work and without cost to the Owner. Only after all the equipment has been properly installed, tested and adjusted shall the new facilities be put into operation.

g. During the testing of the equipment, the Contractor shall arrange to have available, as necessary, representatives of the manufacturers of all the various pieces of equipment or other qualified persons who shall instruct the plant personnel in the operation and care thereof. These representatives shall have spent at least 72 working hours for the instruction and training of authorized Owner representatives. A certificate of completion of this requirement shall be issued by the Owner and shall form part of the Certificate of Project Completion of the contract works.

h. The equipment and installation shall be guaranteed for a period of at least one (1) year of trouble-free operation. A warranty certificate shall be issued by the Contractor to this effect. Effectivity date of the warranty shall start on the same day the units have been accepted. A duplicate copy of the same shall be furnished to the Engineer. The Contractor shall furnish and replace, without cost to the Owner, any equipment or part that is defective or shows undue wear within the one (1) year warranty period.

i. Before acceptance of the work, the Contractor shall furnish, for each piece of equipment supplied and/or installed, four (4) complete bound sets of manuals/catalogues giving the following information (in the English language):

    1. Clear and concise instructions for the proper operation, adjustments, lubrication and other maintenance procedures required by each particular equipment.

    2. List of spare parts, as provided by the Contractor on the date of completion of work and to be stored by the Water District.

    3. List of all spare parts for each equipment, with catalog numbers and other data necessary for ordering replacement parts in the future.

j. All equipment furnished under these Specifications shall comply with all applicable mandatory safety codes.

k. Where materials of construction are not specified, the Contractor shall use first class commercial grades best suited for the particular use for which they are employed.

l. The Contractor shall employ licensed Mechanical and/or Electrical Engineer/s to supervise the mechanical and/or electrical works as required by Commonwealth Act No. 294, known as the Mechanical Engineering Law and Republic Act No. 184, known as the Electrical Engineering Law.

30.02 SCOPE/LIMIT OF CONTRACT WORK

The Contractor/Supplier shall be solely responsible for the supply and proper installation of all electro-mechanical equipment including all necessary requirements to fulfill the works specified herein. The contract works shall consist of but not necessarily be limited to the following work.

1. Supply, deliver, and install new **units of submersible pumps and chlorinators** at Pontoc and Capiñahan Pumping Stations complete with all accessories and appurtenances in accordance with the specifications and as shown on the Drawings.

2. Supply, delivery and installation of one (1) unit ***diesel generator set*** at Iba Pumping Station complete with all accessories in accordance with the Specifications and as shown on the Drawings.

3. Supply, delivery and installation of distribution transformers and its protective devices, metering equipment and necessary materials and equipment to extend the single (1Ø) phase primary line from Electric Cooperative nearest available up to proposed sites of various pumping stations.

30.03 EQUIPMENT PARTS AND AFTER SALES SERVICE

The Contractor shall guarantee the availability of replacement parts and after sales service for a period of five (5) years, within the Luzon, Visayas or Mindanao areas for each piece of equipment supplied herewith. For contractors whose supplier/s has no service and parts outlet in that particular area, a Certificate of commitment from a reputable local based company to provide such parts and services shall be submitted and shall form part of the requirement prior of the provisional acceptance of the works.

30.04 PUMPING EQUIPMENT

A. GENERAL

1. The Contractor shall furnish, deliver, install, test and commission in accordance with these Specifications and drawings, two (2) submersible pump and motor set, complete with Full Voltage/Direct On Line (DOL) motor controller in Brgy. Iba Pumping Station, and all other appurtenances as required in the proper installation and as specified herein and shown on the drawings.

2. The services of a factory representative to check the pumping equipment during and after the installation shall be furnished at no cost to the Owner. However, if the Contractor fails to provide the services of this representative, the Owner has the right to pay the

expenses incurred in the rendering of these services chargeable to the project cost.

3. The Contractor shall be responsible for all components, and for satisfactory installation and operation of the completely assembled unit, including the motor, motor control, electric motor, discharge head, combination of right angle-gear drive and pump.

4. Except as otherwise provided in these Specifications, the pump and motor assembly and accessories shall conform to AWWA Standard E 101-77.

5. The minimum pump efficiencies specified herein are the minimum laboratory efficiencies for a completely staged unit. The head capacity curve of the pump shall rise continuously to the left and the design point shall be located to the right of the point of maximum efficiency. There shall be no point within the operating range on the pump curves wherein the required horsepower exceeds the rated motor horsepower. The laboratory and field tests to be conducted on the pump assemblies shall be in accordance with AWWA Standards.

6. Anchor bolts for the pumps shall be furnished by the Supplier/manufacturer and set by the Contractor.

7. Determination of plumbness/correct alignment of the centrifugal pump and electric motor shall be part of pump installation.

B. SUBMERSIBLE PUMP

1. General

The Contractor shall furnish and install submersible pump as shown on the drawings and as specified herein. The pump shall be of the low head high capacity type that should satisfy the operational requirements described herewith. Pumps shall be as stated in Section VII-Bill of Quantities and in Breakdown of Prices or approved equal.

2. **Design/Operating Requirements** – The pumps shall meet the following operating requirements:

Operating Requirements	Brgy. Iba Pumping Station
Number of Units	1
Minimum capacity at design head, lps (gpm)	10(158.73)
Design head, TDH, m (ft.)	97 (318.24)
Minimum pump laboratory efficiency at design head), percent (%)	75
Nominal size of column, mm (in.)	75 (3)

Estimated location of pump suction strainer, m (ft.)	92(301.83)
Design speed, rpm	3500
Maximum diameter of motor/pump bowl including cable guard, mm (in.)	75 (3)
Recommended Nom. Motor Rating, HP (KW)	20 (11.1855)
Length of Submersible Cable, m (ft.)	100 (328)
Generator Set, KVA (KW), Volts, Phase	50 KvA, 3 Phase
Distribution Transformer, KVA	3-15 KvA

There shall be no point within the operating range of the pump wherein the required horsepower exceeds the rated motor horsepower. In addition to the above requirements, the design point shall be located within the best efficiency range of the pump. Efficiency range shall be within the -5% of the pump's peak efficiency (0.05 x PPE).

3. PUMP CONSTRUCTION

a. **Pump Element** – The impellers shall be of the enclosed type, constructed of bronze or stainless steel, accurately fitted, smoothly finished, and dynamically balanced at normal pump speeds. They shall have removable wearing rings and lateral seal rings mounted on their companion cases. The bowl cases shall be constructed of closed-grained cast iron and stainless steel. Cast iron bowls shall be provided with non-toxic epoxy or glass enamel lining. Pump bearings shall be at least 2-1/2 times the diameter of the shaft. The pump shaft shall be of type 416 stainless steel.

b. **Column/Common Pipe** – The column pipe for the submersible pump shall be seamless black iron not lighter than schedule 40, furnished in 6.0 or 3.0 meters (10 or 20 ft.) nominal lengths, and shall be connected with threaded couplings. The pump suction shall include a stainless-steel strainer to restrict entry of solid materials that may damage the pump elements. The pump inlet area shall be equal to at least five (5) times the impeller inlet area. A non-leak check valve shall be provided and installed at the top portion of the bowl assembly to protect the motor from backflow when the pump stop operation.

c. Each pump shall be provided with a **nameplate,** one each on the equipment itself and one each to their respective above ground discharge elbow. Each plate shall show the serial number of the equipment, name of the manufacturer, capacity in liters per second,

TDH in meters and rated speed in revolutions per minute. Such other information as the manufacturer may consider necessary for complete identification shall be shown on the plates.

4**.** **MOTOR -** The motor shall be of squirrel cage, submersible induction type, nominally rated and, shall be operable at 230V AC, single phase, 60 hertz AC, running at 3500 rpm. They shall be designed for continuous duty operation and shall have a minimum service factor of 1.15. The motors shall be water filled and shall incorporate a mechanical seal to restrict foreign matter from entering the motor. The thrust bearings shall be of ample capacity to carry the weight of all rotating parts plus the hydraulic thrust and shall be an integral part of the driver. Each unit shall be equipped with expansion diaphragm to compensate for filling water expansion/contraction due to temperature changes. The units shall be fitted with a permanent non-corrosive nameplate on which all NEMA standard motor data shall be stamped or engraved in English/Metric. A duplicate of the plate shall be attached to the discharge elbow to afford ready identification of the installed submersible motor. Each pump shall have a nameplate showing the serial number of the equipment and the name of the manufacturer. The nameplate shall show the capacities in cu.m./hr, total head in meters and the rated speed in revolution per minute. Such other information as the manufacturer may consider necessary may be shown on the plate. The nameplate of the distributing agent will not be acceptable. The nameplate shall be securely attached to the equipment to the location affording easy viewing when delivered and installed. Installation of winding temperature sensors may be offered separately.

The motor shall withstand operation of the pump against closed discharge valve for a minimum of six (6) minutes without damage from overheating.

The thrust bearings shall be designed for sustained operation against closed discharge valves (disregarding motor requirements) and shall be shock and water-hammer proof.

The lifetime of the thrust bearings shall be guaranteed for five (5) years' continuous operation under actual site conditions considering various heads, throttled flow, power failures, etc.

30.05 DIESEL GENERATOR SET

a. General

STANDARDS

ISO 3046 pts. 1, 3, 4, 5, 6, 7 – Reciprocating Internal Combustion Engines

ISO 7967 - Reciprocating Internal Combustion Engines – Vocabulary of components and systems.

ISO 8178 - Reciprocating Internal Combustion Engines – Exhaust Emissions.

ISO 8628 - Reciprocating Internal Combustion Engine Driven A.C. Generating Sets

IEC 60085 - Thermal Evaluation and Classification of Electrical Insulations

IEC 60947 - Low Voltage Switchgear and Control gear.

1. The Contractor shall furnish and install four (4) Diesel Generator Sets EGS 190 BS-3 BONNET weather/sound proof or equivalent. The diesel generator set shall be factory mounted on a torsionally stiff structural steel subbase complete with all necessary engine and generator accessories, ready for operation, manual pushbutton start type, for emergency power supply rated for standby operation (Bonnet type, NEMA-4) under the conditions specified herein.

2. Submittals and Quality Assurance Manufacturer's test certificates shall be furnished, together with four (4) copies of operation and maintenance manual, including list of recommended spare parts. Supplier's local agent shall be able to supply supervision during installation.

3. The diesel generator set shall bear manufacturer's nameplate which shall show:

   Name of Manufacturer
   Engine Model Number
   Engine Rotation
   Standard kW/kVA Rating @ 1800 RPM
   Engine Serial Number
   Power Factor
   Frequency
   Year Manufactured

   The nameplates shall be securely mounted on each engine where it can be plainly viewed.

4. Acceptance Test/Commissioning. On completion of the installation, start-up test and commissioning shall be performed by a factory-trained dealer/representative of the manufacturer that owner requirements and factory specifications are satisfactorily met. Further the said representative shall devote at least two working days for the proper training and orientation of operators assigned by the Owner. A statement of satisfactory test and completion of the training of operators shall be issued by the Owner to this effect.

b. Diesel Engine

1. General - The engine shall conform to the standards and shall be of the (Radiator) water-cooled, heavy-duty, 4-cycle, industrial type and shall develop the full continuous power required by the alternator using diesel fuel when operating at a speed not exceeding 1800 RPM. The engine shall satisfy the following operating characteristics:

    a. Design speed ---------- 1800 RPM
    b. Maximum specific fuel consumption (lbs/Bhp-hr) ---------- 0.45

    The engine shall be a manufacturer's current production model with aluminum pistons or light alloy connection removable type cylinder sleeved, heavy-duty replaceable precision type bearings. The crankcase shall be a single piece, stress relieved casting. The crankshaft shall be dropped forged, precision ground and surface hardened, statistically balanced and other features common to heavy-duty engines. The engine shall be as manufactured by Caterpillar or Perkins, Komatsu or approved substitute.

2. Starter - The engine shall be equipped with a VDC solenoid engaged electric motor starter. All necessary components for the safe, efficient and reliable starting shall be included.

3. Cooling System - The cooling system shall consist of a belt driven water circulating pump and an engine mounted radiator. All necessary mounting brackets, hoses, and connections shall be furnished and installed for a complete system.

4. Lubricating System - The lubricating system shall have forced lubrication, a vane or gear type oil pump, a full flow oil filter system with an oil cooler, an oil pressure gauge and oil level indicator.

5. Exhaust System – The engine shall be equipped with a residential silencer, sized in accordance with the engine manufacturer’s recommendation. Maximum back pressure measured at the exhaust header shall not be more than 350 mm (14 in) of water column. The silencer shall be installed with a flexible metal expansion section of stainless steel as shown on the Drawings and shall be designed together with all pipes, bends, bolts, nuts and clamps, for temperatures not less than 1000^{o} F.

    The entire exhaust assembly excluding expansion joint shall be insulated with 2-50 mm layers of magnesium or Rock Wool insulation or equivalent heat resistant with aluminum lagging or clodding.

6. Air Suction Filters – Manufacturer’s Standard.

7. Fuel System - The fuel system shall include an injection pump, engine fuel transfer pump, flexible fuel connections, fuel filters and shut-off valves. The fuel system shall also include the following:

    a. Fuel Oil Tank - The tank shall have a net capacity of at least 24 hours operation t maximum load and shall come complete with all accessories as shown in the drawings. Suitable connections to fill the tank from either drums or from a bulk Supply tanker. Inside surface of the tank shall be pickled or sandblasted to remove all mill scale, thoroughly cleaned of all dust and foreign matter and lightly coated with oil. All tank openings shall be sealed prior to shipping.

    b. Fuel Level Gauge - The Contractor shall furnish and install float, valve a level gauge on each fuel day tank for visual indication of the amount of fuel remaining in the tank. The gauge shall be of either clear glass or plastic materials resistant to normal diesel fuel corrosion. The level gauge shall be provided with valves on both ends for isolation during routine maintenance and replacements. The gauge shall be of appropriate length with graduations calibrated in both liters and percentage of the total fuel tank capacity.

8. Instrument Panel - The engine shall be equipped with an instrument panel mounted separately with that of the engine frame and must be as mentioned together with the D.G. Control Box. The panel shall be installed on a suitable instrument box in a location affording easy viewing and access. The instrument panel shall include but not be limited to the following instrument:

    Ammeters/Voltmeters/Frequency Meters/WattMeter/WattHr-meters

    Lube Oil Pressure Gauge

    Water Temperature Gauge

    Tachometer

    Hour Meter

9. Battery and Charger - There shall be installed a battery complete with cables for supplying appropriate DC power to the engine controls for starting the engine. The battery shall have the necessary ampere-hour rating for cranking the engine for 10 minutes. The battery charger shall be 220 volt VAC input. It shall have an amperage output sufficient to recharge the battery in 4 hours when the battery is 50% discharged. The charger shall incorporate adjustable float and equalizing voltage potentiometers. A current limit signal shall be supplied in the control

circuit from the current sensing resistor. It shall be of the full wave rectifier type and shall include all the required standard components.

10. Miscellaneous Equipment - In addition to the item listed in the previous sub-clauses, the engine shall be equipped but not limited to with the following:

    a. Dry-type or oil intake air cleaner or manufacturers standard.
    b. Flywheel, flywheel housing and stub shaft.
    c. One (1) tool kit, which shall include the following and any special tools required for maintenance, and servicing of the engine.

        1. 2 pcs. Pipe wrench with 2” opening
        2. 1 pc. 12” hacksaw
        3. 1 pc. screwdriver 3/8”x8” square blade
           1 pc. screwdriver 1/4”x6” round blade
        4. 1 pc. side cutting plier, 18”
        5. 1 pc. long nose with cutter, 7”
        6. 1 pc. diagonal cutting plier, 6”
        7. 1 pc. ballpeen hammer, 16 oz head wt.
        8. 1 pc. adjustable wrench, 15”
        9. 1 pc. adjustable wrench, 10”
        10. 1 set TORQUE wrench (suitable for Cyl. Heads & Bearings)
        11. Greaser
        12. 14 pc. set combination open end box wrench
        13. 1 pc. vice grip, 10” straight nose
        14. 21 pc. set socket wrench including ratchet flex handle, extension bar and universal joint
        15. 11 piece set Allen wrench
        16. Double cut files, 12” (1 pc. each)
            a. Round file
            b. Triangular file
            c. Flat file
            d. Half round

        Items 11, 12, and 13 should suit dimensional requirements of the engine to be supplied:

            e. Four (4) sets of oil lube filters and fuel filters.
            f. One (1) set complete water pump repair kit.
            g. Necessary “O” rings, seals, gaskets for replacing equipment
               under (d) and (e) above.

11. Direct Coupling – Manufacturers standards or ISO standards for Reciprocating Internal Combustion Engines components and system.

12. Automatic Speed Governor- 0.25% tolerance electronic governor, capable of isochronous frequency regulation from no load to full load.

c. Alternator

1. The alternator shall be rated (rating as indicated in the above) (minimum) for standby operation at its designed capacity, 3-phase, 60 Hz, 1800 RPM, 230 volts or 460 volts as required, 50^{o}C rise over 30^{o}C ambient temperature at 75 masl and shall be directly coupled to the engine. The alternator shall be single bearing, synchronous type with brushless exciter and shall be built according to applicable NEMA Standards. Class H insulation shall be further protected with 100% epoxy impregnation and an overcoat of resilient insulating material to reduce possible fungus and/or abrasion deterioration.

2. The exciter shall be self-regulating capable of maintaining rated voltage at 200% of rated current and sustaining under short circuit conditions at 400% of rated current. An alternator-mounted volts per hertz type automatic voltage regulator shall be provided to match the characteristic of the alternator and engine. Voltage regulator shall be $\pm$2% from no-load to full rated load. Readily accessible voltage drop, voltage level and voltage gain controls shall be provided. Voltage level adjustment shall be a minimum of $\pm$5%. The solid-state regulator module shall be shock mounted and epoxy encapsulated for protection against vibration and atmospheric deterioration.

3. Alternator shall be capable of sustaining an overload capacity of 300% full load current at zero power factor for a period of 10 seconds without damage to it. Output voltage recovery, after sudden application or rejection of rated load shall be within 0.3 seconds.

4. Alternator shall be open, drip-proof construction with an over-all efficiency of at least 85% at full load, IP21or IP22 Standard Waveform deviation less than 5%.

5. Alternator windings and electrical components shall be tropicalized.

d. Generator Control Panel

1. A separately mounted engine-alternator control panel shall be supplied with the diesel- generator set. The control panel shall be free-standing, dead front construction, 14-gauge NEMA 4 (IP65) enclosure. Cabling and control wiring shall be either top or bottom or MCCB Box shall be located in front of Generator together with the control unit box.

2. Instruments. Panel shall contain, but not limited to the following equipment:

   a. Alternator circuit-breaker, thermal-magnetic type, molded case, rating as required.
   b. 1 voltmeter with phase selector switch and potential transformers.
   c. 1 ammeter with phase selector switch and current transformers.

d. 1 frequency meter/watthour meter/wattmeter
e. 1 hour operating counter.
f. Voltage level adjustment rheostat.
g. Engine instrumentations which shall consist of:
    - Ammeter D.C.7
    - Lube Oil Pressure Gauge
    - Water Temperature Gauge
    - Tachometer
    - Hour Operations Counter

h. Panel illumination lights and switch.
i. Indicating relays and fault indicator lamps for phase failure on alternator supply, low oil pressure, high engine temperature, overspeed, alternator overload and short circuit.
j. Power Factor meter.
k. Kilowatt meter/ KWHr meter
l. Frequency Meter

3. Operating switches and pushbuttons shall include:
    a. Manual start/stop pushbuttons
    b. Alternator on-off
    c. Control lamps test
    d. Speed regulator switch
    e. Selector switches
    f. Test switches
    g. Battery charge switch

4. Operational Controls. During operation, the standby generating set shall be monitored for the following disturbances:
    a. Loss of lube-oil pressure
    b. Excess engine temperature
    c. Alternator overload
    d. Alternator short circuit
    e. Overspeed

    Should any of the faults listed above arises, then the individual signal relay installed for the special task shall respond. To avoid lasting damage if operation were to continue, the generating set shall be automatically shut off and a subsequent new starting effort shall be blocked, and the corresponding fault indicator lamp shall be on.

5. At protracted overloading of the alternator, the thermal overcurrent release with time delay shall cause the alternator main circuit breaker to trip. The set shall continue in operation unloaded to obtain cooling of the alternator.

6. In case of feeder short circuit during an emergency supply operation, the alternator shall immediately be disconnected from the fault

location by means of the electromagnetic trip relay of the main circuit breaker.

7. A power mains supply voltage monitor shall be kept constantly in circuit and in case of phase failure, i.e., more than 10% drop in voltage, symmetrical or asymmetrical of this power supply shall be indicated by means of a signal relay and a horn signal.

8. Battery charger with protective circuit shall be mounted on the top portion of the panel.

9. All control panel electrical components shall be tropicalized.

30.06 MANUAL TRANSFER SWITCH

A wall-mounted manual transfer switch, sinlge-phase, 60 Hz, 230 or 460 as required Voltage ratings, three (3) poles with solid neutral in a NEMA 4 (IP65) enclosure shall be supplied and installed as shown on the plans. It shall have single, free-wheeling handle mounted in front of two mechanically interlocked (rating as required) industrial type circuit breakers. Components of the operating mechanism shall be insulated or electrically dead. Linkages and handles shall be ruggedly constructed and shall not be subject to deterioration. It shall be similar to Westinghouse type MTSS or approved equal.

DIVISION 40 – ELECTRICAL WORKS

40.01 GENERAL

a. The Electrical Work shall consist of the furnishing, all labor, materials, tools and necessary services incidental to the proper and operation of the electrical system as specified herein and as shown on the Drawings.

   The Drawings and Specifications are intended to provide only a broad outline of the required equipment and system of operation and may not include all details of design and construction. Any item of work or material though not expressly shown on the Drawings or specified herein but is obviously required to obtain a usable installation shall be deemed included in the required works.

b. All system components shall be compatible with each other and suitable for 24-hour continuous operation.

c. As used in these Specifications, the word “Owner” refers to the Water District named in the Contractor or Purchase Order (PO). The work “Engineer” refers to the individual or firm authorized by the Local Water Utilities Administration (LWUA), - acting as the Owner’s representative

to oversee the execution of the Contract/PO. The word “Contractor” refers to the party who entered into Contract with the Owner or who received a PO issued by the Owner of LWUA.

40.02 CODES AND REGULATIONS

a. The work under this Contract shall be done in accordance with the requirements of the latest edition of the Philippine Electrical Code (PEC Parts I and II), the regulations and requirements of power and telecommunications utilities as far as their permanent services are concerned, and the government ordinances enforced in the locality. In case of conflict with these specifications or the drawings, the preceding clause shall govern.

b. The Contractor shall be responsible for securing all necessary permits from the pertinent government authorities, at his expense, both for the construction and for the operation of the system upon completion of the work. The Contractor shall furnish the Owner with the approved Certificate of Final Electrical Inspection.

40.03 MATERIAL STANDARD

a. All materials, components, and equipment to be supplied and/or installed shall be of recent manufacture, brand new (at most, three (3) years ex-stock), unused and suitable for intended operation. They shall conform with U.S. Underwriter’s Laboratory (U/L) Standard for Safety, ASA, NEMA, IEC, IPCEA and ASTM in every case where such standards have been established, or with any other International Standards acceptable to the Engineer.
b. All materials and components shall be as specified unless specifically exempted, in which case, they shall be the best of their respective kind.
c. Samples of materials to be supplied shall be submitted for approval when required by the Engineer.
d. All electrical equipment and materials shall bear the manufacturer’s inspection label, unless exception to this requirement is inherent to a particular item.

40.04 SHOP DRAWINGS AND CATALOG DATA

a. The Contractor shall submit to the Engineer for approval seven (7) copies of the shop drawings of equipment and control components he intends to supply, as indicated in the drawings and specifications.
b. Shop drawings shall provide sufficient information to evaluate the suitability and compliance of the proposed equipment and control components with the plans and specifications.
c. Catalog data shall also be submitted to supplement the shop drawings. Catalog cuts, bulletins, brochures or the like, or photocopies of applicable pages thereof shall be submitted where drawings for certain items are not required to be submitted.

d. Should an error in the shop drawings be encountered during installation, the correction, including any field changes found necessary, shall be incorporated on the drawings and the revised drawing shall be submitted to the Engineer for review and approval.

40.05 PRE-DELIVERY EQUIPMENT APPROVAL

The electrical equipment to be supplied shall be completed, assembled, wired and tested at the factory and shall be inspected and tested by the Engineer for approval prior to delivery to the project site.

40.06 COORDINATION

The Contractor shall coordinate and work with all other parties with whose apparatus he shall connect part/s of the work required herein. The Contractor shall prepare drawings of details of the equipment he supplied, location of sleeves, conduits and support that may be required by other trades and shall furnish the Owner with at least five (5) copies of these drawings, for the information of all parties concerned. The approval of such drawings shall not relieve the Contractor in any way from the responsibility of properly locating and/or coordinating his work with those of other parties involved.

40.07 WORKMANSHIP

a. The work throughout shall be executed in the best and most thorough manner in accordance with the best practice of the trade involved and to the satisfaction of the Engineer.

b. Skilled workmen using proper tools and equipment under continuous competent supervision as required by the trade shall accomplish the works.

c. The Contractor shall maintain on file at job site a set of as-built drawings incorporating all actual installation and deviations from the Drawings. The as-built drawings shall be submitted to the Owner prior to provisional acceptance of the electrical works.

40.08 FIELD TEST REQUIREMENT

The Supplier shall furnish labor and equipment to perform the following test:

a. System Test – Each panel-board shall be tested with the power equipment connected, circuit breakers closed, and all loads and fixtures permanently connected for their intended operation for a minimum of 24 hours continuous operation in the presence of the Engineer, at the expense of the Contractor. The entire installation shall be free from any ground fault and from any short circuit. In no case shall the insulation resistance be less than that allowed by PEC regulations for Electrical

Equipment of Buildings and/or manufacturer's recommendations. Failures shall be corrected in a manner satisfactory to the Engineer.

b. Performance Test and Equipment Setting – It shall be the responsibility of the Contractor to test the entire electrical system for the proper equipment operation. Setting of all protective relays, pilot devices, and auxiliary systems shall conform to operating requirements. The Contractor shall turnover the entire electrical installation to the Owner in a satisfactory working condition.

40.09 GUARANTEES

a. The Contractor guarantees that the supplied electrical equipment and components shall be free from any defect in workmanship or materials for a period of one (1) year from the date of Provisional Acceptance or 14 months from completion of installation, whichever comes first.

b. The Contractor shall indemnify and render harmless the Owner and/or the Engineer from and against all liabilities due to injuries or disabilities to persons; from damages to property; or from any and all legal and other expenses which may be incurred by the Owner and/or the Engineer in defense of any claim, legal action or suit arising out of the Contractor's performance of the Contract.

40.10 INTERMEDIATE METAL CONDUIT (ALTERNATE RIGID STEEL) CONDUIT)

a. General: NEMA Standard trade sizes, UL approved or equivalent to Matsushita, Maruichi, Korea or approved equal.
b. Material: Mild steel, hot dipped galvanized with inside enamel or epoxy coating.
c. Size. 15 mm (1/2") minimum
d. Couplings, unions and fittings: standard, threaded
e. Use limitation: As specified in the latest edition of PEC and/or NEC
f. Expansion fittings. Use for runs spanning expansion joints.
g. Paint field cuts and repair damaged protective coating with red or zinc lead chromate. Conduit threads shall not be painted.

40.11 POLYVINYLCHLORIDE (PVC) CONDUIT

a. General: Standard trade sizes, heavy wall, manufactured to NEMA TC-2 Type 40, rated for 90 ^{0}C cable as manufactured by Neltex, Moldex and Atlanta.
b. Material: Polyvinylchloride, extruded.
c. Nominal Size: 20 mm (3/4") minimum.
d. Couplings and Fittings: Standard joint by solvent weld process.
e. Use Limitation

    1. As specified in the latest edition of PEC and/or NEC.
    2. Not permitted where subject to mechanical damage.

3. As indicated on the drawings.

f. Pulling Hardwares: Flat fish tape with ball and flexible leader or polyethylene or Manila rope. Use of steel pulling cable not permitted.

40.12 FLEXIBLE GALVANIZED STEEL CONDUIT

a. General: Standard trade sizes, UL approved or equivalent,
b. Material: Steel, galvanized
c. Size: 15 mm (1/2”) minimum
d. Fittings: Standard
e. Use Limitation:

1. Between motor terminal boxes, or vibration producing devices and rigid conduit.
2. Short lengths of concealed wiring to lighting fixtures (max. length – 1800 mm).
3. Other applications: only where approved or where shown on plans.

40.13 FLEXIBLE LIQUID TIGHT CONDUIT

a. General: Standard trade sizes. UL approved or equivalent.
b. Material: Galvanized steel with outer liquid-tight plastic jacket.
c. Diameter: 15 mm (1/2”)
d. Fittings: Liquid-tight
e. Use Limitation:

1. Short lengths to vibration producing devices situated in wet or potentially wet locations.
2. Between motor terminal boxes or vibration producing devices and rigid conduit.
3. Other applications: Only where approved or where shown on plans.

40.14 CONDUIT INSTALLATION

a. General: Install in accordance with applicable codes and recognized standards of good practice.
b. Location: Approximately as shown on drawings; actual routing subject to approval.
c. Wall and floor sleeves:

1. General: Provide for passage of conduits through walls, floors, or partitions. Set sleeves in masonry during construction; set sleeves through concrete before pouring begins.

2. Material: Galvanized pipe, securely fastened in position.

3. Sleeves through exterior building walls: Install conduit in center of sleeve, fill annular space with loosely packed oakum. Seal interior and exterior of packing with hot applied asphalt. Fit the conduit on

each side of the wall with round galvanized steel flange fastened to conduit by two set screws to retain sealing compound.

4. Sleeves through waterproof constructions: Flanged type

5. Opening required after footings, walls, floors, or ceilings are constructed shall be provided and patched at Contractor's expense in an approved manner.

d. Embedded Conduit:

1. General: Install the conduit before concrete pouring and take the shortest possible line route.
2. Underground installation: Encase conduits with concrete, 75 mm (3") from outer face of conduits.
3. Conduit joints shall be half-wrapped with 3M Scotch Wrap #50 PVC Tape or approved equivalent.

e. Joints: Make with approved couplings and unions to provide electrically continuous and moisture-tight system.

f. Expansion joints: Use expansion fittings and bonding jumpers wherever conduit spans building expansion joints (coordinate during bid walk-through).

g. Drainage: Avoid pockets in conduit runs as much as possible; provide suitable fittings at low spots in exposed conduits where pocket cannot be avoided. Weep holes are not permitted.

h. Bends: Not more than the equivalent of three 90^{o} bends between pulling joints.

i. Wiring of fire related motors shall be embedded or encased in concrete.

j. Field cuts and threads:

1. Cut ends of conduit square with hand or power saw and ream to remove burrs and sharp edges. Do not use wheel cutter.
2. Threads cut on job shall have same effective lengths, thread dimensions, and taper as factory cut threads.
3. Carefully remove burrs from threads. Conduit threads shall not be painted.
4. Apply coat of protective paint through conduits where protective coating is damaged.

k. Supports:
    1. Manufacturer: Unistrut or approved equal.
    2. Hangers, supports, or fasteners: Provide at each elbow and at the end of every straight run terminating in a box or cabinet. Rigid fastenings shall be spaced in accordance with the PEC.

3. Clamps: Galvanized malleable iron one-hole straps, beam clamps, or other approved device with necessary bolts and expansion shields.
4. Adjustable hangers:
    a. Use to support horizontal runs only.
    b. Trapeze hangers: For parallel runs of conduits. Install pipe clamps every third intermediate hanger for each conduit. Paint the hangers in one prime coat of red lead or zinc chromate and one finish coat of approved color. Hangers are not detailed but must be adequate to support the combined weights of conduit, conductors, and hangers.
5. Submit shop drawings for approval.

l. Concealing: Conceal conduits in all areas except mechanical equipment rooms and areas as specified. Run exposed conduits parallel with, or at right angle to, lines of buildings.

m. Conduit ends:
    1. Cap conduit.
    2. Open conduit ends terminating in panels for enclosures where exposed to entrance of foreign material: Plug space around cables with commercial duct sealing compound.
    3. Cap conduit ends during construction to prevent entrance of foreign material.

n. Cleaning: Clean inside by mechanical means to remove all foreign materials and moisture before wires or cables are installed.

o. Conduit connections at panels and boxes: Double locknuts and bushings.

40.15 JUNCTION AND OUTLET BOXES:

a. General: Provide junction boxes for pulling and splicing wires, and outlet boxes for installation of wiring devices as required, or as shown on drawings. As a rule, provide junction boxes in all runs that are greater than 30 meters (100 ft.) in lengths. For other lengths, provide boxes as required for splicing or pulling. Boxes shall be in accessible locations.

b. Construction. Welded sheet steel, galvanized finish. Provide removable covers attached with round head machine screws, minimum of 1.6 mm MSG (Ga. 16).

c. Finish: Galvanized.

40.16 WIRES AND CABLES

a. All wires shall be of stranded copper, annealed, soft drawn, of 98% conductivity, insulated for 600 V working voltage, with type “THW” or “THWN” insulation unless otherwise noted on the Drawings. Insulation

shall bear manufacturer's name and trademark, type, voltage rating and size of the conductor.

b. Cable for submersible pump operation shall be oil and water-resistant. Cable shall have a minimum of two insulation jackets. The inner jacket shall be of rubber or elasticized rubber material while the outer jacket shall be of neoprene, PE or PB material. The outer jacket shall bear the manufacturer's name and trademark, insulation type and application, voltage and ampere rating and size of the conductor. Cable shall be uncut and unspliced from the motor pigtail to the junction box or terminal for the motor starter. It shall be fixed with straps of acceptable materials for such application.

   Cable termination to motor pigtail shall be by means of heavy duty splicing kit or its equivalent.

   Splicing paste shall have a minimum expiration period of one (1) year. Columbia, Duraflex, Philflex, Durex or Phelps Dodge; or approved equal.

c. For lighting and power systems, no wire smaller than 3.5 mm^2 shall be used. Building wire size 8.0 mm^2 and larger shall be stranded.
d. Conductors shall not be pulled into the raceway until:

   1. Raceway system has been inspected and approved by the Engineer;
   2. Masonry work has been completed in the case of concealed installation; and
   3. Raceway has been freed from moisture and debris

e. Conductors shall be hand-pulled, using lubricant where necessary.
f. Wires for the control system shall have a minimum size of 0.75 mm^2 (AWG #18) and thermoplastic-insulated, unless specified otherwise.

40.17 PANELBOARDS – CIRCUIT BREAKER

a. General: Furnish and install circuit-breaker panelboards as indicated in the panelboard schedule and where shown in the drawings.

b. Wall Switches: where more than one flush wall switch is indicated in the same location, the switches shall be mounted in gangs under common plate.

40.18 MOTOR CONTROL CENTER (MCC)

This section includes requirements for a motor control center and all required control devices as shown on the drawing and specified to be part of the MCC equipment. The MCC shall be 240V or 460 VAC or as required voltage rating, 1-Phase, 3-Wire, 60Hz.

40.18.1 Regulatory Requirements

The MCC must conform to Underwriters Laboratory (UL) 845, current revision, CSA, EEMAC, NEMA ICS-3, Part 1, and the latest version of the National Electrical Code and Philippine Electrical Code. The MCC must be manufactured in an ISO 9001 certified facility.

40.18.2 Packing and Shipping

The MCC shall be separated into shipping blocks no more than three vertical sections each. Shipping blocks shall be shipped on their sides to permit handling at the job site. Each shipping block shall include a removable lifting angle, which will allow an easy means of attaching an overhead crane or other suitable lifting equipment.

40.18.3 Storage

If the MCC cannot be placed into service reasonably soon after its receipt, store it in a clean, dry, and ventilated building free from temperature extremes. Acceptable storage temperatures are from 0°C (32°F) to 40°C (104°F).

40.18.4 Warranty

The MCC shall be warranted to be free from defects for a period of one (1) year from the date of shipment by the manufacturer

40.18.5 Materials

Steel materials shall comply with UL 845 and CSA requirements. Each MCC shall consist of one or more vertical sections of heavy gauge steel bolted together to form a rigid, freestanding assembly. A removable gauge 7 structural steel lifting angle shall be mounted full width of the MCC line up at the top. Removable 10-gauge bottom channel sills shall be mounted underneath front and rear of the vertical sections extending the full width of the lineup. Vertical sections shall be made of welded side-frame assembly formed from a minimum of gauge 12 steel. Internal reinforcement structural parts shall be of gauge 12 to 14 steel to provide a strong, rigid assembly. The entire assembly shall be constructed and packed to withstand normal stresses incurred during transit and installation.

40.18.6 Structures

a) Structures shall be totally enclosed, dead-front, freestanding assemblies. Structures shall be capable of being bolted together to form a single assembly.
b) The overall height of the MCC shall not exceed 2286 mm (90 in.) (not including base channel or lifting angle). Base channels, of 38 mm (1.5 in.) in height, and a 76 mm (3 in.) high lifting angle shall be removable. The total width of one section shall be 508 mm (20 in.);[widths of 630

mm (25 in.), 760 mm (30 in.), 890 mm (35 in.), 1016 mm (40 in.) and 1260 mm (50 in.) can be used for larger devices].

c) Structures shall be NEMA/EEMAC 1 (general purpose), 1A (gasketed general purpose), 12 (industrial duty), or 3R non-walk-in (rainproof).
d) Each 508 mm (20 in.) wide standard section shall have all the necessary hardware and bussing for modular plug-on units to be added and moved around. All unused space shall be covered by hinged blank doors and equipped to accept future units. Vertical bus openings shall be covered by manual bus shutters.
e) Each section shall include a top plate (single piece or two-piece). NEMA/EEMAC 12 shall also include a bottom plate. Top and bottom plates shall be removable for ease in cutting conduit entry openings

40.18.7 Standard Paint

All metal structural and unit parts shall be completely painted using an Electrodeposition process so that interior surfaces have a complete finish coat on and between them. The basic process shall consist of using an iron phosphate pretreatment for the improvement of paint adhesion and non-chrome sealer rinse to enhance corrosion resistance. The paint process shall consist of cleaning, rinsing, phosphating, non-chrome sealer rinsing, prepaint rinsing, painting, post paint rinse, a bake cure, and a cool down. Paint shall be UL recognized acrylic Electrodeposition baked enamel ANSI 49 gray. All painted parts shall be able to pass at least 300 hours of salt spray per ASTM B 17 with less than 1/8-inch loss of paint from a scribed line.

40.18.8 Wireways

Structures shall contain a minimum 305 mm (12 in.) high horizontal wireway at the top of each section and a minimum 152 mm (6 in.) high horizontal wireway at the bottom of each section. This wireway shall run the full length of MCC to allow room for power and control cable to connect between units in different sections.

A full-depth vertical wireway shall be provided in each MCC section that accepts modular plug-on units. The vertical wireway shall connect with both the top and bottom horizontal wireway and shall be isolated from unit interiors by a full height barrier. The vertical wireway shall be 102 mm (4in.) wide minimum with a separate hinged door. There should be a minimum of 65,548 cm^3 (4,000 in^3) of cabling space available. Access to the wireways shall not require opening control unit doors. Structures that house a single full section unit, are not required to have vertical wireways. Those control units must open directly into the MCC horizontal wireways.

40.18.9 Barriers

All power bussing and splice connections shall be isolated from the unit compartments and the wireways. The horizontal bus shall be mounted unto a glass filled polyester support assembly that braces the bus against the

forces generated during a short circuit. The horizontal bus shall be isolated from the top horizontal wireway by a two-piece grounded steel barrier. The barrier shall be removable to allow access to the bus and connections for maintenance.

The vertical bus shall be housed in a molded glass-filled polyester support that provides bus insulation and braces the bus against the forces generated during a short circuit. These supports shall have openings every 76.2 mm (3 in.) for unit stab-on connections. Each opening shall be provided with a manual shutter to close off the stab opening. These shutters shall be attached to the structure so that when they are removed (to allow a stab connection) they are retained in the structure and are readily accessible for use should a plug-on unit be removed from the MCC.

Barriers shall be provided in the vertical structure and unit designs to prevent the contact on any energized bus or terminal by a fish tape inserted through the conduit or wireway areas.

40.18.10 Bussing

a) All bussing and connectors shall be tin-plated copper, silver-plated copper, or tin-plated aluminum.

b) The main horizontal bus shall be rated at 600 A, 800 A, 1200 A, 1600 A, or 2000 A continuous and shall extend the full length of the MCC. Bus ratings shall be based on 65ºC maximum temperature rise in a maximum 40ºC ambient. Provisions shall be provided for splicing additional sections unto either end of the MCC.

c) The horizontal bus splice bars shall be pre-assembled onto the horizontal bus to allow the installation of additional sections. The main bus splice shall use four bolts, two on each side of the splice bars, for each phase. Additional bolts must not be required when splicing higher amperage bus. The splice bolts shall secure to captive nuts installed at the back of the splice assembly. It shall be possible to maintain any bus connection with a single tool.

d) Each section that accepts plug-on units shall be provided a vertical bus for distributing power from the main bus to the individual plug-on units. This bus shall be of the same material and plating as the main bus and shall be rated at 300 A or 600 A continuous. The vertical bus shall be connected directly to the horizontal bus stack without the use of risers or other intervening connectors. It shall be possible to maintain the vertical to horizontal bus connection with a single tool. “Nut and bolt” bus connection to the power bus shall not be permitted. When a back-to-back unit arrangement is utilized, separate vertical bus shall be provided for both the front and rear units.

e) A thin plated copper ground bus shall be provided that runs the entire length of the MCC. The ground bus shall be 6.0 mm (0.25 in.) x 25 mm (1.0 in.). A mechanical lug shall be provided in the MCC for a 4/0-250 kcmil ground cable. The ground bus shall be provided with (6) 10 mm (0.38 in.) holes for each vertical section to accept customer-supplied ground lugs for any loads requiring ground conductor.

f) Each vertical section shall have a bare steel or tin-plated copper vertical ground bus that is connected to the horizontal ground bus. The vertical ground bus shall be installed so that the plug-on units engage the ground bus before engagement of the power stabs and shall disengage only after the power stabs are disconnected upon removal of the plug-on unit.

g) The power bus system shall be braced for a short circuit capacity of 42,000 rms amperes minimum as standard. Bus bracing rated at 65,000 and 85,000 rms amperes shall be available.

40.18.11 Typical Unit Construction

a. Units with circuit breaker disconnects through 250 A frame, and fusible switch disconnects through 200 A, shall connect to the vertical bus through a spring reinforced stab-on connector. Units with larger disconnects shall be connected directly to the main horizontal bus with appropriately sized cable or riser bus. Stabs on all plug-on units shall be solidly bussed to the disconnect unit. Cabled stab assemblies are not permitted.

b. All conducting parts on the line side of the disconnect unit shall be shrouded by a suitable insulating material to reduce the possibility of accidental contact with those parts.

c. Unit mounting shelves shall include hanger brackets to support the unit weight during installation and removal. All plug-on units shall use a twin-handle camming lever located at the top of the bucket to rack in and out the plug-on unit. The cam lever shall work in conjunction with the hanger brackets to ensure positive stab alignment.

d. A cast metal handle operator must be provided on each disconnect. With the unit stabs engaged into the vertical phase bus and the unit door closed, the handle mechanism shall allow complete ON/OFF control of the disconnect unit with clear indication of the disconnects status. All circuit breaker operators shall include a separate TRIPPED position to clearly indicate a circuit breaker trip condition. It shall be possible to reset a tripped circuit breaker without opening the control unit door.

e. A mechanical interlock shall prevent the operator from opening the unit door when the disconnect is in the ON position. Another mechanical interlock shall prevent the operator from placing the disconnect in the ON position while the unit door is open. It shall be possible for authorized personnel to defeat these interlocks.

f. A non-defeatable interlock shall be provided between the handle operator and the cam lever to prevent installing or removing a plug-on unit unless the disconnect is in the OFF position.

g. The plug-on unit shall have a grounded stab-on connector, which engages the vertical ground bus before, and releases after, the power bus stab-on connectors.

h. Provisions shall be provided for locking all disconnects in the OFF position with up to three padlocks.

i. Handle mechanisms shall be located on the left side to encourage operators to stand to the left of the unit being switched.

j. Unit construction shall combine with the vertical wireway isolation barrier to provide a fully compartmentalized design.

40.18.12 Circuit Breakers

Circuit breakers shall be molded case type; manually-operated; shall have trip-free operating mechanism of the quick-make, quick-break type; and except as noted, shall be of automatic trip type with combination thermal and instantaneous magnetic trip units. Circuit breakers in combination with motor starters shall be only of the industrial type with instantaneous magnetic trip provided with standard operating handle mounted on the panel.

The thermal-magnetic time delayed overcurrent protection and instantaneous short circuit protection shall operate a common trip bar, which will open all poles in case of overload or short circuit current in any one pole. Circuit breaker shall be trip indicating, with tripped position of breaker handle midway between “ON” and “OFF” positions.

40.18.13 Magnetic Starter Units

1. The Full Voltage/Direct On Line (DOL) motor controller’s magnetic starter unit shall consist of magnetic contactors in combination with an industrial-type circuit breaker with three overload-relays, one in each phase, for motor protection against excessive overloading on starting and in operation. Contactors shall be rated for AC3 applications. Magnetic starter unit shall consist of all necessary relays, timers and motor protective auxiliary devices, as shown on the Drawings and as specified.

2. Overload relay shall conform to IEC 292-1, IEC 947-4, NF C 63-650 and VDE 0660. Rated operational insulation voltage shall be according to IEC 292-1, VDE 0110, UL, SA or better. Overload tripping shall be according to UL 508/IEC 947-4 (Class 10) or better. Ambient air

temperature for normal operation shall be from – 25 to +55 ^{o}C and ambient temperature shall be from – 15 to +55 ^{o}C.

3. Overload relay for submersible pump protection shall be of the type with an operating trip response time of 500 milliseconds or less at 100% trip setting.

4. Laminated control circuit diagram indicating coded termination numbers shall be attached inside the control panel-board for ready reference.

40.19 RELAYS

a. In general, relays shall be of the electro-mechanical or electronic type suitable for panel mounting and industrial applications. Relay coils shall be rated for continuous operation at 220 or 460 volts AC or 48 volts DC as required by their application. Permissible coil pick-up voltage shall be –15% and +15% or broader. Drop-out voltage shall be –25% to 40% of rated voltage. Coil burden shall be compatible with each rated voltage. Coil burden shall be compatible with each application. Operating temperatures shall be – 5^{o}C or better. Ambient temperature of operation shall be from –40 to +60^{o}C. Control voltage range at 60 Hz shall be from 12 to 600 volts. Mechanical life shall be a minimum of 5 million operations. Rated insulation voltage shall conform to VDE 0110C, IEC 158-1, BS 5424 or better.

b. General application relays shall be instantaneous, non-time delay types. Application of supply voltage across the coil shall cause the instantaneous opening or closing of contracts as required and remains at this condition until power supply is removed.

c. Electronic timing relays shall be used where time delay requirements are of short duration. These relays shall have a repeat accuracy of plus or minus 10% with adjustable time setting as indicated on the plans or as recommended by the manufacturer. Reset time shall be as specified. Dry ambient temperature for operation shall be from –25 to +55 ^{o}C. Reset time shall be 40 milliseconds or less unless otherwise specified.

d. Motor operated time delays shall be used where time delay is three minutes or longer. These relays shall be synchronous with elapsed time indication. Repeat accuracy of relay shall be +2% or less with adjustable time setting as indicated in the drawings. Automatic resetting shall be upon removal of supply voltage in case of time delay on energization and upon delay in de-energization. For interrupting timing cycles, the timing relay shall reset to its original state without operating the output contact and ready for a new timing cycle. Timer reset shall be 200 milliseconds or less unless otherwise specified.

e. Relay contacts shall be 220 volts, 60 hertz rating or 48 volts DC as required by their applications. Continuous current ratings of contacts

shall be compatible with the load output requirements and load application, resistive, inductive or motor switching. In case of inductive applications, make and break currents shall also be considered for the kind of load connected. Contact material shall be silver, good for a mechanical lifetime of 10 million operations. Response time of contact shall be 20 milliseconds or less.

f. Level actuated relays shall be used to actuate reservoir and deepwell water levels to control pump operation at any predetermined high or low level desired. The control sensitivity shall be matched to the specific resistance of water to be controlled.

g. The phase monitor relay shall be provided to protect the system against power supply conditions such as over/under-voltage, single phasing, phase unbalance and phase reversal.

h. Relays for use with motor protective devices shall be as required for their intended operations as shown on the Drawings and as specified. Relay control sensitivity shall be matched to the specific conditions to be controlled.

40.20 LIGHTING FIXTURES

a. General: The Electrical Contractor shall furnish, install and connect all lighting fixtures to the building wiring system unless otherwise noted.

b. Fixture type: The fixture type shall be as indicated in the drawings.

c. Fluorescent Ballasts: All fluorescent fixtures shall have high power factor ballast.

d. Shop Drawings

Shop drawings for lighting fixtures shall indicate each type together with manufacturer's name and catalog number. No fixture shall be delivered/install unless approved by the Engineer.

40.21 WIRING DEVICES

a. General:

Furnish and install wiring devices as required.

b. Devices and Plates

1. Wall Switches: Quiet type, spring operated. The type of switch shall be of tumbler operation.
2. General Purpose Receptacles: Flush mounting, type as shown in the plans.

3. General Purpose Wall Plates: Type, color, plating and appearance of device plates shall be as selected by the Consultant. Appropriate samples shall be submitted prior to the purchase of face plates.
4. Manufacturers: National, G.E. Toshiba or approved equal.

40.22 NAME PLATES

a. General: provide and install nameplates wherever indicated as required in these specifications. Wording shall be approved prior to purchase of nameplates.

b. Material: Red Bakelite engraving stock, white core.

c. Lettering: Engraved, approximately 5.0 mm high. Wording shall identify function of device to which nameplate is attached, or identify equipment served by device.

d. Installation (except for factory-installed nameplates): Attach with sheet metal screws after painting of equipment is completed.

e. All receptacle outlets/switches, plates shall be identified with circuit and panel homerun numbers using “dymo” tape labeller.

40.23 FUNGUS CONTROL FOR ELECTRICAL COMPONENTS

Electrical equipment shall be treated fungus and moisture as follows:

a. Current carrying components for both chlorination houses such as switches, fuses and contacts shall not be treated. Other materials and components, which are inherently fungus-resistant or are protected by hermetic sealing, need not be treated.

b. Circuit elements not covered above and which have a temperature rise of not more than 75 ^{o}F (24 ^{o}C) when operating as full loads for both chlorination houses shall be coated with a fungus-resistant varnish. Fungus-resistant varnish shall consist of paraphynol formaldehyde resin in combination with tung oil in suitable salient, made fungistatic by the addition of not less than 7 to 8 percent salicy-tanilide, suitable for the overall treatment of assembled electronic communications, and associated electrical equipment and certain with their component sub-assembly to prevent visible fungus growth. The method of treatment shall be in accordance with the manufacturer’s advice and recommendations. Circuit elements include but are not limited to cable, wire, switchboards, panel-boards, terminal and junction blocks, junction boxes, capacitors.

40.24 TRANSFORMER

40.24.1 General

These specifications cover the electrical and mechanical characteristics of a Single-Phase Overhead type distribution transformer. All characteristics, definitions, and terminology, except as specifically covered in this specification, shall be in accordance with the latest revision of the following ANSI standards.

1. C57.12.00 IEEE Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.
2. C57.12.20 Overhead-Type Distribution Transformers, 500 kVA and smaller
    1. High Voltage, 34500 Volts and below
    2. Low Voltage, 7970/13800Y Volts and below
    3. C57.12.35 Bar Coding for Distribution Transformers
3. C57.12.90 IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and regulating Transformers and IEEE Guide for Short Circuit Testing of Distribution and power Transformers
4. C57.12.91 Guide for loading Mineral-Oil-Immersed Overhead and Pad-Mounted Transformers rated 500 kVA and less with 55 oC or 65 oC average winding rise.

40.24.2 Ratings

a. The transformers shall be designed in accordance with these specifications and shall be 1 unit of 15 KVA each pumping station or as shown in the drawings

b. The primary voltage and the basic insulation level (BIL) shall be 34500 Grd/19920 and 150 kV, respectively.

c. The secondary voltage shall be 240 Volts. The BIL of the secondary voltage shall be 30 kV.

d. The transformer shall be furnished with full capacity high-voltage taps. The tap changer shall be clearly labeled to reflect that the transformer must be de-energized before operating the tap changer as required in Section 6.2.1 of ANSI C57.12.20. The unit shall have one of the following tap configurations:

    Two – 2 ½ % taps above and below rated voltage
    Four – 2 ½ % taps below rated voltage
    NEMA taps (14400, 13800, 13200, 12470, 12540)

High Voltage Bushings and Terminals

The high voltage bushing shall be 150 kV BIL withstand, 432 mm creepage distance. It shall have a 60 Hz Dry 1- minute withstand of 60 kVA and 60 Hz wet 10-second withstand of 50 kV.

The bushing terminals provided shall be tin plated to accommodate both aluminum and copper conductors. Unless otherwise specified, the color of the bushings shall match Light Gray Number 70, Munsell Notation 5BG7.0/0.4.

40.24.3 Low Voltage Bushings and Terminals

The low voltage bushings shall have a 60 Hz Dry 1-minute withstand of 10 kV and 60 Hz wet 10-second withstand of 6kV.

The bushing terminals provided shall be tin plated to accommodate both aluminum and copper conductors.

The internal secondary leads shall be permanently embossed with the letters A, B, C and D per ANSI C57.12.00 and C57.12.20. This marking can be used to locate such leads with respect to one another for internal reconnection.

40.24.4 Protection

The protection scheme of the transformer shall consist of the following:

a. Protected primary overcurrent protection shall be provided by an internally mounted weak link fuse.

b. Primary overcurrent and transformer overload protection shall be provided by a breaker installed on the primary side of the transformer. This breaker shall have the capability to energize and de-energize the transformer by one hotstick operation. This device may be used in series with a current-limiting fuse to provide 50,000 A interrupting capability.

40.24.5 Tank

The tank shall include a pressure relief device as a means to relieve pressure in excess of pressure resulting from normal operation. The venting and sealing characteristics shall be as follows:

Cracking pressure: 10psig +/- 2 psig
Resealing pressure: 6 psig minimum
Zero leakage from reseal pressure to –8 psig
Flow at 15 psig: 35 SCFM minimum

The tank coating shall meet all requirements in ANSI C57.12.31 including the following:

Salt Spray Test
Crosshatch Adhesion Test
Humidity Test

Impact Test
Oil Resistance Test
Ultraviolet Accelerated Weathering Test
Abrasion Resistance – Taber Abraser

The tank shall have recessed tank bottom, which offers protection when sliding over rough surfaces.

The tank shall have an internal mark, which indicates the proper oil level per Section 6.2.3 of ANSI C57.12.20

The tank shall be provided with a mild steel cover ring with stainless steel cover ring loops and a stainless-steel bolt. A bronze nut shall also be provided to eliminate corrosion problems and avoid galling.

40.24.6 The tank shall be complete with an anodized aluminum laser engraved nameplate. This nameplate shall meet ANSI Standard C57.12.00.

40.24.7 Shipping

Unit shall be banded, blocked or bolted to a suitable skid with 2½ inches of clearance for shipment.

40.24.8 Testing and Losses

All units shall be tested for no-load (85 0C) losses, total (85 0C) losses, percent impedance (85 0C), excitation current (100% voltage). Each unit shall be subjected to a full wave voltage impulse and leak test. The manufacturer shall provide certification upon request for all design and other tests listed in Table 17 of ANSI C57.12.00 including verification that the design has passed the Short Circuit Criteria per ANSI C57.12.00 and C57.12.90

STATEMENT OF COMPLIANCE TO TECHNICAL SPECIFICATIONS

Item	Specification	Statement of Compliance
Civil Works	LWUA Standard Specifications for Water System Construction	
Water Meter	1/2" (15mmØ)-BRASS BODY, MULTI- JET WATER METER, 'ISO4064, Class B Specifications: Performance is up to standard ISO 4064. Non-rotatable and Non-reversible Meter Design: Solid and robust design. High impact and pressure resistance, hermetically sealed and register. Dry and magnetic type, 2 pole ring magnet, meter fitted with strainer on inlet to protect against dirt, cleaning without seal is possible with threaded tail piece. Water temperature: ≤50 °C Working Pressure: 16 bars Nominal Flowrate (Qn): 1.5-1.6 m3 Minimum Flowrate (Qmin): 16-30l/hr Maximum Flowrate (Qmax): 2-3 cu.m/hr Maximum Reading: 99,999 AMR Ready/Upgradeable Additional Requirements: Water Meter should easily fit to standard threads of G.I Fittings and subject to actual fitting/test of sample. Tailpiece Gasket should be 2.5mm diameter or should fit the gasket seat properly between the water meter and tailpiece.	
PE Coupling & Other PE Fittings	Body Ring Thrust: UV Stabilized polypropylene impact Copolymer with high long term aging stability complying with ISO 9080.	
	Nut: UV stabilized blue polypropylene; Impact Copolymer	
	Clamp Ring: Polyacetal (POM)	
	Lubricated lip gasket: Food safe NBR rubber suitable for potable water	
	Reinforcement ring (for female thread):Stainless steel AISI 430	

Item	Specification	Statement of Compliance
Sleeve Type Coupling	Body: Ductile Iron Rubber Seal: Rubber Gland Ring: Ductile Iron Bolt, Nuts & Washer: Stainless Steel/GI Minimum Body Length: 170 mm	
DI Fittings	Body: Ductile Iron Rubber Seal: Rubber Gland Ring: Ductile Iron Bolt, Nuts & Washer: Stainless Steel/GI Mechanical Joints	
uPVC Pipes	Series 10	
Brass Ball Valves	Material: Forged Brass (B283, C37700) Ball Seats: PTFE O-Rings: FPM	
Di Saddle Clamp	Ductile Iron; 2 bolts Saddle Clamp FBE Powder Coated (Fusion Bounded Epoxy) Compliance to GGG50: ASTM A56-65-4512 Pressure Rating-PN/6	
G.I. Fittings	Material: Hot dipped zinc coated malleable iron Schedule: 40 STD Body Markings: Size and Trademark Finish: Smooth galvanized finish	

Section VII. Drawings

REFER TO

CONSTRUCTION DRAWINGS

Section VIII. Bill of Quantities

Product Name: **CONSTRUCTION OF WATER SUPPLY SYSTEM FOR CABANGLASAN WATER DISTRICT**

(CABANGLASAN WATER SUPPLY SYSTEM IMPROVEMENT PROGRAM)

Location: **MUNICIPALITY OF CABANGLASAN, BUKIDNON**

SECTION VIII - BILL OF QUANTITIES

Part No. __ of __				**Part Description:** _____	
(Columns (1), (2), (3) and (4) are to be filled up by the Procuring Entity)				**(Columns (5) and (6) are to be filled up by the Bidder)**	
Pay Item No	**Description**	**Unit**	**Quantity**	**Unit Price (Pesos)**	**Amount (Pesos)**
PART A: PUMPING FACILITIES					
•	***BRGY. IBA PUMPING STATION***				
I.	**PUMP AND MOTOR ASSEMBLY & DISCHARGE PIPING**				
IA	Installation of 5.0HP, 230VAC, 3Ø Submersible Motor (w/ Full Voltage Capacitor Start) Coupled to Submersible Pump capable of 3.0 lps discharge @ 53.0m TDH (similar to Grundfos model SP 9-10) complete with column pipe, submersible cable and electrical works.	1	set	In Words: _____ _____ _____ In Figures: _____	In Words: _____ _____ _____ In Figures: _____
II.	**PUMPHOUSE**				
II.A	Furnishing of materials and construction of 4.0m x 5.0m (20 sq.m.) pump house structure complete with windows, doors, glazing, metal works, roofing, tinnery, plumbing (when required), walls & floor finishing, painting, drain system, electrical system with inside & outside lighting according to Plans and Specifications.	20	sq.m.	In Words: _____ _____ _____ In Figures: _____ _____	In Words: _____ _____ _____ In Figures: _____ _____
III.	**TRANSFORMERS AND POWERLINE EXTENSION**				
III.A	15KVA, 13.2kV pri-230VAC secondary, Distribution transformers and its protective devices	1	unit	In Words: _____ _____ In Figures: _____	In Words: _____ _____ In Figures: _____

III.B	Power Extension	625	lm	In Words: _____ _____ _____ In Figures: _____	In Words: _____ _____ _____ In Figures: _____
IV.	**DISINFECTION FACILITY**				
IV.A	Treatment facility/hypo-chlorinator per LWUA std. specs.	1	unit	In Words: _____ _____ _____ In Figures: _____	In Words: _____ _____ _____ In Figures: _____
V.	**TESTING & COMMISSIONING**				
V.A	Testing & Commissioning	1	lot	In Words: _____ _____ _____ In Figures: _____	In Words: _____ _____ _____ In Figures: _____
Sub-total: PART A: PUMPING FACILITIES				In Words: _____ _____ _____ _____ _____ _____ _____ In Figures: _____	

PART B: INSTALLATION OF PIPELINES, FITTINGS & APPURTENANCES

I.	**PIPELAYING**

PIPELINES - Furnish and install pipes complete including joints, fittings, and warning/detection tapes, perform excavation of any type of soil excluding rock/boulders/hard limestone with pipe cover of 1.2 metres or less, measured to existing ground surface, sump pumping, pipe supports, thrust blocks, backfilling using suitable materials from the trench, disposal of surplus materials where directed, compaction and hydrotesting in accordance with Specifications and Drawings. The cost shall include provision and maintaining enough safety barricades, bollards, warning signs/lights and steel plates to cover open trenches when required and in accordance with the Plans and Technical Specifications.

Note 1: Quantity - Length in meters, excluding length of valves, assemblies and fittings.

Note 2: Concrete thrust blocks not required for welded steel pipes.

Note 3: Warning and detection tapes required for all pipes.

Note 4: The unit cost of pipelines includes the cost of providing barricades, warning lights and steel plates.

Note 5: Quantities Estimated are for the purposes of comparing bids. Payment will be based on actual quantities furnished, installed or constructed

I.A	150mmØ uPVC Pipes, S-10	1,000	lm	In Words: _____ _____ _____ In Figures: _____	In Words: _____ _____ _____ In Figures: _____
I.B	100mmØ uPVC Pipes, S-10	3,189	lm	In Words: _____ _____ _____ In Figures: _____	In Words: _____ _____ _____ In Figures: _____
I.C	75mmØ uPVC Pipes, S-10	794	lm	In Words: _____ _____ _____ In Figures: _____	In Words: _____ _____ _____ In Figures: _____
I.D	50mmØ uPVC Pipes, S-10	3,748	lm	In Words: _____ _____ _____ In Figures: _____	In Words: _____ _____ _____ In Figures: _____
I.E	**SLEEVE TYPE COUPLING**				
	100 mm	5	pc/s	In Words: _____ _____ _____ In Figures: _____	In Words: _____ _____ _____ In Figures: _____
	75 mm	2	pc/s	In Words: _____ _____ _____ In Figures: _____	In Words: _____ _____ _____ In Figures: _____
	50 mm	1	pc/s	In Words: _____	In Words: _____

				In Words: _____ In Figures: _____	In Words: _____ In Figures: _____
II.	**LEAK DETECTION & REPAIR**				
II.A	Leak Detection & Repair	1	Lot	In Words: _____ In Figures: _____	In Words: _____ In Figures: _____
Sub-total: PART B: PIPELINES, FITTINGS & APPURTENANCES				In Words: _____ In Figures: _____	
PART C.: SUPPLY & DELIVERY OF SERVICE CONN. & WATER METERS MATERIALS					
I.	**SERVICE PIPES**				
I.A	20 mm Ø Service Connection on 100 mm mainline	100	sets	In Words: _____ In Figures: _____	In Words: _____ In Figures: _____
I.B	20 mm Ø Service Connection on 75 mm mainline	100	sets	In Words: _____ In Figures: _____	In Words: _____ In Figures: _____
I.C	20 mm Ø Service Connection on 50 mm mainline	100	sets	In Words: _____ In Figures: _____	In Words: _____ In Figures: _____

II.	**WATER METERS**				
II. A	For 20 mm (1/2”) water meters	300	unit	In Words: _____ _____ _____ In Figures: _____	In Words: _____ _____ _____ In Figures: _____
Sub-total: PART C: SUPPLY & DELIVERY OF SERVICE CONNECTION AND WATER METER MATERIALS				In Words: _____ _____ _____ _____ _____ In Figures: _____	

TOTAL BIDDED COST (TOTAL OF PART A TO PART C)	*In Words:* _____ *In Figures:* _____

Submitted by:

Name of & Signature and Official Stamp of Bidder/Bidder's Representative:
_____
Date: _____
Position: _____
Name of Bidder: _____

Notes:

1. *In case of discrepancy between the amount in words and the amount in figures, amount in words shall prevail.*
2. *Unit bid prices in Bid Forms shall prevail over the detailed cost estimates in Breakdown of Prices.*
3. *Quantities Estimated are for the purposes of comparing bids. Payment will be based on actual quantities furnished, installed or constructed.*

BREAKDOWN OF PRICES

The Bidder shall completely fill up the Bidder's Breakdown of the Unit Price and Lump Sum Bids herein below provided by inserting the amount in figures for each item in the space provided. The Breakdown shall be submitted together with and shall form part of the Bid Form. The amounts shall represent a true breakdown of the bid prices of the Unit Price and Lump Sum Bids shown in the Bid Form in Philippine Peso. These amounts will be used in preparing monthly estimates. All breakdown should be balanced and consistent with the bid amount in Section VIII – Bill of Quantities. An UNBALANCED BREAKDOWN WILL NOT BE ACCEPTABLE. The total amount indicated in the form below for each Unit Price and Lump Sum Bid Items must equal the bid price shown in the Bid Form.

	BID ITEM	QTY (sets)	UNIT PRICE SUPPLY / MATERIAL (Pesos)	UNIT PRICE INSTALLATION (Pesos)	BID ITEM TOTAL UNIT PRICE (Pesos)
PART A.	**PUMPING FACILITIES**				
•	**BRGY. IBA PUMPING STATION**				
I.	**PUMP AND MOTOR ASSEMBLY & DISCHARGE PIPING**				
a.	Installation of 5.0HP, 230VAC, 1Ø Submersible Motor(w/ Full Voltage Capacitor Start) Coupled to Submersible Pump capable of 3.0 lps discharge @ 53m TDH(similar to Grundfos model SP 9-10) complete with column pipe, submersible cable and electrical works.	1 set			
b.	Discharge line	1 set			
	• Discharge pipe, B.I.				
	• Sleeve type cplg. w/ harness set				
	• Flowmeter,F/F				
	• Air relief piping assy., 25 mm				
	1. Half cplg				
	2. Nipple, G.I., 0.15 length				
	3.Elbow, G.I.				
	4.Check valve				
	• Check valve				
	• Pressure gauge, 75 mm dial,0-100 ps				
	1.Half cplg, 13mm				
	2.Bushing reducer,13mm x 6mm				
	• Tee, F/F				
	• Gate Valve				
	• 45 degrees bend, plain end				

	• Hose bibb,13 mm				
	1.Half cplg				
	2.Nipple, G.I.,0.15 Length				
	3.Elbow, G.I.				
	4. Hose bibb				
	• 90 degrees elbow,B.I.				
	• Ring flange w/BNG				
	• Increaser				
	Sub-total				
II.	**PUMPHOUSE**				
a.	Site Preparation	1 Lot			
b.	Earthworks				
	A. Excavation	10.00 cu.m.			
	B. Backfilling	7.90 cu.m.			
c.	Concrete Works (Class A)				
	a. Column and footing (C1F1)	3.10 cu.m.			
	b. Wall Footing	1.00 cu.m.			
	c. Roof Beams	1.80 cu.m.			
	d. Floor Slab	5.40 cu.m.			
	e. Roof slab	3.00 cu.m.			
d.	Masonry Works				
	a. Mortar & Plastering	60.50 sq.m.			
	b. 6" CHB	87.90 sq.m.			
e.	Reinforcement				
	Reinforcing Steel Bars	1,449.30 kgs.			
f.	Formworks	94.00 sq.m.			
g.	Scaffolding Works	37.00 sq.m.			
h.	Water Proofing	37.00 sq.m.			
i.	Door and Windows				
	A. 0.80mx2.10m Solid Door W/ Jumb & Accs.	1 set			
	B. 1.00mx2.10m Panel Door W/ Jumb & Accs.	1 set			
	D. 2.00mx1.20m Steel Window	1 set			

	E. 1.20mx1.20m Steel Window	2 sets			
	F. 2.0mx2.10m Roll-Up Door	1 set			
	G. 0.20x0.20 Concrete Louver Blocks	16 pcs.			
j.	Painting Works	100.00 sq.m.			
k.	Electrical Works	1 Lot			
	Sub-total				
III.	**TRANSFORMERS AND POWERLINE EXTENSION**				
a.	10KVA, 13.2kV pri-230VAC secondary, Distribution transformers and its protective devices	1 unit			
b.	Power Extension	625 lm			
	Sub-total				
IV.	**DISINFECTION FACILITY**				
a.	Treatment facility/hypo-chlorinator per LWUA std. specs.	1 unit			
	Sub-total				
V.	**TESTING & COMMISSIONING**				
a.	Testing and Commissioning	1 lot			
	Sub-total				
	SUB-TOTAL FOR PART B.				
PART B.	**INSTALLATION OF PIPELINES, FITTINGS & APPURTENANCES**				
I.	**PIPELAYING**				
•	**<u>150MMØ UPVC PIPES, S-10</u>**				
a.	150mm Ø X 6.0 m uPVC Pipes, S-10 w/ RR	1000 lm		---	
b.	Fittings	1000 lm		---	
c.	Warning Tape	1000 lm		---	
d.	Excavation	1000 lm	---		
e.	Laying/ Jointing	1000 lm	---		
f.	Backfilling, Compaction, Hydrotesting and Disinfection	1000 lm	---		
g.	Thrust block	1000 lm			
	Sub-total				
•	**<u>100MMØ UPVC PIPES, S-10</u>**				
a.	100mm Ø X 6.0 m uPVC Pipes, S-10 w/ RR	3,189 lm		---	
b.	Fittings	3,189 lm		---	

c.	Warning Tape	3,189 lm		---	
d.	Excavation	3,189 lm	---		
e.	Laying/ Jointing	3,189 lm	---		
f.	Backfilling, Compaction, Hydrotesting and Disinfection	3,189 lm	---		
g.	Thrust block	3,189 lm			
	Sub-total				
•	**75MMØ UPVC PIPES, S-10**				
a.	75mm Ø X 6.0 m uPVC Pipes, S-10 w/ RR	794 lm			
b.	Fittings	794 lm			
c.	Warning Tape	794 lm			
d.	Excavation	794 lm			
e.	Laying/ Jointing	794 lm			
f.	Backfilling, Compaction, Hydrotesting and Disinfection	794 lm			
g.	Thrust block	794 lm			
	Sub-total				
•	**50 MMØ UPVC PIPES, S-10**				
a.	50mm Ø X 6.0 m uPVC Pipes, S-10 w/ RR	3,748 lm			
b.	Fittings	3,748 lm			
c.	Warning Tape	3,748 lm			
d.	Excavation	3,748 lm			
e.	Laying/ Jointing	3,748 lm			
f.	Backfilling, Compaction, Hydrotesting and Disinfection	3,748 lm			
g.	Thrust block	3,748 lm			
•	**SLEEVE TYPE COUPLING**				
a.	100 mm	5 pc/s			
b.	**75** mm	2 pc/s			
c.	50 mm	1 pc/s			
II.	**LEAK DETECTION & Repair**				
a.	Leak Detection & Repair	1 lot			
	Sub-total				
	SUB-TOTAL FOR PART C.				

PART C.	**SUPPLY & DELIVERY OF SERVICE CONN. AND WATER METERS MATERIALS**				
I.	**SERVICE CONNECTION**				
•	**20 mm Ø Service connection**				
a.	20 mm service connection on 100 mm mainline	100 pc			
b.	20 mm service connection on 75 mm mainline	100 pc			
c.	20 mm service connection on 50 mm mainline	100 pc			
II.	**WATER METERS**				
•	**20 mm Ø Water meters**				
a.	½ "	300 pc			
	Sub-total				
	SUB-TOTAL FOR PART D.				
TOTAL FOR PART A. – PART C.					

NOTES:

A. PIPELINES AND RELATED CIVIL WORKS
The bidder shall complete the following form by inserting the price amounts (in figures) for supply and installation of pipes up to disinfection of pipes.

Note: Others include detection tapes, thrust blocks, etc.

B. ASSEMBLIES
The bidder shall complete the following form by inserting the price amounts (in figures) for the supply of materials and installation (per unit cost).

Note: Include fittings & other expenses such as taxes, clearance and handling up to the construction site.

C. PAVEMENT DEMOLITION AND SURFACE RESTORATION
The bidder shall complete the following form by inserting the price amounts (in figures) for the supply of materials and installation/labor (per unit cost).

C.1 Pavement Demolition - Furnish, labor, tools and equipment necessary to demolish pavement including the hauling of these discard materials to appropriate dump site. Locating appropriate dump site shall be the contractor's responsibility*. (Notes: 1. Payment will be based on the maximum allowable trench width as tabulated under standard drawing CW-01; 2. No payment shall be made for asphalt pavement if its thickness is less than 50mm; 3. Cost of cutting/ sawing the pavement shall be included in the unit bid for pavement demolition).*

Note: Include fittings & other expenses such as taxes, clearance and handling up to the construction site.

C.2 Surface Restoration -Furnish materials, labor and equipment necessary to construct pavement and restore surface as specified and as shown on the Drawings*. (Note 1 : Cost for the supply and preparation of the base course when required shall be included in the bid unit price. Note 2 : Payment will be based on the volume of concrete or asphalt pavement restored considering the maximum allowable trench width as tabulated under standard drawings CW – 01).*

Note: Include fittings & other expenses such as taxes, clearance and handling up to the construction site.

C.3 **ROCK/BOULDER EXCAVATION** (including breaking, excavation, removal/ disposal as specified in the LWUA Standard Technical Specifications**.**

Note: Include fittings & other expenses such as taxes, clearance and handling up to the construction site.

D. **CULVERT CROSSINGS**
The bidder shall complete the following form by inserting the price amounts (in figures) for the supply of materials and installation/labor (per unit cost)

Note: Includes other expenses such as fabrications, thrust blocks, concrete encasement, pipe supports, painting works, backfilling, pavement demolition and restoration, taxes, clearance and handling up to the construction site.

Signature and Official Stamp of Bidder:

_____

_____

_____

Date: _____

SUMMARY OF BID PRICES

PART NO.	DESCRIPTION	AMOUNT
A.	**Pumping Facilities**	
B.	**Pipelines, Fittings & Appurtenances**	
C.	**Supply and Delivery of Service Connection and Water Meter Materials**	
Total Amount in Figures:		
Total Amount in Words:		

READ AND ACCEPTED AND GOOD FOR AGREEMENT:

(Name and Signature of the Bidder or Duly Authorized Bidder's Representative) _____ *Date*

_____
(Position of the Bidder or Duly Authorized Bidder's Representative)

_____
(Name of the Bidder)

Section IX. Checklist of Technical and Financial Documents

Quezon Bukidnon Water District
Government Center, Purok-2, Libertad, Quezon, Bukidnon
CCC No. 627
Hotline #: 0917-598-9322 E-mail Address: quezonwaterdistrict@yahoo.com

OFFICE OF THE BIDS AND AWARDS COMMITTEE

Project Name: **Construction of Water Supply System For Cabanglasan Water District** Date**: October 31, 2023**

Bidder : _____

Checklist of Eligibility Requirements:

1. Department of Trade and Industry (DTI) business name registration or SEC Registration Certificate, whichever may be appropriate under existing laws of the Philippines, supported with the necessary information using the prescribed forms.

_____ PASS _____ FAIL Remarks/Comments:_____

2. Valid and current Mayor's Permit/Municipal License

_____ PASS _____ FAIL Remarks/Comments:_____

3. Valid Tax Clearance as finally reviewed and approved by the BIR.

_____ PASS _____ FAIL Remarks/Comments:_____

4. Valid PhilGEPS Registration Certificate

_____ PASS _____ FAIL Remarks/Comments:_____

5. Statement of ongoing Government and Private Contracts including contracts awarded but not yet started.

☐ a. Notice of Award/ Notice to Proceed/Contract

_____ PASS _____ FAIL Remarks/Comments:_____

6. Statement of the bidder's Single Largest Completed Contract similar to the contract to be bid which shall be supported with the following:

☐ a. Contract Agreement/Purchase Order
☐ b. Statement of Work Accomplished (SWA)
☐ c. Certificate of Final Acceptance or Constructors' Performance Evaluation System (CPES) Final Rating

_____ PASS _____ FAIL Remarks/Comments:_____

7. Philippine Contractors Accreditation Board (PCAB) License/Special PCAB License for Joint Ventures

- ☐ a. General Engineering
- ☐ b. Category C & D
- ☐ c. Size Range: Small B; with Specialization in Water Supply

_____ PASS _____ FAIL Remarks/Comments:_____

8. Bid Security, in any of the following forms:

a. Bid Securing Declaration;
b. The amount of not less than **2%** of ABC in the form of Cash, Cashier's/Manager's Check, Bank Draft/Guarantee or Irrevocable Letter of Credit;
c. The amount of not less than **5%** of ABC if bid security is in Surety Bond

_____ PASS _____ FAIL Remarks/Comments:_____

9. Project Requirements:

- ☐ a. Organizational Chart
- ☐ b. Notarized list of Contractor's' Key Personnel to be assigned to the project with their complete qualification and experience data
- ☐ c. Notarized list of contractor's major equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership or certification of availability of equipment from the equipment lessor/vendor for the duration of the project, as the case maybe.

_____ PASS _____ FAIL Remarks/Comments:_____

10. Omnibus Sworn Statement by the prospective bidder or its duly authorized representative in the forms prescribed by the GPPB

_____ PASS _____ FAIL Remarks/Comments:_____

11. Computation of Net Financial Contracting Capacity (NFCC)

_____ PASS _____ FAIL Remarks/Comments:_____

12. Audited financial statements, stamped "received" by the BIR or its duly accredited and authorized institutions for the immediately preceding calendar year, showing among others the total current assets and current liabilities.

_____ PASS _____ FAIL Remarks/Comments:_____

13. Valid joint venture agreement, in case of a joint venture (if necessary).

_____ PASS _____ FAIL Remarks/Comments:_____

14. Affidavit/Certificate of Site Inspection

_____ PASS _____ FAIL Remarks/Comments:_____