POLOMOLOK WATER DISTRICT

BIDDING DOCUMENTS

for the

CONSTRUCTION OF 1500 CU.M. CENTRALIZED CYLINDRICAL RESERVOIR AT MABACQUIAO AREA (PS NO. 11)

MARCH 2021

Preface

These Philippine Bidding Documents (PBDs) for the procurement of Infrastructure Projects (hereinafter referred to also as the "Works") through Competitive Bidding have been prepared by the Government of the Philippines for use by all branches, agencies, departments, bureaus, offices, or instrumentalities of the government, including government-owned and/or -controlled corporations, government financial institutions, state universities and colleges, local government units, and autonomous regional government. The procedures and practices presented in this document have been developed through broad experience, and are for mandatory use in projects that are financed in whole or in part by the Government of the Philippines or any foreign government/foreign or international financing institution in accordance with the provisions of the 2016 revised Implementing Rules and Regulations (IRR) of Republic Act (RA) No. 9184.

The PBDs are intended as a model for admeasurements (unit prices or unit rates in a bill of quantities) types of contract, which are the most common in Works contracting.

The Bidding Documents shall clearly and adequately define, among others: (i) the objectives, scope, and expected outputs and/or results of the proposed contract; (ii) the eligibility requirements of Bidders; (iii) the expected contract duration; and (iv) the obligations, duties, and/or functions of the winning Bidder.

Care should be taken to check the relevance of the provisions of the PBDs against the requirements of the specific Works to be procured. If duplication of a subject is inevitable in other sections of the document prepared by the Procuring Entity, care must be exercised to avoid contradictions between clauses dealing with the same matter.

Moreover, each section is prepared with notes intended only as information for the Procuring Entity or the person drafting the Bidding Documents. They shall not be included in the final documents. The following general directions should be observed when using the documents:

a. All the documents listed in the Table of Contents are normally required for the procurement of Infrastructure Projects. However, they should be adapted as necessary to the circumstances of the particular Project.

b. Specific details, such as the "*name of the Procuring Entity*" and "*address for bid submission*," should be furnished in the Instructions to Bidders, Bid Data Sheet, and Special Conditions of Contract. The final documents should contain neither blank spaces nor options.

c. This Preface and the footnotes or notes in italics included in the Invitation to Bid, BDS, General Conditions of Contract, Special Conditions of Contract, Specifications, Drawings, and Bill of Quantities are not part of the text of the final document, although they contain instructions that the Procuring Entity should strictly follow.

d. The cover should be modified as required to identify the Bidding Documents as to the names of the Project, Contract, and Procuring Entity, in addition to date of issue.

e. Modifications for specific Procurement Project details should be provided in the Special Conditions of Contract as amendments to the Conditions of Contract. For easy completion, whenever reference has to be made to specific clauses in the Bid Data Sheet or Special Conditions of Contract, these terms shall be printed in bold typeface on Sections I (Instructions to Bidders) and III (General Conditions of Contract), respectively.

f. For guidelines on the use of Bidding Forms and the procurement of Foreign-Assisted Projects, these will be covered by a separate issuance of the Government Procurement Policy Board.

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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

Notes on the Invitation to Bid

The Invitation to Bid (IB) provides information that enables potential Bidders to decide whether to participate in the procurement at hand. The IB shall be posted in accordance with Section 21.2 of the 2016 revised IRR of RA No. 9184.

Apart from the essential items listed in the Bidding Documents, the IB should also indicate the following:

a. The date of availability of the Bidding Documents, which shall be from the time the IB is first advertised/posted until the deadline for the submission and receipt of bids;

b. The place where the Bidding Documents may be acquired or the website where it may be downloaded;

c. The deadline for the submission and receipt of bids; and

d. Any important bid evaluation criteria.

The IB should be incorporated into the Bidding Documents. The information contained in the IB must conform to the Bidding Documents and in particular to the relevant information in the Bid Data Sheet.

REPUBLIC OF THE PHILIPPINES

POLOMOLOK WATER DISTRICT

National Highway, Polomolok, South Cotabato

Tel Nos. (083) 500-926/ 500-9314/500-9340 / Telefax No. (083) 500-8008

INVITATION TO BID FOR *Construction of 1500 cu.m Centralized Reservoir at Mabaquiao Area (PS No. 11)*

1. The Polomolok Water District with the Approved Budget for 2021 intends to apply the sum of Pesos: **Twelve Million Five Hundred Thousand Pesos Only (PHP 12,500,000.00)**, inclusive of VAT and all other applicable government taxes, fees and other charges, being the Approved Budget for the Contract (ABC) to payments under the contract **Construction of 1500 cu.m Centralized Reservoir at Mabaquiao Area (PS No. 11)**. Bids received in excess of the ABC shall be automatically rejected on bid opening.

2. The Polomolok Water District now invites Bids from MANUFACTURERS/SUPPLIERS & ELIGIBLE BIDDERS for the **Construction of 1500 cu.m Centralized Reservoir at Mabaquiao Area (PS No. 11)**. Delivery of the Goods is required within **120 calendar days** from receipt of Notice to Proceed or Purchase Order. Bidders should have completed 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 a non-discretionary "pass/fail" criterion as specified in the 2016 Revised Implementing Rules and Regulations (IRR) of Republic Act (RA) 9184, otherwise known as the "Government Procurement Reform Act".

   Bidding is limited 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 5183.

4. Interested bidders may obtain further information from Polomolok Water District and inspect the Bidding Documents at the address given below during business hours from 8:00 AM to 4:00 PM and/or at the Polomolok Water District website (polwaterdistrict.gov.ph).

5. A complete set of Bidding Documents may be acquired by interested Bidders from the address below starting **04 March 2021** from 8:00 AM to 4:00 PM except Saturdays, Sundays and Holidays, upon payment of a non-refundable fee of **Twenty Five Thousand Pesos (PHP 25,000.00)**. It may also be downloaded free of charge from the website of the Philippine Government Electronic Procurement System (PhilGEPS) and the website of Polomolok Water District website (polwaterdistrict.gov.ph), provided that Bidders shall pay the applicable fee for the Bidding Documents not later than the submission of their bids.

6. Polomolok Water District through its Bids and Awards Committee will hold a Pre-Bid Conference (online coverage) on **12 March 2021, 8:30 AM** at the Conference Room, 2nd Floor Admin. Bldg. Polomolok Water District **and via video conferencing thru Zoom** which shall be open to prospective bidders. To be able to **join the online pre-bid conference**, a scanned written request shall be made/emailed to the BAC Secretariat.

7. Bids must be duly received by the BAC Secretariat at the address below on or before **30 March 2021 at 8:30 AM.** All Bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in **ITB** Clause 18. If a bidder chooses to submit a soft copy of the bids online, the bidder shall send it to **a unique share link which will be provided by the BAC Secretariat to a particular bidder**. The confidentiality of the submitted bids is protected by the bidder's password.

8. Bid opening shall be on **30 March 2021 at 8:30 AM** at the Conference Room, 2nd Floor Admin. Bldg. Polomolok Water District. Bids will be opened in the presence of the bidders' representatives who choose to attend the Bid Opening at the address below and at the same time, via video conferencing through Google Meet. An email invitation will be sent to bidders who purchased the bid documents.

   For the online submission of bids, the bidders must submit a PDF copy of the notarized Bid Securing Declaration or a scanned copy of any acceptable form of Bid Security, together with the eligibility requirements, technical and financial proposals, as specified in the Bidding documents. The date and time appearing in the e-mail of BAC for the bids submitted online must be on or before **30 March 2021 at 8:30 AM** to be on time.

   The BAC shall open the online submitted bids with the bidder's password, which is only known to the bidder, during the opening of bids. This is to maintain the integrity of the government bidding process.

   Late bids shall not be accepted.

9. The *Polomolok Water District* 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

Section 41 of RA 9184 and its IRR, without thereby incurring any liability to the affected bidder or bidders.

10. For further information, please refer to:

BAC – Secretariat
Polomolok Water District

Tel. No. : (083) 500-9400

TeleFax No. : (083) 500-8008

E-mail add : bacpolwd@gmail.com

ENGR. CECIL D. MIRASOL
BAC Chairman

Section II. Instructions to Bidders

Notes on the Instructions to Bidders

This Section on the Instruction to Bidders (ITB) provides the information necessary for bidders to prepare responsive bids, in accordance with the requirements of the Procuring Entity. It also provides information on bid submission, eligibility check, opening and evaluation of bids, post-qualification, and on the award of contract.

1. Scope of Bid

The Procuring Entity, *POLOMOLOK WATER DISTRICT* invites Bids for the **Construction of 1500 cu.m Centralized Reservoir at Mabaquiao Area (PS No. 11)**, with Project Identification Number *PB 21-07*.

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 *FY 2021* in the amount of **Twelve Million Five Hundred Thousand Pesos Only (PHP 12,500,000.00)**.

2.2. The source of funding is:

a. GOCC and GFIs, the Corporate Operating Budget.

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:

a. **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 and/or through videoconferencing/webcasting 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 until *one hundred twenty days from the date of the opening 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

Notes on the Bid Data Sheet (BDS)

The Bid Data Sheet (BDS) consists of provisions that supplement, amend, or specify in detail, information, or requirements included in the ITB found in Section II, which are specific to each procurement.

This Section is intended to assist the Procuring Entity in providing the specific information in relation to corresponding clauses in the ITB and has to be prepared for each specific procurement.

The Procuring Entity should specify in the BDS information and requirements specific to the circumstances of the Procuring Entity, the processing of the procurement, and the bid evaluation criteria that will apply to the Bids. In preparing the BDS, the following aspects should be checked:

a. Information that specifies and complements provisions of the ITB must be incorporated.

b. Amendments and/or supplements, if any, to provisions of the ITB as necessitated by the circumstances of the specific procurement, must also be incorporated.

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:

Dam, Reservoir and Tunneling</td></tr>
<tr><td>7.1</td><td>Not Applicable</td></tr>
<tr><td>10.3</td><td>PCAB License – Small B Category C & D (GE – 3, Small B Category C and D for bid bulletin)</td></tr>
<tr><td>10.4</td><td>The following key personnel shall be present during the implementation of the project and must meet the required minimum years of experience set below:

<table>
<tr><th>Key Personnel</th><th>Relevant Experience</th></tr>
<tr><td>Project Engineer/Manager</td><td>minimum of 5 years</td></tr>
<tr><td>Materials Engineer</td><td>minimum of 5 years</td></tr>
<tr><td>Foreman</td><td>minimum of 5 years</td></tr>
<tr><td>Mason/Carpenter</td><td>minimum of 5 years</td></tr>
<tr><td>Carpenter</td><td>minimum of 5 years</td></tr>
<tr><td>Laborer (skilled/unskilled)</td><td>minimum of 5 years</td></tr>
<tr><td>Safety Officer</td><td>minimum of 5 years</td></tr>
<tr><td>First Aider</td><td>minimum of 5 years</td></tr>
</table></td></tr>
<tr><td>10.5</td><td>
<table>
<tr><th>Equipment</th><th>No.</th></tr>
<tr><td>Dumptruck</td><td>2</td></tr>
<tr><td>Backhoe</td><td>1</td></tr>
<tr><td>Water Truck</td><td>1</td></tr>
<tr><td>Transit Mixer</td><td>5</td></tr>
<tr><td>Concrete Mixer (1 – bagger)</td><td>1</td></tr>
<tr><td>Concrete Vibrator</td><td>4</td></tr>
<tr><td>Bar Cutter</td><td>4</td></tr>
<tr><td>Bar bender</td><td>4</td></tr>
<tr><td>Plate Compactor</td><td>2</td></tr>
<tr><td>Welding Machine</td><td>1</td></tr>
<tr><td>Pneumatic Vibrating Roller</td><td>2</td></tr>
<tr><td>Sheep Foot Roller</td><td>1</td></tr>
</table></td></tr>
<tr><td>12</td><td>Not allowed</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:

a. The amount of not less than PHP 250,000.00, if bid security is in cash, cashier’s/manager’s check, bank draft/guarantee or irrevocable letter of credit; or

b. The amount of not less than PHP 625,000.00 if bid security is in Surety Bond.3</td></tr>
</table>

16	Each Bidder shall submit 1 original of the first and second components of its bid or two (2) password-protected Bidding Documents in compressed archive folders, in case of electronic bid submission, and which shall be submitted simultaneously. The first shall contain the technical component of the bid, including the eligibility requirements under Section 23.1 of this IRR The First Envelope and Second Envelope should be properly marked and sealed as "ORIGINAL COPY -ELIGIBILITY AND TECHNICAL COMPONENT" and ORIGINAL COPY-FINANCIAL COMPONENT", respectively, to avoid confusion and BOTH envelopes shall be placed inside one big SEALED envelope. For authentication purposes, all pages of the bidding documents for submission must be certified by the authorized signatory of the participating Bidder/Company. The bidders are also reminded to **PUT PROPER TAB ON EACH BIDDING DOCUMENTS**. Unsealed or unmarked bid envelopes, or in case of electronic bid submission, Bidding Documents not in compressed archive folders and are not password protected, shall be rejected. However, bid envelopes that are not properly sealed and marked shall be accepted, provided that the bidder or its duly authorized representative shall acknowledge such condition of the bid as submitted. The BAC shall assume no responsibility for the misplacement of the contents of the improperly sealed bid envelopes or improperly compressed or password-protected folder, or for its premature opening.
19.2	Partial bids are not allowed.
20	No further instructions
21	The winning bidder shall submit the following additional documents relevant to the Project ten (10) calendar days from the receipt of the Notice of Award: - construction schedule and S-curve, manpower schedule, construction methods, equipment utilization schedule, construction safety and health program approved by the Department of Labor and Employment, and PERT/CPM or other acceptable tools of project scheduling. - Statement of Compliance with the Construction Guidelines for Project Implementation during the period of Public Health Emergency and Certification and Undertaking pursuant to the Revised Construction Safety Guidelines for the Implementation of Infrastructure Projects during the COVID – 19 Public Health Crisis, repealing Department Order No. 35, series of 2020. - Contractor's All Risk Insurance (for Bid Bulletin)

Section IV. General Conditions of Contract

Notes on the General Conditions of Contract

The General Conditions of Contract (GCC) in this Section, read in conjunction with the Special Conditions of Contract in Section V and other documents listed therein, should be a complete document expressing all the rights and obligations of the parties.

Matters governing performance of the Contractor, payments under the contract, or matters affecting the risks, rights, and obligations of the parties under the contract are included in the GCC and Special Conditions of Contract.

Any complementary information, which may be needed, shall be introduced only through the Special 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

3.1 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.

3.2 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

Notes on the Special Conditions of Contract

Similar to the BDS, the clauses in this Section are intended to assist the Procuring Entity in providing contract-specific information in relation to corresponding clauses in the GCC found in Section IV.

The Special Conditions of Contract (SCC) complement the GCC, specifying contractual requirements linked to the special circumstances of the Procuring Entity, the Procuring Entity's country, the sector, and the Works procured. In preparing this Section, the following aspects should be checked:

a. Information that complements provisions of the GCC must be incorporated.

b. Amendments and/or supplements to provisions of the GCC as necessitated by the circumstances of the specific purchase, must also be incorporated.

However, no special condition which defeats or negates the general intent and purpose of the provisions of the GCC should be incorporated herein.

Special Conditions of Contract

GCC Clause	
2	No sectional completion of Works
4.1	The schedule of delivery of the possession of the site to the Contractor, shall be in full to carry out the projects on its intended completion of date which is one hundred twenty (120) calendar days.
6	No further instructions.
7.2	Fifteen (15) years.
10	Dayworks are applicable at the rate shown in the Contractor's original Bid.
11.1	The Contractor shall submit the Program of Work to the Procuring Entity's Representative within *ten (10) calendar* days of delivery of the Notice of Award.
11.2	The amount to be withheld for late submission of an updated Program of Work is **5% of the contract amount**.
13	The amount of the advance payment *shall not exceed 15% of the total contract price and schedule of payment.*
14	Materials and equipment delivered on the site but not completely put in place shall not be included for payment.
15.1	The date by which operating and maintenance manuals are required: Not applicable. The date by which "as built" drawings are required is ***fifteen (15) calendar days after project completion***.
15.2	The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals by the date required is **5% of the contract amount**.

Section VI. Specifications

Notes on Specifications

A set of precise and clear specifications is a prerequisite for Bidders to respond realistically and competitively to the requirements of the Procuring Entity without qualifying or conditioning their Bids. In the context of international competitive bidding, the specifications must be drafted to permit the widest possible competition and, at the same time, present a clear statement of the required standards of workmanship, materials, and performance of the goods and services to be procured. Only if this is done will the objectives of economy, efficiency, and fairness in procurement be realized, responsiveness of Bids be ensured, and the subsequent task of bid evaluation facilitated. The specifications should require that all goods and materials to be incorporated in the Works be new, unused, of the most recent or current models, and incorporate all recent improvements in design and materials unless provided otherwise in the Contract.

Samples of specifications from previous similar projects are useful in this respect. The use of metric units is mandatory. Most specifications are normally written specially by the Procuring Entity or its representative to suit the Works at hand. There is no standard set of Specifications for universal application in all sectors in all regions, but there are established principles and practices, which are reflected in these PBDs.

There are considerable advantages in standardizing General Specifications for repetitive Works in recognized public sectors, such as highways, ports, railways, urban housing, irrigation, and water supply, in the same country or region where similar conditions prevail. The General Specifications should cover all classes of workmanship, materials, and equipment commonly involved in construction, although not necessarily to be used in a particular Works Contract. Deletions or addenda should then adapt the General Specifications to the particular Works.

Care must be taken in drafting specifications to ensure that they are not restrictive. In the specification of standards for goods, materials, and workmanship, recognized international standards should be used as much as possible. Where other particular standards are used, whether national standards or other standards, the specifications should state that goods, materials, and workmanship that meet other authoritative standards, and which ensure substantially equal or higher quality than the standards mentioned, will also be acceptable. The following clause may be inserted in the SCC.

Sample Clause: Equivalency of Standards and Codes

Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national, or relate to a particular country or region, other authoritative standards that ensure a substantially equal or higher quality than the standards and codes specified will be accepted

subject to the Procuring Entity's Representative's prior review and written consent. Differences between the standards specified and the proposed alternative standards shall be fully described in writing by the Contractor and submitted to the Procuring Entity's Representative at least twenty-eight (28) days prior to the date when the Contractor desires the Procuring Entity's Representative's consent. In the event the Procuring Entity's Representative determines that such proposed deviations do not ensure substantially equal or higher quality, the Contractor shall comply with the standards specified in the documents.

These notes are intended only as information for the Procuring Entity or the person drafting the Bidding Documents. They should not be included in the final Bidding Documents.

A. GENERAL WORKS

1. SCOPE, CONDITION OF CONTRACT

1.1 The civil works shall consist of the following:

- 1.1.1 Excavation and Backfill
- 1.1.2 1500 cubic meter reinforced concrete ground reservoir
  - 1.1.2.1 Concreting works
  - 1.1.2.2 Water stop, construction sealant and water proofing
  - 1.1.2.3 Inside ladder (Stainless Steel 316), Outside ladder and railing
  - 1.1.2.4 Manholes with plate cover (Stainless Steel 316)
  - 1.1.2.5 Air vent with SS Screen
  - 1.1.2.6 Water Level Indicator Assembly
  - 1.1.2.7 Valve box chamber and plate cover
  - 1.1.2.8 Test Line Chamber
  - 1.1.2.9 150mm diameter inlet pipe
  - 1.1.2.10 300mm diameter drain pipe and Overflow pipe (CLSP)
  - 1.1.2.11 350mm diameter outlet pipe (CLSP)
  - 1.1.2.12 Butterfly and Gate Valves
  - 1.1.2.13 Elbow, wye, tee, reducer, sleeve-type coupling, flanges, and other fittings
  - 1.1.2.14 Painting works
  - 1.1.2.15 Testing and disinfection

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

1.3 As used in this Specification the word “Owner” refers to Polomolok Water District (PolWD) named in the contract. The word “Engineer” refers to the individual of firm authorized by the PolWD, acting as the Owner’s representative to oversee the execution of the contract. The word “Contractor” refers to the party who entered into Contract with the Owner.

2. EARTHWORKS

2.1 GENERAL:

The Contractor shall perform all earthworks required and shown on the drawings.

2.2 Compact Tests

Where the backfill is required to be compacted to specified density, test for compliance may be made by and at the expense of the Contractor, using the test procedure specified in the Methods of Test for Moisture Density Relation in Soil using at 10-lb. hammer and 18-inch drop (ASTM D 1557), modified to use three (3) layers. All field density tests shall be performed in accordance with the tests produce specified in the “Method of Test for Density of Soil in Place by the Sand Cone Method” (ASTM D 1556).

2.3 Excavation

a. **General**

Excavation shall include the removal of materials of whatever nature encountered, including all obstruction of any nature that would interfere with the proper execution and completion of the work. The removal of said materials shall be stripped of all vegetation and debris, and such materials shall be removed from the site prior to performing any excavation or placing of any fill. The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavation, and all pumping, ditching or other approved measures for removal or exclusion of water, including taking care of storm water and waste water reaching and site of the work from any source as to prevent damage to the work or adjoining property.

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

b. **Excavation beneath Proposed Structures**

Expect where otherwise specified for particular structures or ordered by the Engineer, excavation shall be carried to the grade of the bottom of the footing or slab. When shown or ordered, areas beneath proposed structures shall be over-excavated. When such over excavation is shown on the Drawings, both over-excavation and subsequent backfill to the required grade shall be performed by the Contractor at his own expense. After the required excavation or over-excavation has been completed, the exposed surface shall be scarified to a depth of 150mm (6-in.) brought to optimum moisture content, and rolled with heavy compaction equipment to ninety-five percent (95%) of maximum dry density.

c. **Disposal of Excess Excavation Material**

The Contractor shall remove and dispose all excavated material at his own expense and in a manner approved by the Engineer or as instructed by the Engineer.

d. **Pipeline Trench Excavation**

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 (24-in.). 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 shall be excavated uniformly to the grade of the bottom 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 amount of open trench to form a cradle will not be required. The maximum amount of open trench permitted at any one time and in one location shall be 300 meters, or the length necessary to accommodate the amount of pipe installed in a single day, whichever is greater.

e. **Rock Excavation**

Rock excavation shall include removal and disposal of the following: (1) all boulders measuring 0.25 cubic meter or more in volume; (2) all rock material in ledges, bedding deposits, and un-stratified masses which cannot be removed without systematic drilling and blasting. Said rock excavation shall be performed by Contractor at his own expense.

2.4 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 than 150mm (6-in.). Material placed within 150mm (6-in.) of any structure or pipe shall be free from rocks or unbroken masses or earthly materials having maximum dimension larger than 75mm (3-in.). Backfill shall not be placed around nor 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 not be full of water while backfill is being placed.

b. **Back 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 200mm (8-in.) in thickness, as measured before compaction, where compaction is attained by means of sheep foot roller and a pneumatic vibrating roller. Where the use of sheep foot roller is impractical, the layers shall not exceed 150mm (6-in.) 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 dry density beneath proposed structures, and ninety percent (90%) of maximum dry density around the sides of the structures and beneath proposed paved areas.

c. **Embankment Fill**

The area where an embankment is to be conducted shall be cleared of all vegetation, roots, and foreign materials. Following this, the surface shall be moistened, scarified to a depth of 150mm (6-in.) and rolled or otherwise

mechanically compacted to ninety percent (90%) of maximum density elsewhere. Embankment fill shall be placed in horizontal layers not to exceed 200mm (8-in.) in thickness, as measured before compaction, where compaction is attained by means of sheep foot rollers is impracticable, the layer shall not exceed 150mm (6-in.) 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 dry density beneath proposed structures, and ninety percent (90%) of maximum dry density around the sides of the structures and beneath proposed paved areas.

2.5 Grading

The Contractor shall perform all grading in the areas as indicated. Tolerance in final grading in unpaved areas shall not exceed 30mm above or below the grades indicated. Finish grading shall be accomplished so as to readily drain into the drainage facilities or adjacent natural drainage areas, without the formation of pockets in which water will stand.

2.6 Granular Bedding

a. **General**

The work shall consist of furnishing, spreading and compacting graded granular base material in all trenches, slab on fill, column, and wall footing and roadways in accordance with the Specification and Drawings.

b. **Material Requirement**

Material for granular bedding shall consist of a processed aggregates such as gravel sand or stone fragments. It shall be clean and free from organic matters, lumps of clay, and other deleterious substances. The material shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base. The material shall comply with the following grading and quality requirements:

1) *The aggregate when graded shall produce a smooth, evenly distributed curve within the limits as shown in Table below.*

TABLE1 – GRANULAR MATERIAL GRADING

USING STANDARD SIEVE WEIGHT		**PERCENT PASSING BY WEIGHT**
Mm	Alternative	
37.5	(1-1/2'')	100

9.5	(1'')	-

2) *The material shall have a soaked CBR-value of not less than 25%, determined according to ASTM D 1833. The CBR-value shall be obtained at density corresponding to 98% of the maximum dry density determined according to AASHTO T 180 Method D.*
3) *The coarse aggregate material retained on a 4.75mm (no.4) sieve shall have a percentage of wear by the Los Angeles Abrasion test (AASHTO96) of not more than 96.*
4) *The maximum dimension of any particle shall not be greater than two-thirds of the required thickness of the layer in which it is to be placed. Oversize material if present shall be removed by hand picking.*

c. **Material Requirement**

Granular aggregate bedding shall be delivered at the site of the work as a uniform mixture. Aggregate base shall be compacted by means of approved vibrating plate compactors or mechanical tampers. Each succeeding pass shall overlap the previous pass by at least, one third of the compactor width. No material shall be spread on soaked surface.

3. CONCRETE WORKS

3.1 Work Included

a. The work to be undertaken this Section shall include all labor, materials, equipment, plant and other facilities and the satisfactory performance of all necessary to complete all concrete work shown on the Drawings and specified herein. All work included under this Section shall be subjected to the General Condition accompanying these specification. The Contractor is required to refer especially thereto.
b. The Contractor is required to secure a pouring permit every time there's schedule for concrete pouring.

3.2 Materials

a. Cement

Except, otherwise provided in these specifications, cement shall confirm to the "Standard Specification for Portland Cement" (AST C-150 – Latest Revision) and shall be Type I,

b. Concrete Aggregates

i. Concrete aggregates shall be well graded, clean, hard particles, or gravel or crushed rock conforming to the "Standard Specification for Portland Cement" (ASTM C-33 Latest Revision).
ii. The maximum size of the aggregates shall not be larger than one fifth (1/5) of the narrowest dimension between forms and not larger than three-fourth (3/4) of the minimum clear spacing between individual reinforcing bars, or

bundles of bars, and in no case larger than 38mm (1-1/2 in.) in diameter except that larger diameters may be allowed in massive concreting with the written permission from the Engineer. Use ¾'' size of coarse aggregates for reinforced concrete wall to avoid further segregation of fine and coarse aggregates during concreting work.

TABLE2 – GRANULAR MATERIAL GRADING

USING STANDARD SIEVE WEIGHT		**PERCENT PASSING BY WEIGHT**
Mm	Alternative	
37.5	(1-1/2'')	100
9.5	(1'')	-
4.75	(No. 4)	60-100
2.00	(No. 10)	40-90
0.425	(No. 40)	15-50
0.074	(No. 200	2-15

c. Water

Water used in mixing concrete shall be cleaned and free from injurious amounts of oil, acids, alkali, organic material, or other substance that may be deleterious to concrete or steel.

d. Reinforcing Steel

All reinforcing steel bars used shall be of deformed type, new, free from rust, oil, defects, greases, or kinks, they shall conform to the latest edition of National Structure Code for Building with a minimum grade equal to 275MPA unless otherwise shown on the plans.

e. Admixtures

At the Contractor's options or at the request of the Engineer, but in either case at the expense of the Contractor, an admixture may be either a hydroxylation carboxylic and acid type or a hydroxylation polymer type, but shall contain no calcium chloride. The quantity required quantities of cement shall be used in the

mix regardless of whether or not any admixtures is used. The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's instruction. Where the air temperature at the time of placement is expected to be consistently over 26.7˚C (80˚F) such admixture shall be Super Emulsions "Plastiment", "Master's Builder's", "Pozzolith 3300", or substitute.

f. Calcium Chloride

Except as otherwise specified for Architectural finish, the use of Calcium Chloride in concrete will not be permitted.

3.3 Storage Materials

Cement and aggregates shall be stored in such a manner as to prevent deterioration or intrusion by foreign matter. Any material which has deteriorated or which has been damaged shall not be used for concrete. Steel shall be stored under cover or otherwise prevented from rusting.

3.4 Testing

The owner or his duty authorized representative of the Engineer shall periodically order the test of any materials supplied by the Contractor entering into concrete to determine it's suitable for the intended purpose. Such test shall be in accordance with the standards or the American Society for Testing and Materials, as noted elsewhere in these Specifications. Samples shall be provided by the Contractor without cost to the Owner. Expenses for the testing and cost of transporting samples to testing laboratory shall be become by the Contractor. Copies of the result of the test shall be furnished to the Owner promptly. Compressive strength specimen for test of concrete during construction shall be according to "Making and Curing of Concrete Compression and Flexural Strength Test Specimen in the Field" (ASTM C-31).

3.5 Controlled Strengths of Concrete

a. Concrete for structural elements, including slabs on grade within water-retaining structures and stairs shall be developing minimum 28-day comprehensive cylinder strengths of 20.68 Mpa (3000 psi), unless otherwise specified in the plans.

b. Concrete for non-structural elements such as cradles, unreinforced encasements, thrust blocks, and partition walls shall develop minimum 28-days cylinder strength of 17.25 Mpa (2500 psi), unless otherwise specified in plans.

3.6 Method of Determining Strength of Concrete

The Contractor shall submit design mixes and test results of samples made in accordance with the "Standard Method of Making and Curing Concrete Compression and Flexure Test Specimens in the Laboratory" (ASTM C-92-Latest Revision) and Standard Method of Test for Compression Strength of Molded Concrete Cylinder" (ASTM Designation C-39) for each strength required, stating the proposed slump and the proportional weights of the cement, saturated surface dry aggregates, and water. These mixes shall be proved by preliminary test thirty (30) days before concreting and shall show a 28-days strength of fifteen percent (15%) higher than the ultimate strength

required. No substitution shall be made the materials or mixed without additional tests to show that the quality of concrete is satisfactory.

3.7 Concrete Proportion and Consistency

a. The proportion of aggregates to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the form and around reinforcement with the method of placing concrete on the formwork without permitting the materials to aggregate, or excess free water to collect on the surface. The combined aggregates shall be of such composition of sizes that when separated on the No. 4 standard sieve, the weight passing the sieve (fine aggregates) shall not be less than thirty percent (30%) of the total, except that these proportions do not necessarily apply to lightweight aggregates.

b. The methods of measuring concrete materials shall be such that the proportions can be accurately controlled and easily checked at any time during the work. Measurement of materials for ready-mixed concrete shall conform to the "Standard Specification for Ready-Mixed Concrete" (ASTM C-94, Latest Revision where applicable).

c. Aggregates shall be measured out by weight and to within one percent (1%). Cements shall be conform to 40kg (88lb.) per bag and this is to be verified from time to time, Water shall be measured by weight or volume to within one and one-half percent (1-1/2%).

d. The water shall in no case exceed 21.24 litres, and 25.67 litres (5.62 and 6.79 US gallons) per bag of cement for all concrete with specified strength of fc=20.68 Mpa (3000 psi) and 17.25 Mpa (2500 psi), respectively. Slumps shall be within the following limits:

Portion of Slumps	**Slump Millimeters (mm)**	**Inches**
Columns and end supported beams, girders	50-100	2-4
Walls and thin vertical sections	75-125	3-5
Footings, Slab on grade and cantilevered beams and slabs	50-80	2-3

A. Slumps shall be according to the "Test of Slumps for Portland Cement Concrete" (ASTM C-143). The minimum cement content for 20.68 Mpa (3000psi) concrete shall be 8.39 sacks per cubic meter of concrete.

B. Job mix adjustments on water content shall be allowed only with the Engineer's permission and provide that cement is also added to maintain the original water-cement ratio of the design mix.

3.8 Exclusion of Water

No concrete shall be placed in any structure until all water entering the place to be filled with the concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited under water without the explicit permission of the Engineer, and then only in strict accordance with his directions; nor shall the Contractor, without explicit permission, allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete.

3.9 Mixing Concrete

a. No hand mixing shall be allowed.

b. The mixer shall be of an approved size and type which will insure a uniform distribution of materials throughout the mass. It shall be equipped with a device for accurately measuring and controlling the amount of mixing water in each batch.

c. The first batch of the concrete materials placed in the mixer shall contain a sufficient excess of cement, sand, and water to coat the inside of the drum without reducing the cement of the mix to be discharged.

d. Re-tampering, i.e., remixing with the addition of water to concrete that has been partially hardened will not be permitted.

3.10 Preparation of Surface for Concreting

a. Earth surface shall be thoroughly wetted by sprinkling prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud and debris at the time of placing concrete.

b. Concrete surfaces upon or against which concrete is to be placed, where the placement of the old concrete has been stopped or interrupted so that, in the opinion of the Engineer, the new concrete cannot be incorporated integrally with the previously placed, are defined as construction joints. The surfaces of horizontal joints shall be levelled with a wooden float to provide a reasonably smooth surface. A surface consisting largely to coarse aggregates shall be avoided. Except where the drawings call for, joint surfaces to be painted, the joint surfaces shall be cleaned of all laitance, loose of defective concrete and foreign material. Such cleaning shall be accomplished by sandblasting followed by thorough washing. All pools of water shall be removed from the surface of the construction joints before the new concrete is placed. After the surfaces have been prepared to the satisfaction of the Engineer, all approximately horizontal construction joints shall be covered with a layer of mortar approximately 25mm (1 in.) thick. The mortar in place shall have the portion of cement and sand as the regular concrete mixture, unless otherwise directed by the Engineer. The water-cement ratio of the mortar in place shall not exceed that of the concrete to be placed upon it, and the consistency of the mortar shall be suitable for placing and working in a manner herein after specified. The mortar shall be spread uniformly and shall be worked thoroughly into all irregularities of the surface, and wire brooms shall be used

where possible to scrub the mortar into the surface. Concrete shall be placed immediately upon the fresh mortar.

c. When the placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means that will secure proper union with subsequent work, provide that construction joints shall be made only where approved by the Engineer.

3.11 Placing Concrete

a. Concrete which upon or before placing is found not to conform with the requirements specified herein shall be rejected and immediately removed from the work. Concrete which is not placed in accordance with these specifications, or which is of inferior, as determined by the Engineer, shall be replaced by and at the expense of the Contractor. No concrete shall be placed except in the presence of a duly authorized representative of the Engineer. Concrete shall not be placed under unsuitable heat or wind conditions that will prevent proper placement and curing, as determined by the Engineer. Prior to placing any concrete, the Contractor shall give the Engineer twenty four (24) hours written notice.

b. Concrete shall be deposited in its final position without segregation, re-handling, or flowing. Placing shall be done using concrete pump-Crete.

c. Placing of concrete with a free drop or fall more than 1.20 meters (4ft.) shall not be allowed, except when approved by the Engineer.

d. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 450mm (18 in.) and care shall be taken to avoid inclined layer or inclined construction joint except where such are required for slopping members. Each layer shall be place while the previous layer is still soft. The rate of placing concrete in form shall not exceed 1.5 meters (5 ft.) of vertical rise per hour.

3.12 Forms (must be steel)

a. **General**

The Contractor shall provide forms to confine the concrete and shape it to the required lines. Plastering, in general, shall not be allowed. The Contractor shall assume full responsibility for the adequate design of all form. However, form which in the opinion of the Engineer are unsafe or inadequate in any time be condemned by the Engineer; and the contractor shall promptly remove the condemned forms for the work and replace them at his own expenses. A sufficient number of forms of each kind shall be provided to permit the required rate of progress to be maintained. Whenever, in the opinion of the Engineer, additional forms are necessary to maintain the progress schedule such additional forms shall be provide by the Contractor at his own expense. The design and inspection of the concrete forms, false work, and shoring shall comply with applicable safety regulations, and as may be specified in the General Condition of these Specifications.

b. **Materials**

Except as otherwise expressly approved by the Engineer, all lumber brought at the job site for use as forms, shoring, or bracing shall be new material.

All forms shall be smooth surface forms and shall be of the following materials:

Walls	-	Steel or plywood panels
Columns	-	Steel, plywood, or surface lumber
Roof	-	Plywood
All other work	-	Steel Panels, plywood, or surfaced lumber

Plywood shall be manufactured especially for concrete form work and shall be oiled with an approved from oil and edge sealed.

c. **Column Forms**

Column forms shall be checked for the plumbness before concrete is deposited. Hand holes shall be provided in column forms at lowest points of pour lifts to render this space accessible for cleaning.

d. **All girder, beam, and slab center lines**

All girder, beam, and slab centrelines shall be crowned at least 6.3mm (1/4 in.) in all direction for every 4.7 meters (15 ft.) span. However, cambers from all cantilevers shall be indicate on the plans or obtained from the Engineer by the Contractor.

e. The following are the **tolerance limits for the work:**

1. Variation from plumb:

   In lines and surface of columns, piers, walls, and risers:

In 3.05 m (10 ft.)	6.3 mm (1/4 in.)
6.10 m (20 ft.) max	9.5 mm (3/8 in.)
12.20 m (40 ft.)	19.0 mm (3/4 in.)

2. Variation in cross sectional dimensions of columns and piers, beams and thickness of walls and slabs:

Minus	6.3 mm (1/4 in.)
Plus	13.0 mm (1/2 in.)

3. Footings

   Variation in dimensions on drawings (applied to concrete only and not to reinforcing bars or dowels):

Minus	13.0 mm (1/2 in.)
Plus	50.0 mm (2 in.)

   Misplacement of eccentricity, two percent (2%) of the footing width in the direction of misplacement but not to exceed 50.0 mm (2 in.)

   Reduction in thickness, five percent (5%) at specified thickness

f. Form design

1. All forms shall be true in every aspect to the required shape and size, shall conform to the establishment alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation or ridges, fins, or offsets, or similar surface defects in the finished concrete. Plywood, 16.0mm (3/4 in.) and greater in the thickness, may be fastened directly to studding in the studs are close enough to prevent visible deflection marks in concrete. Adequate clean-out wholes shall be provided at the bottom of each lift of forms. The size, number, and location, of such clean out shall be subject to the approval of the Engineer.

2. Concrete construction joint will not be permitted on location other than those shown or specified, except as may be approved by the Engineer. When a second lifts is placed on hardened concrete, special precaution shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory affects whatsoever on the concrete. Pipe studs and anchor bolts shall be set in the form where required.

3. Unless otherwise shown, exterior corners in concrete members shall be provided with 19.0mm (3.4 in.) chamfers, Re-entrant corners in concrete member shall not have fillets unless otherwise shown.

g. Form Test

Form ties integral water stop shall be provided with a cork or other suitable means for forming a conical hole to insure that the form-tie may be broken off back of the face of the concrete. The maximum diameter or removal cones for rod ties, or of other removal form-ties fasteners having a circular cross section, shall not exceed 38mm (1-1/2 in.) and shall such fasteners shall be such as to leave holes of regular shape for reaming. Holes left by the removal of fasteners from the end of snap-

ties or form-ties shall be reamed with suitable toothed reamers so as leave the surfaces of the holes clean and rough before being filled with mortar as provide in Section 21.20. Wire ties for holding forms will not be permitted. No form tying device or part thereof, other than metal, shall be left embedded in the concrete, nor shall any tie be removed in such manner as to leave a hole extending through the interior of the concrete member. The use of snap-ties which cause spilling of the concrete upon form stripping or tie removal will not be permitted. If steel panel's forms are used, rubber grommets shall be provided where metal rods shall remain embedded and shall terminate not less than 25mm (1 in.) back from the formed faces or faces of concrete. Form or metal rods left embedded in concrete of water retaining tanks shall be equipped with an integral metal water stop of not less than 38mm (1-1/2 in.) in diameter.

h. **Vertical surface**

All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is called for in the drawings or explicitly authorized by the Engineer. Not less than 25mm (1 in.) of concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against timed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be timed to the required lines and will stand securely without caving of sloughing until the concrete has been placed.

i. **Maintenance of Forms**

Forms shall be maintained at all times in good condition, particularly as to size, shape, strength, rigidity, tightness, smoothness of surface. Forms, when in place, shall conform to the established alignment and grades. Before concrete is placed, the forms shall be thoroughly cleaned. The forms surfaces shall be treated with a non-staining mineral oil or other lubricant approved by the Engineer. Any excess lubricant shall be satisfactory remove before placing the concrete. In addition, all form shall be given a preliminary oil treatment by the manufacturer or shall be oiled by the Contractor at least two (2) weeks in advance of their use. Care shall be exercised to keep oil off the surfaces of steel reinforcement and other metals items to be embodied in the concrete. Forms may be reused if in good condition and if approved by the Engineer. Light standing between uses will be required whenever necessary in the opinion of the Engineer to be obtain uniform surfaces texture on all exposed concrete surface. Exposed concrete surfaces are defined as surfaces where are permanently exposed to view. In the case of forms for the inside wall surfaces or hydraulic structures, unused tie rod holes shall be covered with metal caps or shall be filled by other methods approved by the Engineer.

j. **Removal of Forms**

Direction of the Engineer concerning the removal of forms shall be strictly followed, and this work shall be done with care so as to avoid injury to the concrete. No heavy loading on green concrete will be permitted. In the case of roof slabs and above ground floor slabs, forms shall remain in place until test cylinders for the roof concrete attain a minimum of comprehensive strength of 15.52 Mpa (2,250 psi) provide that no forms shall be disturbed or removed under an individual panel

or unit before the concrete in the adjacent panel or unit has attained a strength of 15.52 Mpa (2,250 psi) and has been in place for a minimum of seven (7) days. The timed required establishing said strength will be determined by the Engineer who will make several test cylinders for this purpose from concrete used in the first group of roof panel placed. If the time so determined is more than the seven-day minimum, then it shall be used as the minimum length of time. Forms for all vertical walls and column shall remain in placed at least three (3) days after the concrete has been placed. Forms for all parts of the work not specifically mentioned herein shall remain in place for periods of time as ordered by the Engineer.

3.13 Corrosion Protection Requirements

Pipes, conduits, dowels, and other ferrous item required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be minimum of 50mm (2-in.) clearance between said item and any part of the concrete reinforcement. Securing such item in position by wiring or wielding those to the reinforcement will not be permitted.

3.14 Order of Placing Concrete

a. The order of placing concrete in all parts of the work shall be subject to the approval of the Engineer. In order to minimize the effects of shrinkage, the concrete shall be done by placing alternate units in a manner such that each unit placed shall have cured at least seven (7) days before the contiguous unit or units are placed, except that vertical walls shall be placed until the wall footings have cured at least fourteen (14) days, and the corner section of vertical wall shall not be placed until all the adjacent wall panels have cured at least fourteen (14) days.

b. The surface of the concrete shall be level whenever a run of concrete is stopped. To insure a level, straight joint on the exposed surface of walls, a wood strip at least 19.0mm (0.75 in.) thick shall be taken to the forms on these surfaces. The concrete shall be carried about 13.0mm (0.50 in.) above the underside of the strip. About one hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be levelled with a trowel and all laitance shall be removed. Hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be levelled with a trowel and all laitance shall be removed.

3.15 Tamping and vibrating

a. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted throughout the entire depth of the layer which is being consolidated, into a dense. Homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rocks pockets, and bringing only a sight excess of water to the exposed surface of concrete during placement.

b. Except to uniform provided herein, uniformed top surfaces of the concrete shall be brought to uniform surfaces and worked with suitable tools to a reasonably smooth wood float finish. Excessive floating at surfaces while the concrete is plastic will not be permitted. All surfaces shall be placed monolithically with the base slab. Dusting of dry cement and sand on the concrete surface to absorb excessive

moisture will not be permitted. Floor slabs and exposed tops of walls and curbs shall be given a steel trowel finish. At the Contractor's option, the above mentioned floor slabs may be finished with a power float after screeding. Subsequent to aforementioned finish, all sloping surfaces of floor slabs shall be lightly broomed to provide a skid-resistant surface.

3.16 Slip form Process in Concrete Work

A. General

The use of slip form in concrete work is optional for this project. However, should the Contractor decide to adopt slip form in concreting, the procedure/guidelines outlined below shall be followed;

B. Form Material

Steel, plywood, or timber sheeting shall be used.

C. Depth of forms

The effective of any slip form shall be a minimum of 1.00m (39 in.)

D. Yokes

Additional supports shall be provided in order to prevent bucking of the jack rods.

E. Bracing and Working Platform

The Contractor shall provide adequate bracing which shall be a part of the working platform. Plywood not less than 19mm (0.75 in.) thick may be used as the working platform. Top top of the working platform shall be in the same level as the tops of the inside forms, to permit direct shovelling of concrete from the deck into the forms.

F. Jacking System

The Contractor shall use hydraulic lifting gear with hydraulic jacks bearing against rods buried in the concrete. Alternatively, the forms may be lifted by winches and cable, rack and pinion, or hang from steel rods. Hydraulically operated jacks with the capacities ranging from 3,000, 4,500, and 6,000 kilograms shall be used. Jacks shall be cylindrical in shape with hole in the centre through which the jack or passes, with two sets of jaws which alternatively lift and grip.

G. Jack rods

The Contractor shall use 25mm (1 in.) diameter smooth mild steel bars with the threaded ends for easy coupling for extension. Jack rods shall remain in place as part of the reinforcement. Unsupported length of the jack rods shall not be more than 0.60m (2 ft.) on maximum load. Where rods pass through large formed openings, they must be braced adequately.

H. Control of the Jacking Process

A suitable process distribution system from a control hydraulic pump shall be used. The Contractor shall operate all jacks at the same speed to give uniform lift, care being taken that the jacks carry the same load. All jacks shall be provided with same hydraulic pressure to avoid cases where some will lift more slowly than others.

To control the level of the forms during the jacking process, plastic pipes with the coloured water may be used, care being taken to purge out or remove entrapped air in the plastic pipe.

I. Control and Tolerance

As jacking proceeds, provisions shall be made to limit any deviation from the vertical. A plumb bob shall be used during the entire operation.

J. Reinforcement

1. Vertical reinforcement placed shall be held in position by templates mounted on the forms and moving with them. Steel shall be lapped and tied to the rod below and shall be held at the top by the templates at heights from 1.20m at 3.00m (3.94 to 9.84 ft.) from the deck. Where difficulties are encountered in the use of templates, the Contractor shall weld a pie of steel to the yolks just above the top of the forms to guide the reinforcement into the correct positions.

2. Horizontal reinforcement shall be placed as work progresses. The contractor shall thread the bars through the yokes and tie or weld these to the vertical steel to control buckling. Steel should be of shorting lengths, say 3.00m (9.37 ft.) to permit easy handling. The reinforcing steel should be placed on the working platform in the correct order for placement.

K. Forming Operation and Recesses

The Contractor shall employ special techniques to form opening for doors, for connections of beams and floors, and for provisions of nibs and haunches. Toothed or dovetailed connections shall be used.

L. Handling Concrete

The Contractor shall use the common method for slip forming structural cores by depositing the concrete on the working platform and shovelling it into its final position. Crane and bucket or hoist and borrows may be used.

M. Care and Maintenance of Formwork

After concreting has ceased, the exposed form must be cleaned and oiled. Care should be taken to prevent coating of reinforcing steel and spillage onto the set concrete.

O. Finishing and Curing

1. Finishing

Where small holes and depressions occur, a sponge float to fill small hole shall be used to improve the overall appearance of the finished surface.

2. Curing

Potable water shall be used for curing. Whenever possible, water shall be sprayed directly into the surface. The Contractor shall provide suitable and adequate water supply at the working platform. Workers shall apply water to the concrete surface intermittently. Where the finished structure is to be exposed to the elements, the wetting action of the rain to complete the cement hydration may be used as a curing method.

Covering of the interior and exterior surfaces of the formed structure with plastic sheets to keep the moisture always in contact with the concrete surface will be an acceptable method of curing.

3.17 Placing Reinforcement

a. All reinforcement shall be placed in accordance with the plans furnished by the Engineer. In case of any doubt or ambiguity in placing of steel, the contractor shall consult with the Engineer whose decision shall be final in such cases.

b. All loose rust or scale, all adhering materials, and all oil or other materials which tend to destroy bond between the concrete and the reinforcement shall be removed before placing the steel and before concreting begins.

c. Metal reinforcement shall be accurately placed and adequately secured by using annealed iron wire ties or suitable clips at intersection and shall be supported by

concrete or metal supports, spaces or metal hangers. The minimum clear distance between parallel bars shall be one and one-half (1-1/2) times the diameter for round bars, and twice the side dimension for square bars. In no case shall the clear distance between bars be less than 25mm (1 in.) nor less than one and one-third (1-1/3) times the maximum size of the maximum aggregates. Where bars are used in two or more layers, the bars in the upper layer shall be placed directly above those in the lower layers at the clear distance of not less than 25mm (1 in.).

d. Bends for stirrups and tie shall be made around a pin having a diameter no less than six (6) times the minimum thickness of the bar, except that for bars larger than 25mm (1 in.), the pin shall not be less than eight (8) times the minimum thickness of the bars. All bars shall be bend cold.

e. Reinforcement steel shall not be straightened or re-bend in a manner that will injure the material. Bars with kinds or bends not shown on the drawing shall not be used. Heating of the reinforcement will be permitted only when approved by the Engineer.

3.18 Offsets and Splices in Reinforcement

a. In slabs, beams, and girders, splices of reinforcement at points of maximum stress be generally avoided, and may be allowed only upon written approval of splice details by the Engineer. Splices shall provide sufficient lap to transfer stress between bars by bonding shear or by butt welding to develop tension at least one hundred twenty-five percent (125%) of the specified yield strength of the reinforcing bars. Splices in adjacent bars shall be generally staggered.

b. Where changes in the cross-section of a column occur, the longitudinal bars shall be offset in a region where lateral support is afforded. Where offsets, the slope of the inclined portion of the bars with the axis of the column shall not be more than one in six; in the case of tied columns, the ties shall be spaced not over 75mm (3 in.) on the centre for distance of 300mm (12 in.) below the actual point of offset unless otherwise shown on the plans.

3.19 Test on Concrete

a. The Owner of the Engineer may require a reasonable number of test on the concrete to be made during the progress of the work. Not less than four (4) cylindrical specimens shall be made for each test of which at least two (2) shall be reserved for 28-day test.

Not less than one sampling sets (composed of 4 cylindrical specimens) shall be made for every twenty (20) cubic meters of concrete and in no case less than one test for each day's concreting. Samples shall be secured and moulded in accordance with "Standard Method of Sampling Fresh Concrete" (ASTM C-172-Latest Revision) and "Standard Method of Making and Curing Test Specimens in the Field" (ASTM C-31-Latest Revision). Strength shall be made in accordance

with the “Standard Method of Test Compressive Strength of Cylindrical Concrete Specimens” (ASTM-39-Latest Revision).

The Contractor shall provide the samples to be taken at the place of deposit and as specified by the Engineer and shall also box samples for shipment, packing them to prevent damage from sharp blows. The Owner of his duly authorized representative and the contractors Materials Engineer shall transport the test cylinder to a laboratory for testing. The Contractor shall pay cost of said transportation and testing of samples.

b. To conform with the requirements of these specifications, the average strength of test samples representing each class of concrete as well as the average of any five (5) consecutive strength test representing each class of concrete, shall be equal to or greater than the specified strength and not more than one strength test in ten shall have an average value less than ninety percent (90%) the specified strength.

c. Should the test fail to give the required strength, the Owner shall have the right to order a change in proportions or in the procedures of curing of the concrete for the rest of the structure.

3.20 <u>Liquidated Damages</u>

For failure to meet the specified strengths of concrete which has been designed, prepared, and deposited by the Contractor, the Contractor shall pay the Owner as liquidated damages. Not as penalty or forfeiture, the following schedule applied on the amount of the concrete represented by samples.

a. For concrete less than one hundred percent (100%) but greater than or equal ninety percent (90%) of specified strength, payment of ten percent (10%) of the unit bid cost per cubic meter of concrete.

b. For concrete less than ninety percent (90%) but greater than or equal eighty percent (80%) of the specified strength, payment of fifteen percent (15%) of the unit bid cost per cubic meter of concrete.

c. For concrete less than eighty percent (80%) of the specified strength, removal of the concrete so deposited and replacement of same at the expense of the Contractor.

(i) In any case of failure to meet specified, the Contractor may, at his expense, obtain concrete core samples from the poured concrete and the compressive strength of same, as determined by a competent testing authority, shall be taken as conclusive evidence of its strength and integrity, provided the coring will not impair the safety of the structure and can be satisfactorily replaced.

To determined adequacy of the affected parts, the Owner shall have the option to order load test on parts of the structure where concrete strength test are below eighty percent (80%) of specified. These tests shall be in accordance with ACI-318, latest revision; recommendations and their costs shall be borne by the Contractor.

(ii) In case of failure samples to meet specified strengths to the extent mentioned in (1) or (2) or (3) above, the Contractor shall be required to prolong the curing of the poured concrete as directed by the Engineer, in addition to payment of the liquidated damages mentioned above.

4. STEEL AND MISCELLANEOUS METAL WORKS

4.1 General

a. The Contractor shall furnish, fabricate, and install all steel and miscellaneous metal work as specified herein and as show in the drawings. Miscellaneous metalwork is defined as all item required to be fabricated from structural steel shapes, plates, bars, and their products. He shall provide the necessary labour, supervision, tools, materials, supplies, and appurtenances for the proper construction and operation of the elevated steel reservoir. The Contractor shall be accomplished the work in a complete and finished manner and insure the highest quality or workmanship in accordance with the drawings and specification and to be satisfactions and to the satisfaction of the Engineer.

b. Structural steel straps, plates, bars and their products shall conform to the “Standard Specification for Structural Steel” (ASTM Designation A36).

c. Unless otherwise shown, all miscellaneous metal work of fabricated steel shall be galvanized after fabrication in accordance with the section 22.03. Unless otherwise indicated, stainless steel metalwork shall be of Type 18-8 stainless steel. Items fabricated stainless steel shall not be galvanized.

d. All materials to be used shall be new, previously unused, and in first condition. Steel materials of unidentified analysis may be used provided they are tested and properly certified by a qualified testing laboratory.

e. Painting of shall metalwork, unless otherwise specified shall be in accordance with Division 27, “Painting and Coating”.

f. Testing and disinfecting shall be undertaken as specified in Division 25, “Pressure and Leakage Testing an Disinfecting”.

g. Shop drawings for all steel and miscellaneous metalwork shall be submitted to the Engineer for review in accordance with Section 7.02, “Shop Drawings”.

h. The work and equipment to be provided by the Contractor under this Contract shall conform to the U.S. Standards as mentioned in the following articles or to any International Standards of equal value.

i. Welding terms used in this specification shall be interpreted according to the definition given in AWS A3.0.

4.2 Materials

A. Structural Shapes

All structural shapes for use shall be produced by the open-hearth, basic oxygen, or electric-furnace process. Open or non-tubular structural shapes shall conform to ASTM A36. When structural shapes are fabricated from steel plates, the plates shall conform to item (b).

B. Plates

Plates materials shall be open-hearth, electric-furnace, or basic oxygen process steel conforming to the latest revision of any of the following applicable ASTM specification: A36; A131, Grade A and B; A283, Grade A, B, C and D; or A573, Grade 58.

C. Anchor Bolts, Rods, and Reinforcing Steel

1. The Contractor shall furnish and set all bolts, anchor bolts, rods and reinforcing steel. Except where otherwise shown or specified, all bolts, anchor bolts, washers, and nuts shall be steel, galvanized after fabrication in accordance with Section 22.02.

2. Except as otherwise provided herein, steel for bolts, anchor bolts, cap screws shall be in accordance with “Specifications for Low Carbon Steel Externally and Internally Threaded Standard Fastener”, Grade B (ASTM Designation A307), or “Specification for Carbon Steel Bars Subject to Mechanical Property Requirements” (ASTM Designation A306) or threaded parts of ASTM A36 and shall meet the additional requirements: (1) the nut material shall be Coarse Thread Series conforming of the requirements of the American Standard for Screw Threads. All bolts and cap screws shall have hexagon heads, and nuts shall be Heavy Hexagon Series.

3. Threads of galvanized bolts and nuts shall be formed with suitable taps and dies such that they retain the normal clearance after hot-dip galvanizing.

4. Unless otherwise shown, all bolts, anchor bolts and nuts which are buried, submerged, or inside a covered hydraulic structure shall be Hot-Dip galvanized as per TS-20 and then coated with two coats of coal tar epoxy after installation.

4.3 Galvanizing

All structural steel plates, shapes, bars, and fabricated assemblies required to be galvanized shall, after the steel has been thoroughly cleaned of rust and scale, be galvanizing in accordance with the "Specification for Zinc (Hot-Galvanized) Coating on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip" (ASTM A123). Any galvanized part that becomes warped during the galvanizing operation shall be straightened. Bolts, anchor bolts, nuts and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the "Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware" (ASTM A153). Field repairs to galvanizing shall be made using "Galvano","Galvo-Weld", or approved equal.

4.4 Shop Fabrication-Steel Works

a. Finish of Plate Edges-Welded Work

The plate edges to be welded may be universal mill edges or they may be prepared by shearing, machining, chipping, or by mechanically guided oxygen or plasma arc cutting. Edges of irregular contour may be prepared by manually guided oxygen or plasma arc cutting.

1. Oxygen or plasma arc cutting. When edges of plates are oxygen or plasma arc cut, the surface obtained shall be uniform and smooth and shall be cleared of slag accumulated before welding. All cutting shall follow closely the lines prescribed.

2. Shearing, Shearing may be used for material 13mm (1/2 in.) or less in thickness to be joined by butt joints, and for all thickness of materials permitted to be joined by lap joints.

b. Shipping/Transporting

All materials shall be loaded, transported to the site, unloaded and stored in such a manner as to prevent damage.

4.5 Welding

a. General

All welding shall be the shielded arc method and shall conform to the AWS "Code for Arc and Gas Welding in Building Construction". Qualification of welder shall be in accordance with the specification for Standard Qualification Procedure of the AWS.

b. Butt Joints

1. All welding in Butt Joints shall be complete joint penetration welds, which may be double welded from both sides or welded from one side only using a backing strip or equivalent means to ensure complete joint penetration welds. Butt joints may be used for welding all thickness of material permitted to be welded under this specification.

2. Butt joints may be used for welding all thickness of materials permitted to be welded under this specification.

c. Lap joints

1. Shall have continuous full fillet welds on both edges of the joints. The maximum thickness permitted for this type shall be 13mm (1/2 in.)

2. In any case, welded lap joints, except when show on the plans, shall be lapped not less than five times the nominal thickness of the thinner plate joined (5T); but in the double-welded lap joint, the lap nee not exceed 50mm (2 in.), and in single-welded lap joints, the lap need not exceed 25mm (1 in.).

d. Minimum Size of Fillet and Seal Welds

1. **Fillet Welds:** Plates 5mm (3/16 in.) and less in thickness shall have full fillet welds. Plates more than 5mm (3/16 in.) thick shall have welds of a size not less than one-third the thickness of the thinner plate at the joint, with a minimum of 5mm (3/16 in.).

2. **Seal Welds:** Seal welding, when desired, shall be accomplished by a continuous weld combining the function of sealing and strength, changing section only as the required strength may necessitate.

e. Minimum Lengths of Welds

The minimum lengths of many welds shall be four times the size but not less than 38mm (1-1/2 in.), or else the size of the weld shall be considered not to exceed one or fourth of its length.

The effective length of the fillet weld shall not include the length of the tapered ends. A deduction of at least 6.35mm (1/4 in.) shall be made from the overall length as an allowance for tapered ends.

f. Safety in Welding and Cutting

Operation involving welding, cutting, brazing, or allied processes shall be conform to ANSI Z49.1 for the protection of welders, welding operation, and nearby personnel.

g. Safe Usage of Cutting and Welding Processes

Procedures shall conform to ANSI Z491.1 (NFPA 51B) for the prevention of fire and property damage.

4.6 Bolts

a. The Contractor shall furnish and set all bolts and anchor bolts. Except where otherwise shown or specified, all bolts, anchor bolts, washers, and nut shall be steel, galvanized after fabrication.

b. Except as otherwise provided herein, steel for bolts and cap screws shall be in accordance with "Specification for Carbon Steel Externally and Internally Threaded Standard Fasteners", Grade B (ASTM Designation A-307), or "Specifications for Carbon Steel Bars Subjects to Mechanical Property Requirements" (ASTM Designation A-306) or threaded parts ASTM A36 and shall meet the following additional requirements: (1) the nut materials shall be free-cutting steel, and (2) the nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads. All bolts and cap screw shall have hexagon heads an nuts shall be Heavy Hexagon Series.

c. Threads on galvanized bolts and nuts shall be formed with suitable taps and dies such that they remain the normal clearance after hot-dip galvanizing.

5. MASONRY WORKS

5.1 General Requirements

Concrete masonry unit work of the type indicated shall be provided and be properly coordinated with the work of other trades. The source of supply of materials, which will affect the appearance of the finished work, shall not be changed after the work has started.

5.2 Scope of Work

The work includes all labor, materials, tools, and equipment necessary to install concrete masonry and all appurtenant work in connection with the work as shown on the Drawings and as specified herein.

5.3 Materials

a. Concrete hollow blocks shall be standard machine vibrated and shall have fine and even texture and well-defined edges. Units shall be non-loaded bearing and shall conform to the requirements of ASTM Specifications C-129, with minimum compressive strength 2.45Mpa (350psi) (average of specimens). Samples shall be submitted to the Engineer for approval.

b. Mortar and Grout. Mortar shall consist of one (1) part Portland cement, one-fourth (1/4) part lime putty, and three (3) parts mortar sand. Grout shall be the same materials and portion as mortar to which additional water shall be added to produce a consistency for pouring without segregation of the constituents. In concrete block wall construction a portion of the sand may be replaced with pea gravel up to not more than two (2) parts by volume of the cement used. Such pea gravel shall be graded with not more than five percent (5%) passing the No.8 sieve and with 100 percent (100%) passing the 3/8-inch sieve.

c. Cast-in place concrete lintels or beams shall made from concrete having minimum 28-days compressive strength of 20.68Mpa (3000 psi) and in compliance with Division 21-Concrete works. Exposed surface shall have a smooth dense finished.

d. Reinforcing steel bars shall conform to Division 21 – Concrete Works (See plan for bar arrangement and sizes).

5.4 Laying Concrete Masonry Units

a. Workmanship

Units shall be plumped and true to line with level horizontal joints. Hollow units shall be laid with full mortar coverage on horizontal and vertical face shells, and at least 50% of the cells shall be filled with grout, the cells containing vertical reinforcements to be among those to be filled up. All cells of CHB walls from footing up to at least the ground floor level shall be filled up. Solids units shall be laid with full head and bed joints. Joints shall be uniform and approximately 10mm wide unless otherwise indicated.

Unless otherwise shown on the drawings, joint of exterior concrete masonry units that will be exposed and painted shall be cut flush and tooled finished with a 6.5mm deep “V” joint for horizontal joints. Vertical joints between the horizontal joints shall be filled tooled flush. Joints of interior concrete masonry units shall be cut flush, and the blocks shall be given a cement plaster finish except as otherwise shown on the Drawings. The minimum thickness of cement plaster shall be 10mm.

b. Setting Embedded Items

All anchor bolts and miscellaneous metalwork embedded in masonry shall be set in accordance with setting plans or instructions furnished by trades supplying the

metalwork. Care shall be exercised to insecure that all anchors are completely surrounded by grout.

c. Masonry Lintels

The Contractor shall provide properly shored supports for construction of masonry lintels for openings in walls. Shoring shall not be removed for at least seven days after lintels are placed.

d. Placing Reinforcing Bars and Grouting

All reinforcing steel, except dowels in concrete, shall be accurately set in strict accordance with the Drawings and the note thereon. Vertical steel shall be secured firmly in place by means of frames or other suitable devices. Horizontal steel may be placed as the work progresses. In any core reinforcement, the distance between any masonry and the reinforcement shall be at least 12.7mm (1/2") at all points. The masonry contractor shall furnish at all tiles, spacers and supports required to hold steel in position during grouting.

Cores shall be grouted in lifts not exceeding 1.22m (4 ft.) in height. Grout shall be thoroughly rodded. Splices in reinforcing bars shall be lapped at a distance sufficient to develop the stress in the bar, but not less than 40 bar diameter. Concrete hollow blocks shall be laid with all cells completely grouted from the wall footing up to the ground level. The rest of the concrete hollow blocks above ground shall have at least 50% of the cells grouted, including those containing the vertical reinforcements.

e. Protection and Cleaning

Corners shall be protected from damage, with substantial board covers. Mortar or grout stains on masonry work shall be removed immediately. Any masonry work showing strain from mortar or concrete, or grout at completion of work, shall be replaced of the entire masonry surface sand-blasted to provide uniform approved appearance. In clearing the block, only stiff fibre brushes and wooden scrapers shall be used. Metal implements or acids shall not be used for cleaning blocks. All perfect joining, nail holes, chipped edges of corners, and similar defects shall be correct re replaced as directed.

6. PAINTING WORKS

a. General

All work required of the Contractor shall be the highest workmanship. Living-out of shop-fabricated material shall be done only by experienced workmen.

b. Scope of Work

All painting and finishing shall be performed by skilled craftsmen. Each cost of paint shall be applied at proper consistency, evenly, and free of laps, sags, and runs and cut sharply to required lines. Except as otherwise specified or required, paints shall be applied only under dry and dust-free conditions that will insure properly finished surfaces, free of detects and blemishes. Paints shall not be applied where temperature is likely to be above 32°C (90'F). Sufficient time shall be allowed between coats to insure proper dying. All primer and intermediate coast shall be unscarred and completely integral at the time of the application of each succeeding coat. The Engineer shall be notified when each coat has been applied and is ready for inspection. Until each coat is inspected and approved by the Engineer, no succeeding coats shall be applied. Whenever two coats or coats of dark colored paint are specified, the first coat shall contain sufficient powered aluminum to act as in indicator for proper coverage when applying the second coat.

c. Methods of Application

Except as otherwise specified or when, in the opinion of the Engineer, a particular method would produce unsatisfactory results, paint may be applied by brush, spray, or other application method at the option of the Contractor

d. Straightening

Any required straightening of materials shall be done by methods that will not harm the steel materials. Minor cold straightening may be performed by hammering or preferably by rolling or pressing. Heat may be used in straightening for more severe deformations.

e. Moisture Control

Application of three (3) coats Bitumen Paint on the lean concrete then after a minimum of 1-hour time frame spread the Polythelene 250 micron sheets on the whole lean concrete before the placement of reinforcements and pouring of concrete for foundation and floor slab.

B. RESERVOIR

1. GENERAL

a. Minimum lap splice length for reinforcing bars shall be 40 bars diameter and location of which shall be staggered.

b. Minimum concrete clear cover for reinforcing bars shall be as follows:

1) Columns 40 mm

2) Footing

i. At Bottom 75 mm

ii. At Top 50mm

3) Wall exposed to earth 50mm

4) All exposed and submerged metals shall be suitably protected as follows:

i. Exposed pipes Enamel-based with primer.

ii. Others Epoxy-based with primer.

c. Before commencing construction, contractor shall coordinate his proposed construction joints for reservoir walling, with the structural engineer for approval.

d. The minimum cover for all pipes except Steel Pipes 150-200mm diameter shall be 0.75m.

e 300mm diameter steel pipe shall have a minimum cover of 0.9m.

f. All pavements disturbed in the installation of pipes shall be repaired to match the existing conditions.

g. Concrete thrust blocks shall be provided on all non-welded steel pipelines whether shown or not in accordance with the standard drawings. Thrust blocks may be omitted when welded.

h. No pouring of concrete shall be done without securing the proper pouring permit.

i. Pest control solution shall be applied on earth surfaces before the schedule of concrete pouring.

j. Butterfly Valves shall be of approved brand.

k. a. 4.7mm thk (150-200mm diameter) & 6mm thk (350mm Diameter) , Steel Pipe Epoxy Coated cement lined pipe shall be used as shown on drawing for Water transmission, inlet, outlet and distribution pipes (Verify Diameter)

2. EARTHWORKS

2.1 Excavation beneath Proposed Concrete Reservoir

After the reservoir area has been stripped of all vegetation and debris, loan and topsoil from the 60cm (24-in) of excavated soil shall be removed and stockpiled for possible later use as fill on or around the reservoir and for possible later use as fill on or around the reservoir and for miscellaneous topsoil. Excavation under the reservoir shall extend to the bottom of the drain rock layer and over excavated to 1.60m after such excavation has been completed, the exposed surface shall be rolled with heavy compaction equipment to provide a reasonably smooth surface for placement of drain rock. Areas under the reservoir upon which earth fill is to be placed shall be sacrificed to a depth of 15cm (5-in) brought to optimum moisture content, and compacted to ninety-five percent (95%) of maximum density.

2.2 Backfilling beneath Proposed Concrete Reservoir

Backfill at the bottom of the Reservoir shall consist of boulders 10-16” diameter 600mm meters deep thoroughly compacted followed by a mixed item 200 and 201 backfill material thoroughly compacted and it shall be placed 900mm meters below the 100mm gravel bedding followed by lean concrete. The backfill shall be brought up evenly with each layer moistened and compacted by mechanical means to ninety percent (90%) of maximum density.

Backfill around excavated reservoir walls shall consist of mixed 200 & 201 backfill,

the rest shall be from the selected materials obtained from the extraction, and shall be placed in uniform layers not more than 200 mm (8-in) in thickness before compaction where shall be attained by means of hands operated power-driven tampers. The backfill shall be brought up evenly with each layer moistened and compacted by mechanical means to ninety percent (90%) of maximum density.

Flooding, ponding, or jetting will not be placed until after the reservoir has been tested by leakages. The reservoir shall remain filled with water while said backfill is being placed. Loaded carry all's or vehicles weighing more than 4,500 kg (9,9001b) when loaded shall not be permitted closer to the walls than a horizontal distance equal to the depth of the fill at that time.

2.3 Backfill around Reservoir Walls

Following the site preparation, excavation and any backfilling, a 60mm (24-in) thick layer of drain rock shall be placed over the reservoir area as shown on the Drawings.

2.4 Moisture Control

Apply Three Coats Bitumen Paint on the lean concrete then after a minimum of 1-hour time frame spread the Polyethylene Sheets on the whole lean concrete before the placement of reinforcement and pouring of concrete for foundation / floor slab.

And also, application three coats Bitumen paint on the wall around the reservoir (outside) is required from the bottom of concrete up to 200mm above the finish ground line.

3. PRESSURE AND LEAKAGE TESTING DISINFECTION

3.1 General

The Contractor shall furnish all equipment, labor and materials, including taps, valves and bulkheads are required and exclusive of water and water meter for testing and proper disinfection reservoirs. 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.

3.2 Testing and Disinfection of Reservoir and Appurtenant Piping.

A. General

The operation of testing and disinfecting the reservoir shall be combined. Any leaks found after the reservoir is filled shall be repaired and the disinfection procedures repeated to the satisfaction of the Engineer.

B. Cleaning

Prior to disinfecting, the reservoir shall be thoroughly cleaned by hosing down with a high pressure hose and nozzle of sufficient size to deliver a minimum flow of 3.15 lps (50 gpm).

C. Disinfection

A strong chlorine solution 200ppm (200 mg per liter) shall be sprayed on face of the reservoir. Following this, the reservoir shall be partially filled with water to a minimum depth of approximately 30 cm. (1.0 ft). During the filling operation, a chlorine water mixture shall be injected by means of a solution-feed chlorinating device. The dosage applied to the water shall be sufficient to give a chlorine residual of at least 50 mg per liter / 50ppm upon completion of the partial filling operation. Precaution shall be taken to prevent the strong chlorine solution from flowing back into the lines supplying the water. After the partial filling completed, sufficient water shall be drained from the lower ends of the appurtenant piping to insure filling the lines with heavily chlorinated water. Disinfection of the steel reservoir shall be done after protective coatings have been applied to the inside surfaces of the reservoir. The reservoirs and connecting lines thereto shall be thoroughly disinfected with chlorine before being placed in operation.

D. Retention Period

Chlorinated water shall be retained in the reservoir in the reservoir and in the appurtenant piping long enough to destroy all non-spore-forming bacteria and, in any event, for at least twenty-four (24) hours. After the chlorine retained for required time, the chlorine residual in the reservoir and in the lines shall be at least 25 mg per liter (25ppm). All valves shall be operated while the lines are filled with the heavily chlorinated water.

E. Final Filling of Reservoir

After the chlorine residual has been in accordance with Subsection (d), the water level in the reservoir shall be raised uniformly to approximately 30 cm (1 ft) below the overflow level by the additional of potable water. Before final filling is commenced, the quantity of heavily chlorinated water remaining in the reservoir after filling the piping sufficient when the water level is raised to its final elevation to produce a chlorine residual of between 1 mg per liter and 2mg per liter. After the reservoir has been filled, the strength of the chlorinated water in the reservoir shall be determined by the Engineer. If the chlorine residual is less than 1 mg per liter, an additional dosage shall be applied to the water in the reservoir. If the chlorine residual is greater than 2 mg per liter in the reservoir, the reservoir shall be partially emptied and additional water added. In no case shall water be released through the drain lines prior to the expiration of the required retention period.

F. Leakages Allowance of Reservoir

After the reservoir has been filled continuously for a period of thirty (30) days, if a leakage is such that the water surface drops more than 5.1 cm (2 in.) in a 30-day period, the Contractor shall empty the reservoir to permit examination for evidence of any cracking or other conditions that might be responsible for the leakages. Any cracks shall be "vee'd" and sealed with rubber sealant in accordance with Section 21.13 (b). Any evidence of leakages through the joints shall be repaired to the

satisfaction of the Engineer. Following these operations, the Contractor shall again sterilize the reservoir in accordance with this Section, exclusive of the spraying operation.

4. FOUNDATION AND FLOOR SLAB

4.1 Moisture Control

Application of Bitumen/ Bituminous Paint on the lean concrete shall be done then after a minimum of 1-hour time frame spreading of the 250 micron Polyethylene Sheets shall commence covering the entire lean concrete before the pouring of concrete for foundation and floor slab.

4.2 Water stop

a. Water stop arrives at the job site in rolls that are usually 50' long. When fittings or joints are made, the water stop is joined by melting the materials of each pieces and pressing (fusing) the ends against each other. In cutting the water stop, the cuts must be square. The heat applied must not be too hot as excessive heat will chair the water stop thereby preventing a good bond. The best way to maintain then proper heat is by use of a thermostat controlled heating iron. In melting the water stop, the entire face accurately so that the pieces are not offset and are perfectly matched. A good way to rapidly join the water stop is by the use of a guide or 3 sided tray that allows the 2 pieces to slide together.

b. Provide Water Stop on all construction joints to be submerged under water.

c. Water stop shall be continuous through floor wall and bottom slab of reservoir.

d. Water stop shall be submitted to the engineer for approval.

e. At construction joints, concrete shall be worked under water-stop by hand, making sure that all air rock pockets are eliminated.

4.3 Sealant (forming the groove)

a. All floor slab construction joints shall be provided with sealant.

b. In the standard drawings, the section of the groove is shown as 3/4" deep, 3/8" wide at the bottom and 5/8' wide at the top. The contractor must furnish a form, to those dimensions, that will attach to the floor slab forms. The groove from is usually made of wood and is attached to the slab from by nailing as the groove must stay in place until the sealant is applied. A simple method is to tack a second nail to the groove from on the side of the first concrete when the slab from is removed. The strip is to remain in place until after the adjacent slab is cast and until application of the sealant material.

4.4 Concrete

a. The concrete that will be placed should be monolithic and pause in the pouring of concrete in the floor slab is not permitted and is prohibited.

a. In placing concrete around the water stop, extreme care must be taken to be sure the entire area around the water stop has been properly filled with the concrete and the concrete consolidated. The concrete placement around the water stop must be made by hand.

b. To prevent shrinkage cracks in the concrete, the slab sections have not only been designated to the size shown on the drawings but there is also a placement sequence to be followed. Generally, a floor section cannot be cast until the adjacent section has cured for at least 7 days. Placement is then made in a checkerboard pattern.

c. After a section has been cast, there is usually activity in the adjacent sections. Some rebar extends to the adjacent slab. After placing the concrete and from the time the concrete has started to take its initial set, workmen must not be allowed to walk on the steel that extends into the fleshly placed concrete unless the steel is rigidly supported.

d. No pouring of concrete will happen without 'Pouring Permit' signed and approved by the Engineer.

4.4 Curing

a. To cure floor slab concrete, it is first sprayed with an approved curing compound then covered with plastic sheets or sisalkraft paper. Placing the paper should be delayed until the concrete is hard enough so that workmen will not mark the surface. During curing period, care must be taken to prevent damage to the curing paper and no foot traffic or storage of materials should be allowed on the slab during the first 7 days.

b. Key ways, such as in the wall footing, are cured by keeping wet sacks or burlap on them until the wall is placed. Water is added periodically to keep sacks wet.

4.5 Bond Breaker

After stripping the floor slab forms, an approved bond breaker is painted on the vertical face of the joint above and below the water stop but not in sealant groove or on the water stop. Bond breaker prevents the adjacent slab from bonding to the first slab thereby causing the movement, due to shrinkage or temperature change, to occur.

5. WALLS

5.1 Forms

a. Forms for walls are to be suitable materials and may be either steel or plywood. Forms should be oiled between uses so that when they are stripped they will easily break away from the concrete.

b. Any form tie which extends through the concrete must have a device that is integral with the form tie which acts as water stop to prevent seepage of water along the form tie.

c. Each wall panel, at the inside and outside face of the wall at all vertical wall joints, must be provided with chamfer strips as shown on standard joint details.

d. use of wall steel tie rod for wall forms is permitted, provided that it will be rod will be permanent and restored using non-toxic sealant (See typical wall tie detail).

5.2 Reinforcing Steel

All rebar, in any part of the structure, must be 2" clear of any pipe or metal insert passing through the wall and the insert must not be welded to the rebar.

5.3 Water Stop

The water stop in the vertical joint may be held in place by attaching a wire to the edge of the water stop and tying it on the rebar at intervals not greater than 18". Be sure the hole for the wire is on the edge water stop in the wall.

5.4 Sealant

The portion of sealant that is under the wall must be placed before placing the wall concrete. Later, when the balance of the sealant is placed in the floor joints, it will tie into this short piece making the sealant continuous to the water stop in the wall.

Inside wall face should be painted with bitumen paint from the top of floor slab up to the 100mm above the finish ground level.

Outside wall face should be plain finish.

5.5 Placing Concrete

a. As with the floor slab, there must be a 7-day waiting period before adjacent wall panel may be cast. In addition, a wall panel cannot be poured until the footings have cured for 14 days.

b. After stripping the keyway form, all laitance in the keyway must be removed by sandblasting.

c. When placing the concrete, each lift should be started at the end with placement progressing to the other end to prevent a buildup of water. A free of more than 1.2m (4') is not allowed. Workmen should not be allowed to walk on the rebar.

5.6 Formal Removal

After the concrete has been in place for 3 full days, the forms may be removed. Use wood wedge instead of a steel wedge for loosening wall form.

5.7 Repair

Immediately after removing the forms, the concrete should be inspected for necessary repairs. If one are needed, the curing compound may be applied immediately.

5.8 Curing

a. Any exterior portion of the wall which is to have earth against it will receive 2 coats of an approved asphalt emulsion immediately after removing forms and making necessary repairs. The first coat is applied diluted '7 with water and the second coat at full strength. After the emulsion has set whitewash is applied to reflect heat from the sun. The whitewash is must be maintained in good condition until the backfill is placed and many require occasional touching up after heavy rains.

b. The interior portion of the wall will receive 2 coats of approved food grade water proofing solution.

c. All other concrete is cured with the specification of an approved curing compound.

5.9 Sealant (cleanup)

a. one of the operations prior to testing and disinfecting is the application of sealant. Prior to removing the sealant groove from, the reservoir should be cleaned by sweeping to prevent dirt from going into the construction joint after the groove from has been removed. In removing form, care must be exercised so the edges of the joint do not spell off creating an oversized joint at that location. Ends of nails, which held the form in place, must be cut off. The joint should then be inspected for any cracks or spells which have occurred and the loose concrete removed as this will create a possible leak area for which sealant will give no protection. During the reservoir construction, inspection is made to locate cracks. The sealant groove is then cleaned by careful sandblasting to remove all laitance on the concrete after which it is blown clean with high pressure air. Clean up of the floor should be a continual operation during this period and after sandblasting to prevent unwanted dirt and sand from entering the joint.

b. Following sandblasting a primer is thoroughly applied to the concrete and allowed to dry all in accordance with the manufacturer's literature. Joints must be filled with sealant. Fillers or backups are not allowed.

c. Water should not be placed on the sealant until it has cured for at least 7 days.

d. Apply Bitumen paint on the wall around the reservoir (outside) from the bottom of concrete up to 100mm above the finish ground line.

6. ROOF

6.1 Shoring

a. It is the contractor's responsibility to design and assure the safety of the roof shoring. Shoring towers are bearing uniformly at their based and that no sliding or shifting can occur, that nailing or fastening has been done properly and that the materials being be used are good quality, free of determined knots, splits, etc.

6.2 Forms

a. Only plywood forms can be used for roof forming. Maintenance and oiling of the forms should be completed prior to their installation. Special care should be taken to make sure joints are tight as a small open form joints can cause a lot of grout leakages creating a "sanded" joints. When forming the drop head for the column, chamfer strips should be installed at the vertical and horizontal corners.

6.3 Reinforcing Steel

a. Rebar for the roof should be installed so the placement so the placement tolerance is such that the concrete cover is no less than specified but may be up to and not exceeding 1/4" more. Precautions in walking on steel dowels, similar to that floor slab, should be observed.

b. Many other procedure are similar to the floor slab construction such as placing water stop, checker-board pattern in placing concrete, placing concrete around water stop, applying board breaker, the method of cure and cleaning laitance from the column construction joint.

6.4 Form Removal

a. Removal of roof forms. Is the Roof concrete have reached strength of at least 2,500 psi in the roof slab forms are permitted to be removed plus 2,500 psi in the adjacent roof slabs. Test cylinders should be made at the time the first wall panels are cast to establish when the concrete will reach this strength. When removing the plywood form or shoring, it should not be dropped to the floor as this will cause chips and damage to the concrete floor that will have to be repaired. Overhanging edges of the roof slab should never be allowed to be unsupported. Normally, effective support would be headers supported on wood post.

6.5 Curing

a. Similar to floor slab for exposed concrete

C. OTHER WOKS

D. The work consist of the supply of materials, installation and other works necessary for the commissioning and documentation of the project.

E. No installation of valves, fittings and other appurtenance included in this project shall commence without verification on its compliance to specifications and approval of the assigned PolWD representative (Project Inspectors/ Project Engineer)

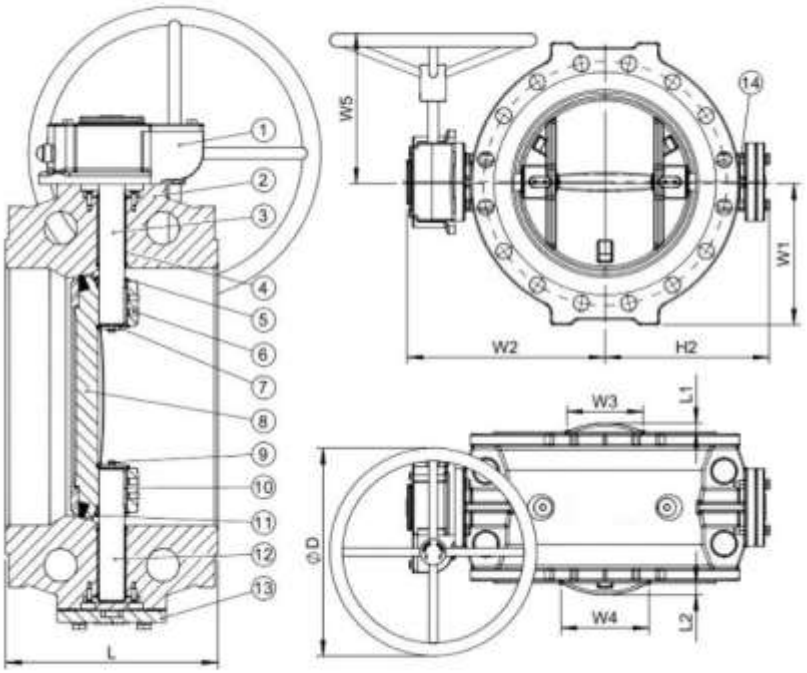
1. C.I. GATE VALVES & BUTTERFLY GATE VALVES

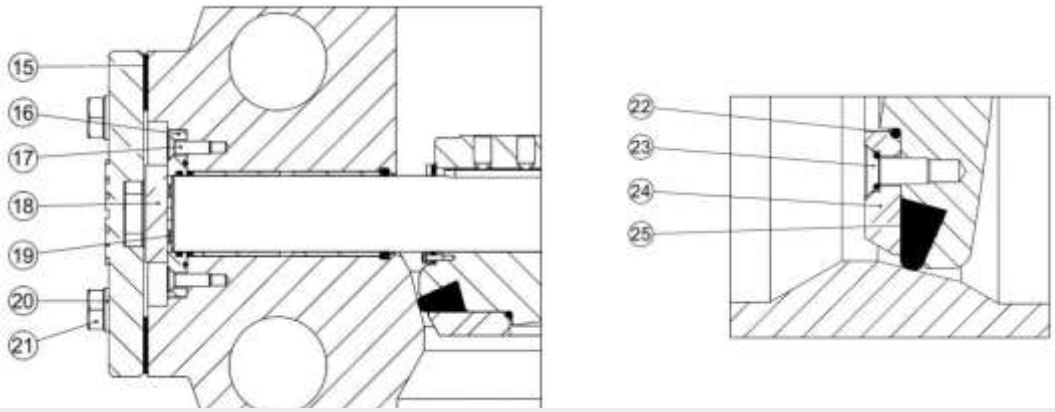
DOUBLE ECCENTRIC BUTTERFLY VALVE

Gearbox	Cast iron	
2.	Body	Ductile iron
3.	Shaft, drive	Stainless steel 420
4.	Bearing	Bronze/PTFE composite
5.	Cover	Stainless steel
6.	Set screw	Stainless steel A2
7.	End cover	Stainless steel
8.	Disk	Ductile iron
9.	Key	Stainless steel A2
10.	Gasket	Stainless steel A2
11.	Screw	Stainless steel A2
12.	Shaft, stub	Stainless steel 420
13.	End plate	Ductile iron
14.	Nut	Stainless steel A2

15.	Gasket	EPDM rubber
16.	Spacer	Bronze
17.	Screw	Stainless steel A2
18.	Thrust bearing	Bronze
19.	Screw	Stainless steel A2
20.	Washer	Stainless steel A2
21.	Bolt	Stainless steel A2
22.	O-ring	EPDM rubber
23.	Screw	Stainless steel A2
24.	Seal retainer ring	Steel
25.	Seal ring	EPDM rubber

Components

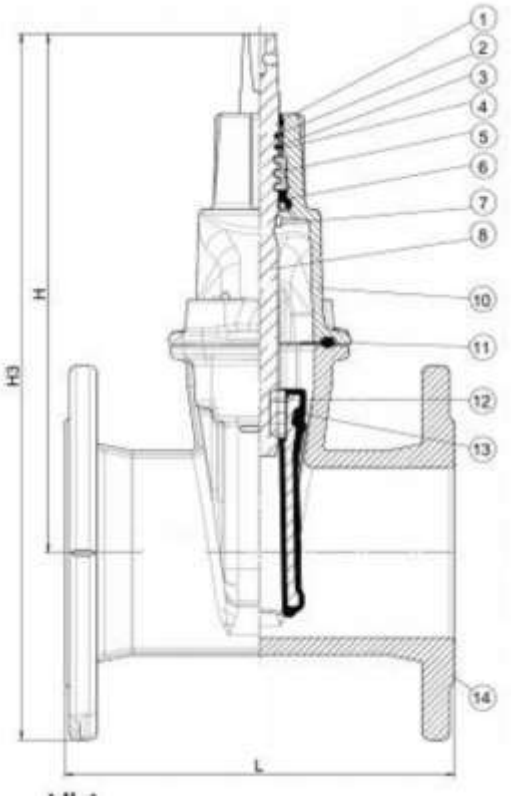


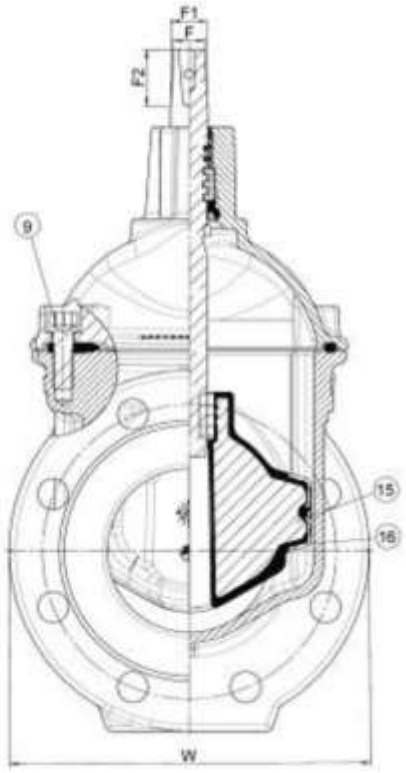


C.I. GATE VALVE / F/F

- Fixed, integral wedge nut prevents vibration and ensures durability.
- The ductile iron core is fully vulcanized with drinking water approved EPDM rubber, no iron parts are exposed to the medium and the excellent rubber vulcanization prevents creeping corrosion underneath the rubber.
- Guides in the wedge and on the valve body ensure a uniform closure, safe operation and prevent overloading of the stem.
- The wedge has a large through bore with room for the stem, completely free of hollows or cavities where stagnant water or impurities could collect and cause contamination.
- Stainless steel stem with wedge stop and rolled threads for high strength.
- Full circle brass thrust collar provides fixation of the stem and low free running torque.
- Triple stem seal system with an NBR wiper ring protecting against impurities from outside, a polyamide radial bearing with four NBR O-rings and innermost an EPDM rubber lip seal as the main hydraulic seal to the flow.
- Round bonnet gasket fixed in a recess groove in the bonnet preventing it from being blown out by pressure surges.
- Counter bored and hot-melt sealed bonnet bolts encircled by the bonnet gasket ensures no risk of corrosion.
- Full bore.
- Epoxy coating to DIN 30677-2, GSK approved.

1.	Wiper ring	NBR rubber
2.	O-ring	NBR rubber
3.	O-ring	NBR rubber
4.	Bushing	Polyamide
5.	Thrust collar	Brass
6.	Manchette	EPDM rubber
7.	Stop ring	Stainless steel
8.	Stem	Stainless steel
9.	Bonnet bolt	Stainless steel A2
10.	Bonnet	Ductile iron
11.	Bonnet gasket	EPDM rubber
12.	Wedge nut	Brass
13.	Wedge rubber	EPDM rubber
14.	Body	Ductile iron
15.	Wedge core	Ductile iron
16.	Wedge shoe	Polyamide





Approved according to WRAS Certificate

Hydraulic test according to EN 1074-1 and 2 / EN 12266

3. <u>SLEEVE-TYPE COUPLING</u>

a.	Coupling	:	Cast Iron / Ductile Iron
b.	Gasket	:	SBR Rubber
c.	Flange	:	Cast Iron / Ductile Iron
d.	Type	:	Sleeve Type
e.	Bolt & Nut	:	Hot Dip Galvanized Iron (Flange Type)
f.	Color	:	Black / Blue
g.	Coating	:	Epoxy Coated (Internal and External)

Sleeve Diameter (mm)	Pipe Outside Diameter	Min. No of Bolt & Size (mm)	Minimum Coupling Length (mm)
350 (14'' Ø)	365	8-14mm	150
200 (12'' Ø)	160	8-14mm	150
150 (6'' Ø)	160	8-12mm	150

4. ALTITUDE VALVES

SPECIFICATIONS of ONE (1) WAY ALTITUDE VALVE	
Technical Data:	
Main Valve	
1. Nominal Sizes	150mm diameter
	200mm diameter
	250mm diameter
2. Main Valve Pattern	Globe {Straight Flow)
3. Body and Bonnet Material	Ductile Iron
4. Body Coating	Epoxy
5. Connection Type	Flange type {ISO 2084/ 2441/ 5752)
6. Position Indicator	Stainless Steel 316

7. Valve Disk Holder	Ductile Iron
8. Body/Bonnet Bolt & Nuts	Stainless Steel 304
9. Drain Plug	Stainless Steel 316
10. Spring	Stainless Steel 302
11. Seat	Stainless Steel 316
12. Guide	Brass or Bronze
13. Stem	Stainless Steel 420
14. O Rings	Elastomer EPDM
15. Diaphragm	EPDM/ Reinforced Elastomer
Pilot Circuit	
16. Isolating Valve	Nickel plated Copper Alloy
17. Opening Speed Controller	Copper-alloy+Stainless Steel+EPDM
18. Strainer with G 3/8 Screen	Bronze+Copper-alloy+Stainless Steel
19. 3/8” Altitude Pilot Valve Material	Bronze
20. Tubing and Fittings	Stainless Steel 316
21. Spring: 1.5 to 8 Mwh	Stainless Steel or steel

6 to 30 mWH*	
Main Valve Features:	
1. 25 bar maximum pressure rating {PN25).	
2. Include isolating cocks for pressure gauges {inlet and outlet) .	
3. All moving parts and seat made entirely from Stainless Steel 316	
4. Valve components must be accessible and serviceable without removing the valve from the pipeline.	
5. Visual Position Indicator with high resistance glass	
6. Includes drain plug in the body.	
Pilot Circuit Features:	
1. Consists of 3 isolating cocks (inlet. chamber, and outlet} for easy maintenance.	
2. Includes strainer or filter.	
3. Outlet pressure is adjustable from 1.5 to 8 mWH with one spring only.	
4. Equipped with opening/closing speed controller.	
5. Leak-tightness at zero flow rate.	
6. Circuit and components entirely made of Stainless Steel 316.	
Performance:	
1. The valve prevents overflowing and closes at a constant and adjustable level.	
2. The use of a pilot with a wide diaphragm guarantees excellent operating accuracy (the closing level remains within ± 10 cm of the set value).	
3. Fully opens at a low level, below the low level range.	
4. Balances the inlet flow rate and the outlet flow rate till approximately 0.40m to 0.50m below the top level	

Required/Standard Markings: ***(Compliance upon Delivery)***
▪ Standard product name plate attached to the valve body containing applicable information such as brand name, serial number, model, pressure rating, etc.
▪ Manufacturer's Name/Logo (embossed) (DTI Standard)
▪ Nominal Size in mm (embossed) (DTI Standard}
Additional Requirements:
▪ Warranty must be minimum of one (1) year from date of acceptance.
▪ Contractor / Supplier must submit brochures/product catalog containing Technical Data, Design Specifications, Characteristic and Performance, Shop Drawings, and other pertinent information of the product.
▪ Training and commissioning for installation is included, pressure setting, and maintenance of the product is included. *(Compliance upon Delivery)*
▪ Each valve is tested according to ISO 5208-2. *(Winning bidder must submit test result/testing certificate of the offered product /item. Compliance upon delivery)*
▪ Product Supplier must issue a Statement of Aftersales service that contains a statement to provide a competent and qualified Service Engineer within 24 hours for technical repair / assistance after receipt of request/call from the Water District within the period of warranty.
▪ At least 10 years warranty on valves and butterfly valves.

Section VII. Drawings

INTENT OF SPECIFICATIONS AND DRAWINGS

a. The intent of the Specifications and Drawings is that the Contractor shall furnish all the required plan, labor materials, equipment and services unless otherwise specifically provided.

b. The Specifications and Drawings are complementary and what is called for in one shall be as binding as if called for in both.

c. Any discrepancies, errors, or omissions found in the Specification or Drawings shall be reported in writing with ten (10) days from discovery to the Engineer who will issue the correction in writing within the same period. The Contractor shall not take advantage of any such discrepancies, errors, or missions, but shall comply with any corrective measures regarding the same prescribed by the Engineer.

d. In case of conflict between the Specification and the Drawings, inform the Engineer and the Owner for clarifications.

2. SHOP DRAWING

a. Whenever called for in these Specifications or on the Drawings, or where required by the Engineer, the Contractor shall furnish the Owner for review three (3) prints of each shop drawing. The term “Shop drawing” as used herein shall be understood to include detail design calculations, fabrications and installation drawings, list, graphs, operation instruction, etc. Shop drawings shall be submitted to the Owner for review / approval within fifteen (15) days from receipt of the Notice of Award, unless otherwise extended in writing by the Owner.

b. All shop drawings submittals shall be accompanied by a transmittal from using the format bound with the Contract Documents, if one is included. Any shop drawing submittal not accompanied by such a form, or where all applicable items on the form are not completed, will be returned for re-submittal. The Contractor may authorized a material or equipment supplier to deal directly with the Owner with regard to shop drawings, however, ultimate responsibility for the accuracy and completeness of the information contained in the submittal shall remain with the Contractor.

c. A separate transmitted form shall be used for each specific item or class material or equipment for which a submittal is required. Transmitted of shop drawings on various items using a single transmittal form will be permitted only when items taken together constitute a manufacturer’s “package” or are so functionally related that expediency indicates review of the group or package as a whole. At his option, the Contractor or Supplier may obtain from the Owner qualities of the shop drawings transmittal form at reproduction cost.

d. Within five (5) calendar days after receipt of said prints, the Owner will return prints of each drawing to the Concrete to the Contractor with his comments noted thereon. Whenever a re-submittal is required, the Contractor shall make a complete and acceptable submittal to the Owner within ten (10) days from receipt of the returned shop drawings. Non-compliance hereof will gives rise to the Owner's right to either (a) cancel the award; or (b) withhold the money due the Contractor to cover additional costs of the Engineer's review beyond the second submission. Such failure may be considered a factor against the Contractor's competences in future bidding to be conducted by the Owner.

e. If three (3) prints of the drawings are returned to the Contractor marked "NO EXCEPTION TAKEN", formal revision of said drawings will not be required.

f. If three (3) prints of the drawings are returned to the Contractor marked "MAKE CORRECTION NOTED", formal revision of said drawings will not be required.

g. If one (1) print of the drawings is returned to the Contractor marked "AMEND-RESUBMIT", THE Contractor shall revise the said drawing and shall resubmit eight (8) copies of said revised drawing to the Owner.

h. If one (1) print of the drawings is returned to the Contractor marked "REJECTED-RESUBMIT", the Contractor shall revise the drawing and shall resubmit eight (8) copies of said revised drawing to the Owner.

i. Fabrication of an item shall not be commend before the Owner has reviewed / examined the pertinent shop drawings and returned copies to the Supplier marked either "NO EXEPTION TAKEN" or "MAKE CORRECTIONS NOTED". Revisions indicated on shop drawings shall be considered as changes necessary to meet the requirements of the Contract Drawings and Specification and shall not be taken as the basis of claims for extra work. The Contractor shall have no claim for damages or extension of time due to any delay resulting from the Contractor having to make the required revisions to shop drawings (Unless reviewed by the Owner of said drawings is delayed beyond a reasonable period of time and unless the Contractor can established that the Owner's delay in review actually resulted in the delay in the Contractor's Construction Schedule). The review of said drawings by the Owner will be limited to checking for general agreement with the specifications and drawings, and shall in no way relieve the Contractor of the responsibility for errors or omissions contained therein nor shall review operate to waive or modify and provision contained in Specifications or Contractor Drawings. Fabricating dimensions, quantities of material, applicable code requirements shall be the Contractor's responsibility.

3. REFERENCE TO STANDARDS OR PUBLICATIONS

Any reference in the Specifications or Drawings to any specification, standard or publication of any organization shall, in the absence of a specific designation to the contrary, be understood to refer to the latest edition of the specification, standard or publication in effect as of the date of advertising the work. Internationally accepted standards equal to or better than specified standards or specifications are acceptable.

4. REFERENCE TO PROPRIETARY PRODUCTS

Where references to proprietary products appear in the Specifications or Drawings, it in for the purpose of establishing an acceptable standard of quality or design but no guarantee is given that said referenced manufacturer's products will meet all contact requirements without modifications. Unless a substitute is expressly prohibited, the Contractor may request approval of a substitute for any such proprietary product. Such request must be in writing and must include descriptive literature, specifications, test reports of samples, as appropriate, to enable the Owner to determine the acceptability of the product proposed for substitution. No substitute product shall be used in the work until written approval has been received from the Owner. All costs involved in making laboratory test of the sample submitted as substitute for the specified materials shall be borne by the Contractor.

5. SPECIFICATIONS AND DRAWINGS FURNISHED TO CONTRACTOR

The Owner will furnish the Contractor with two (2) sets of Specifications together with reduced drawings (if any) and two (2) sets full-scale Drawings. Additional quantities of Specifications and Drawings will be furnished at reproduction cost.

6. AS-BUILT DRAWINGS

The Contractor shall maintain at least one (1) set of blueprints of all works at the job site. These prints shall be marked and updated to indicate current job-progress and shall show deviations from the construction drawings. After final inspection, the Contractor shall transfer all as-built information to a set of reproducible tracings that shall be delivered to the Engineer prior to acceptance of the project.

Section VIII. Bill of Quantities

Notes on the Bill of Quantities

Objectives

The objectives of the Bill of Quantities are:

a. to provide sufficient information on the quantities of Works to be performed to enable Bids to be prepared efficiently and accurately; and

b. when a Contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed.

In order to attain these objectives, Works should be itemized in the Bill of Quantities in sufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried out in different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the Bill of Quantities should be as simple and brief as possible.

Daywork Schedule

A Daywork Schedule should be included only if the probability of unforeseen work, outside the items included in the Bill of Quantities, is high. To facilitate checking by the Entity of the realism of rates quoted by the Bidders, the Daywork Schedule should normally comprise the following:

a. A list of the various classes of labor, materials, and Constructional Plant for which basic daywork rates or prices are to be inserted by the Bidder, together with a statement of the conditions under which the Contractor will be paid for work executed on a daywork basis.

b. Nominal quantities for each item of Daywork, to be priced by each Bidder at Daywork rates as Bid. The rate to be entered by the Bidder against each basic Daywork item should include the Contractor's profit, overheads, supervision, and other charges.

Provisional Sums

A general provision for physical contingencies (quantity overruns) may be made by including a provisional sum in the Summary Bill of Quantities. Similarly, a contingency allowance for possible price increases should be provided as a provisional sum in the Summary Bill of Quantities. The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises. Where such provisional sums or contingency allowances are used, the SCC should state the manner in which they will be used, and under whose authority (usually the Procuring Entity's Representative's).

The estimated cost of specialized work to be carried out, or of special goods to be supplied, by other contractors should be indicated in the relevant part of the Bill of Quantities as a particular provisional sum with an appropriate brief description. A separate procurement procedure is normally carried out by the Procuring Entity to select such specialized contractors. To provide an element of competition among the Bidders in respect of any facilities, amenities, attendance, etc., to be provided by the successful Bidder as prime Contractor for the use and convenience of the specialist contractors, each related provisional sum should be followed by an item in the Bill of Quantities inviting the Bidder to quote a sum for such amenities, facilities, attendance, etc.

Signature Box

A signature box shall be added at the bottom of each page of the Bill of Quantities where the authorized representative of the Bidder shall affix his signature. Failure of the authorized representative to sign each and every page of the Bill of Quantities shall be a cause for rejection of his bid.

These Notes for Preparing a Bill of Quantities are intended only as information for the Procuring Entity or the person drafting the Bidding Documents. They should not be included in the final documents.

Section VIII. Bill of Quantities

NO.	WORK ITEM	QUANTITY	UNIT
A	General Requirements		
	1. Mobilization and Demobilization	**1**	lump sum
	2. Health & Safety	**1**	lump sum
	3. Project Sign	**1**	lump sum
	4. Site Development	**1**	lump sum
B	Earthworks	**1**	lot
C	Concrete Works	**1**	lot
D	Scaffolding and Farmworks (Scaffolding and Formworks – for bid bulletin)	**1**	lot
E	Miscellaneous and Metal Works	**1**	lot
F	Valve Box Chambers	**1**	lot
G	Pipes and Fittings	**1**	lot
H	Disinfections & Hydrotesting	**1**	lot
I	Material Testing	**1**	lot
J	Painting Works	**1**	lot
K	Construction of Test Pit	**1**	lot

Section IX. Checklist of Technical and Financial Documents

Notes on the Checklist of Technical and Financial Documents

The prescribed documents in the checklist are mandatory to be submitted in the Bid, but shall be subject to the following:

a. GPPB Resolution No. 09-2020 on the efficient procurement measures during a State of Calamity or other similar issuances that shall allow the use of alternate documents in lieu of the mandated requirements; or

b. any subsequent GPPB issuances adjusting the documentary requirements after the effectivity of the adoption of the PBDs.

The BAC shall be checking the submitted documents of each Bidder against this checklist to ascertain if they are all present, using a non-discretionary "pass/fail" criterion pursuant to Section 30 of the 2016 revised IRR of RA No. 9184.

Checklist of Technical and Financial Documents

I. TECHNICAL COMPONENT ENVELOPE

Class "A" Documents

Legal Documents

☐ (a) Valid PhilGEPS Registration Certificate (Platinum Membership) (all pages);
or

☐ (b) 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;
and

☐ (c) Mayor's or Business permit issued by the city or municipality where the principal place of business of the prospective bidder is located, or the equivalent document for Exclusive Economic Zones or Areas;
and

☐ (e) Tax clearance per E.O. No. 398, s. 2005, as finally reviewed and approved by the Bureau of Internal Revenue (BIR).

Technical Documents

☐ (f) Statement of the prospective bidder of all its ongoing government and private contracts, including contracts awarded but not yet started, if any, whether similar or not similar in nature and complexity to the contract to be bid; **and**

☐ (g) Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid, except under conditions provided under the rules;
and

☐ (h) Philippine Contractors Accreditation Board (PCAB) License;
or
Special PCAB License in case of Joint Ventures;
and registration for the type and cost of the contract to be bid; **and**

☐ (i) Original copy of Bid Security. If in the form of a Surety Bond, submit also a certification issued by the Insurance Commission;
or
Original copy of Notarized Bid Securing Declaration; **and**

(j) Project Requirements, which shall include the following:

☐ a. Organizational chart for the contract to be bid;

☐ b. List of contractor's key personnel (*e.g.*, Project Manager, Project Engineers, Materials Engineers, and Foremen), to be assigned to the contract to be bid, with their complete qualification and experience data;

☐ c. 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 may be; **and**

☐ (k) Original duly signed Omnibus Sworn Statement (OSS);

and if applicable, Original Notarized Secretary's Certificate in case of a corporation, partnership, or cooperative; or Original Special Power of Attorney of all members of the joint venture giving full power and authority to its officer to sign the OSS and do acts to represent the Bidder.

Financial Documents

☐ (l) The prospective bidder's audited financial statements, showing, among others, the prospective bidder's total and current assets and liabilities, stamped "received" by the BIR or its duly accredited and authorized institutions, for the preceding calendar year which should not be earlier than two (2) years from the date of bid submission; **and**

☐ (m) The prospective bidder's computation of Net Financial Contracting Capacity (NFCC).

Class "B" Documents

☐ (n) If applicable, duly signed joint venture agreement (JVA) in accordance with RA No. 4566 and its IRR in case the joint venture is already in existence;
or
duly notarized statements from all the potential joint venture partners stating that they will enter into and abide by the provisions of the JVA in the instance that the bid is successful.

II. FINANCIAL COMPONENT ENVELOPE

☐ (o) Original of duly signed and accomplished Financial Bid Form; **and**

Other documentary requirements under RA No. 9184

☐ (p) Original of duly signed Bid Prices in the Bill of Quantities; **and**

☐ (q) Duly accomplished Detailed Estimates Form, including a summary shee indicating the unit prices of construction materials, labor rates, and equipmen rentals used in coming up with the Bid; **and**

☐ (r) Cash Flow by Quarter.