



REPUBLIC OF THE PHILIPPINES
NATIONAL POWER CORPORATION
(Pambansang Korporasyon sa Elektrisidad)

BID DOCUMENTS

Name of Project : CONSTRUCTION OF STAFFHOUSE, WAREHOUSE,
FOST AND OTHER FACILITIES IN BALABAC DPP

Location : BRGY I, POBLACION, BALABAC PALAWAN

Specs No. : LuzP21Z1326Sc

PR Number : S1 - BAL22 - 011

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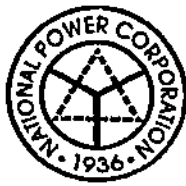
Design and Development Department



SECTION I

INVITATION TO BID





National Power Corporation

INVITATION TO BID

PUBLIC BIDDING – BCS 2022-0440

1. The NATIONAL POWER CORPORATION (NPC), through its approved Corporate Budget of CY 2022 intends to apply the sum of **(Please see schedule below)** being the Approved Budget for the Contract (ABC) to payments under the contract. Bids received in excess of the ABC shall be automatically rejected at Bid opening.

PR Nos./PB Ref No. & Description	Similar Contracts	Pre-bid Conference	Bid Submission / Opening	ABC/ Amt. of Bid Docs
<p>S1-END22-003 / PB220725-NA</p> <p>Lease of 2.0 MW Modular Diesel Gensets for El Nido DPP, El Nido, Palawan</p>	<p>Lease of Modular Diesel Generating Sets or Operation and Maintenance (O & M) of Diesel Generating Sets</p>	<p>13 July 2022 9:30 A.M</p>	<p>25 July 2022 9:30 A.M</p>	<p>P 30,748,000.00 / P 25,000.00</p>
<p>S1-MQN22-002 / PB220301-SV (PB3)</p> <p>Supply and Delivery of Consolidated Generator Controllers and AVRS of Various MQNLOD Power Plants</p>	<p>Supply and Delivery of Controllers and AVRS for Diesel Generating Sets</p>	<p>13 July 2022 9:30 A.M</p>	<p>25 July 2022 9:30 A.M</p>	<p>P 5,340,000.00 / P 10,000.00</p>
<p>S1-TOR22-001 / PB220627- AD00196 (PB2)</p> <p>Supply, Delivery, Installation and Test of 1 x 200 KL FOST including Construction of Containment Wall for Existing FOST and Associated Facilities for Torrijos DPP</p> <p>• PCAB License: License Category of at least “Category D – General Building” and registration classification of at least “Small B – Mechanical Works”</p>	<p>Construction of Fuel Oil Storage Tank or Water Storage Tank Including its Concrete Foundation and Associated Works with Capacity of not less 200 cu.m</p>	<p>13 July 2022 9:30 A.M</p>	<p>25 July 2022 9:30 A.M</p>	<p>P 8,276,000.00 / P 10,000.00</p>

<p>S1-BAL22-011 / PB220725-AD</p> <p>Construction of Staff House, Warehouse, FOST and Other Facilities in Balabac DPP, Balabac, Palawan</p> <p>• PCAB License: License Category of at least "Category D – General Building" and registration classification of at least "Small B – Building and Industrial Plant"</p>	<p>Construction of Industrial, Office, Residential, Storage or Commercial Building</p>	<p>13 July 2022 9:30 A.M</p>	<p>25 July 2022 9:30 A.M</p>	<p>₱ 9,568,800.00 / ₱ 10,000.00</p>
<p>S1-NPS22-019 / PB220725-AD</p> <p>Construction of Office and Staff House at Roxas Substation (NPSSTL), Roxas, Palawan</p> <p>• PCAB License: License Category of at least "Category D – General Building" and registration classification of at least "Small A – Building and Industrial Plant"</p>	<p>Construction of Industrial, Office, Residential, Storage or Commercial Building</p>	<p>13 July 2022 9:30 A.M</p>	<p>25 July 2022 9:30 A.M</p>	<p>₱ 2,800,000.00 / ₱ 5,000.00</p>
<p align="center">Venue: Kañao Function Room, NPC Bldg. Diliman, Quezon City</p>				

2. The NPC now invites bids for Items listed above. Delivery of the Goods is required (see table below) specified in the Technical Specifications. Bidders should have completed, within (see table below) from the date of submission and receipt of bids, a contract similar to the Project. The description of an eligible bidder is contained in the Bidding Documents, particularly, in Section II. (Instruction to Bidders).

PR No/s. / PB Ref No/s.	Delivery Period / Contract Duration	Relevant Period of SLCC reckoned from the date of submission & receipt of bids
S1-END22-003	Twelve (12) Months – Maximum Six (6) Months – Minimum	Ten (10) Years
S1-MQN22-002	Ninety (90) Calendar Days	Ten (10) Years
S1-TOR22-001	One Hundred Eighty (180) Calendar Days	-
S1-BAL22-011	One Hundred Forty (140) Calendar Days	-
S1-NPS22-019	Seventy-Five (75) Calendar Days	-

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) No. 9184.

Bidding is restricted to Filipino citizens/sole proprietorships, partnerships, or organizations with at least sixty percent (60%) interest or outstanding capital stock belonging to citizens of the Philippines, and to citizens or organizations of a country the laws or regulations of which grant similar rights or privileges to Filipino citizens, pursuant to RA 5183.

4. Prospective Bidders may obtain further information from National Power Corporation, Bids and Contracts Services Division and inspect the Bidding Documents at the address given below during office hours (8:00AM to 5:00PM), Monday to Friday.
5. A complete set of Bidding Documents may be acquired by interested Bidders from the given address and website(s) and upon payment of the applicable fee for the Bidding Documents, pursuant to the latest Guidelines issued by the GPPB. Bidding fee may be refunded in accordance with the guidelines based on the grounds provided under Section 41 of R.A. 9184 and its Revised IRR.
6. The National Power Corporation will hold Pre-Bid Conference (see table above) and/or through video conferencing or webcasting which shall be open to prospective bidders.

Only registered bidder/s shall be allowed to participate for the conduct of virtual pre-bid conference. **Unregistered bidders** may attend the Pre-Bid Conference at the Kañao Room, NPC subject to the following:

- a. Only a maximum of two (2) representatives from each bidder / company shall be allowed to participate during the virtual pre-bid conference.
 - b. A "No Face mask / No Entry" policy shall be implemented in the NPC premises. Face mask shall be 3-ply surgical or KN95 mask type.
 - c. The requirements herein stated including the medium of submission shall be subject to GPPB Resolution No. 09-2020 dated 07 May 2020
 - d. The Guidelines on the Implementation of Early Procurement Activities (EPA) shall be subject to GPPB Circular No. 06-2019 dated 17 July 2019
7. Bids must be duly received by the BAC Secretariat through (i) manual submission at the office address indicated below; (ii) online or electronic submission before the specified time stated in the table above for opening of bids. Late bids shall not be accepted.
 8. All Bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in ITB Clause 14.
 9. Bid opening shall be on Kañao Function Room, NPC Head Office, Diliman, Quezon City and/or via online platform to be announced by NPC. Bids will be opened in the presence of the bidders' representatives who choose to attend the activity.
 10. The National Power Corporation reserves the right to reject any and all bids, declare a failure of bidding, or not award the contract at any time prior to contract award in accordance with Sections 35.6 and 41 of the 2016 revised IRR of R.A. No. 9184, without thereby incurring any liability to the affected bidder or bidders.

11. For further information, please refer to:

**Bids and Contracts Services Division,
Logistics Department**

BIR Road cor. Quezon Avenue

Diliman, Quezon City

Tel Nos.: 8924-5211 and 8921-3541 local 5611/5361/5504

Fax No.: 8922-1622

Email: bcsd@napocor.gov.ph / bcsd_napocor@yahoo.com

12. You may visit the following websites:

For downloading of Bidding Documents: <https://www.napocor.gov.ph/bcsd/bids.php>



RENE B. BARRUELA

Vice President, Corporate Affairs Group and
Chairman, Bids and Awards Committee

SECTION II

INSTRUCTION TO BIDDERS



SECTION II - INSTRUCTIONS TO BIDDERS

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SECTION II - INSTRUCTIONS TO BIDDERS

1. Scope of Bid

NPC invites Bids for the **CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP**, with Project Identification Number **LuzP21Z1326Sc**.

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

2. Funding Information

The GOP through the source of funding as indicated below for CY 2021 in the amount specified in the Invitation to Bid. The source of funding is the proposed Corporate Operating Budget of the National Power Corporation (NPC).

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.
- 7.1. The Bidder must submit together with its Bid the documentary requirements of the subcontractor(s) complying with the eligibility criteria stated in ITB Clause 5 in accordance with Section 23.4 of the 2016 revised IRR of RA No. 9184 pursuant to Section 23.1 thereof.
- 7.2. Subcontracting of any portion of the Project does not relieve the Contractor of any liability or obligation under the Contract. The Supplier will be responsible for the acts, defaults, and negligence of any subcontractor, its agents, servants, or workmen as fully as if these were the Contractor's own acts, defaults, or negligence, or those of its agents, servants, or workmen.

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 Form NPCSF-INFR-01 - Checklist of Technical and Financial Documents, Section VIII - Bidding Forms.

- 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 **Form NPCSF-INFR-01 - Checklist of Technical and Financial Documents, Section VIII - Bidding Forms**.
- 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 (120) calendar days** from the date of 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 15 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



SECTION III - BID DATA SHEET

ITB Clause	
5.2	<p>For this purpose, contracts similar to the Project refer to contracts which have the same major categories of work, which shall be projects involving construction of industrial building, office, residential, storage or commercial building.</p> <p>The Single Largest Completed Contract (SLCC) as declared by the bidder shall be verified and validated to ascertain such completed contract. Hence, bidders must ensure access to sites of such projects/equipment to NPC representatives for verification and validation purposes during post-qualification process.</p> <p>It shall be a ground for disqualification, if verification and validation cannot be conducted for reasons attributable to the Bidder.</p>
7.1	<p>Only a maximum of fifty percent (50%) of the Works may be subcontracted. All Subcontractors must be approved by NPC.</p>
10.1	<p>The list of on-going contracts (Form No. NPCSF-INFR-02) shall be supported by the following documents for each on-going contract to be submitted during Post-Qualification:</p> <ol style="list-style-type: none"> 1. Contract/Purchase Order and/or Notice of Award 2. Certification coming from the project owner/client that the performance is satisfactory as of the bidding date. <p>The bidder shall declare in this form all his on-going government and private contracts including contracts where the bidder (either as individual or as a Joint Venture) is a partner in a Joint Venture agreement other than his current joint venture where he is a partner. Non declaration will be a ground for disqualification of bid.</p>
	<p>The Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid (Form No. NPCSF-INFR-03) shall be supported by the following documents to be submitted during Bid Opening:</p> <ol style="list-style-type: none"> 1. Contract/Purchase Order 2. Owner's Certificate of Final Acceptance issued by the project owner other than the contractor or a final rating of at least Satisfactory in the Constructors Performance Evaluation System (CPES). In case of contracts with the private sector, an equivalent document (Ex. Official Receipt or Sales Invoice) shall be submitted.
10.3	<p>The required License issued by the Philippine Contractors Accreditation Board (PCAB) shall be License Category of at least "CATEGORY D – GENERAL BUILDING" and registration classification of at least "SMALL B – BUILDING OR INDUSTRIAL PLANT".</p>

<p>10.4</p>	<p>The list of key personnel shall include the following minimum requirements:</p> <p>a. One (1) Project Engineer</p> <p>Registered Civil Engineer who had supervised at least a project similar in nature as to the type and cost of the proposed project within the last 10 years. Must have at least 3 years professional experience as Civil Engineer on similar project.</p> <p>b. One (1) Materials Engineer</p> <p>Registered Civil Engineer with valid accreditation from the Department of Public Works and Highways (DPWH) as Materials Engineer I</p> <p>c. One (1) Safety Officer 2</p> <p>Construction Safety Officer who has completed at least forty (40) hours of Construction Safety and Health Training (COSH) from Occupational Safety and Health Center (OSHC) or Safety Training Organizations (STOs) accredited by the Department of Labor and Employment (DOLE)</p> <p>Valid Professional Regulations Commission (PRC) license for professional personnel, Construction Safety and Health Training Certificate from OSHC/STOs accredited by DOLE for the Safety Officer, certificate of accreditation including ID card issued by DPWH for Materials Engineer, shall be submitted and included as an attachment in the Standard Form NPCSF-INFR-09: List of Key Personnel Proposed to be Assign to the Contract.</p> <p>The above key personnel must either be employed by the Bidder or contracted by the Bidder to be employed for the contract to be bid.</p>												
<p>10.5</p>	<p>The list of construction equipment (owned or leased) shall include the following minimum requirements:</p> <table border="0"> <tr> <td>1. Welding Machine</td> <td>-</td> <td>1 unit</td> </tr> <tr> <td>2. Concrete Mixer (at least 1 bagger)</td> <td>-</td> <td>1 unit</td> </tr> <tr> <td>3. OxyAcetylene cutting outfit</td> <td>-</td> <td>1 unit</td> </tr> <tr> <td>4. Bar Cutter (25 mm Φ) capable</td> <td>-</td> <td>1 unit</td> </tr> </table>	1. Welding Machine	-	1 unit	2. Concrete Mixer (at least 1 bagger)	-	1 unit	3. OxyAcetylene cutting outfit	-	1 unit	4. Bar Cutter (25 mm Φ) capable	-	1 unit
1. Welding Machine	-	1 unit											
2. Concrete Mixer (at least 1 bagger)	-	1 unit											
3. OxyAcetylene cutting outfit	-	1 unit											
4. Bar Cutter (25 mm Φ) capable	-	1 unit											
<p>10.6</p>	<p>Bidders shall also submit the following requirements in their first envelope, Eligibility and Technical Component of their bid:</p> <p>1. Duly signed and completely filled-out Technical Data Sheets (Mechanical Works) – Section VI – Part II (MW)</p> <p>Manufacturer's brochures, manuals and other supporting documents of equipment, materials, hardware and tools proposed by the bidders must comply with the technical specifications of such equipment, materials, hardware and tools. It shall be a ground for disqualification if the submitted brochures, manuals and other supporting documents are determined not complying with the specifications during technical evaluation and post-qualification process.</p> <p>Equipment, materials, hardware and tools proposed by the winning bidder to be supplied, which were evaluated to be complying with the technical specifications, shall not be replaced and must be the same items to be delivered/installed/used during the contract implementation. Any proposed changes/replacement of said items may be allowed on</p>												

	<p>meritorious reasons subject to validation and prior approval by NPC.</p> <p>2. Complete eligibility documents of the proposed sub-contractor, if any</p>
10.7	<p>The prospective bidders shall declare its Joint Venture partner during the purchase of bid/tender documents. Any single bidder/s who already procured/secured the bidding documents but want to avail the Joint Venture Agreement (JVA) shall inform the BAC in writing prior to the bid opening for records and documentation purposes. Failure to do so shall be a ground for disqualification/non-acceptance of its bid.</p>
12	<p>No further instructions</p>
15.1	<p>The bid security shall be in the form of a Bid Securing Declaration or any of the following forms and amounts:</p> <ol style="list-style-type: none"> 1. The amount of not less than 2% of ABC, if bid security is in cash, cashier's/manager's check, bank draft/guarantee or irrevocable letter of credit; 2. The amount of not less than 5% of ABC if bid security is in Surety Bond.
19.2	<p>Partial Bid is not allowed</p>
20	<ol style="list-style-type: none"> a. Drawings and documents to be submitted during post-qualification process as specified in Clause EW-10.0 of Section VI-Technical Specifications (Electrical Works); b. Contract/Purchase Order and/or Notice of Award for the contracts stated in the List of all Ongoing Government & Private Contracts Including Contracts Awarded but not yet Started (NPCSF-INFR-02); c. Certification coming from the project owner/client that the performance is satisfactory as of the bidding date for all ongoing contracts stated in form NPCSF-INFR-02. d. The licenses and permits relevant to the Project and the corresponding law requiring it as specified in the Technical Specifications, if any.
21	<p>The following documents shall form part of the contract:</p> <ol style="list-style-type: none"> 1. Notice to Proceed 2. Construction schedule and S-curve 3. Manpower Schedule 4. Construction Methods 5. Equipment Utilization Schedule 6. Construction safety and health program of the contractor duly approved by the Bureau of Working Condition (BWC) of the Department of Labor and Employment (DOLE) or proof of submission to BWC 7. PERT/CPM.

SECTION IV

GENERAL CONDITIONS OF CONTRACT



SECTION IV – GENERAL CONDITIONS OF CONTRACT

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SECTION IV – GENERAL CONDITIONS OF CONTRACT

1. Scope of Contract

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

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

2. Sectional Completion of Works

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

3. Possession of Site

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



SECTION V – SPECIAL CONDITIONS OF CONTRACT

GCC Clause	
2	Sectional completion is not specified.
4	<p>It shall also be the obligation and responsibility of the Contractor to carry out the Works properly and in accordance with this Contract, including but not limited to the following conditions:</p> <p>a. The Contractor shall conduct the Works with due regard to safety and health in accordance with its Construction Safety and Health Program (CSHP) duly approved by the Department of Labor & Employment (DOLE) and in compliance with the DOLE Department Order No. 13 – The Guidelines Governing Occupational Safety and Health in the Construction Industry.</p> <p>Failure to comply with the approved CSHP will be considered as non-compliance with the Contract and shall result to the imposition of Section 19, Violation and Penalties of the DOLE Department Order No. 13 and any appropriate sanctions such as, but not limited to:</p> <ol style="list-style-type: none"> 1. Suspend the work until the Contractor complies with the approved CSHP with the condition that the work resumption will not incur additional cost to the Corporation; 2. Suspend payment of the portion of work under question; 3. Correct the situation by employing 3rd party and charge all expenses incurred to the Contractor's collectibles/securities; and 4. Report the condition to the Bureau of Working Conditions of the DOLE for their appropriate action. <p>b. The Contractor shall be responsible for the strict compliance with the provision of the Philippine Laws affecting labor and operation of Work under the contract and shall be responsible for the payment of all indemnities arising out of any labor accident which may occur in the execution of the Works and for which he may be responsible under Republic Act 3428, as amended, known as the Workmen's Compensation Law.</p> <p>c. The Contractor is obliged to exercise due care so as not to endanger life and property in the vicinity of the Works where he operates in connection with this Contract. He shall be liable for all damages incurred in any manner by acts of negligence of his own, or his agents, employees, or workmen.</p> <p>d. It is the responsibility of the Contractor for the strict compliance with the requirements of the Philippine Clean Air Act of 1999 (R.A. 8749) and Philippine Clean Water Act of 2004 (R.A. 9275). The Contractor shall be liable for any damages/destructions to the environment including penalties that will be imposed by the Department of Environment and Natural Resources (DENR) arising from non-compliance of the requirements thereof.</p>

	<p>e. The Contractor shall be responsible for the strict compliance with the requirements of the Environmental Compliance Certificate (ECC) issued for this project (if any) and DENR Administrative Order No. 26. He shall be liable for any damages/destructions to the environment including penalties that will be imposed by the DENR arising from non-compliance thereof, in any manner by his acts or negligence, or by his agents, employees, or workmen in the execution of the Works. The Contractor may employ a Pollution Control Officer accredited with the DENR for the duration of the project, if so required by the DENR Administrative Order No. 26</p> <p>f. It shall be the Contractor's responsibility for the correctness, accuracy and quality of works. NPC's approval does not relieve his contractual obligation and responsibility under this contract.</p> <p>g. Payment of all forms of taxes, such as value added tax (VAT) including municipal licenses and permits, and others that may be imposed by the Philippine Government or any of its agencies and political subdivisions in connection with the Contract shall be for the account of the Contractor.</p> <p>h. In general, the Contractor is totally responsible for the execution of the Works and therefore, takes upon himself all the technical, legal and economic risks and all obligations which could arise therefrom or connected therewith. The overall responsibility of the Contractor includes the responsibility for actions or omissions of his own personnel as well as the personnel of the sub-contractors.</p>
<p>4.1</p>	<p>NPC shall give access to the Site for the Contractor to commence and proceed with the works on the start date. The access to the site referred herein shall not be exclusive to the Contractor but only to enable him to execute the Work.</p>
<p>5</p>	<p>1. The following must be indicated in the performance bond to be posted by the Contractor:</p> <ul style="list-style-type: none"> i. Company Name ii. Correct amount of the Bond iii. Contract/Purchase Order Reference Number iv. Purpose of the Bond: "To guarantee the faithful performance of the Principal's obligation to undertake <u>(Contract/Purchase Order Description)</u> in accordance with the terms and conditions of <u>(Contract No. & Schedule/Purchase Order No.)</u> entered into by the parties." <p>2. The bond shall remain valid and effective until the duration of the contract <u>(should be specific date reckoned from the contract effectivity)</u> plus sixty (60) days after NPC's acceptance of the last delivery/final acceptance of the project.</p> <p>3. In case of surety bond, any extension of the contract duration or delivery period granted to the CONTRACTOR shall be considered as given, and any modification of the contract shall be considered as authorized, as if with the expressed consent of the surety, provided that such extension or modifications falls within the effective period of the said surety bond. However, in the event that the extension of the contract duration or delivery schedule would be beyond the</p>



	<p>effective period of the surety bond first posted, it shall be the sole obligation of the CONTRACTOR to post an acceptable Performance Security within ten (10) calendar days after the contract duration/delivery period extension has been granted by NPC.</p> <p>4. Other required conditions in addition to the standard policy terms issued by the Bonding Company:</p> <ul style="list-style-type: none"> i. The bond is a penal bond, callable on demand and the entire amount thereof shall be forfeited in favor of the Obligee upon default of the Principal without the need to prove or to show grounds or reasons for demand for the sum specified therein; ii. The amount claimed by the Obligee under this bond shall be paid in full and shall never be subject to any adjustment by the Surety; iii. In case of claim, the Surety shall pay such claim within sixty (60) days from receipt by the Surety of the Obligee's notice of claim/demand letter notwithstanding any objection thereto by the Principal.
6	No site investigation report.
7.2	<p>In case of permanent structures, such as buildings of types 4 and 5 as classified under the National Building Code of the Philippines and other structures made of steel, iron, or concrete which comply with relevant structural codes (e.g., DPWH Standard Specifications), such as, but not limited to, steel/concrete bridges, flyovers, aircraft movement areas, ports, dams, tunnels, filtration and treatment plants, sewerage systems, power plants, transmission and communication towers, railway system, and other similar permanent structures: Fifteen (15) years.</p> <p>In case of semi-permanent structures, such as buildings of types 1, 2, and 3 as classified under the National Building Code of the Philippines, concrete/asphalt roads, concrete river control, drainage, irrigation lined canals, river landing, deep wells, rock causeway, pedestrian overpass, and other similar semi-permanent structures: Five (5) years.</p> <p>In case of other structures, such as Bailey and wooden bridges, shallow wells, spring developments, and other similar structures: Two (2) years.</p>
10	No dayworks are applicable to the contract.
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/Letter of Acceptance.
11.2	<p>The period between Program of Work updates is Thirty (30) calendar days.</p> <p>The amount to be withheld for late submission of an updated Program of Work is One percent (1%) of contract amount.</p>
12	During contract implementation, the Procuring Entity shall conduct Constructors Performance Evaluation in accordance with Section 12, Annex E of the Revised Implementing Rules and Regulation of R.A. 9184 using the NPC Constructors Performance Evaluation System (CPES) Guidelines.

	<p>CPES ratings shall be used for the following purposes: a) eligibility screening/post-qualification; b) awarding of contracts; c) project monitoring & control; d) issuance of Certificate of Completion; and in adopting measures to further improve performance of contractors in the prosecution of government projects.</p> <p>Qualified Constructors Performance Evaluators (CPE) shall conduct project evaluation as follows:</p> <p>(b) During Construction - Except for those projects with a duration of 90 calendar days and below which may be subjected to at least one (1) visit, all projects shall be subjected to a minimum of two (2) evaluations to be performed by the CPE. The number of evaluations beyond the prescribed minimum shall be determined by the CPES-Implementing Unit based on the size, nature and complexity of the project and shall be subject to approval by the proper authorities within the agency. The first evaluation shall be performed when the project is at least thirty percent (30%) physically complete or as maybe required by the CPES-IU using the S-curve or other appropriate means to determine whether there is substantial work completed for evaluation.</p> <p>(c) Upon Completion - only one evaluation shall be performed by the CPE right after the Project Implementation Group reports one hundred percent (100%) completion of the project.</p>
13	The maximum amount of advance payment is fifteen percent (15%) of the Contract Price and paid in lump sum.
14	No further instructions.
15.1	The date by which "as built" drawings and operating and maintenance manuals are required is within thirty (30) calendar days after completion of contract.
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 Five percent (5%) of contract amount.

SECTION VI

TECHNICAL SPECIFICATIONS



SECTION VI

TECHNICAL SPECIFICATIONS GENERAL WORKS



SECTION VI - TECHNICAL SPECIFICATIONS

GW – GENERAL WORKS

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SECTION VI - TECHNICAL SPECIFICATIONS**GW – GENERAL WORKS****GW-1.0 PROJECT HIGHLIGHTS****GW-1.1 General**

This section covers the general technical requirements for furnishing all supervision, labor, materials, supplies, tools and equipment in accordance with specifications contained herein and as shown on the accompanying drawings to complete the **CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP.**

GW-1.2 Project Location

The project is located at Balabac DPP in Brgy I, Poblacion, Balabac Palawan.

GW-1.3 Scope of Work

The works and services to be performed under this Contract shall essentially consist of, but not limited to the following:

Architectural Works

- a) Concrete and Masonry Works;
- b) All insulation works;
- c) Fenestration Works;
- d) All painting and varnishing works;
- e) Supply and installation of two (2) units twenty (20) feet Prefabricated Container House including all finishing works;
- f) Application of touch up paint for scratch during installation.
- g) Supply and installation of pre-painted roofing and siding sheets;
- h) Supply and installation of wire mesh enclosure;
- i) Soil poisoning;
- j) All carpentry and joinery works;
- k) All other works and services required to complete the project.

Civil Works

- a) Moving-in including furnishing, supervision, construction, operation and maintenance of general construction facilities and moving-out thereof after completion and acceptance;
- b) Structural excavation, gravel fill and backfilling works for all concrete footings;
- c) Complete construction of all structural components (i.e. footings, etc.) including fabrication, installation/ erection and pre painting of metal/steel structures;
- d) Complete construction of drainage connections and appurtenances.
- e) Complete construction of concrete steps;
- f) Complete construction of the proposed warehouse including the corresponding drainage system;



- g) Supply, fabrication, erection/installation and test of 1x60m³ Fuel Oil Storage Tank with nominal diameter of 3.6m and height of 6.1m complete with valves, all tank appurtenances and accessories shown on the drawings including tank calibration, testing (radiographic & hydrostatic), sandblasting and painting;
- h) Supply, Installation and test of one (1) set of not less than 10m³/hr Fuel Oil Transfer Pump
- i) Construction of oil water separator
- j) Construction of Concrete Foundation for the FOST, concrete slab on tank farm and its concrete containment walls and posts including drain pits and valve boxes;
- k) Construction of fuel oil transfer pump house complete with electrical amenities and concrete foundation for fuel oil transfer pump;
- l) Complete construction of waste oil storage shed including cyclone wire seclusion fence and chb containment wall;
- m) Complete construction and repair/improvement of CHB Perimeter and Fence with barbed wire including demolition of existing barbed wire perimeter fence; and
- n) All other works and services required to complete the project.

Mechanical Works

- a) One (1) set of 60 m³ Diesel Fuel Oil Storage Tank complete with associated valves and piping works, level gauge, vertical caged ladder and other tank appurtenances/accessories;
- b) One (1) set of Fuel Oil Transfer Pump with capacity not less than 10m³/hr at a discharge head of 30m complete with associated valves and piping works, controls and instrumentation and other accessories including spare parts for one (1) year operation;
- c) One (1) lot of Domestic Water Supply System consisting of pipes, valves, pipe fittings, gaskets, flanges, bolts and nuts, pipe supports including the required excavation and backfilling of embedded pipes and other incidentals to complete the domestic water supply piping system;
- d) One (1) unit of Inverter-Window Type Air Conditioner of 11,500 kJ/hr minimum cooling capacity for Personnel's Quarter, complete with its mounting accessories and controls;
- e) One (1) unit of Inverter-Window Type Air Conditioner of 8,000 kJ/hr minimum cooling capacity for Office, complete with its mounting accessories and controls;
- f) One (1) unit of Wall Mounted Exhaust Fan, 100 m³/hr minimum capacity for Comfort Room of Office, complete with its mounting accessories and control;
- g) One (1) unit of Wall Mounted Exhaust Fan, 300 m³/hr minimum capacity for Kitchen, complete with its mounting accessories and control;
- h) One (1) set of Foam (AFFF) wheeled type fire extinguisher complete with self-contained cylinder mounted on a frame with handle, floorstand and steel wheels, 125 L (33 gallons) capacity complete with associated valves, dial gauge indicator, nitrogen expellant tank



for unit pressurization, appropriate size of discharge hose of 15 m long fitted with couplings and foam nozzle assembly;

- i) Six (6) units of Portable Type Fire Extinguisher, Clean Agent (HCFC or Halotron I Type), 7.1 kg. (15.5 lbs), wall-hung type and UL/FM approved;
- j) All other works and services required to complete the project.

Electrical Works

- a) Supply, Installation and Test of 25 kVA, 7.97kV/240V, 1-Phase, 60 Hz Station Service Transformer;
- b) Supply, Installation and Test of 15 kV Fuse Disconnect Switches with Lightning Arrester Combination;
- c) Supply, Installation and Test of Kilowatt-hour Meter and its accessories;
- d) Supply, Laying and Test of Power, Control and Instrumentation Cables including appurtenances required for the interfacing of supplied equipment;
- e) Supply, Installation and Test of Lighting and Power System of the Staffhouse, Warehouse, Pumphouse, Hazardous Waste Storage Facility and Materials Recovery Facility;
- f) Supply, Installation and Test of Pump Motor Power Supply including necessary control, monitoring and protective devices;
- g) Supply, Laying and Test of Insulated Copper Conductors;
- h) Supply and Installation of Conduit System;
- i) Dismantling of the existing station service transformer including power cables, kilowatt-hour meter, line hardwares, terminal lugs & other appurtenances and stocking to the designated stockyard to be provided by the end user; and
- j) All other works and services including those not specifically detailed herein but are required to fully complete the project.

GW-1.4 Contract Period

The Contractor shall complete the works as herein specified within ninety (140) calendar days. The contract period is inclusive of five (5) unworkable days considered unfavorable for the execution of the works. The total contract duration shall be reckoned from the date of contract effectivity as specified in the **Notice to Proceed**.

GW-1.5 Contractor's Classification

License Category of at least "**CATEGORY D – GENERAL BUILDING**" and registration classification of at least "**SMALL B – BUILDING & INDUSTRIAL PLANT**".

The Contractor must have undertaken similar contracts and/or projects.



GW-1.6 Minimum Required Personnel

For the duration of the contract, the Contractor shall have the following minimum required personnel assigned to the project:

- a. One (1) Project Manager

Registered Civil Engineer who had supervised at least a project similar in nature as to the type and cost of the proposed project within the last 10 years. Must have at least 5 years professional experience as Civil Engineer on similar project.

- b. One (1) Materials Engineer

Registered Civil Engineer with valid accreditation from the Department of Public Works and Highways (DPWH) as Materials Engineer I.

- c. One (1) Field Engineer

Registered Engineer who had supervised at least a project similar in nature as to the type and cost of the proposed project within the last five (5) years. Must have at least 3 years professional experience as a Civil Engineer on similar project.

- d. One (1) Safety Officer 2

Construction Safety Officer who has completed at least forty (40) hours of Construction Safety and Health Training (COSH) from Occupational Safety and Health Center (OSHC) or Safety Training Organizations (STOs) accredited by the Department of Labor and Employment (DOLE).

Valid Professional Regulations Commission (PRC) license for professional personnel. Construction Safety and Health Training Certificate from OSHC/STOs accredited by DOLE for the Safety Officer, certificate of accreditation including ID card issued by DPWH for Materials Engineer, shall be submitted and included as an attachment in the Standard Form NPCSF-INFR-09 List of Key Personnel Proposed to be Assign to the Contract.

The above key personnel must either be employed by the Bidder or contracted by the Bidder to be employed for the contract to be bid.

GW-1.7 Minimum Required Construction Equipment

The list of construction equipment (owned or leased) shall include the following:

- a. Welding Machine (300 Amp) - 1 unit
- b. Concrete Mixer (1 bagger) - 1 unit
- c. Oxyacetylene cutting outfit - 1 unit
- d. Bar cutter (25 mm Φ capable) - 1 unit



GW-2.0 GENERAL REQUIREMENTS**GW-2.1 Language and System of Measurement**

All documentation relative to this Contract shall be in English. Submitted drawings, literature, etc., which are not in English language will be considered as not submitted at all.

Metric units shall be used in all documents, correspondence, technical schedules and drawings. On drawings or printed pamphlets where other units have been used, the metric equivalent shall be marked in addition.

GW-2.2 Correspondence

Actions or responses to all communications pertaining to this Contract shall be addressed to:

The Manager, Project Management Department
National Power Corporation
BIR Road corner Quezon Avenue,
Diliman, Quezon City

The Contractor shall maintain a record of all correspondences that shall be accessible to NPC for information. The Contractor shall forward its correspondences to NPC in one (1) original.

All correspondences between NPC and the Contractor shall be numbered consecutively.

GW-2.3 Contractor's Organization and Personnel**GW-2.3.1 Organization**

The Contractor shall maintain in the project site offices – for management, control and execution of the Contract – its organization and personnel required in GW (1.6) and as named in its proposal. Any changes in the organization and personnel shall be subject to the approval of NPC.

The Contractor shall maintain an up-to-date project organization chart, which shall be submitted to NPC for approval in the event of any changes.

GW-2.3.2 Personnel/Key Positions

Listed in GW (1.6) above comprises the Contractor's key personnel under this Contract. These key positions in the organization charts of the Contractor pertain to individuals assigned to management/supervisory positions, who at any time during the execution of the work can give decision and recommendation on matters pertaining to the proper and early completion of the Works.

The appointment, transfer and replacement of personnel to all key positions shall be subject to NPC's prior approval.



GW-2.4 Planning and Scheduling**GW-2.4.1 General**

The Contractor shall be responsible for planning and scheduling, progress monitoring and reporting of all works and activities defined under this Contract.

Within fifteen (15) days from the effectivity of the Contract, the Contractor shall submit for NPC approval a detailed work schedule using chart.

The detailed work schedule shall show commencement and completion dates of the project's major activities and milestones.

GW-2.4.2 Format and Presentation

The Contractor shall prepare an activity network with the activities listed showing the following:

- (a) Activity code
- (b) Activity description
- (c) Duration in days

The Contractor shall also prepare a bar chart identifying all activities which cannot be performed without NPC's approval, and the need dates for NPC's decision thereof.

The Contract Schedule submitted shall meet the completion dates in the Construction Schedule and Schedule of Timings and shall clearly demonstrate the manner in which the various phases of the Works shall be completed.

All activities required for execution of the Works shall be carried out in accordance with the sequence and times and completion dates shown on the work schedule or subsequent revisions as approved by NPC.

GW-2.4.3 Progress Monitoring Principle and System

For the duration of the Contract, the Contractor shall monitor progress of the Works, and shall immediately advise NPC in advance of any anticipated delays in schedule, and the reason, therefore.

If the Contractor believes it is necessary or advantageous to change the sequence of events shown on the Contract Schedule, he shall submit a proposed revision accompanied by a full explanation of the reasons and ramification of the change to NPC for approval. No change shall be made in the order in which the Works activities are being performed until NPC's approval for the revised Contract Schedule has been obtained.

Actual progress of each activity of the Works shall be updated and compared with the progress indicated on the approved Contract Schedule at least once every month by the Contractor.

After NPC approves the Contractor's detailed Contract Schedule and planned activity completion dates, the Contractor shall update and analyze the Contract Schedule on a monthly basis and submit updates to NPC on or before the 5th day of the following month.



The Contractor shall not change the sequence of activities shown on the approved Contract Schedule without NPC's prior approval.

GW-2.4.4 Meetings

A. Progress Review Meetings

The Contractor shall schedule and hold monthly progress review meetings with NPC to a mutually agreed agenda that shall be held at the Contractor's site offices or preferred venue.

B. Interface Meetings

The Contractor shall attend interface meetings with NPC's other contractors, if any, as arranged by NPC on a monthly, or as needed, basis. The Contractor may also call for such meetings whenever necessary.

C. Other Meetings

The Contractor shall arrange discipline meetings and other meetings as necessary with sub-contractors, etc. NPC shall be notified in due time of such arrangements and given opportunity to attend.

The Contractor and NPC shall, as required, hold meetings on specific subjects.

D. Call for Meetings

Except for regular scheduled meetings, calls for meetings and agenda shall be sent out by the party calling the meeting to all requested attendees.

E. Minutes of Meetings

Minutes shall be prepared by the Contractor on an agreed form and be issued for NPC's review the next working day after the meeting has taken place. Minutes shall be approved by NPC before copies are distributed to all attending parties.

Matters requiring action shall be assigned the responsible party with dates for completion of such action. Result of action from previous meetings shall be recorded.

Copies of the minutes of meetings from interface meetings and other meetings, as stated above, shall be sent to NPC in six (6) copies.

GW-2.4.5 Reports

A. Monthly Reports

The Contractor, beginning on the second month after Commencement Date, shall submit to NPC a monthly report related to the Works performed during the preceding month. The Contractor shall present the report with diagrams in printed format.



Cut-off date for the report shall be the last Sunday of each month and, thereupon, the monthly report shall be submitted to NPC not later than 12:00 noon of Wednesday after the cut-off date.

The monthly report shall include, but not limited to, the following items:

- (a) Narrative discussion of major accomplishments and any deviations from time schedule, reasons for such deviations, with recommended actions and potential effects;
- (b) The Contract Detail Schedule showing the status at the cut-off date by means of a front line or equivalent;
- (c) A systematic listing and analysis of all significant time critical activities;
- (d) A summary of HSE activities and reported incidents in own and major sub-contractor's activities;
- (e) Report on interface activities; and
- (f) Narrative report on quality management activities.

GW-2.5 Documents to be Prepared by the Contractor

GW-2.5.1 General

All documents, calculations, certifications, manuals, drawings, etc. pertaining to the execution of all works that are to be prepared by the Contractor are listed hereunder. The Contractor's attention is drawn to various sections of the Specification, where detailed contents of the required documentation are specified.

GW-2.5.2 Detailed Drawings, Design and Specifications

Whenever required in the Contract, the Contractor shall submit corresponding detailed fabrication drawings and applicable specifications of structural and/or material assemblies (i.e., steel connections, concrete to steel connections, etc.) supported by the corresponding design calculations.

The detailed drawings and specification shall include the following:

- As-stake site development plans/layout and/or general assembly drawings, as may be applicable
- Erection/Installation methodology indicating: 1) the various materials, equipment and tools to be used; 2) system and procedures; and 3) testing and commissioning
- Assembly drawings showing: 1) sectional views; 2) mounting details; 3) function of the assemblies; 4) adjustment and operating ranges; 5) concrete pedestals and foundation including bolts and anchorages; 6) field tolerances; 7) all field joints; and 8) methods of lubrication (if required)
- When applicable, engineering instructions and detailed specifications for manufacturing, fabrication, painting (including final color scheme), heat treatment, welding, surface treatment and testing.

GW-2.5.3 Design Calculation and Final Design Data

Upon the completion of the preliminary design, the Contractor shall submit the final design data, analysis and calculations (referred to as designs) –



all type written and in book bound form, clearly laid out with all the design criteria and standards indicated, for NPC's review and approval.

GW-2.5.4 Catalogue Cuts, Illustrations, Etc.

Applicable requirements of this paragraph with reference to drawings shall apply equally to catalogue cuts, illustrations, printed specifications, design data, analysis/calculation, and manufacturer's descriptive literature and instructions for all equipment and/or applicable materials furnished to demonstrate fully of their conformance to the requirements and intent of the Contract Documents.

GW-2.5.5 Final / As-Built Drawings

The Contractor shall furnish NPC a complete set of original copies of all drawings as finally approved and built – together with the electronic or soft copies of the said drawings in CDs, DVDs or other media types, and in format acceptable to NPC.

For all approved drawings with no subsequent revisions, the reproducible copies earlier furnished may be considered part of this set.

NPC will not release the final payment and the performance security until the foregoing conditions have been fulfilled.

GW-2.5.6 Presentation/Submission of Documents

The foregoing drawings and documents shall be submitted to NPC for approval.

In submitting the required documents, the Contractor must take into account the following:

- (a) Metric units shall be used in all documents, correspondence, technical schedules and drawings.
- (b) All drawings and copies thereof shall be submitted in five (5) sets, on A-3 size white paper and with black print unless otherwise agreed upon.
- (c) All drawings and similar documents shall be provided with clear space (approximately 80 mm x 50 mm) above the title block for NPC's stamping of "Approved" or "Approved with Corrections Indicated" or "Returned for Correction" that are defined as follows:
 - "Approved" or "A" mark authorizes the Contractor to proceed with the Work as indicated
 - "Approved with Corrections Indicated" or "AWCI" mark authorizes the Contractor to proceed with the Work with due consideration of the notes and/or comments/corrections indicated therein and re-submit the drawings, specifications or designs for subsequent approval
 - "Returned for Correction" or "RFC" mark requires the Contractor to make the corrections indicated and re-submit the



corresponding drawings, specifications or designs for approval before commencing the Work indicated.

- (d) All other documents shall be similarly submitted in five (5) sets and in book bound form (or securely fastened).

Approval of the Contractor's drawings and other technical documents shall not be construed as the Contractor's relief of its obligations to meet all the requirements of this specification.

When revised drawings or drawings which have been returned to the Contractor marked "**Approved with Corrections Indicated**" or "**Returned for Correction**" are re-submitted for approval, the revision block shall be completed with the description and date of revision and the appropriate revision letter or numeral which shall be clearly indicated adjacent to the revision or modification which requires approval.

No revision affecting the design shall be made after a drawing has been "**Approved**" without re-submitting the drawings suitably revised for formal approval.

NPC will complete the review and approval of the Contractor's drawings within twenty (20) calendar days from the receipt of the respective documents at NPC's office mandated to act on those submittals. If within the same period, the Contractor has not received any response from NPC to that regard, the Contractor may proceed with the design and manufacture of equipment, materials or assemblies as if the drawings have been approved. The Contractor, however, is referred to the provision stated above regarding NPC approval of Contractor's drawings.

GW-2.5.8 Building/Occupancy Permit and other Licenses and Permits imposed for the Contract

All forms of taxes, such as value added tax (VAT) including Local Government Unit (LGU) licenses and permits, and others that may be imposed by the Philippine Government or any of its agencies and political subdivisions in connection with Contract shall be for the account of the Contractor. NPC shall provide assistance to the Contractor in securing the needed documents for the permits/licenses or approvals.

Whenever Building/Occupancy Permit is required at the place where the subject building/structure is located or to be erected, the Contractor shall apply, process, submit and bear all costs and charges to the corresponding fees/incidental services of the required documents in securing a building permit.

For Building/Occupancy Permit purposes, the assigned Project Manager or designated representative of NPC shall be the signatory for the Owner's Representative/Procuring Entity and Full-time Inspector and Supervisor for the Construction Works. The Manager of the DDD or designated representative of NPC shall be the signatory of the Project Specifications and the drawings and design analysis/computation of Architectural, Structural, Electrical, Mechanical & Plumbing. While the Contractor will be the signatory for the Bill of Quantities/Cost Estimates. NPC may opt to require the contractor to provide the professional/eligible personnel to sign the permits especially but not limited to project with construct and design contract. The Contractor at his own expense shall bear all the costs and



charges needed to comply with the said documents. The Contractor shall not be relieved on its responsibility with regards to the reliability and integrity of the project concern.



GW-3.0 MATERIALS AND EQUIPMENT**GW-3.1 General**

All materials to be furnished by the Contractor shall be new and unused, free from defects and imperfections and best suited for its intended purpose. All materials shall comply with the latest revisions or editions of the specified standards or material specifications.

The equipment and/or materials to be furnished under this specification shall be essentially the current standard products of the respective manufacturer regularly engaged in the production of such equipment and/or materials. It shall be designed and manufactured for maximum safety and reliability in accordance with quality specifications.

Original brochures, catalogs and other related technical data sheets of materials and equipment to be furnished by the Contractor under this contract shall be submitted in prescribed form during the project implementation for NPC's review and approval prior to its fabrication and/or procurement.

Certified mill test reports, as required in the relevant sections of this specification and the governing codes and standards, shall be furnished by the Contractor for NPC's record. Copies of each mill test report shall be submitted to NPC prior to procurement/fabrication of materials under consideration.

GW-3.2 Codes and Standards

All materials, equipment, fabrication, construction, installation, inspection and testing furnished shall conform to the latest specifications and provisions of engineering societies and governing standards or other internationally accepted standards listed hereunder:

ACI	- American Concrete Institute
AISC	- American Institute of Steel Construction
ANSI	- American National Standard Institute
API	- American Petroleum Institute
ASME	- American Society of Mechanical Engineers
ASNT	- American Society of Non-Destructive Testing
ASTM	- American Society of Testing Materials
AWS	- American Welding Society
NPFA	- National Fire Protection Association
OSHA	- Occupational Safety Health Act of 1970
SSPC	- Steel Structures Painting Council
PNS	- Philippine National Standards
NBCP	- National Building Code of the Philippines
NSCP	- National Structural Code of the Philippines

Other standards not mentioned above may be accepted provided that they ensure equal or higher quality; provided; further, that they meet the requirements of existing laws and regulations of the Government of the Republic of the Philippines.

In the event of any conflict among the above listed or other applicable codes and this Specification, Appendices and Attachments, the Contractor



shall refer the conflict to NPC for written resolution. Otherwise, the responsibility shall be on the Contractor to show the suitability of any alternative standards he may wish to use without NPC approval.

In addition to the above codes and standards, the Contractor shall comply with all applicable state and local laws and regulations. The latest edition of each standard shall mean the latest edition available at the date of contract signing.

Other internationally recognized national standards may be accepted, if in the opinion of NPC, such will guarantee a quality not inferior to that guaranteed by the above standards. The list of these alternative standards which the Contractor proposes to adopt must be attached to his Bid for acceptance. In every case, the Contractor must list fully the standards they will conform to for this Contract.

All units, dimensions and calculations shall be in metric system.

GW-3.3 Test of Materials

All materials, parts and/or assemblies, to be used in the Works shall be tested conforming to the specifications and provisions of the approved and applicable standards for testing of materials. Results of the test shall be submitted to provide the means of determining compliance with the applicable specifications. All test or trials shall be made in the presence of NPC or his duly authorized representative unless NPC waived in writing its right to witness such test.

GW-3.4 Tropical Serviceability

GW-3.4.1 General

In choosing materials and their finishes, due regard shall be given to the humid tropical conditions and environment under which the equipment is to work, and the structures are to be built. Some relaxation of the following provisions may be permitted where equipment is hermetically sealed, but it is preferred that tropical grade materials should be used wherever possible.

GW-3.4.2 Metals

Iron and steel, in general, are to be galvanized or painted, as appropriate or specified. Small iron and steel plate (other than SUS 316 stainless steel) of all instruments and devices, the metal parts or mechanisms are to be treated in an approved manner to prevent corrosion. Other components which are laminated, or which cannot be rust proofed, shall have all the expected parts thoroughly cleaned and heavily enameled, lacquered or compounded.

GW-3.5 Workmanship

Workmanship shall be of first-class quality and in accordance with the best modern engineering practice for construction of all civil works structures and the manufacture, assembly, test and commissioning of equipment and other components, notwithstanding any omissions from the specifications and drawings. To ensure quality workmanship, only technicians and competent workers, skilled in their respective trades, shall be employed.



GW-4.0 DESIGN AND CONSTRUCTION CONDITIONS**GW-4.1 Acknowledgement to Site Conditions**

It shall be the responsibility of the Contractor to conduct site inspection to determine the nature, location and extent of the works, the physical site conditions, and the availability/sources of materials and facilities needed to undertake the Work. The Contractor shall thoroughly investigate and familiarize himself with all the conditions prevailing at the site, assessment of existing facilities/installations that may be affected by the works under this contract, the surrounding areas, means of communication and transportation, and all other factors that could potentially hamper the smooth execution of the works under the contract.

Any and/or all expenses arising from the lack of knowledge, familiarity or understanding of the existing site conditions shall be the responsibility of the Contractor and no additional payment to that regard shall be made by NPC..

GW-4.2 Sound Control

The Contractor shall ensure that the sound levels of equipment covered by this specification, including those equipment and tools to be used during the performance of his works are within the permissible limits for personnel as defined in DOLE's Occupational Safety & Health Standards for Noise and contractual requirements for overall plant noise levels.

If the Contractor expects the maximum sound level of his equipment to exceed 90 dBA at a distance of 1 meter, Contractor shall use acoustical treatment features to achieve the sound control design objectives.



GW-5.0 DRAWINGS**GW-5.1 Drawings Contained in the Tender Document**

All drawings referred to in this section shall be the Bid Drawings attached to the Tender Document unless specifically stated otherwise.

Discrepancies between the drawings and actual field conditions, or between drawings and specifications, shall be immediately brought to the attention of NPC for proper resolution. All works with apparent discrepancies shall not be started without NPC's formal approval.

Anything mentioned in these specifications and not shown on the drawings or shown in the drawings but not mentioned in the specifications but are obviously necessary to complete the works shall be considered and included as if they are both mentioned and shown.

Drawings and the specifications are complimentary to each other and what is called for in one shall be as binding as if called for both.

Bid drawings may be used for planning the work but shall not be used for construction purposes or for furnishing materials, unless authorized or approved by NPC. Bid Drawings, which show the work to be done as definitely and in as much detail as possible, may be used as guide by the Contractor to proceed in the performance of his work.

Drawings which require changes or adjustments to suit with the actual site conditions shall be prepared/submitted by the Contractor for NPC's review and approval.

GW-5.2 Contractor/Manufacturer Drawings**GW-5.2.1 General**

Prior to the procurement of all materials, equipment and auxiliaries to be furnished under this contract, the Contractor shall submit for NPC's review, approval, and/or reference, five (5) copies of prints of detailed drawings (i.e. fabrication/assembly drawings of applicable civil structures, outline/arrangement drawings of equipment and its auxiliaries, wiring diagrams, etc.), and/or brochures. NPC shall review, comment or note corrections to be made and return two (2) copies to the Contractor within twenty (20) calendar days from receipt of the drawings and other required documents at appropriate NPC office mandated to act on those submittals. If corrections are required, the Contractor shall make all necessary corrections and re-submit the corrected ones within fourteen (14) calendar days for NPC's review and approval.

Drawings and/or brochures for approval shall be addressed to:

The Manager, Design and Development Department
National Power Corporation
BIR Road corner Quezon Avenue,
Diliman, Quezon City 1100

Approvals by NPC shall in no way relieve the Contractor from entire responsibility for the engineering, design, workmanship, material and all other liabilities under the Contract.



NPC reserves the right to reproduce any drawings or prints received from the Contractor as may be necessary regardless of any notice or marks appearing on the drawings or the prints prohibiting such action. All drawings shall preferably be in computer-aided design (CAD) format. All other computer-generated documents shall be compatible to Microsoft Office.

Prior to its submission, the Contractor shall first submit a list of drawings he proposes to submit for NPC's approval. Only selected drawings in the list, or any drawings as NPC deemed necessary, shall be submitted for approval. The sequence of submission shall be such that information is available for checking each drawing when it is received.

Construction of any particular structure or portion thereof prior to the approval of pertinent drawings shall be at the Contractor's risk; whom shall be responsible for the undue cost arising from subsequent correction to the work already done but needs to be rectified to conform to the revised and approved drawings.

Should an error be found in the approved Contractor's drawings during construction/erection, the correction, including any field change considered necessary, shall be noted on the drawings and re-submitted for approval.

All data and information to be submitted shall be in the English language and all drawings shall be drawn using the metric system as unit of measurement.

All approved drawings shall form part of the Contract.

All drawings submitted by the Contractor or by any Sub-Contractor shall contain (in the lower right-hand corner), in addition to the Contractor's name, the date, drawing scale, drawing title and number, and contract number as given in the Specification.

NPC Standard Specifications for Title Blocks shall be provided to the Contractor during the contract implementation.

GW-5.2.2 As-Built Drawings

The Contractor shall provide and keep up-to-date "As-Built" drawings of all structures constructed. These drawings shall show all changes or revisions from the original drawings, including locations of embedded piping and other concealed items of Works.

The Contractor shall furnish prints of these drawings, which shall be kept in the Contractor's field office for use only as a record set. At the end of every month, all entries, changes or revisions made in the drawings by the Contractor shall be checked and approved by NPC.

The complete, duly checked and approved "As-Built" drawings shall be submitted by the Contractor within thirty (30) calendar days from the completion of the contract or prior to the issuance of the certificate of completion, on four (4) prints and one (1) set of write-once recordable CD's. Such CD's shall be suitable for CD ROM/WRITE drive of computer system.

Drawings and schedules shall be preferably submitted in standard A3 size.



No separate payment will be made for furnishing of "As Built" drawings. Cost thereof shall be included in the various pay items in the Bill of Quantities.

GW-5.2.3 Processing of Drawings

All drawings to be submitted by the Contractor for NPC's review and approval shall be on A3 size folded to A4 unless mutually agreed otherwise during the implementation stage.

NPC shall review, comment or note corrections to be made and return two (2) copies to the Contractor within twenty (20) calendar days after receipt of the drawings/documents by NPC official(s) authorized to process such documents. If corrections are required, the Contractor shall make all the necessary corrections and re-submit the same within fourteen (14) calendar days for NPC's review and approval.

Five (5) prints with dark lines on a white background shall be furnished to NPC for each drawing submitted for approval. Two (2) copies will be returned to the Contractor either marked "Approved", "Approved with Corrections Indicated (AWCI)", or "Returned for Corrections (RFC)" as defined in CW-2.5.7 (d) above. When prints of drawings are marked AWCI or RFC, the Contractor shall revise/finalize these drawings and re-submit the same in five (5) copies each for final approval. Every revision shall be shown by number, date and subject in a revision block.

If minor revisions are made after a drawing has been approved, the Contractor shall furnish two (2) additional prints, subsequent to each revision. No major revision affecting the design shall be made after a drawing has been marked "Approved" without re-submitting new drawings thereof for re-processing and approval of such revision.

GW-5.2.4 Documents for NPC's Records

The Contractor shall furnish five (5) copies of the following documents for NPC's records:

- a) Material Data, Material Certifications and Test Results/Reports required by governing Codes and Standards; and
- b) Factory Test/Site Test (Performance) Results



GW-6.0 INSPECTION AND TESTS**GW-6.1 General**

The Contractor shall perform at his own expense all tests required to ensure adequacy of material, workmanship and conformance of materials/equipment to the requirements of the specifications and standards.

The Contractor shall submit to NPC for approval, a complete test program for all his supplied materials/equipment and workmanship covered by the contract. Likewise, five (5) copies of test procedures shall be submitted for approval at least forty-five (45) days prior to the conduct of actual test of equipment.

NPC and/or his duly authorized representatives shall witness all applicable tests detailed in the relevant sections. NPC shall be notified by the Contractor thirty (30) days in advance of all test programs and schedule to be conducted requiring the presence of NPC.

NPC shall still be notified in advance of tests although not requiring the presence of NPC. In such case, the Contractor shall then proceed with the tests and shall submit test reports in five (5) copies to NPC. NPC's acceptance of the work by waiving the inspection of tests and receipt of the Contractor's Certified Test Reports and Inspection and Testing Certificate shall in no way relieve the Contractor of his responsibility in accordance with the requirement of the Specifications.

For inspected or tested goods that fail to conform with the Specification, the Contractor shall either replace or make any alterations necessary to meet the requirements of the Specifications at no costs to NPC.

The Contractor shall provide the required consumables, if any, to be used during the test, unless otherwise specified in the relevant sections of the technical specifications.

During the test and upon written request of the Contractor, NPC may provide personnel to assist the Contractor in the performance of the test under the direction of the Contractor.

NPC or its designated representative shall be entitled to attend the tests and/or inspections conducted on the premises of the Contractor or its Subcontractor(s) provided that NPC shall bear all of its own costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses. The Contractor, however, shall extend all reasonable facilities and assistance during the conduct of such test and/or inspection on its premises.

GW-6.2 Inspection/Tests at Contractor's Premises

NPC reserves the right to inspect all shop and assembly work associated with the Works, verify quantities consigned to stores and inspect quality control and assurance records as well as shop and purchase order records. When scheduled, and as often as NPC deems appropriate, progress will be monitored with respect to Key Dates in the Contract Schedule and the sequence of events and activities on the Contractor's Detailed Contract Schedule.



The Contractor shall carry out all tests in accordance with the requirements of the specifications and submitted test procedures duly approved by NPC.

Prior to shipment and final inspection, each material/equipment furnished by the Contractor shall be given the manufacturer's standard factory acceptance test and/or as required in the relevant sections of the technical specifications.

The Contractor shall carry out tests, as may be required by the specified Standards and the Quality Control and Assurance Program, as well as the entire test program approved by NPC.

If NPC opted not to witness the Factory Tests, NPC will issue a Certificate of Waiver of Tests Witnessing/Inspection for the equipment and materials. In such case, the Contractor shall proceed with the Factory Tests in accordance with the requirement of the specification and the manufacturer's test specification as approved by NPC.

Issuance of the Certificate of Waiver of Tests Witnessing/Inspection for equipment or material required to be witnessed by NPC or its authorized representative(s) however, shall in no way relieve the Contractor of his responsibility to conform with the approved test procedures and the requirements of the Specifications.

The factory test record and dispositions, and any other pertinent supporting data and documents shall form part of a test report to be submitted in accordance with the specification.

GW-6.3 Tests Failures

If any equipment or materials supplied by the Contractor fails to pass any test, the Contractor shall make the necessary corrections or alterations for defects or order equipment/component replacement, as maybe appropriate. Any and all expenses due to additional tests or re-tests made on that regard, i.e. failure to meet the acceptance criteria and other requirements of the specification, shall be borne by the Contractor.

GW-6.4 Test Reports/Certificates

Five (5) certified copies of the reports of all tests and other manufacturer standard tests shall be furnished to NPC within a maximum of fifteen (15) days following the completion of the tests.

Test certificates shall include, in addition to the test results, the following information:

- a) Name/Title of Project and Specs No.;
- b) Material/Equipment data; and
- c) NPC's tag number; and/or equipment serial number.

The Contractor shall bear the cost of furnishing these records and reports.



GW-7.0 QUALITY ASSURANCE REQUIREMENTS**GW-7.1 General**

The Contractor shall have a well-organized Quality Management System that is relevant to the Works covered under the contract to ensure that items and services, including subcontracted items and services, will comply with this specification.

Within thirty (30) days of the Effective Date of Contract, the Contractor shall submit five (5) copies of his complete quality control and assurance procedures, and manuals for review by NPC. The manual shall include pro-forma checklists for all requirements of the Contractor's quality control and assurance program and those called for in this Specification.

GW-7.2 Quality Assurance Program

The Contractor shall, for all work covered by the Contract:

- (a) Establish procedures for adequate planning and resourcing of all quality related activities including the preparation of quality plans;
- (b) Establish measures for the identification and control of items through all stages of the Contract. This shall include measures to maintain traceability as identified in agreed quality plans;
- (c) Arrange for the protection of the quality of the product and/or services to include delivery to the specified destination and/or performance of the required services, respectively; and
- (d) Control their measuring and test equipment in accordance with the established procedures for measurements and calibration systems and ensure that such equipment that may be used by subcontractors to verify work is similarly controlled.

Where any site installation and/or test and commissioning work is involved, the Contractor shall prepare contract-specific quality assurance procedures in agreement with NPC prior to commencement of such works.

The Contractor shall ensure that all computer systems and software to be utilized on the project is qualified for the application under consideration and such qualification is documented.

GW-7.3 Quality Plan

The Contractor shall establish and implement quality plans detailing the specific activities, design reviews, operations, control procedures, inspections, testing, approvals and certification requirements as applicable. All procedures, which support the quality plan shall be referenced and distributed to NPC together with the quality plan. Quality plans shall be submitted to NPC for review and approval.

GW-7.4 Records

The Contractor shall generate records as required by the quality assurance system and quality plans. The Contractor shall make available its records including audit reports for NPC's inspection.

All records shall be concisely compiled, indexed and cross-referenced to the project contract number and the relevant subcontract numbers. They



shall be clearly identifiable to the individual parts and assemblies to which they refer.

All records generated during the course of the Contract, including those generated as evidence of effective implementation of the quality assurance program of the Contractor and his subcontractors, shall be retained by the Contractor for a minimum period of five (5) years from the date of contract completion. These records shall be made available to NPC on request during the retention period.

GW-7.5 Reporting and Corrective Action

The Contractor's quality assurance program shall provide established procedures for prompt detection and correction of all conditions adversely affecting quality, including failures, malfunctions, incidents, trends, deficiencies, deviations, non-conformances, and defective materials.



GW-8.0 CERTIFICATE OF COMPLETION AND ACCEPTANCE

When all the works and services have been satisfactorily completed as required in the Contract, the Contractor may give notice to this effect to NPC. Such notice shall be deemed to be the basis for NPC to conduct final joint inspection. Certificate of Completion shall be issued within fifteen (15) days after all works have been inspected and found in conformance to the specifications and contract requirements.

The Defects Liability Period of one (1) year for the completed Works shall commence on the date of issue of the Certificate of Completion. During this period, the Contractor shall undertake the repair works, at his own expense, of any damage to the infrastructure on account of the use of materials of inferior quality, within ninety (90) days from the time NPC has issued an order to undertake repair. In case of failure or refusal to comply with this mandate, NPC shall undertake such repair works and shall be entitled to full reimbursement of expenses incurred therein upon demand.

One (1) year after the issuance of Certificate of Completion, provided that there are no defects found and/or pending repair works, NPC shall issue the Certificate of Final Acceptance for the completed Works. Project warranty period shall start upon issuance of final acceptance.



GW-9.0 GUARANTEE

The Contractor shall guarantee that he will repair, and/or replace, at his own expense, equipment and materials against defect in design, materials and workmanship for a period of twelve (12) months after the issuance of the Certificate of Final Acceptance. The Contractor guarantees that when the equipment and/or material are placed in operation and/or use, it will perform in the manner as set forth in the Contract.



SECTION VI

**TECHNICAL
SPECIFICATIONS**

ARCHITECTURAL WORKS



SECTION VI - TECHNICAL SPECIFICATIONS

AW – ARCHITECTURAL WORKS

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SECTION VI – TECHNICAL SPECIFICATIONS

AW – ARCHITECTURAL WORKS

AW-1.0 GENERAL ARCHITECTURAL REQUIREMENTS

AW-1.1 General

The work to be done under this section shall include the furnishing of all labor, materials, equipment, tools, storage and stockyards of the pertinent materials and structural components and other incidentals for all architectural works enumerated hereunder, as shown on the accompanying drawings or as otherwise directed.

The work shall be performed and completed in a workmanlike manner, in accordance with generally modern accepted practice in carpentry fenestrations, tinsmithing, plumbing, painting, landscaping and masonry work, etc. notwithstanding any omission from these Specifications or drawings.

Materials and structural parts that the Contractor shall supply and install and which will be incorporated in the structure shall be new and unused. They shall be suitable for their intended purpose and appropriately matched to each other complying with all applicable regulations, quality and dimensions standards. Defective work is not acceptable.

AW-1.2 Submission of Samples

At least one (1) month before the start of any installation or application of materials, the Contractor shall submit samples of materials for all sections for evaluation and approval. No work shall be done until after samples are approved by the NPC Representative in writing. All work must strictly conform to approved samples as to quality, texture, color and finish.

Failure of the Contractor to comply with the preceding stipulation shall not entitle them of any extension of time nor any claim whatsoever for any delay in the work after rectification due to disapproval of work.

To avoid unnecessary delay, it is suggested that the orders and/or purchase of imported or local materials shall be made within sufficient period in order that adequate supply is available at any time when needed.

AW-1.3 Substitution of Materials

The Contractor shall submit a written request for substitution of materials in lieu of those specified when deemed very necessary and urgent. Such request shall indicate the reasons for substitution. No substitute material shall be used without written authorization from the NPC Representative.

In case of approved substitution of an inferior kind of material, a reduction in the contract price equal to the difference in cost of the two kinds of materials shall be made. Market prices at the provincial capital or at a commercial center agreed upon by the NPC Representative and the



Contractor on the date upon which authority for substitution is granted shall be the basis of said price reduction. Price differentials shall be determined and agreed upon immediately by both parties and incorporated in the approved letter of substitution.

The Contractor shall submit written request for substitution at least one (1) month before such materials are actually needed. Such request shall be accompanied by samples to be substituted and corresponding certification.

No price increase will be allowed for a better kind of material.

AW-1.4 Certification of Materials

The Contractor shall submit to the NPC Representative signed certificates from manufacturer or sole distributor of equipment and materials to be furnished and installed by the Contractor, certifying as to the kind, quality, rated capacity, quantity, performance and other descriptions of the equipment and materials delivered under a receipt number and date. No equipment or materials shall be erected, installed or applied such as electrical fixtures and accessories, concrete reinforcing steel, cement, G.I. and C.I. pipes, valves and fittings, plumbing and sanitary fixtures, building materials and finishes, paint and waterproofing, etc., without the required certificates.

AW-1.5 Other works which even if not specifically mentioned in the Section and Bill of Quantities shall be included:

- The measurements for the execution and payment of the Works, including provisions of the measuring equipment and the engagement of labor
- Connecting up of water, gas and electricity from the mains of the site indicated by the NPC Representative to the points of use
- Provision of small equipment and tools
- Safeguarding the Works against surface water, which shall normally be reckoned with, and its possible necessary removal
- Protecting the Works from heat, wind and rain
- Protection and safety measures required
- Protecting the executed works and the items handed over the execution of same from damage and theft up to the time of acceptance
- Supplying of the operational materials
- Supplying of consumable stores
- Supplying of fitting dowels
- Supplying of simple type pipe covering, e.g., in the shape of pipe sheathings with corrugated cardboard and the like
- Supplying and fitting of pipe fastening elements, e.g., pipe clips, hangers, etc.
- installing and dismantling as well as providing all framework and scaffolds



- Making blackouts on concrete
- Chemical preservation of timber
- Instructing the operating and maintenance personnel

NOTE: The above provisions are general for all types of buildings. The Contractor shall be guided accordingly by the applicable provisions in the specifications and what is shown in the drawings for each type.

AW-1.6 Measurement and Payment

Measurement for payment for different items in Architectural Works will be based on the areas, lengths, volumes and quantity placed and accepted by the NPC Representative.

Payments for each architectural item will be made at the corresponding contract unit price per square meter, linear meter, cubic meter and number of pieces/sets, for the pertinent items under Architectural Works in the Bill of Quantities.

Payment shall constitute full compensation for all labor, materials, equipment, tools and incidentals necessary for the completion of each work.



AW-2.0 CONCRETE MASONRY WORKS**AW-2.1 General**

The work to be done under this section shall include the furnishing of all labor, materials, equipment, tools and other incidentals to complete the work.

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

Masonry units shall be handled with care to prevent chipping and breakage. Storage piles shall be so located as to avoid being damaged by construction operations and traffic. Cement and lime shall be stored off the ground under watertight cover until ready for use. Damaged materials shall be rejected.

AW-2.2 Materials

Concrete Hollow Blocks shall be of standard manufacture, machine-vibrated, fine and even textured and well-defined edges.

Unless otherwise shown on the drawings, concrete hollow blocks to be used shall conform to the requirements of the latest edition of ASTM Specification C-129 Minimum Compressive Strength of not less than 4.48MPa average of the fine specimens.

Mortar Proportions

- a) Cement mortar for laying concrete hollow blocks shall consist of one (1) part Portland cement, one-fourth (1/4) part lime and three (3) parts sand. Only sufficient water to make a workable mix will be permitted.
 - 1) Masonry grout for filling cells of concrete blocks shall consist of one (1) Portland cement, one-fourth (1/4) part lime, three (3) parts sand to which three (3) pea gravel is added by volume. Mortar materials shall be accurately measured by volume and thoroughly mixed until evenly distributed throughout the batch mechanical mix. The actual mixing time shall not be less than two minutes.
 - 2) Intersecting hollow blocks walls and partitions shall be bonded by overlapping units on alternative course or by the use of 6.3mm (1/4") diameter ties at 610mm (24") O. C. every second course (maximum) anchored in filled cells.

Cement shall be Portland cement of approved brand conforming to ASTM Specifications C150, Type I.

Lime shall be made with pulverized and quicklime or with hydrated lime.

Sand shall be clean, washed and free from deleterious substances.

Water for mixing shall be clean and potable.



AW-2.3 Installation

Laying of all masonry units shall be plumbed, leveled and accurately spaced. All units shall be wetted before laying. The block should be laid on full mortar bedding and in such a way that no cracks are formed between the blocks and the mortar at the time the blocks are placed. All joints should be filled with mortar at the time it is laid. Any horizontal and vertical CHB wall reinforcements shall be anchored to concrete works by means of 10mm (3/8") by 609mm (24") long dowels. Embedding of anchor bolts, expansion shields, conduits, etc. shall be done as the erection progresses.

Cutting and patching of masonry required to accommodate the work of other trades shall be performed by masonry mechanics.

Finishing of all hollow block wall surfaces to be applied with cement plaster will be cleaned and evenly wet slashed with a wash of neat cement and sand followed by 1:2 cement mortar mix 10mm (3/8") thick which shall be applied with a wooden float.

AW-2.4 Testing of CHB

Test samples from every 500 units shall be taken at random from the CHB to be used before installation. The testing shall be performed by a laboratory approved by the NPC Representative and the cost thereof shall be charged to the account of the Contractor. Concrete hollow blocks represented by such samples, failing to meet the requirements under the latest edition ASTM C129 shall be rejected.

AW-2.5 Measurement and Payment

Measurement and payment for **Concrete Hollow Blocks** including its reinforcing bars will be based on the area in place and accepted by the NPC Representative.

Payment will be made at the corresponding contract unit price per square meter for the pertinent items under Architectural Works in the Bill of Quantities.

Payment shall constitute full compensation for all labor, materials, equipment, tools and incidentals necessary for the completion of this work.



AW-3.0 PLASTERED PLAIN CEMENT FINISH**AW-3.1 General**

The work to be done under this section includes furnishing of all labor, materials, equipment and other facilities and the satisfactory performance of all work necessary to complete all cement plaster finish.

Plaster mixture is applied in layers to masonry and reinforced concrete, surface to interior or exterior walls and ceilings.

AW-3.2 Materials

- a) Portland cement conforming to the latest edition of ASTM Standards C-150
- b) Lime - Slaked quicklime or hydrated lime to make lime putty
- c) Sand - Natural sand, white or light grey, washed and cleaned, strong and free from injurious amount of dust and flaky particles.
- d) Water - Clean and fresh contains no salt, potable and free from sulfur oil and other impurities that may cause discoloration of the finish.

Accessories for plaster work, includes nails, picture, moulds, casings, window stools, bases, etc.

AW-3.3 Application

The total thickness of masonry and plaster shall be 15mm (5/8"). For a three-coat plastering, the scratch coat and brown coat shall be at least 6.3mm (1/4") thick and the hard finish 3.2mm (1/8") thick with a minimum thickness of 1.6mm (1/16") at any point. For a two-coat work the base shall be 12.7mm (1/2") thick and the hard finish the same as for a three-coat work.

The lath for plastering shall be leveled, plumb and well secured to the backing material. The leveling elements installed would include grounds and screeds. For walls, a screed shall be installed at the base of the wall with its top about 102mm (4") above finish floor. The screed is run horizontally, leveled and set at the exact thickness of finished plaster. Around all openings and the intersection with the ceiling grounds are installed.

All anchorage for cabinets, furniture, stair, handrails, electrical outlets, etc., should be installed before plastering is started.

All internal corners should be reinforced by lapping wire lath. Mixture for various coats should be checked to see that proportions are correct.

Manufacturer's directions for applying the various types of plaster should be followed scrupulously. The NPC Representative should check whether they conform to end use of the plaster.

NOTE: All cement plaster finish shall be painted.



AW-3.4 Measurement and Payment

The measurement for payment for all **Plaster Plain Cement Finish** will be based on the area applied and accepted by the NPC Representative.

Payment will be made at the corresponding contract unit price per square meter for the pertinent item under architectural works in the Bill of Quantities.

Payment shall constitute full compensation for all labor, material including metal lath, equipment, tools and incidentals necessary for the completion of this work.



AW-4.0 ROOFING AND SIDING SHEETS**AW-4.1 General**

The Contractor shall furnish all labor, materials, and operations including tools, other implements and accessories for the complete installation of roofing sheets wherever indicated in the drawings.

Installation shall be performed by skilled workmen in accordance with the construction and shop drawings and the manufacturer's standard.

Shop drawings and manufacturer's catalogue showing product standards and technical data will be provided by the Contractor to the NPC Representative for approval.

AW-4.2 Materials

Material for roofing will be weather and chemical resistant. It shall be corrugated aluminum-zinc-silicon alloy coated metal sheet. Base metal shall be determined as specified in the drawing that shall range from 0.4 to 0.6mm thick. Bended sheets such as flat barge caps, flashings, ridge rolls, capping and moldings that serve as its accessory components shall have the same composition with the roofing and siding sheets of which minimum thickness base metal shall be 0.4mm. Gutters likewise shall have the same material composition with base metal thickness of 0.6mm unless otherwise specified in the drawing commonly as stainless.

AW-4.3 Measurement and Payment

Measurement and payment for **Roofing and Siding Sheet** will be based on the projected area inspected and accepted by the NPC Representative. No measurement & payment will be made on hidden areas covered by side & end overlaps, the cost for these being included in the projected area.

Payment will be made at the corresponding unit price per square meter for pertinent items under Architectural Works in the Bill of Quantities.

Measurement and payment for flashing and other accessories shall be referred to the Bidding Form.



AW-5.0 FIBER CEMENT BOARD**AW-5.1 General**

The work to be done under this section includes the furnishing of all labor, materials, equipment, tools and other facilities necessary to complete the work.

Boards for walls of the type and thickness indicated shall be properly installed and coordinated with the work of other trades.

AW-5.2 Materials

Fiber cement board for wall shall be of Portland cement, sand, cellulose fiber and water autoclaved, immune to water damage, fire resistant, durable, rot and termite proof.

AW-5.3 Handling and Storage

Boards shall be stacked on edge or laid flat on a smooth surface. Edges and corners shall be protected from chipping. To ensure optimum performance, store sheets under cover and keep dry prior to fixing.

AW-5.4 Installation

Fiber cement boards shall be fixed by a qualified installer as recommended by the manufacturer.

AW-5.5 Framing

Steel channel and wood framing shall be used at maximum spacing of 600mm x 600mm O.C. B.W. Six (6) millimeter thick board shall be fixed to metal frame with 2mm Ø galvanized fiber cement nail.

AW-5.6 Measurement and Payment

Measurement for payment for Fiber Cement Board will be based on what is required on the Bill of Quantities.



AW-6.0 WIREMESH ENCLOSURE INCLUDING GATES AND LOCKSETS**AW-6.1 Scope**

In accordance with the specifications contained herein, the Contractor shall furnish all labor, materials, equipment and tools and shall construct the enclosure for waste oil storage including gates and locksets shown on the drawings

AW-6.2 Materials**AW-6.2.1 Heavy Galvanized Cyclone Wire**

The material shall be made from steel wire helically wound and interwoven in such a manner as to provide a continuous mesh without knots or ties except in the form of knuckling or of twisting and barbing the ends of the wires to form the selvage of the fabric. The base metal shall be steel of such quality and purity that, when drawn to the size of wire specified and coated with zinc either before or after fabrication, the finished fencing shall be of uniform quality and have the properties and characteristics conforming to ASTM Designation A392. Fabric that is zinc coated after weaving and produced in accordance with this specification shall be hot-dip galvanized. Fabric that is zinc coated before waving may be either electronically or hot-dip galvanized.

At the option of NPC, Heavy Galvanized Cyclone wire delivered to the site shall be tested. One roll from every fifty (50) rolls or fraction thereof shall be taken at random as a sample for test purposes, except in no case shall less than two (2) samples be tested. To determine compliance with the requirements of this specification, the test specimens for each of the test specified shall be taken from the outside end of the sample rolls representing the lot. If any specimen tested fails to meet the requirements of this specification, the roll represented by the specimen shall be rejected and two (2) additional rolls shall be tested, both of which shall meet the requirements in every respect, otherwise the lot represented by the sample may be rejected.

AW-6.2.2 G.I. Pipes

Galvanized iron pipes for the seclusion fence and gates shall conform to ASTM A120-68A.

AW-6.2.3 Structural Steel

All structural steel (rolled shapes and plates) for the fabrication of the vehicular and pedestrian gates, unless otherwise specified on the drawings, shall conform to ASTM A36.

AW-6.3 Construction

- a) Fabrication and installation of the heavy galvanized cyclone wire seclusion fence and gate shall be in accordance with the drawings or as directed by the NPC.
- b) All welding work shall conform to the Specification for Welded Highway and Railway Bridges of the American Welding Society (AWS).



AW-6.4 Measurement and Payment**AW-6.4.1 Wire Mesh Enclosure Including Wire Mesh Door and Lockset**

Measurement for payment shall be based on the corresponding contract unit price shown on the Bill of Quantities, which payment shall include the cost of furnishing all labor, materials, equipment and tools necessary for the construction of wire mesh enclosure, doors and locksets.

AW-7.0 PREFABRICATED CONTAINER HOUSE

AW-7.1 General

The specification covers the features and technical requirements for the supply, delivery and erection/installation of two (2) units, 20ft. Prefabricated Container House. Other parts and accessories which are not specifically mentioned herein but are necessary for the proper assembly and erection of the staff house shall be included to be furnished.

All materials to be used and incorporated into the staff house shall be new and unused. They shall be suitable for the intended purpose and shall comply with all applicable regulations, quality, and standards.

The Supplier shall accept full responsibility for his work including design, performance qualifications, specifications, documentation, reports, fabrication, assembly, corrosion protection, shop testing, preparation for shipment, field testing, warranty provisions and compliance with the applicable codes and standards and the requirements of this Specification.

AW-7.2 Work Scope

The works and services to be performed by the successful bidder shall cover the supply, delivery, and complete erection/installation of two (2) units, 20ft. Prefabricated Container House which shall essentially consist of but not limited to the following:

1. Moving-in including furnishing, installation, construction, operation and maintenance of general construction facilities.
2. Clearing and grading of the project site and disposal of all excess materials to designated areas.
3. Construction of reinforced concrete foundation including all required structural excavation, backfill and proper disposal of all excess excavated materials as per detailed drawings.
4. Supply and installation of two (2) units twenty (20) feet Prefabricated Container House with the following specifications and fixtures:

Dimensions	6.0 meters length by 2.4 meters width by 2.6m height
Container Frame	Square tubing, 4 mm base metal thickness, pre-painted.
Wall Panels	50mm Polysterene insulation on walls with double-sided 0.45mm pre-painted galvanized iron sheet.
Roof Panels	Glasswool insulation on the roof with pre-painted galvanized iron sheet and exterior ceiling.



Flooring	Magnesium board with linoleum finish.
Windows	2 sets of 1.0m x 1.0m Aluminum frame sliding windows with 6 mm thk clear glass; and 1 set of aluminum frame awning window with 6 mm thk clear glass (for bedroom)
Door	1 set of 0.80m x 2.1m steel door; and 1 set of PVC door (for bedroom)
Toilet & Bath (1 set – 1.20m x 1.20m)	Complete with fixtures & fittings, including ceramic floor tiles, door, window and plumbing

- 5. Application of touch up paint for scratch during installation.
- 6. Removal/clearing of all debris and waste/excess materials prior to demobilization.

AW-7.3 Design Criteria for Prefabricated Container House

The prefabricated container house shall be designed for the erection on the concrete foundation. All materials under these specifications shall be designed, constructed and erected in accordance with the requirement of the specification and codes of AISC, ASTM and other such regular published and accepted codes except were modified or supplemented by these specifications.

Wind load

The wind load shall be based on the latest edition of NSCP.

AW-7.4 Measurement and Payment

Measurement and payment for prefabricated container house will be based on the corresponding contract unit price (set) under the architectural work's Schedule of Requirements.

Payment shall be made at the contract unit price, which payment shall cover costs of furnishing all materials and labor including equipment and tools required to complete the work and all associated costs for site grading, foundation/ slab construction including transport to site.



AW-8.0 PLUMBING FIXTURES AND FITTINGS**AW-8.1 General**

The work covered by this section of the Specifications consists in furnishing all plant, labor, equipment and tools, articles, appliances and materials and in performing all operations in connections with the installation of all plumbing fixtures, fittings and accessories, complete, in strict accord with this section of the Specifications or indicated on the drawings, are included in this work.

AW-8.2 Make

The model numbers herein given intended to illustrate the quality and design of fixtures that will be required. American standard fixtures specified herein and any substitution made to any item of fixtures specified must first be approved by the NPC Representative.

AW-8.3 Trade Marks

All plumbing fixtures and fittings must bear the trademarks of the manufacturer.

Maintenance Manual shall be submitted including complete instructions for replacing valve washers and strainers and give manufacturer's recommendations as to cleaning finish fixture surfaces.

Submit samples of valves, faucets, trims, and others for approval of the NPC Representative.

AW-8.4 Fixtures

Water Closet – as shown in the drawings or as specified in the Schedule of Requirements

- a) Bibbs - Nickel Plated Copper or Brass Alloy
- b) Kitchen Sink - Stainless
- c) Floor Drain - Stainless or Brass Alloy
- d) Clean-outs - Brass alloy

AW-8.5 Installation

Plumbing fixtures shall be installed free and open in a manner to afford access for cleaning. All brackets, cleat, plates, and anchors required to support the fixtures shall be furnished in a rigid manner. Water closets shall be sat on Boll-Wax.

Installed plumbing fixtures shall be kept clean and in working order for adequate protection so as not be used by anybody until issuance of Certificate of Completion.

All fixtures shall be provided with individual control stop so that each fixture may be separately controlled without affecting any other fixture.

All flush valves shall be equipped with vacuum breaking devices.



AW-8.6 Toilet Accessories

- a) Soap Holders – colored, vitreous China to match fixtures quality, brand and wainscoting color.
- b) Tissue Paper Holder - colored, to follow Water Closet brand and quality. Provide and fit, ready for use, on the most convenient side of the wall inside each water closet compartment, 750mm (30") above the finish floor.
- c) Liquid Soap Dispenser

AW-8.7 Measurement and Payment

Measurement and payment for **Plumbing Fixtures** will be based on the number of sets/pieces installed and accepted by the NPC Representative.

Payment will be made at the corresponding contract unit price per set/piece for the pertinent item under Architectural Works in the Schedule of Requirements.

Payment shall constitute full compensation for all labor, materials, equipment, tools, and incidentals necessary for the completion of this work.



SECTION VI

TECHNICAL SPECIFICATIONS

CIVIL WORKS

SECTION VI - TECHNICAL SPECIFICATIONS

CW – CIVIL WORKS

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SECTION VI – TECHNICAL SPECIFICATIONS

CW – CIVIL WORKS

CW-1.0 GENERAL CONSTRUCTION FACILITIES

CW-1.1 Scope

This section covers the construction and/or maintenance of access roads, drainage system and other appurtenant structures, moving-in of the Contractor's construction equipment, setting up of the Contractor's camp and the disposition of the Contractor's various facilities at the end of the Contract.

CW-1.2 Moving-in

The Contractor shall bring to the site all his necessary construction equipment and plant and install all stationary construction equipment and plant at location and in the manner approved by the NPC. The Contractor shall submit sufficient detailed plans showing the proposed location of such stationary equipment and plant and other pertinent data. No installation of such stationary equipment shall be undertaken unless the corresponding plans have been approved by the NPC.

CW-1.3 Contractor's Camp Facilities

The Contractor shall provide and grade his camp site, construct his camp, employee housing, warehouse, machine and repair shops, fuel storage tanks and provide such related facilities and sanitary conveniences that the Contractor deems necessary for maintaining health, peace and order in the camp and work areas. The areas that may be used by the Contractor within the plant site shall be designated by the NPC.

The Contractor shall provide, maintain and operate, under competent direction, such camps and facilities as are necessary for the housing, feeding and accommodation of his employees.

CW-1.4 Water Supply

The Contractor shall, at his own expense, be responsible for the supply, installation, operation and maintenance of a safe and adequate supply of drinking and domestic water. Whenever there is a possibility of contamination of the water supply for drinking and domestic purposes, chlorination or some other approved methods of sterilization shall be carried out. The installation and maintenance of these services shall be subject to the approval of the NPC.

CW-1.5 Sewerage Disposal and Sanitation

The Contractor shall, at his own expense, be responsible for the installation operation and maintenance of an adequate sewerage disposal and sanitation system and shall provide adequate toilet and wash-up facilities for his employees at his camp and in the areas where work is being carried out.



The Contractor shall execute the work with due regard to adequate sanitary provisions and applicable codes and shall take all necessary steps to prevent the pollution of water in any spring, river, or other sources of water supply. All toilets or wash-up facilities shall be subject to the prior and continuing approval of the NPC.

CW-1.6 Fire Protection

The Contractor shall observe all necessary precautions against fire, shall provide and maintain at his own expense, portable fire-fighting equipment he may deem necessary, and shall comply with all applicable laws of the Philippines relating thereto.

In the event of an uncontrollable fire occurring in the area of the Contractor's operation, the Contractor shall have to extinguish the fire immediately at his own expense, to the full extent of the manpower and equipment employed under the contract at the time of the fire.

The Contractor shall indemnify NPC against all liabilities, claims, damages and/or lawsuits arising thereto.

CW-1.7 Construction Power

The Contractor shall be responsible for providing his own electric power supply required for construction and erection/installation. If power is available from NPC and should the Contractor elect to utilize the NPC's power supply, he shall make an arrangement with NPC concerned group as to the billing rates and other requirements needed for direct connection to NPC.

CW-1.8 Camp Security

The Contractor shall provide his own security force to the extent that he deems necessary for maintaining peace and order in the camp and work areas and to safeguard materials and equipment. Nothing under the provisions of this paragraph shall relieve the Contractor from full responsibility for the maintenance of peace and order and protection of life and property in all areas where he operates.

CW-1.9 Construction Material Storage

The Contractor is required to put up warehouse(s) with capacities sufficient to store the construction materials required in the work. The warehouse(s) shall be specifically for this contract, notwithstanding his other facilities in the site that may serve the purpose.

CW-1.10 Care Of Water During Construction

In accordance with the specifications contained in this section or otherwise directed, the Contractor shall construct and maintain all necessary temporary drainage ditches and other temporary protective works and he shall also furnish, install, maintain and operate necessary pumping equipment and other devices to protect construction operations free from water coming from any source, including rain.

The Contractor shall be responsible for dewatering foundation areas so that work can be carried out on a suitably dry condition. The Contractor



shall construct drainage ditches, holes, culverts, furnish, maintain and operate at his own expense all necessary pumps and other dewatering devices to keep all work areas free from water.

After the work is completed and before it is accepted by the NPC, the Contractor shall remove all pumping equipment and shall remove, fill or plug all temporary drainage structures as directed, all at his expense.

CW-1.11 Removal of Camp and Construction Facilities

After the completion of the work covered by the contract and prior to acceptance of the completed work, the entire camp facilities of the Contractor, including its water supply system, electric distribution system, quarters, warehouses, shops, dining halls, commissaries, temporary shed and other facilities therein shall be removed by the Contractor. The site shall be cleared and cleaned as directed by the NPC.

CW-1.12 Measurement and Payment

No separate measurement and payment will be made for the Contractor's Construction Facilities. The cost of furnishing, constructing, maintaining, operating and removing of temporary drainage structures, pumping system and other dewatering devices necessary to keep construction operations free from water, shall be included in the various pay items in the Bill of Quantities for structures where such care of water is required.

CW-2.0 ENVIRONMENTAL REQUIREMENTS FOR CIVIL WORKS**CW-2.1 Scope**

This section pertains to the environmental and safety provisions, requirements and conditions that shall govern during the execution of all civil works under this project.

CW-2.2 General Conditions

The Contractor shall ensure compliance with the applicable environmental and safety regulations, as well as ECC conditions, during installation/construction of this project through the implementation of measures that include, but not limited to, the following:

- a) Designate a Safety Officer and a Pollution Control Officer who shall respectively handle all safety and environmental concerns of the project.
- b) Prepare and submit Construction Safety and Health Plan (CSHP).
- c) Properly manage debris and various waste generated during installation/construction, such as the following:
 - Dispose of demolition and construction debris in a designated or NPC approved disposal area(s);
 - Stockpile (and cover if possible) or haul to the designated and/or pre-developed dump sites (spoil disposal areas) that shall be provided with suitable drainage – equipped with sediment traps, stripped top soil, spoils from quarry/borrow sites and excavated materials;
 - Segregate solid wastes, such as empty cement sacks, scraps of tin or wood, used wires and other domestic garbage, for recycling or storage in NPC-approved temporary storage areas and further disposal to LGU-designated disposal sites.
 - Properly handle, store and dispose off, through DENR-accredited transporter/treater, hazardous wastes i.e. used oils, paints, thinner, etc.
- d) Limit construction activities that generate excessive noise to daytime works only to prevent nuisance to nearby residents during rest hours.
- e) As far as practicable, undertake site stripping, grading and excavations during dry weather.
- f) Construction/Installation shall be carried-out in a manner where landslides and erosions are minimized.
- g) Avoid unnecessary opening/clearing of areas outside construction sites or destruction of vegetative cover, especially cutting of existing trees; and to re-vegetate disturbed areas.



- h) Implement biological control measures such as maintenance of vegetation buffers (i.e. sodding of grass, planting of creeping vines, herbs, shrubs and trees) to shield streams/rivers from sedimentation; planting of vegetative cover over erodible surfaces; and planting of exposed sloping areas with shallow-rooted species like grasses, herbs or creepers.
- i) Locate fill slopes and spoil heaps away from drainage routes and properly remove/dispose the same as soon as practicable.
- j) Preserve or replace, if practicable, natural drainage patterns (when disturbed by civil works) with appropriate drainage channels.
- k) Convey oil-contaminated wastewater from workshops, garages, or gas filling stations through an oil trap (i.e. improvised oil-water separator) prior to discharge.
- l) Spray water, wherever and whenever necessary, to minimize dust generation.
- m) Provide PPEs and other safety provisions required by DOLE, for its project/site works.
- n) Take all necessary steps to prevent the pollution of groundwater and/or water bodies in the vicinity of the project site.

CW-2.3 Measurement and Payment

No separate measurement and payment will be made for the Contractor's compliance to the foregoing. The entire cost thereof shall be included in the various pay items in the Bill of Quantities.



CW-3.0 STRUCTURAL EXCAVATION, FILL AND BACKFILL

CW-3.1 Scope

In accordance with the specifications contained herein and as shown on the drawings and otherwise directed, the Contractor shall perform all the required structural excavation, fill and backfill for the entire project, including the proper disposal of excess excavated materials.

CW-3.2 Materials

CW-3.2.1 Structural Excavation

No classification will be made on the materials excavated. The Contractor shall determine his unit bid price for structural excavation based on unclassified material regardless of the nature of the materials actually encountered and excavated.

CW-3.2.2 Structural Fill

a. Sand and Gravel Fill

The material shall be of the same classification as the sand and gravel base consisting of river sand and gravel as approved by the NPC. The composite material shall be free from vegetable matter and lumps or balls of clay, and shall be uniformly graded from coarse to fine in accordance with the grading requirements shown below:

<u>Sieve Designation (Square Mesh Sieves)</u>	<u>Percentage by Weight Passing</u>
50.0 mm (2")	100
25.4 mm (1")	55-85
9.5 mm (3/8")	35-60
4.76 mm (No. 4)	25-50
2.08 mm (No. 10)	20-40
0.42 mm (No. 40)	8-20
0.074 mm (No. 200)	2-8

b. Structural Earth Fill

Structural earth fill shall consist of filling with suitable materials obtained from grading excavation or from borrow areas approved by the NPC.

CW-3.2.3 Structural Backfill

Backfill for Structures Other Than Pipes – Material for backfill shall consist of compactable and approved material taken from grading and structural excavations. Any additional material needed shall be obtained from borrow areas proposed by the Contractor and approved by the NPC.

Backfill for Sewerage and Drainage Pipes – The layer of backfill materials immediately above, up to 60 cm. from the top of pipe, and on the sides of the pipe shall consist of selected material consisting of clay soil and/or other fine materials that are free from stone particles, roots, debris. The



upper layer shall consist of compactable materials taken from pipe trench and other structural excavation.

Backfill for Water Supply Pipes – Backfill for water supply pipes shall consist of compactable materials taken from trench excavation and approved by the NPC.

CW-3.3 Construction

CW-3.3.1 Excavation

a. General

The Contractor shall notify the NPC sufficiently in advance before the beginning of any excavation so that a joint survey for baseline data and cross-sectional measurements can be undertaken on the undisturbed/natural ground surface. All excavation shall be carried out according to the lines, slopes and grades shown on the drawings. In case an increase or decrease in quantities occur as a result of changes made by the NPC to such lines, slopes, and grades, the provisions on Variation Orders under the General Conditions of Contract (GCC) shall apply.

After each excavation is completed or where replacement of unsuitable material below required foundation grade has been undertaken, the Contractor shall notify the NPC so that proper inspection and confirmatory test on the bearing capacity of the foundation material can be made. In no case that concrete, sewer, drainage or water supply pipe can be placed unless a written approval has been issued by the NPC.

Over-excavation performed by the Contractor due to his carelessness shall be filled and properly compacted with the suitable material approved by NPC, at no additional cost to NPC.

b. Structural Excavation, Structure Other Than Pipes

The Contractor shall excavate the foundations to the specified side slopes and depths shown on the drawings, after which the NPC will conduct tests on the underlying material below foundation grade to determine the actual bearing capacity at such depth. If the required bearing capacity is not attained, the NPC shall instruct the Contractor to excavate further down until, in the opinion of the NPC, the bearing capacity is adequate to sustain the applied load on the foundation.

Compliance to such instruction shall not entitle the Contractor for additional compensation over and above the unit prices for excavation regardless of the nature of material excavated. For purposes of measurement, the applicable paylines for the excavation under this condition or situation shall be as shown on the drawings that show the paylines for excavation and special foundation materials.

CW-3.4 Measurement and Payment**CW-3.4.1 Structural Excavation**

Measurement for payment for structural excavation performed by the Contractor for structures (except drainage, sewerage and water supply pipes, and appurtenances of which cost of excavation and backfill is included in the cost of installed pipe and constructed appurtenances) will be based on the number of cubic meters of materials excavated.

For purpose of payment, all authorized excavation below foundation grade (like in the case of unsuitable materials encountered) shall be included in the measurement.

Payment will be made at the contract unit price for Structural Excavation in the Bill of Quantities, which payment shall constitute full compensation for furnishing all labor and equipment necessary for excavation work and proper disposal of excess material excavated.

CW-3.4.2 Structural Fill

Measurement for payment for Structural Fill will be based on the number of cubic meters of fill materials placed within the neat lines as shown on the drawings.

Payment will be made at the contract unit price for the item, Sand and Gravel Fill/Base, in the Bill of Quantities, which payment shall constitute full compensation for furnishing, placing and compacting fill materials; labor which include spreading, compacting, etc., equipment and other incidentals necessary to complete the item.

CW-3.4.3 Structural Backfill

Measurement for payment for Structural Backfill (except backfill for drainage and sewerage pipes, appurtenances and other structures of which cost of backfill is included in the cost of installed pipes and appurtenances) will be based on the number of cubic meters of approved materials, backfilled, satisfactorily compacted and accepted. Any backfill material placed outside the pay lines for excavation to replace slides or over-excavation will not be paid.

Payment will be made at the contract unit price for the item, Structural Backfill, in the Bill of Quantities, which payment shall constitute full compensation for furnishing all labor, materials and equipment necessary for backfilling work.

CW-4.0 CONCRETE**CW-4.1 Scope**

In accordance with the specifications contained in this section, the Contractor shall furnish all materials, labor, equipment and tools and perform all concreting works in accordance with the drawings, or as otherwise directed.

CW-4.2 Class of Concrete

Class of concrete or strength shall be as indicated on the drawings, which shall conform to the minimum requirement for compressive strength indicated on the provision of NSCP for Concrete and, in no case, shall not be less than 20.7 MPa.

CW-4.3 Materials**CW-4.3.1 Cement**

Cement for concrete works shall be furnished by the Contractor and shall conform to the requirements of the latest edition of the Standard Specifications for Portland Cement (ASTMC150) and/or Portland-Pozzolan Cement (ASTMC595).

Unless otherwise specified, cement shall be ordinary Portland Cement, Type I for general construction which concrete is not in contact with soils or ground water, Type II for concrete in contact with soil or ground water. However, the use of Portland Pozzolan Cement Type IP meeting the AASHTO/ASTM requirements may be allowed, provided that trial mixes shall be done and that the mixes meeting the concrete strength requirements of the AASHTO/ASTM provisions, pertaining the use of Portland Pozzolan Type IP, shall be adopted.

Changing of brand or type of cement within the same structure will not be permitted unless with prior permission and approval obtained from the NPC.

CW-4.3.2 Reinforcing Steel

The Contractor shall furnish all reinforcing steel of the sizes shown on the drawings and in accordance with the herein specifications for reinforcing steel.

CW-4.3.3 Water

Water for use in concrete shall be subject to the approval of the NPC. It shall not be salty and shall be reasonably clear and free from oil, acid, injurious alkali or vegetable matter.

CW-4.3.4 Aggregates

All coarse and fine aggregates shall consist of hard, tough, durable and clean, uncoated particles. All foreign materials and dust shall be removed by processing. Aggregates shall generally be rounded and reasonably free from thin, flat and elongated particles in all sizes and well graded from coarse to fine.



CW-4.3.5 Formwork

Timber, lumber and plywood to be used for falsework and formwork shall be sound and shall comply with the requirements of this specifications. Use forms where a smooth form finish is required. Lumber shall be square-edged or tongue-and-groove boards, free or raised grain, knotholes and the other surfaces defects. Steel when used shall conform to the requirements of the ASTM A36. Steel form surfaces shall not contain irregularities, dents, or sags.

Forms shall be wood, plywood, or steel. Wood forms for surfaces exposed to view in the finished structure and requiring a smooth form finish, shall be plywood. For unexposed surfaces, undressed square-edge lumber may be used. Forms for surfaces requiring special finishes shall be plywood, or shall be lined with plywood, a non-absorptive, hard-pressed fiberboard, absorptive-type lining or other suitable material. Plywood, other than for lining, shall be concrete-form plywood free of raised grain, torn surfaces, worn edges, patches, or other surface defects, which would impair the texture of the concrete surface. Surfaces of steel forms shall be free from irregularities, dents, and sags.

CW-4.4 Storage of Materials**CW-4.4.1 Cement and Aggregates**

All cement shall be stored, immediately upon delivery at the Site, in weatherproof building that will protect the cement from dampness. The floor shall be adequately raised from the ground and in buildings placed in the locations approved by NPC. Provisions for storage shall be ample, and the shipments of cement as received shall be separately stored in such a manner that allows the earliest deliveries to be used first and to provide easy access for identification and inspection of each shipment. Storage buildings shall have capacity for storage of sufficient quantity of cement to allow sampling at least twelve (12) days before the cement is to be used. Bulk cement, if used, shall be transferred to elevated air tight and weatherproof bins. Stored cement shall meet the test requirements at any time after storage when NPC orders retest. At the time of use, all cement shall be free flowing and free of lumps.

Handling and storing of concrete aggregates shall be such that segregation or inclusion of foreign materials is sufficiently prevented. NPC may require that aggregates be stored on separate platforms at satisfactory locations.

In order to secure greater uniformity of concrete mix, NPC may require that the coarse aggregate be separated into two or more sizes. Different sizes of aggregates shall be stored in separate bins or in separate stockpiles and relatively away from each other to prevent the material at the edges of the piles from intermixing.

CW-4.4.2 Reinforcing Steel

Reinforcing steel shall be stored in accordance with the herein specifications for reinforcing steel.

CW-4.5 Concreting**CW-4.5.1 General**

The written approval of the NPC shall be secured prior to any concreting work. All concrete shall be poured on dry and cleaned surfaces.

CW-4.5.2 Formwork Construction

Forms shall be installed mortar and watertight, true to the dimensions, lines and grades of the structure and with the sufficient strength, rigidity, shape and surface smoothness as to leave the finished works true to the dimensions shown on the drawings or required by NPC and with the surface finish as specified.

The inside surfaces of forms shall be cleaned of all dirt, mortar and foreign material. Forms, which will subsequently be removed, shall be thoroughly coated with a release agent or coating prior to its use. The release agent shall be commercial quality form oil or other approved coating which will permit the ready release of the forms and will not discolor the concrete.

Formwork for concrete placed underwater shall be watertight.

Forms shall be constructed so that the form surface of the concrete does not undulate excessively in any direction. Undulations exceeding either 2 mm or 1/270 of the center distance between studs, joints, form stiffeners, form fasteners, or wales will be considered to be excessive. Should any form of the forming system, even though previously approved for the use, produce a concrete surface with excessive undulations, its use shall be discontinued until modifications, satisfactory to NPC's Representative, have been made.

Portions of concrete structures with surface undulations in excess of the limits herein stated may be rejected by the NPC.

Form fasteners consisting of bolts, clamps or other devices shall be used as necessary to prevent spreading of the forms during concrete placement. The use of ties consisting of twisted wire loops to hold the forms in position will not be permitted.

All formworks shall be provided with adequate clean-out openings to permit inspection and easy cleaning after all reinforcement has been placed. Where forms for continuous surfaces are placed in successive units, the forms shall be fitted over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Panel forms shall be constructed so that they can be removed without damaging the concrete. All exposed joints, edges, and external corners shall be chamfered a minimum of 20 mm unless specified otherwise herein. Forms for heavy girders and similar members shall be constructed with a proper camber.

Coating: Before placing the concrete, the contact surface of forms shall be coated with a non-staining mineral oil or suitable non-staining form coating compound or shall be given two coats of nitrocellulose lacquer, except as specified otherwise. Mineral oil shall not be used on forms for surfaces, which are to be painted. For surfaces not exposed to view in



the finished structure, sheathing may be wetted thoroughly with clean water. All excess coating shall be removed by wiping with cloths. Reused forms shall have the contact surfaces cleaned thoroughly. Those that have been coated shall be given an additional application of the coating. Plaster waste molds shall be layered with two coats of the thin shellac or lacquer and coated with soft or thinned non-staining grease.

Tolerance and Variations: The Contractor shall set and maintain concrete forms to ensure that, after removal of the forms and prior to patching and finishing, no portion of the concrete work will exceed any of the tolerances specified. Variations in floor levels shall be measured before removal of supporting shores. The Contractor shall make the necessary corrective measures for the variations resulting from deflection, or when the latter affects concrete quality or curing. The tolerances specified shall not exceed by any portion of the concrete surfaces; the specified variation for one element of the structure shall be considered unacceptable when it permits another element of the structure to exceed its allowable variations. Except as otherwise specified herein, tolerances shall conform to ACI 347.

CW-4.5.3 Placing Reinforcement

Reinforcing steel and embedded items shall be properly and securely installed prior to the placing of concrete.

In no case shall concreting start without prior inspection and approval by the NPC of the placed reinforcement and other embedded items.

CW-4.5.4 Mixing Concrete

Mixing of concrete shall conform to the requirements of ACI Code for Concrete Construction.

CW-4.5.5 Placing Concrete

Concrete shall be conveyed from mixers to the forms or to the place of deposit as rapidly as possible and by methods that will prevent segregation or loss of ingredients. There shall be no vertical drop greater than 1.5 meters except where suitable equipment like metal pipe or tremie is used. The pipe or tremie shall be kept full of concrete and its end shall be kept buried in the newly placed concrete. Chutes through which concrete is delivered to the structure in a thin, continuously exposed flow will not be permitted except for very limited or isolated sections of the work.

Earth surfaces, upon which concrete shall be placed, shall be cleaned, dry and thoroughly compacted before placing the concrete.

Rock surface, upon which concrete shall be placed, shall be thoroughly cleaned of loose or semi-detached or unsound rock particles. Before placing concrete, all surfaces shall be wetted thoroughly to keep them in a completely moist condition, after which leveling mortar of the same cement ratio as the concrete mix complete contact between concrete and the leveled surface.



CW-4.5.6 Finishing Concrete

After the concrete has been deposited, distributed and vibrated, the concrete shall be struck off and screened by mechanical means approved by the NPC. The finishing machine shall be of the screening and troweling type designed and operated both to strike off and to consolidate. Hand finishing may be employed when suitable finishing machines are not available. Finishing of concrete shall be done, as directed, to the satisfaction of the NPC.

All finished surfaces shall be tested with 3 meters straight edge and any variation of the surface from the desired crown or cross section shall be properly corrected.

CW-4.5.7 Removal of Forms

Forms shall be removed as soon as practicable in order to avoid delay in curing and to make possible earliest practicable repair of surface imperfections, but in no case shall they be removed without approval. Any needed repair or treatment shall be performed at once and shall be followed immediately by the specified curing. Forms shall be removed with care so as to avoid injury to the concrete and any concrete so damaged shall be repaired as directed.

Falsework removal for continuous structures shall be as directed by NPC but in which case shall be temporarily supported such that the structure is gradually subjected to its working stresses. False work shall not be released in any span until the strength specified hereunder is attained.

When concrete strength tests are to be used as basis for the removal of forms and supports, the compressive strength of concrete must meet the following minimum requirements:

	Min. Time	Min.% Strength
Centering under girders and beams	14 days	80%
Sides of beams and all vertical surfaces	1 day	70%
Floor Slabs	14 days	80%

The site shall be cleared of all debris and refuse resulting from work.

CW-4.5.8 Curing and Protection

Concrete shall be cured for a period of not less than fourteen (14) consecutive days by keeping the surfaces of concrete continuously (not periodically) wet. Where tongue and groove forms were used and left in place of curing, they shall be kept wet at all times prevent opening at the joints and drying out of the concrete.

CW-4.5.9 Sampling and Testing of Concrete

The Contractor shall furnish all materials, either separately or mixed, as required by NPC. Selection of materials and the making of test specimens shall be made under the supervision of NPC and delivered to NPC laboratory or any NPC-accredited testing agency at the Contractor's expense.



The expense of making and curing all concrete specimens including the materials comprising the concrete specimens shall be borne by the Contractor. The cost of shipping and testing the concrete shall likewise be at the expense of the Contractor.

No concreting work on the project will be permitted to be done until NPC signifies in writing that, following the performance of the necessary tests, he gives his approval to the use of all materials involve in making the concrete.

Test cylinders shall be prepared from the concrete samples and tested. At least one set of four (4) cylinder samples shall be made for each major structural member. Two (2) cylinders shall be tested at 28 days for specification compliance and one shall be tested at 7 and 14 days respectively for information. The acceptance test result shall be the average of the strength of the two cylinders tested at 28 days.

The compressive strength of the concrete shall be deemed acceptable if the averages of the three consecutive strength test results is equal to or exceeds the specified strength and no individual test falls below the specified strength by more than 3.50 MPa if f_c' is 35 Mpa or less; or by more than $0.10f_c'$ if f_c' exceeds 35 Mpa.

Concrete deemed to be not acceptable using the above criteria maybe rejected unless the Contractor can provide evidence, by means of core tests, that the quality of concrete represented by the failed test result is acceptable in place. Three (3) cores shall be taken in accordance with ASTM C42 and soaked for 24 hours prior to testing. Concrete in the area represented by the cores will be deemed acceptable if the average strength of the cores is equal to at least 85% of and no single core is less than 75% of the specified strength.

If the strength of control specimens does not meet the requirements of this Subsection, and it is not feasible or not advisable to obtain cores from the structure due to structural considerations, payment of the concrete specimens as specified hereunder:

Deficiency in Strength of Concrete Specimens, Percent (%)	Percent (%) of Contract Price Allowed
Less than 5	100
5 to less than 10	80
10 to less than 15	70
15 to less than 20	60
20 to less than 25	50
25 or more	0

CW-4.5.10 Tolerances and Repair for Concrete Construction

Concrete structures shall be constructed to the lines shown on the drawings or where so required to suit actual field requirements. Any structure that does not conform to such lines shall be repaired or removed and made anew by the Contractor at no additional cost to the Corporation.



Repairs shall be made at surface imperfections due to faulty placing of concrete and cuts on the structures due to the removal of excess concrete on the lines shown on the drawings. Such repairs shall be made immediately after early stripping of the forms, after the imperfections have been identified and the methods of repair appropriately established.

CW-4.5.11 Second Stage Concrete

The second stage of concrete finishing shall be done only after the final installation of all pertinent equipment, anchorages, pipings, conduits and other embedded items as may be required for all electromechanical works.

CW-4.6 Measurement and Payment

Measurement for payment for Concrete (except concrete which shall be measured for separate payment) will be based on the volume of concrete placed and accepted within the neat lines of the structure as shown on the drawings or in accordance with the manner of measurement set forth in the various sections of the Technical Provisions. No deduction will be made for rounded or beveled edges or space occupied by the metal items 10 sq. cm. or less in cross section, embedded in concrete.

Payment will be made at the corresponding contract unit price for the various items of concrete shown in the Bill of Quantities. Payment shall cover all costs for furnishing all labor, materials, including equipment and tools required for concreting work. Payment shall also include non-shrink cementitious grout and epoxy grout inside foundation block out and above engine base plate and care of water.

No separate measurement for payment will be made for formworks of which the cost shall be included in concreting works.



CW-5.0 REINFORCING STEEL**CW-5.1 Description**

This work shall consist of furnishing, fabricating, and placing of steel reinforcement of the type, size, shape and grade required in accordance with these specifications and in conformity with the requirements shown on the Drawings or as directed by the NPC.

CW-5.2 Material Requirement

All material shall conform to the requirements hereinafter given. Certified test reports (mill test or other) shall be submitted to the NPC for all reinforcement steel used. These tests shall show the results of all chemical and physical tests made.

CW-5.2.1 Bar Reinforcement

Reinforcement bars for concrete shall be hot-rolled, weld able, deformed billet-steel bars conforming to the requirements specified in ASTM A615 and PNS 49 unless shown on the Drawings or as required by the NPC. The use of the cold twisted bars is not permitted. Bar reinforcement shall be shipped in standard bundles, tagged and marked in accordance with the Code of Standard Practice of the Concrete Reinforcement Steel Institute.

CW-5.2.2 Sampling

The NPC's Representative will sample reinforcement bars at the source of supply or at the point of distribution, and the Contractor shall notify the NPC in sufficient time in advance to permit sampling and testing before shipment is made. Three (3) samples from each size shall be taken at random representing five (5) tons or fraction thereof of each size.

CW-5.3 Construction Requirement**CW-5.3.1 Fabrication**

Bent bar reinforcement shall be cold bent as shown on the drawings or as required by the NPC. Bars shall be bent around circular pin having the following diameters (D) in relation to the diameter of the bar (d):

Bars 6mm Φ to 20mm Φ inclusive	D=6d
Bars 25mm Φ and 28mm Φ	D=8d
Bars 32mm Φ and greater	D=10d

Bends and hooks in stirrups and lateral ties may be bent to the diameter of the principal bar enclosed therein.

CW-5.3.2 Protection of Material

Steel reinforcement shall be protected at all times from injury. When placed in the work, it shall be free from dirt, detrimental scale, paint, oil or other foreign matter. However, when steel has on its surface easily removable and detrimental rust, loose scale or dust, it shall be cleaned by a satisfactory method, approved by the NPC.



Store reinforcement of the different sizes in racks raised above the ground with accurate identification. Protect reinforcing steel from contaminants such as grease, oil and dirt.

CW-5.3.3 Placing and Fastening Reinforcement & Miscellaneous Material (ACI-301)

All reinforcement bars, stirrups, hanger bars, wire fabric, spirals and other reinforcing materials shall be provided as indicated in the drawing or required by the specification, together with all necessary wire ties, chairs, screws, supports, and other devices necessary to install and secure the reinforcement properly. All reinforcement, when placed, shall be free from rust, scale, oil, grease, clay, and other coatings, and foreign substances that would reduce or destroy the bond. Rusting of reinforcement shall not reduce the effective cross sectional area of the reinforcement to the extent that the strength is reduced beyond specified values. Heavy, thick rust or loose, flaky rust shall be removed by rubbing with burlap or other approved method, prior to placing. Reinforcement that has bends not shown on the project drawings or on approved shop drawings, or is reduced in section by rusting such that its weight is not within permissible ASTM tolerances, shall not be used. All reinforcement shall be supported and wired together to prevent displacement by construction loads or by the placing of concrete. Unless directed otherwise by the NPC, reinforcement shall not be bent after being partially embedded in hardened concrete. Detailing of reinforcing shall conform to ACI 315. Where cover over reinforcing steel is not specified or indicated, it shall be in accordance with ACI 318.

All steel reinforcement shall be accurately placed in position shown on the drawings or as required by the NPC and firmly held there during the placing and setting of the concrete. Bars shall be tied at all intersections except where spacing is less than 30 mm in each direction, when alternate intersections shall be tied. Ties shall fasten on the inside.

Distance from the forms shall be maintained by means of stays, blocks, hangers or other approved supports. Blocks for holding reinforcement from contact with the forms shall be pre-cast mortar blocks of approved shape and dimensions or approved chairs. Layers of bars shall, be separated by pre-cast mortar blocks or by other equally suitable devices. The use of pebbles, pieces of broken stone or brick, metal pipe and wooden blocks or metal chairs shall not be permitted. Unless otherwise shown on the Drawings or required by the NPC, the minimum distance between bars shall be 40mm. Reinforcement in any member shall be placed and then inspected and approved by the NPC before the placing of concrete commences. Bundled bars shall be tied together at not more than 1.80 meters intervals.

Reinforcement shall be placed accurately and secured. It shall be supported by suitable chairs and spaces or by metal hangers. On the ground, and where otherwise subject to corrosion, concrete or other suitable non-corrodible material shall be used for supporting reinforcement. Where the concrete surface will be exposed to the weather in the finished structure or where rust would impair the appearance or finish of the structure, all reinforcement supports, within specified concrete cover, shall be galvanized or made of a suitable non-corrodible material.



All placement or movement of reinforcing steel after placement, to positions other than indicated or specified, shall be subject to the approval of the NPC.

Concrete protection for reinforcement shall be as indicated, or if not indicated, in accordance with ACI 318.

The minimum concrete cover for reinforcement specified in the bid documents shall take precedence over all permissible reinforcement placement variations; nothing in the variations listed below is to be construed as permitting violation or compromise thereof:

- | | |
|--|------------------|
| a. Height of bottom bars | ±6mm above form |
| b. Lengthwise positioning | ±50mm of bars |
| c. Spacing bars in walls and solid slabs | ±25mm |
| d. Spacing bars in beams and footings | ±6mm |
| e. Height of top bars | ±6mm |
| f. Stirrup spacing: | |
| (1) For any one stirrup | ±25mm |
| (2) For over-all group | ±25mm of stirrup |

Anchors and bolts; including but not limited to those for the machine and equipment bases; frames or edgings, hangers and inserts, door bucks, pipe supports, pipe sleeves, pipe passing through walls, metal ties, conduits, flashing reflects, drains and all other materials in connection with the concrete construction shall, where practicable be placed and secured in position when the concrete is placed. Anchor bolts for machines shall be set to templates, shall be plumbed carefully and checked for location and elevation with an instrument, and shall be held in position rigidly to prevent displacement while concrete is being placed.

CW-5.3.4 Splicing

Splicing of reinforcement shall be in accordance with ACI 318, except as indicated otherwise or modified herein. Where splices in addition to those indicated on the drawings are necessary, they shall be approved by the NPC prior to their use. Splices shall not be made in beams, girders, and slabs at points of maximum stress. Butt Splicing shall preferably be used over lapping for bar sizes larger than 32 mmΦ. Splices to be welded shall conform to AWS D1.4; certification of weld ability of the reinforcement by the manufacturer, shall be submitted to the NPC. If the Contractor elects to use butt splicing of reinforcing, he shall submit complete details of the process to be used by the NPC. If the butt splices are used the Contractor shall ensure that the splice meets the requirements specified herein by performing at least three splices which shall be submitted for tests to a testing laboratory that has been approved for such testing by the NPC. The cost of these shall be borne by the Contractor.

All reinforcement shall be furnished in the full lengths indicated on the Drawings. Splicing of bars, except where shown on the Drawings will not be permitted without the written approval of the NPC. When allowed, splices shall be staggered as far as possible and with a minimum separation of not less than 40 bar diameters. Not more than one-third of the bars may be spliced in the same cross section, except where shown on the Drawings.



Unless otherwise shown on the Drawings, bars shall be lapped a minimum distance of:

<u>Splice Type</u>	<u>Grade 40 Min.Lap</u>	<u>But Not Less Than</u>
Tension	24d	300mm
Compression	20d	300mm

Where d is the diameter of the bar. In lapped splices, the bars shall be placed in contact and wired together. Lapped splices will not be permitted at locations where the concrete section is insufficient to provide a minimum clear distance of one and one-third the maximum size of coarse aggregate between the splice and the nearest adjacent bar. Welding of reinforcing steel shall only be done if detailed on the Drawings or if authorized by the NPC in writing. Spiral reinforcement shall be spliced by lapping at least one and half (1 1/2) turns or by butt-welding unless otherwise shown on the drawings.

CW-5.4 Measurement and Payment

The quantity to be paid for shall be the calculated theoretical number of kilograms of reinforcement steel bars as determined from the net length of the steel shown on the drawings, incorporated in the concrete and accepted.

The weight of deformed bars will be computed from the theoretical weight of the same nominal size as shown in the following tabulation:

<u>Designation</u>	<u>Size (mm)</u>	<u>Weight (kg/m)</u>
#2	6	0.222
#3	10	0.616
#4	12	0.888
#5	16	1.579
#6	20	2.468
#8	25	3.854
#9	28	4.833
#10	32	6.313
#11	36	7.991

Clips, ties, separators and other and related materials used for positioning and fastening the reinforcement in place as required by the NPC shall not be included in the weight-calculated payment under this item. If bars are substituted upon the Contractor's request and as a result, more steel is used than specified - only the amount specified shall be included.

When laps are made for splices, other than those shown on the drawings or required by the NPC and for the convenience of the Contractor, the extra steel shall not be measured nor paid for.

The accepted quantity shall be paid at the corresponding unit price for the item, Reinforcing Steel as shown in the Bill of Quantities which price and payment shall be made in full compensation for furnishing materials, labor, equipment and incidentals necessary to complete this item.



CW-6.0 DRAINAGE SYSTEM AND APPURTENANT STRUCTURES**CW-6.1 Scope**

In accordance with the specifications contained herein, the Contractor shall furnish all materials, labor, equipment and tools, perform all required excavation and backfill, install all pipes and construct drain pits and ditches, as the case may be, where indicated on the drawings or where directed conforming with the lines and grades as established in the field by the NPC. The Contractor shall also construct or install, where required, appurtenant structures like street inlet, street inlet-catch basin combination, manhole, catch basin for downspouts, catch basin for intersecting perforated PVC pipes, drainage outlets, drain pit etc. as well as joints and connections as may be required to complete the system.

CW-6.2 Materials**CW-6.2.1 Non-reinforced Concrete Drainage Pipes**

Non-reinforced concrete drainage pipes shall meet the requirements of ASTM C14-68.

One pipe length shall be taken at random representing a group of fifty (50) pipes or fraction thereof of the same size and shall be submitted for test. Any group represented by corresponding test specimens that do not meet the strength and other test requirements shall not be used in the work.

CW-6.2.2 Reinforced Concrete Drainage Pipes

Reinforced concrete drainage pipes shall meet the design and test requirements for Class II Reinforced Concrete Pipes in accordance with ASTM C76-68 and ASTM C497-67.

One (1) pipe length shall be taken at random representing a group of fifty (50) pipes or fraction thereof of the same size and shall be submitted for test. Any group represented by corresponding test specimens that do not meet the strength and other requirements shall not be used in the work.

CW-6.2.3 PVC Pipes

Polyvinyl Chloride (PVC) Pipes shall be unplasticized conforming to ISO4435 or equivalent. Details/scheme of perforation shall be as indicated in the bid drawing or as directed by NPC.

CW-6.2.4 Concrete Covered Rectangular Ditch

Cement, reinforcing steel, aggregate, and water to be used for the construction of concrete covered rectangular ditch and open rectangular canal shall conform to the requirements set forth in Section CW-7.0 – Concrete. Foundation base material for concrete canal shall be sand and gravel as described in Section CW-5.0.

CW-6.2.5 Bedding Material**A. For Stable Soil and Rock Foundation**

Bedding material for sewerage and drainage pipes unstable soil and rock foundation, as determined by NPC, shall consist of sand or natural sandy soil in which all the materials pass a 9.5 mm (3/8") sieve but not more than 10% passes a 0.074 mm (No. 200) sieve.

B. For Unstable Foundation

Bedding for sewerage and drainage pipes in the soft and unstable foundation as determined by the NPC shall consist of 13.79MPa concrete cradle in conformity with the dimensions shown on the drawings, or as determined by the NPC.

C. Foundation under Roadways and Parking Areas

Bedding for sewerage and drainage pipes crossing under roadways and parking areas with pipe cover (excluding concrete or asphalt pavement) of 60.9 cm (2 ft.) or less shall consist of 13.79MPa concrete cradle in conformity with the dimensions shown on the drawings, or as determined by the NPC.

CW-6.3 Construction**CW-6.3.1 Trench Excavation and Backfill**

Trench excavation and backfill work shall be done in accordance with the pertinent provisions of Section CW-5.0.

CW-6.3.2 Concrete Canal

Concrete canal, open or covered, shall be constructed in accordance with the lines and grades shown on the drawings. The class of concrete shall be as indicated on the drawings or directed by the NPC.

CW-6.3.3 Appurtenant Structures

Appurtenant structures like street inlet, street inlet-catch basin combination, manhole, catch basin for downspouts, catch basin for intersecting perforated PVC pipes, septic tank, drainage outlets, etc. shall be constructed at locations indicated on the plans or at the other convenient locations designated by the NPC. All appurtenant structures shall be of 17.30 MPa concrete unless otherwise shown on the drawings.

CW-6.4 Pipe Installation**CW-6.4.1 General**

Before any drain pipe is installed, the sand or concrete bedding shall have been prepared and approved in accordance with the grade, shape, and dimensions shown on the drawings, or as directed by the NPC. No pipe over 45.7 cm (18") in diameter shall be laid on concrete bedding until seven (7) days have been elapsed after placing the concrete bedding. Pipes under 45.7 cm (18") in diameter may be laid after five (5) days elapsed after placing the concrete bedding.

All drain pipes shall be laid carefully, hubs upgraded, ends fully and closely jointed, and true to the lines and grades are given. Succeeding pipe shall be joined to the previously laid pipe, correct in alignment and grade. Any pipe, which has been damaged during installation or before acceptance of the work, shall be replaced and laid by the Supplier at his expense.

CW-6.4.2 Non-reinforced and Reinforced Concrete Drainage Pipes

Whenever possible, concrete pipes shall be handled and installed with the aid of mechanical equipment and not just rolled or pushed into the trench from the bank. For small pipes, rope slings may be placed at both ends of the pipes and the rope slowly paved out until the pipe rests on the trench bed. Proper and careful handling and laying should be observed at all times to prevent unnecessary structural damage to the pipe, especially at the pipe ends.

For pipes on sand bedding, before joining the next pipe length to the last pipe already laid, the bottom of the trench shall be excavated to the shape, size, and location of the collar below the joint. The next pipe section shall then be securely attached to the previously laid pipe seeing to it the correct alignment and grade is always attained. The same procedures shall be observed for the remaining pipes.

All pipe joints shall be filled with stiff mortar composed of one (1) part cement and two (2) parts clean sand and enough water. The inside part of the joint shall be plastered properly to bring the inside surfaces of the jointed pipe ends flush even. Sufficient mortar shall be placed on the outside surface of joint to form a bead around the joint. Plastering work shall be as directed and approved by the NPC. After initial set, the mortar on the outside surface shall be protected from air and sunlight with a cover thoroughly wetted earth or burlap. Curing of the joint shall be done for a period of at least seven (7) days within which no backfill shall be placed on the installed pipeline.

CW-6.5 Measurement and Payment

CW-6.5.1 Concrete Rectangular Ditch

Measurement for payment for the rectangular ditch and other channels will be based on the number of linear meters of canal constructed and accepted.

Payment will be made at the corresponding contract unit price per linear meter of the pertinent items shown in the Schedule of Requirements. Payment shall constitute full compensation for furnishing all labor, materials, equipment, and tools necessary for the construction of the concrete canal including attendant excavation and backfill.

CW-6.5.2 Concrete Drainage Pipes and PVC Pipes

Non-reinforced and reinforced concrete drain pipes, and perforated PVC pipes in place and accepted will be measured by the linear meter along the centerline of the pipeline.

The quantities measured as provided above, completely installed and accepted, will be paid at the contract unit price for each size and kind of



pipe shown in the Schedule of Requirements. Payment shall constitute full compensation for furnishing all labor, material, equipment, and tools for fabricating, hauling, installing and jointing of pipes. Payment shall also include the cost of attendant excavation, bedding and backfilling.

CW-6.5.3 Appurtenant Structures

Measurement for payment of appurtenant structures like street inlet, street inlet-catch basin combination, manhole, catch basin for downspouts, catch basin for intersecting perforated PVC pipes, septic tank, drainage outlets, etc. will be based on the number of structures constructed/installed and accepted.

The Supplier will be paid at the contract unit price for the pertinent item for each appurtenant structure shown in the Schedule of Requirements. Such payment shall cover all costs for furnishing all equipment, labor, materials, and tools necessary to complete the construction of the aforementioned appurtenant structures. Payment also includes the cost of attendant excavation and backfill, furnishing, scheduling, cutting, bending and placing of reinforcing steel.

CW-6.5.4 Bedding

Measurement for payment for sand or natural sandy soil bedding and concrete cradle will be based on the number of cubic meters of materials placed and accepted.

Payment will be made at the corresponding contract unit price for the item. Sand Bedding for Pipes, and item, Concrete Cradle for Pipes, in the Schedule of Requirements, which payment shall constitute full compensation for furnishing all labor, materials, equipment, and tools necessary to complete the items.

CW-7.0 STRUCTURAL STEEL**CW-7.1 General**

This section covers the fabrication, erection, and shop painting of structural steel in accordance with the AISC "Manual of Steel Construction" referred to herein. In the AISC "Manual of Steel Construction" referred to herein, the Specification for Design, Fabrication, and Erection of Structural Steel for Buildings," and "Structural Joints using A325 or A490 Bolts" shall be considered a part thereto.

CW-7.1.1 Submittals

Shop Drawings of all structural steel in five (5) copies for approval prior to fabrication of structural steel with complete information necessary for the fabrication and erection of the component parts of the structure including the location, type and size of all bolts and welds, member sizes and lengths, camber & connector details, blocks, copes, and cuts. Include all welds by standard welding symbols.

Erection Plan consists of descriptive data to illustrate the structure steel erection procedure including the sequence of erection and temporary shoring and bracing, and written description of the detailed sequence of all welding, including each welding procedure to be performed.

Certificates of Conformance for the following:

- Bolts, Nuts and Washers
- Welding Electrodes and Rods
- Paint
- Steel
- Certified Test Reports

Chemical Analysis and Tensile Strength Test of structural steel in accordance to ASTM A53.

For high strength bolts and nuts, the Contractor shall also submit chemical analysis, including tensile strength and hardness tests as required by ASTM A325.

CW-7.1.2 Delivery and Storage

All materials shall be handled, shipped and stored in a manner that will prevent distortion or other damages. Materials shall be stored in a clean and properly drained location and out of contact with the ground. Damaged materials shall be replaced or, when permitted by NPC, may be repaired in an approved manner at no additional cost to NPC.

CW-7.2 Materials

All the materials shall be of the best quality of their kind, well graded and within the allowable distortions. They shall be free from flakes, corrosion, scale of fragments that could reduce the resistance and durability or injure the external appearance.

Except as modified herein, blast clean surfaces in accordance with SSPC SP6. Wash clean surfaces that become contaminated with rust, dirt, oil,



grease or other contaminants with solvents until thoroughly clean. Ensure that steel to be embedded in concrete and surfaces when assembled, are free from rust, grease, dirt and other foreign matter.

CW-7.2.1 Steel

Materials shall conform to the respective specifications specified herein. Materials not otherwise specified herein shall conform to the AISC "Manual of Steel Construction".

Structural Steel:	ASTM A36
Steel Pipe:	ASTM A53, Type E or S, Grade B, ASTM A501
Steel W-Shape Piles (Soldier Piles):	ASTM A328

CW-7.2.2 Bolts, Nuts and Washers:

All bolts, nuts and washers shall be of hot-dip galvanized steel, in accordance with the following:

Bolts:	ASTM A307, Grade C or ASTM A36 for Anchor Bolts; ASTM A325 for Fastening Bolts
Nuts:	ASTM A563, Grade A, heavy hex style, except nuts less than 38mm may be provided in hex style
Washers:	ANSI B18.22.1, Type B

CW-7.2.3 Accessories:

Welding electrodes and steel structural members shall use:

Rods	E70XX electrodes
Non-shrink Grout	ASTM C827, non-metallic

CW-7.3 Execution

CW-7.3.1 Fabrication

Structural steel fabrication shall be in accordance with the applicable provisions of the Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings as set forth in the AISC "Manual of Steel Construction".

CW-7.3.2 Welding of Structural Steelwork:

All welding works shall be as indicated in the drawings and shall conform to AWS D1.1 - 77 "Structural Welding Code". Unless specified on the drawings, fillet welds shall be a minimum of 5 mm (3/16") and welding electrodes shall be with a tensile strength of 485 MPa.



All welding works shall be executed by the AWS D1.1 qualified welders, welding operators and trackers, whose workmanship shall be subject to the approval of NPC.

CW-7.3.3 Shop painting

Except as otherwise specified, shop prime surfaces of all structural steel, except steel to be embedded in concrete or mortar. Surfaces to be welded shall not be coated within 12 mm from the specified top of the weld prior to welding. Insure that the surfaces are thoroughly dry and clean when the paint is applied. Do not paint on wet weather except under cover. Do not apply paint to steel, which is at a temperature that will cause blistering or porosity, or will otherwise be detrimental to the life of the paint. Apply paint in a workmanlike manner, and coat all joints and crevices thoroughly. Prior to assembly, paint all surfaces that will be concealed or inaccessible after assembly.

Shop prime coat surfaces as soon as possible after cleaning. Apply one coat of inorganic zinc to a minimum dry film thickness of 100 microns.

- Field painting: When the erection work is complete, the heads of field bolts, all welds and any surface from which the shop coat of paint has become worn off or has otherwise become defective, shall be cleaned and thoroughly covered with one coat of shop coat paint. When the paint applied for touching up bolt heads and abraded surfaces has become thoroughly dry, apply two field coats of marine epoxy paint subject to the approval of NPC.

- Marking: Prior to erection, members shall be provided with a painted erection mark. In addition, connecting parts assembled in the shop for remaining holes in field connections shall be matched marked with scratch and notch marks. Do not locate erection markings on areas to be welded. Do not locate erection markings in areas that will decrease member strength or cause stress concentrations.

CW-7.3.4 Erection

Except as modified herein, erect steel in accordance with the AISC "Manual of Steel Construction". Where parts cannot be assembled or fitted properly as a result of errors in fabrication or of deformation due to handling or transportation, report such condition immediately to the NPC's Representative and obtain approval there from for the methods of correction for straightening, including members of steel conforming to ASTM A514.

Drain Steel work properly; fill pockets in structures exposed to the weather with an approved waterproof material.

Provide safety belts and lines for workmen aloft on high structures unless safe working platforms or safety nets are provided.

When calibrated wrenches are used for tightening bolts, calibrate them at least one each working day using not less than three typical bolts of each diameter. Do not use impact torque wrenches to tighten anchor bolts set in concrete.



Connections: Connections shall be executed as shown on drawing. In case, connections are not detailed, it shall be designed in accordance with AISC "Manual of Steel Construction". Build connections into the existing work. Punch, sub-punch and ream, or drill bolt holes.

Tolerances: Structural steel shall be furnished and installed to the lines and levels as shown on the drawings.

Any structure that does not conform shall be repaired, removed and/or erected anew by the Contractor at no additional cost to NPC.

Tolerances on structural steel shall be in accordance with the "Code of Standard Practice" of the AISC "Manual of Steel Construction".

CW-7.3.5 Tests and Inspections

Visual Inspection of Welding: After the welding is completed, hand or power wires brush welds, thoroughly clean them before the inspector makes the check inspection. Inspect welds with magnifiers under strong, adequate light for surface cracking, porosity, and slag inclusions; excessive roughness; unfilled craters; gas pockets; undercuts; overlaps; size and insufficient throat and concavity. Inspect the preparation of groove welds for adequate throat opening and for snug positioning of backup bars.

Non-Destructive Testing¹: In accordance with AWS D1.1 Twenty-five percent (25%) of the total number of joints, as selected by the NPC, shall be tested. If more than 20 percent of welds contain defects identified by testing, then all welds shall be tested by radiographic or ultrasonic testing, and to be approved by the NPC. When all welds made are required to be tested, magnetic particle testing shall be used only in areas inaccessible to either radiographic or ultrasonic testing. Retest defective areas after repair.

CW-7.4 Measurement and Payment

Measurement for payment for structural steel shall be based on the total kilogram of structural steel placed and accepted.

Payment will be made at the contract unit price for the item Structural Steel in the Bill of Quantities, which payment shall constitute full compensation for furnishing all labor, materials and equipment necessary to complete the item.

¹ Not applicable on non-critical structures/joints and as directed/required by NPC Design Engineer.
NATIONAL POWER CORPORATION



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MW - MECHANICAL WORKS

MW-1.0 GENERAL

The work to be done under this specification shall include the furnishing of all labor, materials, equipment, tools and other incidentals required for all mechanical and associated works specified herein and shown on the accompanying drawings or otherwise directed by NPC for the **Construction of Staffhouse, Warehouse, Fuel Oil Storage Tank and Other Facilities in Balabac DPP.**

All equipment and materials to be supplied by the Contractor shall be new and unused, of current manufacture, and of the highest grade and the best of their respective kinds, and free from defects and imperfections. They shall be suitable for their intended purpose and shall comply with all applicable regulations, quality, and dimension standards.

The work shall be performed and completed with high quality workmanship, in accordance with all applicable codes, standards and generally accepted modern practice in the Supply, Fabrication, Installation and Test of the Fuel Oil Storage Tank, Auxiliary Equipment/Accessories and Associated Facilities. To have quality workmanship, only technicians skilled in their respective trades shall be employed.

MW-2.0 SCOPE OF WORK

It is not the intent of this specification to specify all technical requirements or to set forth those requirements covered by applicable codes and standards. The Contractor shall furnish high quality work, materials and equipment meeting the requirements of this specification and industry standards.

The Contractor shall conduct actual inspection at sites and thoroughly investigate and familiarize himself with all the conditions at site, determine the required quantity of materials and equipment to be supplied/utilized during the project execution, determine possible sources of materials and equipment to be supplied/utilized, and verify the actual scope of works and relative costs. Any and/or all expenses arising through the lack of knowledge or understanding regarding the existing conditions of the site shall be the responsibility of the Contractor and no additional payment thereof shall be made by NPC.

The Contractor shall also be responsible to assess and determine all and every work and service although not specifically detailed but are deemed required to fully complete the work and smooth execution of the project. Relative costs of any additional works or materials which the Contractor deemed required or necessary to complete the works shall be included in the bid proposal.

The work to be done under this section shall comprise the furnishing of all labor, tools, equipment, supply of appurtenant materials and other incidentals including installation/erection and test of all mechanical works enumerated hereunder in accordance with the Specifications contained herein and as shown in the drawings or otherwise directed by the NPC, which shall consist of but not limited to the following:

- a) One (1) set of 60 m³ Diesel Fuel Oil Storage Tank complete with associated valves and piping works, level gauge, vertical caged ladder and other tank appurtenances/accessories;
- b) One (1) set of Fuel Oil Transfer Pump with capacity not less than 10m³/hr at a discharge head of 30m complete with associated valves and piping works, controls and instrumentation and other accessories including spare parts for one (1) year operation;
- c) One (1) lot of Domestic Water Supply System consisting of pipes, valves, pipe fittings, gaskets, flanges, bolts and nuts, pipe supports including the required excavation and backfilling of embedded pipes and other incidentals to complete the domestic water supply piping system;
- d) One (1) unit of Inverter-Window Type Air Conditioner of 11,500 kJ/hr minimum cooling capacity for Personnel's Quarter, complete with its mounting accessories and controls;
- e) One (1) unit of Inverter-Window Type Air Conditioner of 8,000 kJ/hr minimum cooling capacity for Office, complete with its mounting accessories and controls;
- f) One (1) unit of Wall Mounted Exhaust Fan, 100 m³/hr minimum capacity for Comfort Room of Office, complete with its mounting accessories and control;
- g) One (1) unit of Wall Mounted Exhaust Fan, 300 m³/hr minimum capacity for Kitchen, complete with its mounting accessories and control;
- h) One (1) set of Foam (AFFF) wheeled type fire extinguisher complete with self-contained cylinder mounted on a frame with handle, floorstand and steel wheels, 125 L (33 gallons) capacity complete with associated valves, dial gauge indicator, nitrogen expellant tank for unit pressurization, appropriate size of discharge hose of 15 m long fitted with couplings and foam nozzle assembly;
- i) Six (6) units of Portable Type Fire Extinguisher, Clean Agent (HCFC or Halotron I Type), 7.1 kg. (15.5 lbs), wall-hung type and UL/FM approved;
- j) All other works and services required to complete the project.

MW-3.0 GENERAL TECHNICAL REQUIREMENTS**MW-3.1 General**

The requirements specified herein shall apply to all equipment and materials to be supplied by the Contractor.

The work shall be performed and completed with high quality workmanship, in accordance with generally modern accepted practice in the fabrication, assembly, installation and test of all equipment and materials supplied by the Contractor, notwithstanding any omission from these Specifications or drawings.

Defect and damages to the equipment resulting from faulty installation works shall be repaired and/or replaced by the Contractor at no cost to the NPC.

MW-3.2 Materials and Equipment**MW-3.2.1 General**

All materials and equipment to be supplied by the Contractor under this Contract shall be new and unused, free from defects and imperfections and best suited for the purpose intended. All materials shall comply with the latest revisions or editions of the specified standards for each equipment specification unless otherwise specified or permitted by NPC. The names of manufacturers of equipment and articles contemplated for incorporation in the work together with performance capacities and other significant information pertaining to the equipment shall be furnished for approval. Equipment or articles installed or used without such approval shall be at the Contractor's risk of subsequent rejections.

All materials or parts used in the equipment to be supplied shall be tested in conformance with applicable specifications and shall be purchased with certified mechanical and chemical properties.

The materials and components to be supplied shall essentially be the standard products of the manufacturer as best meets the conditions of sound engineering economy of manufacture and procurement.

Brochures, catalogs and other related technical data of materials and equipment to be supplied by the Contractor under this contract shall be submitted by the Contractor for NPC's review and approval prior to fabrication.

From the commencement of the works until the date of Final Completion, the Contractor will be fully responsible for the care of the works and all materials and equipment, whether supplied by the Contractor or Corporation, and for all temporary works. Should any damage, loss or injury happen to the works, materials or equipment or to any part thereof from any cause attributable to the fault of the Contractor, the Contractor shall at his own expense, repair, replace and make good the damage, loss or injury so that at completion, the works shall be in good order and condition and in conformity in every respect with the requirements of the Contract.

MW-3.2.2 Applicable Codes and Standards

The design, materials, equipment, manufacturing, construction, installation, and testing of all works under this contract shall be in strict accordance with the latest edition of all applicable codes and standards, national and local laws, codes and regulations, statutes and ordinances.

The latest edition of each standard shall mean the latest edition available at the date of contract signing.

All units, dimensions and calculations shall be in metric system.

MW-3.3 Equipment Foundation

All equipment shall be installed in accordance with the manufacturer's recommendations and applicable codes and standards. Requirements for concrete foundations where the equipment are to be mounted shall be referred to the relevant Civil Works Specifications.

The Contractor shall be responsible for the correct positioning and leveling of the equipment and auxiliaries, and any checking made by the NPC during the course of the work shall not relieve the Contractor from his responsibility. During installation works, electro-mechanical equipment shall be carefully lifted or glided on the foundation by using only approved methods and equipment, and in a manner that will prevent damage to the equipment and foundation. The equipment shall be positioned on a location as shown on the drawings and shall be leveled and checked true to grade and alignment before final grouting. The Contractor shall strictly adhere to the installation procedures/manuals provided by Manufacturers of the equipment.

Prior to equipment mounting and grouting, the surface area and blackouts of concrete foundation shall be cleaned of all dirt by any approved means. Chipping of concrete surface to the required thickness shall be done by any approved methods without damaging the concrete structure as a whole.

The pouring of concrete to secure in place any equipment on its concrete foundation shall not be made until the NPC has verified the correct location of the foundation. Should incorrect positioning be ascertained after the concrete pouring, the Contractor shall make the correction at his own expense.

The concrete foundation surfaces shall be free of any loose materials, oil, water or any other contaminants that would prevent the grout from bonding. The concrete shall be chipped to expose a minimum aggregate so as to remove all laitance and provide a rough surface for bonding. The exposed surface shall be blown with compressed air free of oil to remove dust.

MW-3.4 Piping System**MW-3.4.1 General**

The Contractor shall supply and install all the piping system as required and specified to provide a complete and acceptable installation necessary for the safe and efficient operation of each plant system and equipment. All required piping shall be furnished complete with flanges, joints, gaskets, packing, drains, vents, insulation if required, hangers, guides, and all auxiliary steel and anchors required to complete the pipe supports.

The Contractor shall submit, if required to suit actual site conditions, for NPC's review and approval detailed drawings covering the arrangement, actual layout, route and interface connections. Any required modification from the approved drawings or specification to suit actual site conditions, shall be permitted only with prior consent of NPC.

Piping shall be properly arranged such that it will result in neat appearance and convenient to operate and maintain. Items requiring periodic attention shall be readily accessible from floors or platforms. Pipe shall neither obstruct passageways of any kind nor interfere with access to other valves or equipment.

The Contractor shall install the piping system in a thorough manner and with good workmanship, in accordance with the construction drawings and specifications or as directed by NPC.

All pipes, fittings, valves and appurtenances shall be free from dirt or other foreign matters before laying. In the installation of the pipes, care shall be taken to prevent the pipes from becoming clogged during the progress of the work; should any pipe become either partially or wholly clogged before final acceptance of the work, it shall be cleaned out by the Contractor in a manner satisfactory to NPC or shall be replaced by and at the expense of the Contractor. Open ends shall be temporarily plugged, otherwise, suitably closed when necessary. Special care shall be taken in carrying out the installation of joints, branches, valves and other fittings.

Pipe sleeves shall be provided for pipe and tubing which penetrates platforms, floors, roofs and partitions. Proper flashing shall be provided to ensure tightness and water-proofing, where required.

A minimum of 2.0 m headroom shall be maintained to the bottom of all piping components or insulation in walking areas.

Instrument and sampling nozzle connections and valves shall be of 15 mm Ø.

A minimum of 50 mm clearance shall be provided between piping including insulation and any point of adjacent equipment or piping.

A 200 mm minimum clear space shall be provided from the bottom surface of pipe to trench bottom or finished grade. Metric flanges shall be used throughout. Welded flanges shall be weld-neck or slip-on flanges. The raised face shall be machined.

Joints between stainless and steel flanges shall be of the insulated type.

Piping installation shall be sloped to prevent trapping of air bubbles. Where required, suitable venting system with valve shall be provided.

Pressurized pipes shall generally not be embedded in concrete. When embedding such pipes is necessary, approval by NPC is required.

Unless otherwise stated, all piping shall be designed for a Nominal Pressure of 10kg/cm².

Where pipeline are laid, the trench shall be provided with a cushion pad of at least 100 mm sand and sandy soil bedding materials prior to pipe laying, unless otherwise shown on the drawings.

Steel piping to be installed underground shall generally be applied with tape wrapping with minimum finished thickness of 1 mm and applied spirally with overlap of 50% in all parts of the pipe and fittings or asphalt jute of 6 mm thickness, unless otherwise specified. Bitumen based primer shall be applied to pipe before applying the tape. The tape wrapping brochures shall be submitted for NPC approval prior to procurement and application. The wrapping shall extend for 300 mm beyond the buried portion.

All pipeline excavation shall be backfilled up to the level of the finished grade surface in layers of 150 mm and thoroughly compacted, unless otherwise shown on the drawing. Backfill materials shall be compactable soil taken from trench excavation and approved by NPC. Trench excavation, backfilling, concrete works and construction of valve manhole shall be done in accordance with the pertinent provisions of the Civil Works Specifications.

Pipes to be placed underground shall not be covered prior to the approval of NPC. Underground pipes shall be embedded as shown on the drawings.

All pipes that cross roadways or concrete pavement shall be provided with pipe sleeve of steel material or reinforced concrete pipe to protect the pipe from various load imposed by passing vehicles, unless otherwise shown on the drawing. The pipe sleeves shall extend 600 mm beyond shoulder of each pavement side.

After considering site conditions, and in case execution cannot be done according to the piping route in the design drawings, on-site changes may be acceptable subject to the approval of NPC.

Flexible joints as well as vibration isolation joints shall be installed as near as possible to equipment and devices and shall not be forced to expand, extend and compressed. In case flexible joints are long and sagging due to own weight, it shall be suspended or supported.

Pipe fittings and unions for screwed piping are to be installed in such a way as to be easily accessible for repair and maintenance.

For water piping, after installation, pipe insides shall be washed thoroughly using high pressure cleaning pump. Water for washing must be clean enough not to damage the equipment.

For oil pipes, after installation, pipe insides shall be soaked thoroughly using acid solution to remove all dirt, rust and the likes. All equipment shall be disconnected from the pipes to be washed to avoid damage to the units. Acid solution shall be disposed in a manner that will not pose hazard to the environment. Thoroughly flush the pipe insides with a clean water to wash away all acid solutions and let dry before re-connecting the pipes.

All existing facilities, if applicable, which are affected and damaged during the installation of piping shall be replaced and/or restored to its original appearance by the Contractor at its own expense.

The Contractor shall strictly observe the safety requirements/regulations of existing plants during the performance of the work.

All piping works shall be coordinated with other works at site and with existing installation so that interference between piping and other structural features will be avoided. In case interference occurs, NPC will decide which work is to be relocated.

MW-3.4.2 Pipe and fittings

Unless otherwise specified, all pipes to be used shall generally conform to ASTM A 53, Grade B, seamless with a minimum wall thickness equivalent to schedule 40. Only specified pipes shall be used for interconnection piping between the diesel engines and its auxiliary equipment including fuel oil transfer piping system. Pipes used for Domestic water supply and distribution systems shall be as specified in the relevant sections of this specification.

All steel piping, 65 mm and above, shall be butt-welded or flanged. All piping, 50 mm and under shall be joined by socket welded or screwed where specified.

Steel pipe fittings for 65 mm pipes and above shall be seamless, butt weld, minimum of schedule 40 conforming to ASTM A 234 Gr. WPB with dimensions to ANSI B16.9. Fittings for 50 mm pipe and below shall be forged, socket weld or threaded (minimum of 3000 lb and 2000 lb rating, respectively) and conforming to ASTM 105 with dimensions to ANSI B16.11.

Malleable iron, galvanized screwed fittings conforming to ANSI B16.3 (Malleable iron threaded fittings, Class 150) may be used for Potable Water System.

Flanges for steel piping shall be forged, weld neck for 65mm and larger or socket weld for 50mm and smaller, 150 lb raised face and conforming to ASTM A181 Class 60. Galvanized flanges shall be used for fire protection and potable water supply systems.

Gaskets shall be selected based on the nature of the fluid or its temperature to be handled. Gasket materials shall not contain asbestos in any form.

Flanged bolts shall be hexagonal head machine bolts conforming to ASTM A 307 Gr. B with dimensions in accordance with ANSI B18.2.1 and complete with heavy semi-finished head nuts conforming to ASTM A 194, Gr. 2H and ANSI B18.2.2.

Equipment and auxiliaries shall be furnished with all required bolts, screws, anchor bolts with sleeves, nuts, washers, locking devices, washers, gaskets, and other accessories to complete the piping system.

Generally, all gaskets, bolts, nuts and washers to be used in the various piping systems shall be new and free from defects and imperfections. Materials to be used shall be suitable for the liquid to be handled.

Threads shall be metric. Where required they shall be adequately treated against corrosion before dispatch from the works. All threads shall be greased carefully during installation except where otherwise specified. Split pins or other approved locking devices generally shall be provided for nuts which may become loose due to vibration, etc.

Any such rivets, bolts, screws, gaskets, etc., which are considered surplus, but not more than 10% of the permanent installation, after the installation of the equipment has been completed shall become spare parts and shall be wrapped, marked and handed over to NPC.

MW-3.4.3 Drains and Vents

Not all piping system vents and drains may be shown on the piping drawings. The Contractor shall provide and install vent and drain connections at all high and low points, respectively, and as required for suitable operation.

Where practicable, all pipelines shall be sloped in the direction of flow and shall be adequately trapped at low points and vented at high points in the pipe runs.

The minimum valve size for vents and drains shall be 20 mm nominal diameter. In general, the piping for drain and vents shall be the same material as the main lines.

All piping shall be arranged to permit complete drainage when a particular unit or system is shutdown for maintenance.

All vent lines which are normally operated shall be terminated at least 3 m or higher above the highest service platform.

All drain lines which run to waste shall be routed to a suitable drain trench, floor drain or sewer.

MW-3.4.4 Pipe Supports

Pipe supports shall be fabricated and installed as shown on the drawings. If pipe supports required are not shown on the accompanying drawings the Contractor shall provide detailed drawings and submit to NPC for review and approval.

Pipe supports shall be fabricated and assembled to permit the free movement of piping caused by thermal expansion and contraction. The design of elements for supporting or restraining piping systems, or components thereof, shall be based on all the concurrently acting loads transmitted into the supporting elements. Where resonance with imposed vibration and shocks occur during operation, suitable dampers, restraints, anchors, etc., shall be added to remove these effects. Pipe supports shall be spaced as far apart as economically possible, with due consideration to assure that the sag of the pipe between supports is within limits that will permit drainage and also avoid excessive bending stresses from concentrated loads.

All piping shall be installed with supporting devices selected and located to insure that the finished system will provide uniform continuous slope for draining, that expansion will be so directed as to minimize stresses in the piping material, and that all elements will be suitably and substantially supported, guided and anchored. Supports at floor or wall sleeves will not be permitted.

Riser pipes shall be individually supported. To reduce riser loads, the riser supports may be supplemented by the nearest support on a horizontal pipe. The horizontal length of pipe between the nearest support and risers shall be not longer than the length of the riser supplemented by the nearest support. Bends shall have the supports no further away from the riser than the radius. Where two rods are used in a solid rod riser hanger, each rod shall be capable of taking the entire load.

Piping systems, where flexibility is not required, shall be supported by rigid hangers. It shall be designed and fabricated so that they will not become disengaged by pipe movement.

Hanger rods shall be provided with suitable sockets or eyes to permit lateral piping movement without imposing a bending moment on the hanger rod. The eyes in the rods shall be welded shut. Safe loads for hanger rods shall be calculated on the root area of the threads. In no case shall hanger rods of less than 10 mm diameter be used for support of piping 50 mm and smaller or less than 15 mm diameter rod for supporting pipe 65 mm and larger.

When the pipe is covered with insulation and is to rest on the support, protection saddles shall be used whenever possible. Protection saddles shall be welded to the piping to prevent slipping and/or falling. The saddle material shall be the same as the pipe material, however, alloy saddles shall not be welded to alloy piping in the field. On lines of 50 mm diameter and below where service temperatures are 100 °C and under, the pipe shall slide or rest directly on the support and shall be left bare of insulation at such locations.

The location and provision of temporary supports required during hydrostatic testing shall be the responsibility of the Contractor.

Temporary construction supports shall not be welded to the pipe except with approval of NPC and shall be attached in a manner that will not damage the pipe. These supports shall be completely removed upon completion of construction.

Equipment connections shall not be used to support piping either for temporary or permanent support.

MW-3.4.5 Welding

All welding shall be performed by welders and procedures qualified in accordance with the requirements of ANSI Code B31.1 "Power Piping" or, where applicable, ASME Boiler and Pressure Vessel Code, Section IX.

All welding shall penetrate to the full depth of the pipe. The slag shall be cleaned from each weld bead and any defects be removed before the next bead is applied. The completed weld shall be cleaned of slag and spatter metal on all surfaces.

Welding, preheat and post-weld heat treatment for piping shall be in accordance with the requirements of ANSI B31.1 or where applicable, the ASME Boiler and Pressure Vessel Code.

All welding, except for small pipe, shall be performed by the electric-arc method and where practical, with process controlled automatic machines. All pipe weld joints for piping 50 mm and smaller shall be socket weld or other method as approved by NPC.

Where weld metal is deposited in successive layers, each layer shall be thoroughly peened before the next layer is applied.

Particular care shall be taken in aligning and separating the edges of the members to be joined by butt welding so that complete penetration and fusion at the bottom of the joint will be ensured.

Pipe and tubing shall be accurately cut to measurements shown on the drawings by proper means such as machining, grinding or by thermal cutting. Burrs shall be removed by reaming.

Welding fittings shall be of the same material and wall thickness as the pipe to which they are attached. Where there is a difference in wall thickness, the component shall have a gradual transition in accordance with the applicable standard.

Nozzles or branch pipes shall be carefully shaped and welded to the header or run pipe in such a manner that the nozzle, the branch pipe, or any weld material shall not extend into the run pipe to cause obstruction of flow.

All surfaces for welding shall be clean and free from paint, oil, rust, scale and other materials detrimental to welding.

All filler materials including consumable insert materials and shield gases shall comply with requirements of the Applicable Codes and Standards. All welding rods shall be stored in accordance with the Contractor's instructions. The electrodes for arc-welding shall be classified on the basis of mechanical properties of the as-welded deposited weld-metal, type of covering, hydrogen absorption, welding position of the electrodes and type of current.

Steel piping shall be fusion welded using manual, automatic and semi-automatic welding processes whereby the arc and the deposited weld are protected from atmospheric conditions during welding. Pipes shall be properly aligned using line-up clamps or alignment jigs prior to butt welding.

MW-3.5 Valves and Accessories

All valves and accessories to be supplied under this contract shall generally conform with the requirements in this specification. All valves supplied by NPC shall be installed in accordance with the requirements specified herein.

The Contractor shall select valves, valve drives and accessories which are suitable for the operating conditions of the systems in which they are to be used, and shall be responsible for the pressure and temperature ratings of the selected components. The selected components shall meet the requirements of trouble free and safe operation under maximum load, part load and transient conditions.

Generally, all valves shall be leak-proof in either flow direction (except for non-return valves) when the nominal pressure is applied.

Valves, valve drives and accessories which are of similar make, size and type shall be interchangeable with one another. The Contractor shall standardize the types and the sizes of the valves as far as possible, in order to facilitate maintenance and limit the stock of spare parts. The manufacturer of valves shall be well known.

All regularly operated isolation valves and control valves shall be accessible from a permanent floor or access platform.

All valve bodies shall be of the same nominal size as the adjacent piping, unless otherwise specified. The internal diameter of valve ends adjacent to the pipe work shall be the same as the internal diameter of the connecting pipe.

All valves shall be located and designed so that the maintenance and change of valve internals is possible without removing the valve casing from the pipe. The stems of all valves for outdoor service shall have weatherproof protection covers of approved construction.

Valves other than outside screw and yoke type, in size larger than 50 mm are to be provided with gate position indicators. Valves shall close clockwise.

The drive units of motor-driven valves shall also be provided with handwheels for manual operation. The handwheel shall be operable under all conditions and shall be independent of the motor drive. It shall not be rigidly coupled to the motor drive and shall not compulsory turn when the motor is energized.

All valves 65mm and larger shall have a body and bonnet material of at least cast iron. Cast steel material shall be used for high pressure or temperature applications. Stem, seat ring & seat, wedge or disc shall be made of bronze, for high pressure or temperature applications stainless steel shall be used. Valves 50mm and below shall be made of bronze unless otherwise other materials are approved by NPC.

Gate or globe valves shall generally be used for isolation in the piping system. Ball valves or butterfly valves may be used if specified or shown on the drawings.

All gate and globe valves, 65mm and over shall be of OS & Y or rising stem, solid wedge type disc for gate valves and plug type disc for globe valves, bolted, bonnet, bolted gland and have flanged ends with the following materials of components:

- | | | | |
|----|------------------|---|------------------------|
| a) | Body & bonnet | - | Cast iron |
| b) | Stem | - | Bronze or brass |
| c) | Seat ring & seat | - | Bronze or bronze faced |
| d) | Wedge or disc | - | Bronze or bronze faced |

Gate and globe valves, 50mm and smaller shall be made of bronze or stainless steel, rising stem, union bonnet, inside screw, solid wedge or plug type disc, with screwed or flanged ends. Valves installed in valve boxes shall have flanged ends for easy replacement or if valves with screwed ends are used, appropriate unions shall be installed.

Valves of all sizes shall have a rating of not less than Class 150.

Garden hose connection valves or hose bibbs shall be of bronze material, 20mm size and outfitted with male thread hose connections.

MW-3.6 Bolts, Screws, Nuts and etc.

All bolts, screws, anchor bolts, with sleeves, nuts, washers, locking devices, etc., required for all equipment and accessories to be supplied under this Contract shall be furnished.

Threads shall be metric. Where required they shall be adequately treated against corrosion before dispatch from the works. All threads shall be greased carefully during installation except where otherwise specified. Split pins or other approved locking devices generally shall be provided for nuts which may become loose due to vibration, etc.

All bolts, nuts, screws and other devices used to fix, clamp or adjust any parts which are exposed to water or high humidity, or subjected to frequent adjustment or frequent removal shall be of corrosion resistant steel or bronze or hot-dipped galvanized. All other bolts and pins shall be of carbon steel.

When in position, all bolts or screwed rods shall project through the corresponding nuts, but this projection shall not exceed three threads, unless more length is required for adjustment.

MW-3.7 Corrosion Protection and Painting**MW-3.7.1 General**

The Contractor shall be responsible for the adoption of preparation procedures and protective coating systems that are suitable for the environment experienced by the various components/elements of the Plant.

Where a specific coating system is mentioned elsewhere in the specification, the Contractor shall accept responsibility for the suitability for such system. The Contractor has the option to nominate an alternative coating system that is of equal or better quality subject for the approval of NPC.

At least forty five (45) calendar days from the expected or planned completion of major construction and installation/erection activities of the Contract, the Contractor shall submit for the approval of NPC, a full schedule of coating systems including the following information:

- a) Plant item name;
- b) Protective coating systems including number and thickness of coats;
- c) Short list of protective coating manufacturers and applicators;
- d) Surface preparation;
- e) Workshop action; and
- f) Final color schedule as specified in the relevant sections of this specification or as directed by NPC.

MW-3.7.2 Treatment for Shipping

The various items of materials, which do not fall under the paintings or lining specifications in the documents, shall be surface treated for shipping.

The various items of materials and equipment which constitute the supply shall be thoroughly cleaned before shipment as to eliminate dirt, rust and grease and all welding slugs, spatters and loose metals.

All metallic machined surfaces shall be covered with a protective coating. This coating shall be effective against salty air and shall be easily removable at site.

All iron or steel external surfaces shall be covered with two (2) coats of protective anti-rust paint.

All internal surfaces of tank shall be coated with an easily washable corrosion preventive compound.

Piping, valves and other parts that have undergone hydraulic tests and which cannot be completely dried should be treated with water-absorbing corrosion inhibitor before the application of protective coating.

MW-3.7.3 Application of Paint

Before any painting is made, all surfaces must be prepared properly by removing all rusts, scales, welding slugs and spatters, grease and encrustation of any nature. Steel surfaces shall be white blasted in accordance with Steel Structures Painting Council Standard. The various paints to be used shall be of high quality and type subject to approval of NPC.

No painting shall take place outdoor during the presence of rain, fog, dew or where the surfaces may be otherwise damp in particular and no application of paint should be made on plaster surfaces that are not completely dry. No coating shall be applied unless the surface is at minimum of 3°C above dew point.

For successive coats, first coat shall be dried hard before the second coat. The color of successive coats must be sufficiently different to allow easy identification of the sequence of painting of surfaces for control purposes.

Paint shall not be applied to machined surfaces, corrosion resistant materials or linings, unless specified in relevant section of this specification.

All contact surfaces of field-welded connections shall be masked at a distance of 100 mm back from the weld joint and shall be suitably protected against corrosion.

For non-insulated surfaces exposed to high temperature, two (2) coats of Aluminum modified silicone with volume solids of 42% ± 2% high temperature paint shall be applied. For insulated surfaces exposed to high temperature one (1) primer coat of Aluminum modified silicone shall be applied prior to installation of insulation.

For internal surfaces for the receipt of oil, three (3) coats of paint having a phenolic-base or equivalent shall be applied. As minimum, first coat shall be applied with 80 microns DFT of zinc rich polyamide epoxy primer. Second and final coat shall be applied with 100 microns DFT polyamide epoxy top coat for each coat. External surfaces shall be painted with 80 microns DFT of zinc rich polyamide epoxy primer on first coat. On second coat, 160 microns FTF of intermediate chlorinated rubber shall be applied and 80 microns DFT chlorinated rubber topcoat as Final Coat.

All other equipment and piping installed outdoors and indoors shall be prime coated with 80 microns DFT zinc rich epoxy paint and 80 microns DFT of chlorinated rubber for each intermediate and topcoat.

Steel pipes installed underground shall be applied with tape wrapping with minimum finished thickness of 1 mm and applied spirally with overlap of 50% in all parts of the pipe and fittings. Bitumen based primer shall be applied to pipe before applying the tape. The tape wrapping brochures shall be submitted for NPC approval prior to procurement and application. The wrapping shall extend for 300 mm beyond the buried portion.

Exposed fabrication, erection, or shipping marks shall be cleaned off and the areas touched-up shall be painted to match the adjacent surfaces.

For surfaces where blast cleaning and a wash primer are specified, touch-up painting shall include application of the wash primer before the touch-up coats.

Final tests and inspection shall be carried out by Contractor to ascertain the correspondence of the paintwork to the prescribed color and treatment. These tests will indicate whether or not the paintwork is correctly applied and is free from wrinkles or roughness that might affect the adhesion of the protective coating.

Should the measured dry film thickness result to less than the specified one, the Contractor shall apply additional paint to the coat inspected or shall increase the thickness of succeeding coat, as applicable, to assure the specified total dry film thickness.

MW-3.7.4 Hot Dip Galvanizing

The zinc protective coat shall be adherent, smooth and free from discontinuity and imperfections such as bubble, porosity, cracks, or other irregularities of the protective layer.

The thickness of applied layer shall correspond to a minimum rate of 550 gm/m².

MW-3.8 Equipment Marking, Labeling and Miscellaneous Requirements

MW-3.8.1 Identification System

All members comprising multi-part assemblies are to be marked with distinguishing numbers and/or letters corresponding to those of the drawings or material lists. These identification marks shall be clearly readable.

Color banding of a code approved by NPC is to be employed to identify members of similar shape or type but of differing strengths or grades.

Plate material used for nameplates and labels shall be of stainless steel, 1mm minimum thickness or approved equivalent.

Nameplates, labels and warning plates shall be in English.

All electro-mechanical equipment, valves, instruments, piping, panels and all component parts including cables, control wiring and terminals which shall be supplied and installed by the Contractor under this contract shall be designated with an alphanumeric code allowing clear identification of the equipment and components during design, installation and operation of the plant. Each equipment and components shall be systematically marked, both on the drawings and documents and on the equipment, valves, instruments, piping, cables, wires and terminals themselves.

Equipment designation codes and brief technical data shall be indicated on all drawings and documents including bills of materials, lists of spare parts, etc. The codes will later be used for easy identification of stored equipment parts and materials and shall be suitable for use with a computer supported registration system.

Attached drawings are in most cases already marked with designated codes, the system shall be expanded to include detailed diagrams, cable lists, spare parts list, etc., as approved by NPC.

MW-3.8.2 Nameplates

All equipment and auxiliaries to be supplied by the Contractor under this contract shall be provided with 1 mm thick of stainless steel or approved equivalent corrosion-resistant nameplate with clearly legible writing of approved size and pattern which shall be permanently attached to each assembled piece of equipment at an easily visible location subject to approval by NPC.

Nameplates generally contain the brief technical specifications or characteristics of each component or equipment has been designed to operate and shall include the following: manufacturer's name, type of equipment, serial number, year of manufacture, weight, Standard Plant Identification Number (SPIN) and other relevant information in compliance with applicable standards. Any special instructions shall also be shown and suitably attached, as much as practicable, to the equipment or other visible location near the subject equipment.

For other major components, i.e. pumps, motors, etc., the following shall be added: rated horsepower, speed, total head, capacity, direction of rotation and any other pertinent information.

Nameplates for panels, boards, etc. shall be made of laminated black and white plastic. The lettering shall be bold-engraved through the black layer so that the letters appear white.

If it is not practical to include the SPIN or tag number on the equipment, valve, & instruments nameplate, a separate durable stainless steel tag or approved non-corrosive material with the identification number shall be securely attached to the equipment as specified in this specification.

Each equipment wherever necessary, shall be provided with cautionary and warning plates and signs in accordance with the prescribed ANSI/IEEE or equivalent IEC Standards for the particular equipment.

Nameplates shall be attached by screws, the use of glue is only permitted for fixing labels on inside of a panel where screws are not applicable due to physical size of equipment.

MW-3.8.3 Labels

Labels contain only the Standard Plant Identification Number (SPIN) of each component or equipment for maintenance management and record purposes. In case SPIN is already factory fixed in the nameplate, labels are no longer required.

Labels for pumps and other rotary equipment shall be securely attached or installed adjacent to the equipment or as directed by NPC. For large equipment, i.e. tanks, piping, etc, the labels may be printed directly on the equipment's external surface which shall be fixed at readily visible locations. In addition to labels, a direction of flow for pipelines shall also be identified by arrows painted with color different from the pipe base color. Size of labels varies with the size of the equipment.

All valves shall be provided with suitable labels attached to the valve handwheel and engraved in it the valve number or SPIN and other inscriptions as applicable. Valve body mounted shall be applied where handwheel top mounted labels are not applicable.

Labels shall be provided on both front and rear sides of MCC's, boards, panels, etc.

Standard Plant Identification Number (SPIN) for instruments and other devices shall also be provided and inscribed in the label or nameplate as applicable.

Labels shall be secured by screws or by flexible wires if screws are not applicable such as for valves, instruments, etc.

MW-3.8.4 Tag Numbers/Standard Plant Identification Number (SPIN)

Tag Numbers or SPIN for all supplied equipment and materials shall be provided by the Contractor.

Tag Numbers/SPIN are designation codes which shall be used to achieve uniformity and standardization in identifying each component and equipment for installation, maintenance, documentation and record purposes. The Tag Numbers/SPIN shall be clearly inscribed in a stainless steel or equivalent corrosion resistant metal in accordance with the NPC Standard Specifications.

Tag Numbers/SPIN are generally specified or indicated on the Bid drawings. In case of supplied equipment, valves, instruments or devices are not designated with tag numbers or SPIN, the Contractor shall assign a number subject to the approval of NPC.

MW-3.8.5 Erection Marks

All members comprising multi-part assemblies are to be marked with distinguishing numbers and/or letters corresponding to those of the approved drawings or material lists. These erection marks, if impressed before painting or galvanizing, shall be clearly readable.

Color banding of a code approved by NPC is to be employed to identify members of similar shape or type but of differing strengths or grades.

MW-3.9 Drawings and Instruction Manuals**MW-3.9.1 Drawings Contained in the Tender Document**

The drawings contained in relevant section of this tender document shall be the Bid Drawings and/or Reference Drawings which shall be utilized for bidding purposes only. They are considered as defining the minimum requirements for the design of the equipment to be furnished and to show the general layout and equipment arrangement which indicate limiting or mandatory dimensions and elevations.

However, if such indicated dimensions are found deemed inadequate during the implementation stage, changes or adjustments may be made subject to NPC's review and approval.

Bid drawings which show the work to be done as definitely and in as much detail as possible may be used as guide by the Contractor to proceed in the performance of his works. Prior to construction/execution of the works the Contractor shall submit said drawings for NPC approval. Soft copies of the bid drawings shall be furnished to the Contractor for their reference/perusal. Also, drawings which require changes or adjustments to suit with actual site conditions or which may be modified in design/details to conform with latest revisions of applicable codes and standards shall be prepared/submitted by the Contractor for NPC's review and approval.

Anything mentioned in the specifications and not shown on the drawings, or shown in the drawings but not mentioned in the specifications but which are obviously necessary to make a complete installation shall be considered/included under the Contractor's Scope of Works.

Discrepancies between the drawings and actual field conditions or between drawings and specifications shall immediately be brought to the attention of NPC for proper resolution. All works involving discrepancies shall not be started without NPC's formal approval.

All drawings submitted by the Contractor or by any Sub-Contractor shall contain in the lower right-hand corner, in addition to the Contractor's name with signature, the date, drawing scale, drawing number and title, and contract number as given in the Specification. Drawing Title Blocks per NPC standard specifications shall be provided to the Contractor during the contract stage.

The drawings shall be adequate to demonstrate full compliance with the Contract requirements and provide NPC complete understanding of the equipment and its associated auxiliaries and associated works.

All data and information to be submitted shall be in the English language and all drawings shall be drawn using the metric system as unit of measurement.

MW-3.9.2 Contractor/Manufacturer Drawings and Instruction Manuals

The Contractor shall submit five (5) copies for NPC's approval a complete technical information of all materials and equipment to be supplied under this Contract prior to fabrication, manufacturing and/or purchasing, construction and installation. The technical information shall include catalogues/brochures, illustrations, physical or chemical properties, dimensional data, assembly/outline and arrangement drawings, wiring and control circuit diagrams, calculations as required, test procedures, draft operation and maintenance manuals and other information as deemed required to fully describe the supplied equipment and materials.

To provide the basis for programming the checking of the Supplier's drawings, the Supplier shall, within one (1) month from effectivity date of the contract, prepare and submit to NPC for approval a drawing and document lists summarizing the drawings he proposes to submit in accordance with the requirements specified herein, together with the dates on which he proposes to submit such drawings. These lists shall be updated monthly to show the status of the drawings and documents submitted and any additional proposed drawings. NPC shall have the right to require the Supplier to submit additional information as may reasonably be required.

The Contractor shall be responsible to make any necessary design and detailed drawings including calculations of associated foundations and structural supports for all his supplied equipment to meet the intent of the specifications. The detailed drawings and calculations, if required, shall be submitted for review and approval of NPC prior to construction and erection/installation works.

Any construction of any particular structure or portion thereof prior to the approval of drawings pertinent thereto shall be at the Contractor's risk. The Contractor shall be responsible for any extra cost that may arise in correcting the work already done to conform with the drawings as revised and approved.

Should an error be found in the Contractor's drawings during construction/erection, the correction including any field change considered necessary shall be noted on the drawings and shall be resubmitted for approval.

NPC shall have the right to require the Supplier to make any changes to the drawings necessary to make the works conform to the intent of the Contract.

All data and information to be submitted shall be in the English language and all drawings shall be drawn using the metric system as unit of measurement.

Drawings approved by NPC shall in no way relieve the Supplier from entire responsibility for engineering, design, workmanship, material and all other liabilities under the Contract.

All drawings submitted by the Contractor or by any Sub-Contractor shall contain in the lower right-hand corner, in addition to the Contractor's name, the date, drawing scale, drawing title and number, and contract number as given in the Specification. Standard Specifications for Title Blocks shall be provided to the Contractor during the contract stage.

MW-3.9.3 As-Built Drawings

The Contractor shall provide and keep an up-to-date "As-Built" drawings of all equipment and miscellaneous works procured, fabricated or assembled, installed and constructed. These drawings shall show all changes and revisions from the original drawings and specifications, including the exact "as-built" configurations, assembly, sizes and kinds of equipment and accessories, miscellaneous metal works, piping and electrical systems and other items of work.

These drawings shall be kept in the Contractor's field office but shall be made available at all times for review of NPC. At the end of every work, all entries, changes or revisions made in the drawings by the Contractor shall be checked and approved by NPC.

The complete and duly checked and approved "As-Built" drawings shall be submitted by the Contractor within thirty (30) calendar days from the completion of the contract in five (5) prints and one (1) set of electronic copy on CD/DVD. Such CD/DVD shall be suitable for any optical drive of computer system.

MW-3.9.4 Instruction Manuals

The Contractor shall furnish five (5) copies of the draft Instruction Manuals/Operation & Maintenance Manuals for all his supplied equipment under this Contract, at least one (1) month prior to the conduct of site testing for NPC review and approval. Upon approval, the Contractor shall resubmit five (5) copies in final form.

Instruction Manuals shall be furnished by the Contractor and assembled on standard metric A4 sheets. Covers and binders to be used for the manuals shall be robust and oil-resistant.

Manuals shall contain data relevant to the equipment or system design and its installation, start-up, operation, lay-up, preventive maintenance, troubleshooting, testing and repair. Drawings which are to be bound into the manual shall also be A4 or A3 folded to A4.

Instruction Manuals shall include copies of NPC approved "As-built Drawings" of all plans and drawings, brochures and catalogues, workshop or service manuals, including standard/special tools list and spare parts list.

No separate payment will be made for furnished "As Built" drawings and Instruction Manuals/O & M Manuals. Contractor shall include all cost thereof in the unit and lump sum bid prices as specified in the Bidding Form.

MW-3.9.5 Processing of Drawings

All drawings and documents to be prepared by the Supplier for NPC's review and approval shall be on A4 size or A3 size folded to A4 and submitted to, except otherwise mutually agreed during the implementation stage:

The Manager, Design and Development Department
National Power Corporation
BIR Road corner Quezon Avenue,
Diliman, Quezon City 1100

NPC shall review, comment or note corrections to be made and return two (2) copies to the Contractor within twenty (20) calendar days after receipt of the drawings and documents. If corrections are required, the Contractor shall make all necessary corrections and re-submit within fourteen (14) calendar days for NPC's review and approval.

Five (5) prints with dark lines on a white background shall be furnished to NPC for each drawing submitted for approval. Two (2) copies will be returned to the Contractor within twenty (20) calendar days after receipt of the drawings duly marked either "Approved", "Approved with Corrections Indicated", or "Returned for Corrections".

Upon receipt of prints marked "Approved With Corrections Indicated" or "Return for Corrections", the Contractor shall resubmit to NPC without delay required copies of said prints for NPC's review and final approval. No major revision affecting the design shall be made after a drawing has been marked "Approved" without re-submitting the drawing for formal approval of said revision. Every revision shall be shown by number, date and subject in a revision block.

Prints marked "Approved" or "Approved with Corrections Indicated" authorize the Contractor to proceed with procurement of materials and equipment, construction or fabrication of the works shown on the drawings, with corrections, if any, indicated thereon.

When prints of drawings are marked "Approved with Corrections Indicated" or "Returned for Corrections", the Contractor shall make necessary corrections and finalize the drawings and re-submit it in five (5) copies each for final approval. Every revision shall be shown by number, date and subject in a revision block.

If minor revisions are made after a drawing has been approved, the Contractor shall incorporate the corrections on the as-built or final drawings to be submitted by the Contractor. No major revision affecting the design shall be made after a drawing has been marked "Approved" without re-submitting the drawing for formal approval of said revision.

NPC reserves the right to reproduce any drawings or prints received from the Contractor as may be required despite any notice prohibiting the same appearing on the drawing or the print. All drawings are preferred in a computer-aided format. However, if unable to comply with this requirement, manual drafted drawings will be acceptable. All CAD produced drawings are to be submitted in Autocad formats. All other computer-generated documents are to conform to Microsoft Office.

MW-4.0 FUEL OIL STORAGE AND TRANSFER SYSTEM

MW-4.1 General

This section provides the essential information for the Fuel Oil Storage and Transfer System Equipment and Accessories to be supplied, installed and tested by the Contractor for the Balabac DPP. The system shall comprise of fuel oil unloading, storage and transfer facilities including its associated equipment and accessories to complete the system requirements of the plant site.

The work shall include the supply, installation and test of all the equipment specified below and other accessories even though not specifically mentioned in this specification or shown on the drawing but are necessary to obtain a complete set for the safe and reliable operation of the system as a whole.

- a) One (1) unit of 60 m³ Diesel Oil Storage Tank, Associated Valves, Instruments and Accessories;
- b) One (1) set of 10 m³/hr Fuel Oil Transfer Pump, Associated Valves, Control & Instrumentation and Accessories;
- c) One (1) lot of Piping Materials, Valves, Flowmeters, Instrumentation, Pipe Fittings, Pipe Supports and other required accessories to complete the piping systems including necessary excavation, backfilling and pipe coating/ application to embedded pipes; and
- d) All other works and services required to complete the project.

MW-4.2 Diesel Fuel Oil Storage Tank

MW-4.2.1 General

The design, fabrication, erection and testing of storage tank shall conform to the requirements specified in this general specifications, applicable codes & standards and as shown on the accompanying drawings.

Upon completion of erection and testing, tank shall be shot blasted internally and externally and painted with approved quality paint to withstand the anticipated service conditions.

Storage tank shall be provided with necessary nozzles for connections to all pipeworks as shown on the drawings which include tapping points for instrumentation, manholes, vents, drains and other appurtenances such as caged vertical ladder, hand railings, and etc.

The tank shall be provided with two hinged and jointed manhole doors (@ shell and roof) secured by bolts and winged nuts.

Prior to the purchase of materials, fabrication and erection/installation of the fuel oil storage tank, the Contractor shall submit for approval by NPC, brochures for tank materials, associated valves and piping materials, painting specifications, test procedures including necessary erection/installation details as required.

MW-4.2.2 Scope of Work

The work to be done under this section shall comprise all labor, tools, supply of appurtenant materials and other incidental for all works enumerated hereunder in accordance with the Specifications contained herein and as shown in the drawings or otherwise directed by the NPC.

The scope of the work shall consist of but not limited to the following:

- a) Design, fabrication, delivery, installation/erection and testing of One (1) set of Diesel Oil Storage Tank with a nominal capacity of 60 cu.m., diameter of 3.60m and height of 6.1m;
- b) Fabrication/installation of vertical caged ladders, railings, manholes, roof vents, intake and discharge nozzles, air-foam chamber nozzles, drain and overflow nozzles, sounding gauge hatch, heat detector nozzle, level gauge and other accessories shown on the bid drawings or specified herein;
- c) Three (3) units of 65 mm Ø gate valves for F.O. Storage Tanks inlet, outlet and spare nozzle;
- d) One (1) unit of 50 mm Ø gate valve for drain line;
- e) One (1) unit of 150 mm Ø butterfly valve for tank farm drain outlet;
- f) Tank calibration, Testing, sandblasting and painting; and
- g) One (1) unit of 10 m long fuel oil sounding tape.

MW-4.2.3 Materials

All materials to be used for the storage tank shall be new and unused and of the best Grade and quality for the purpose. All manufactured items shall be standard commercial products of reputable manufacturers and in case where the materials shown in the drawing are not covered by the standards or specifications, the Contractor shall furnish high quality materials which are acceptable to the applicable Specifications and provisions of ASTM A-36 and AISC Standard Specifications or equivalent approved by NPC.

All materials used for pipes and fittings shall be carbon steel, schedule 40, seamless, conforming to ASTM A53 Grade B, unless otherwise approved. Valves shall be cast or forged carbon steel body materials, flanged ends, with rising stem and generally be of gate valve type for size 65 mm in diameter, unless otherwise specified. Valves 50 mm Ø and below shall be of all bronze material, unless otherwise specified.

Plates shall be shaped at shop and edges be sheared, machined or chipped to suit the curvature of the tank and shall be marked before shipment to site.

Certified mill test reports, covering all steel plate and structural shapes to be used in the work and as required by the governing codes and standards shall be furnished by the Contractor for NPC's record. Copies of each mill test report shall be submitted to the NPC prior to fabrication of materials covered.

MW-4.2.4 Design and Construction

The fuel oil storage tank shall be of all welded construction designed, fabricated, constructed and erected in accordance with the requirement of API Standard 650 including Appendix E and shall be supplied complete with manholes, nozzles, level gauge, caged vertical ladder, railings, associated valves and piping works as shown on the drawings.

The tank shall be vertical, cylindrical and with self-supporting conical roof.

The tank shall be designed for erection on a concrete ring wall type foundation and shall conform to API standard requirements. The foundations shall be in accordance with the requirements shown on the relevant Civil Work drawings.

The fuel storage tank shall be designed and constructed with the following criteria:

MW-4.2.4.1 Shell

The tank's shell plates shall be constructed of not less than the thickness (corrosion allowance included) specified and shown on the drawings conforming to ASTM A 36 material. Other materials which shall at least be equal or superior to the specified may be proposed/used subject to NPC approval.

The tank's shell shall be designed to have all courses truly vertical.

Shell vertical joints shall be by butt-weld with complete penetration and fusion as attained by double welding or by other means which obtain the same quality of deposited weld metal on the inside and the outside weld surface. Vertical joints in adjacent shell courses shall not be in alignment, but shall be offset from each other a minimum distance of five (5) times the thickness of the thicker course at the offset point.

Shell horizontal joints shall be by butt weld with complete penetration and fusion. Abutting shell plates shall have a common vertical centerline.

Top angles of A 36 material shall be attached to the shell either by butt joint which shall be of complete penetration and fusion or an alternative joint as shown on the drawing. Top angle size shall not be less than 75mm x 75mm x 6mm and the outstanding leg extends outside the tank.

Shell plates shall be of standard size conforming to 1,220m (4') wide, 2,440 mm (8') long and edges shall be properly squared and/or prepared for butt welding. Minimum thickness shall be 5mm or as shown on drawings.

Shell plates of standard size conforming to 1,830mm (6') wide, 6,100mm (20') long may be used if transportation to the specified plant site is accessible through land transportation direct from the source. Accordingly, detailed drawings showing arrangements of plates for shell, roof and bottom shall be submitted by the Contractor for NPC's review and approval.

MW-4.2.4.2 Bottom

Bottom plates shall have a minimum thickness of 8.0mm (5/16") (allowance for corrosion included) or as shown on the drawings with standard plate size similar the shell plates and conforming to A36 material. The plates shall be joined by lap welding, arranged as shown in the bid drawings. Three (3) plate laps in tank bottoms shall not be closer than 300mm (12") from each other and also from the tank shell. The bottom plates under the bottom shell ring shall have the outer ends of the joints fitted and lap-welded to form a smooth bearing for the shell plates.

Where butt-welded bottom plates are employed, the edges shall be prepared with either square or V-grooves. The butt welds shall be made by applying a backing strip 3mm (1/8") thick or heavier by tack welding to the underside of the plate. The bottom plates shall have a minimum slope of 1:100mm.

The attachment between the bottom edge of the lowest course shell plate and the bottom plates shall be a continuous fillet weld laid on each side of the shell plate.

MW-4.2.4.3 Roof

The roof of the 60 m³ fuel oil storage tank shall be of self supported-cone type provided with rafters as shown on the drawings. The roof and its supports shall be constructed in accordance with the latest edition of API 650, Standard for Construction of Welded Steel Tank.

The self-supporting cone type roof shall be 15 degrees from the horizontal as shown on the drawings. All roofs and supporting structures shall be designed to support dead load, plus a uniform live load of not less than 1.0 kPa (20 lbs/sq.ft.) of projected area. Roof plates shall have a minimum nominal thickness of 5mm (3/16") and its material shall be ASTM A36.

The roof plates shall be welded to each other on top side with a continuous full-fillet weld on all seams and shall not be attached to the supporting members. The roof plate circumference shall be attached to the top angle (not less than 75mm x 75mm x 6mm) of the tank with a continuous fillet weld on the top side only. Rafters supported on shell by means of rafter lugs are welded to the tank shell and connected to the collar plate or center column if required, as shown on the drawings. Where other construction is employed, detailed drawings shall be submitted by the Contractor for NPC's review and approval.

MW-4.2.4.4 Shell Attachments and Tank Appurtenances

The tank shall be provided with the following tank appurtenances generally arranged in accordance with the bid drawings:

- a) Vertical Caged Ladder and Hand railings
- b) Roof manhole
- c) Shell manhole
- d) Shell outlet nozzle
- e) Shell inlet nozzle with riser pipe
- f) Water draw off sump nozzle & piping
- g) Roof vent
- h) Overflow nozzle & piping
- i) Sounding gauge hatch
- j) Level gauge nozzles
- k) Heat detector nozzle
- l) Air-foam nozzle with riser pipe
- m) Grounding pads
- n) Nameplate
- o) Sounding Tape

MW-4.2.4.4.1 Vertical Caged Ladders and Handrailings

The tank shall be provided with vertical caged ladders. Caged ladder shall be provided on tank with height of 6.1 meters and above or as shown on the drawings.

Guard railings along the circumference of the roof shall be provided. Height of top railing above floor shall be 1000mm. Toeboard of 75mm height x 6mm thickness shall also be provided with midrail located approximately one-half the distance from top of floor to top of railing. Maximum distance between railing posts shall be 2400mm (96") or as shown on the drawings.

Caged ladder shall be 450 mm wide with 25 mm round bar ladder rungs spaced at 300 mm center to center. Cage starts at 2000 mm from the bottom of ladder and extends 1000 mm over the top of the ladder or at the same level of the tank handrailings. Cage horizontal bars and vertical supports shall be 50 mm x 6 mm. Center of rung to cage shall be 700 mm and radius of loop shall be at least 350 mm.

All parts shall be made of A36 except otherwise specified and hot dipped galvanized. Details of construction shall be as shown on the drawings.

MW-4.2.4.4.2 Manholes and Nozzles

Manholes and nozzles shall be provided and constructed in accordance with the bid drawings or with API 650. Reinforcing plates for these openings shall be made of one piece only. The minimum cross-section area of the reinforcement shall not be less than the product of the vertical diameter of the hole in the shell and gross plate thickness used. The necks, reinforcing plates and shell-plate openings which have either sheared or oxygen-cut surfaces shall have such surfaces uniformed and smoothen, with corners rounded, except where such surfaces are fully covered by attachment welds.

The tank atmospheric vent shall be fitted with a stainless filter of a replaceable type. Vent shall conform to the requirements of API Standard 2000.

Manholes and nozzles attached or fitted on the tank shall be of carbon steel, Schedule 40, seamless pipe conforming to ASTM A53 Grade B.

Manholes on tank shall be furnished with hinged cover as shown on the drawings. Design of hinged components other than those shown on the drawings may be used provided that detailed drawings shall be submitted by the Contractor for NPC's review and approval.

MW-4.2.4.4.3 Grounding Pads & Rod

The tank shall be provided with at least two (2) grounding pads equally spaced around the exterior of the tank for grounding protection. Grounding pads shall be type 304 stainless steel or approved equivalent and shall be welded to the tank. Pads shall be at least 65mm by 75mm by 6mm thick and shall be drilled and tapped to the full thickness of the pad for hex head cap screws. Screw hole spacing and location shall match that of NEMA Standard hole terminals or as shown on the drawings.

Grounding rods to be used shall be of copper with minimum size of 20mm Ø and 3m long with connecting copper wire between grounding pad and rod or as required.

MW-4.2.4.4.4 Nameplate

Nameplate shall be provided and securely fixed to the tank at location which are readily visible. The main inscriptions on the nameplate shall include Tank Tag Number or SPIN (FO01TNK), Manufacturer/fabricator, Design Code, Nominal Capacity, Nominal Diameter, Nominal Height, Date of Manufacture and etc.

In addition to the nameplate, the lettering "NPC" and the NPC Logo shall be painted on one side of the outside wall surfaces of the fuel oil storage tank facing the national road or main highway. The exact location of which shall be as directed by NPC. Each letter shall have at least a height of 0.6 m and approximately 0.45 m. width, or as otherwise directed by NPC. The color of the letters shall be luminous black. The color of NPC logo shall conform to its standard color.

MW-4.2.4.4.5 Holding Down Bolts

Holding down bolts shall be provided to protect the tank from skidding or overturning due to wind load or earthquake load. Number and size of bolts shall be provided as shown on drawings and equally spaced high strength bolts conforming to ASTM A 307 or approved equivalent.

MW-4.2.4.4.6 Piping, Valves and Fittings

Interconnecting piping to be installed shall be as shown on the drawings. Piping and fittings shall be of carbon steel, Schedule 40, seamless pipe conforming to ASTM A53 Grade B.

Inlet, outlet, water draw-off nozzles including spare nozzle shall be supplied with valves of sizes preferably similar to the nozzles unless otherwise specified or shown on the drawings. Air foam and heat detector nozzles for future use shall be provided with blind flanges or plug as applicable. Valves 65 mm and above shall be of rising stem, cast and forged carbon steel body, and with flange ends. Valves 50 mm and under shall be of bronze material, rising stem and with flanged or screwed ends. Gate valves shall generally be used, except for 150 mm Ø valve installed on waste oil drain to oil water separator, which is butterfly valve.

All valves that are directly connected to the tank nozzles shall be have flanged ends.

MW-4.2.4.4.7 Gauges and Instrumentation

The tank shall be outfitted with all the proper instrumentation and/or gauge necessary for the accurate monitoring and control of the Diesel Fuel Oil.

The tank shall be provided with a ground receding level gauge. The level gauge shall be completed with welded hollow shell float, guide wires, tape, sheave elbows, tape conduit (pipe), support brackets, gauge head and level switches. The level gauge shall be constructed of the following materials:

- | | | |
|----------------------------|---|--------------------|
| a) Gauge head | - | Aluminum |
| b) Sheave elbows | - | Aluminum |
| c) Sheaves | - | Stainless steel |
| d) Float | - | Stainless steel |
| e) Guide & gauge wires | - | Stainless steel |
| f) Guide wires anchor | - | Stainless steel |
| g) Support brackets | - | Carbon steel |
| h) Gauge wire conduit pipe | - | ASTM 53 galvanized |

The level gauge shall be so located that tank liquid level can be accurately indicated to a height equal to the straight side height of the tank.

All connection lugs or openings in the tank required for gauge equipment installation shall be furnished.

A calibration scale shall be printed on the tank and shall be large enough so it can easily be visible preferably from the powerhouse.

Wires and cables to be used and installed aboveground shall be enclosed in a rigid steel conduit (galvanized) except those laid on cable trays. Cables installed underground shall likewise be enclosed and pipe sleeve are coated with bituminous paint.

MW-4.2.4.4.8 Sounding Tape

The Contractor shall include the supply of one (1) set of Fuel Oil Tank Sounding Tape which is 10 meter long. Tape body/frame shall be of aluminum alloy with stainless steel tape and brass dropper.

MW-4.2.5 Erection

The Contractor shall furnish all labor, tools, welding equipment and cables, falsework, scaffolding and other equipment necessary for the erection of the tank complete and ready for use. Lifting lugs attached to the tank for erection purposes shall be removed by the Contractor and any noticeable projection of weld metal shall be chipped-off.

Shell plates shall be shaped to suit the curvature of the tank at the shop prior to shipment to the project site.

Tank shell seams shall be so positioned that they do not pass through vessel connections. Inside seam shall be ground smooth for application of the internal's protective coating.

The tank and their structurals shall be welded by shielded metal-arc, the gas metal-arc, the flux-cored-arc, the electroslag or the electrogas process using suitable equipment. Welding may be performed manually, automatically or semi-automatically according to procedures described in ASME Section IX. Welding shall be performed in a manner to ensure complete fusion with the base metal. No welding of any kind shall be performed when the surfaces to be welded are wet, dirty nor during high winds unless the welder and the work are properly shielded. Each layer of weld metal or multi-layer shall be cleaned of slag and other deposits before applying the next layer.

The edges of all welds shall merge with the surface of the plate without a sharp angle. The maximum acceptable undercut shall be 0.4mm (1/64") of the base metal for vertical butt joints and 0.79mm (1/32") in depth for horizontal butt joints.

Tack weld, a weld made to hold parts of a weldment in proper alignment until final welds are made, shall not be considered as having any strength value in the finished structure.

The minimum size of fillet weld shall be as follows: plates 5mm (3/16") thick, not less than one-third the thickness of the thinner plate at the joint, with minimum of 5mm (3/16"). Single welded lap joints are permissible only on bottom plates and roof plates. Lap-welded joints, as tack-welded, shall be lapped not less than five (5) times the nominal thickness of the thinner joints, the lap need not exceed 50.8mm (2") and 25.4mm (1") for single welded lap joints. The reinforcement thickness of the welds on all butt joints on each side of the plate shall not exceed 2.4mm (3/32") and 3.2mm (1/8") for vertical and horizontal joints respectively. The reinforcement need not be removed except that it exceeds the maximum acceptable thickness. During the welding operation, plates shall be held close contact at all lap joints. Tack welds used in the assembly of vertical joints of the shell shall be removed when such joints are, welded manually. Tack welds, whether removed or left in place, shall be made using a fillet weld or butt weld procedure. Tack welds to be left in place shall be made by qualified welder and shall be examined visually for defects. Defective tack shall be removed.

Misalignment in completed vertical joints shall not exceed 10% of the plate thickness or 1.6mm (1/16"), whichever is larger. The upper plates in completed horizontal butt joints shall not project beyond the face of the lower plate at any point by more than 20% of the upper plate thickness, with a maximum projection of 3.2mm (1/8"), except that a projection of 1.6mm (1/16") is acceptable for upper plates less than 7.9mm (5/16") thick.

MW-4.2.6 Test and Inspection

Test and inspection of all materials and equipment shall be performed in accordance with the requirements of all applicable codes and standards, unless otherwise stated in this specification.

The Contractor shall establish test procedure in accordance with the requirements of this specification which will be used as guide in the performance of field test and inspection for all works furnished. The test procedure shall be submitted to NPC for review and approval.

Upon completion of works, the Contractor shall conduct and perform test and inspection for the system's equipment furnished which will be in accordance with the approved test procedure. The tests shall be performed in the presence of NPC representative. Prior to start of tests, the Contractor shall notify NPC of the date when such tests are to be performed.

Any defect found during the tests shall be rectified by the Contractor in the same manner described herein.

MW-4.2.6.1 Weld Inspection**a) Butt Welds**

Complete penetration and fusion is required for welds joining shell plates to shell plates. Inspection for quality of welds shall be made by liquid penetrant examination. Where visual inspection by NPC inspector indicates unsatisfactory welds, acceptance or rejection shall be based on inspection of the results of the liquid penetrant examination.

b) Fillet Welds

Fillet welds are welds of approximately triangular section joining two (2) surfaces approximately at right angle to each other as in lap joint, tee joint or corner joint.

Inspection of fillet welds shall be made by visual examination. Where visual inspection by the NPC inspector indicates unsatisfactory welds, acceptance or rejection shall be based on sectioning such areas by chipping with a mechanical round-nosed chipping tool.

c) Cost

All costs for making weld inspection and any necessary repairs shall be borne by the Contractor. However, if the NPC inspector requires weld inspection in excess to the number specified in this Section or requires chipouts of fillet welds in excess of one per 30m (100') of welds is disclosed, the cost of the additional inspection shall be borne by NPC.

MW-4.2.6.2 Methods of Inspecting Joints

Liquid penetrant examination is required for shell butt welds, annular plate butt welds and flush-type connection with butt welds. Inspection by liquid penetrant examination shall not be required for roof plate or bottom plate welds nor for welds joining roof plates to the top angle, top angle to shell plate, shell plates to bottom plates or appurtenances to tanks.

The method of liquid penetrant examination shall be in accordance with Section V, of ASME Code and applicable editions/addenda. The examination shall be performed in accordance with a written procedure prepared by the Manufacturer in compliance with the applicable requirements of Section V of the ASME Code.

All materials to be used shall be of a recognized commercial quality per manufacturer's recommendation.

Liquid Penetrant Examination shall be properly recorded and documented and submitted to NPC including rejectable indications and its location and extent.

MW-4.2.6.3 Tank Testing**a) Testing Tank Bottom Welds**

Upon completion of welding the tank bottom, all joints shall be tested by vacuum using a soap film solution.

b) Testing Tank Shell

Upon completion of the entire tank and the performance of weld inspection specified in Section MW-4.2.6.1, the tank shell shall be tested by one of the following:

- b.1 If water is available, the tank shall be filled with water and inspected frequently during the filling operation. Filling of water shall be 50mm (2") above the top leg of the top angle;
- b.2 If water is not sufficient to fill the tank, the test shall be made by one of the following:
 - b.2.1 Painting all joints on the inside with a highly penetrating oil and carefully examining the outside of the joint for leakage.
 - b.2.2 Applying vacuum to either side of the joints or applying internal air pressure as specified in Item c) of this Section and carefully examining the joints for leak.

c) Testing Tank Roof

Upon completion, the tank roof shall be tested by applying internal air pressure or external vacuum to the seams with a soap film solution. The internal pressure shall not exceed the weight of the roof plates.

MW-4.2.6.4 Repairs**a) Repair of Welds**

All defects found shall be called to the attention of the NPC inspector and his approval shall be obtained before they are repaired. Pinhole leaks or porosity in tank bottom joints may be repaired by applying an additional weld bead over the defective area. Other defects or cracks in tank bottom joint or leaks in shell joints or in the shell-to-bottom joints shall be required by chipping or melting out the defects from one or both sides of the joint, as required, and rewelding. Only sufficient cutting out the defective joints is required as is necessary to correct the defects. Isolated pinhole leaks in roof joints may be caulked mechanically. Considerable porosity in the roof joints or of cracking shall be added with bead of weld metal laid over the affected portion. Mechanical caulking is not permitted for any other repairs. Repairs of defect discovered after the tank has been subjected to hydrostatic test shall be made with the water level at least 300 mm (1') below the point being repaired or with the tank empty if repair is on or near the tank bottom.

All repaired welds shall be checked by repeating the original inspection procedure and by repeating one of the testing methods.

MW-4.2.7 Tank Calibration

The tank shall be calibrated for accurate measurement of Diesel Fuel Oil. Five (5) copies of calibration table shall be furnished by the Contractor to NPC.

The Contractor shall include the supply of 1 set of Fuel Oil Tank Sounding Tape which is 10 meter long. Tape body/frame shall be of aluminum alloy with stainless steel tape and brass dropper.

MW-4.2.8 Painting Requirements**MW-4.2.8.1 General**

The tank and other surfaces shall be painted in accordance with first class standard practices suitable for the purpose.

All paints and shop primer to be used shall be of standard types of a well-known manufacturer subject to the approval of NPC.

MW-4.2.8.2 Surface Preparation

Prior to painting all weld spatter, mill scale, burrs, rust, loose particles, and flux shall be removed. Grinding and deburring shall be performed with a wheel that will assure a clearly cut surface.

Blast cleaning with iron-free sand or grit shall be used. The grit shall be new and unused. Surface preparation of external surface of tank that will be carried-out at the site shall be done by power tool cleaning to avoid scattering of abrasives caused by blast cleaning.

All cleaned surfaces shall be primed within six (6) hours or before any rust bloom forms on the blasted surface.

MW-4.2.8.3 Painting Application

Application of painting shall be in accordance with the Manufacturer's recommendations and standard practices. No painting shall be applied on wet or damp surfaces.

The tank external surfaces, appurtenances and other surfaces shall be painted to conform with the following:

- | | | |
|---|---|-------------------------------------|
| a) Primer Coat
(75 microns DFT) | : | Zinc rich epoxy polyamide
primer |
| b) Intermediate Coat
(100 microns DFT) | : | Epoxy polyamide |
| c) Final Coat
(50 microns DFT) | : | Polyurethane enamel |

The tank inside surfaces including structural shall be painted to conform with the following:

- a) Primer Coat (50 microns DFT) : Zinc rich epoxy polyamide primer
- b) Intermediate Coat (100 microns DFT) : Polyamide amine cured epoxy coating
- c) Final Coat (100 microns DFT) : Polyamide amine cured epoxy coating

The underside of the tank bottom shall be coated with coal tar epoxy, 400 microns DFT.

The Contractor shall provide test instruments used for testing dry film thickness.

Should the measured dry film thickness result to less than the specified one, the Contractor shall apply additional paint to the coat inspected or shall increase the thickness of succeeding coat, as applicable, to conform with the specified total dry film thickness.

Final color of paint on external surfaces of the tank shall be silver or as directed by NPC. Final color of associated piping and equipment shall be similar to the existing facilities unless otherwise directed by NPC.

MW-4.2.9 Submittals

Prior to the purchase of materials, fabrication and erection/installation of the fuel oil storage tank, the Contractor shall submit for review and/or approval by NPC, construction drawings of the tank concrete foundation and detailed drawings as required.

Certified mill test reports, covering all steel plate, structural shapes and piping/nozzles to be used in the work and as required by the governing codes and standards shall be furnished for the NPC's review and record. Copies of each mill test report shall be submitted to NPC prior to fabrication of materials covered under this work.

Prior to the conduct of tank test, inspection and test procedures shall be submitted for NPC's review and approval. Test report shall be submitted in five (5) copies fifteen (15) days after the conduct of test.

MW-4.3 Fuel Oil Transfer Pump

MW-4.3.1 General

The fuel oil transfer pump shall be used for unloading diesel oil from a tanker or 210-liter drum or transferring diesel oil from the fuel oil storage tank to the diesel engine day tanks.

The plant shall be provided with one (1) set of Fuel Oil Transfer Pump with capacity of not less than 10 m³/hr at a discharge head of 30m complete with accessories necessary for the safe and reliable operation of the pump including spare parts as recommended by the manufacturer for one (1) year operation.

The pump shall be installed inside the pump house complete with concrete foundation, anchor bolts and electrical amenities and shall conform to the requirements of relevant Civil and Electrical Works Specifications.

MW-4.3.2 Scope of Works

One (1) set of Fuel Oil Transfer Pump, with capacity not less than 10m³/hr at a discharge head of 30m, shall be supplied, installed and tested complete with accessories necessary for the safe and reliable operation of the pump including spare parts as specified and recommended by the manufacturer for one (1) year operation and its concrete foundation, anchor bolts, pump house and spare parts for one (1) year operation.

The works shall include the supply and installation of associated valves, strainers, gauges, power cables, controls and other accessories necessary for the safe and reliable operation of the fuel oil transfer pump, but not limited to the following:

- a) Six (6) units of 65 mm Ø Gate Valve;
- b) One (1) unit of 50 mm Ø Gate Valve;
- c) Six (6) units of 25 mm Ø Globe Valves @ fuel oil supply lines to existing fuel day tanks;
- d) Two (2) units of 65 mm Ø Swing type Check Valve @ F.O. Transfer Pump outlet and pump's bypass line;
- e) Two (2) units of 65 mm Ø Simplex Strainer (40 mesh size min.);
- f) Two (2) units of 100 mm Ø dial size Pressure Gauge @ F.O. Transfer Pump Inlet and outlet;
- g) One (1) Flowmeter @ downstream of F.O. Transfer Pump;
- h) One (1) lot of Piping Materials, pipe fittings, pipe supports, pipe coating and other accessories including any required excavation and backfilling works; and
- i) One (1) lot of spare parts for the fuel transfer pump as specified in the Clause MW-4.3.4.

MW-4.3.3 Design and Construction

The pump shall be horizontal gear type with a capacity of not less than 10 m³/hr at a discharge head of 30m. Pump casing shall be made of cast iron material capable of withstanding a hydrostatic pressure of 150% of the maximum pumping pressure under which the pump could operate at design speed.

The fuel oil transfer pump shall conform, as minimum, to the following requirements:

- | | | | |
|----|---------|---|----------------------------|
| a) | Casing | : | Cast Iron |
| b) | Gear | : | Ductile Iron |
| c) | Shaft | : | High Strength Carbon Steel |
| d) | Bushing | : | Bronze (Graphited) |

Gland shall be made of cast iron stuffed with graphite gland packing. Oil pan shall be provided at the gland section to catch possible oil leaks.

Pump shall be equipped with adjustable safety valve or relief valve to protect the unit from overpressure. Safety valve box and cover shall be made of cast iron.

Lifting lugs and eyes and other special tackle shall be provided as necessary to permit easy handling of the pump and its components.

The pump shall be driven by a direct-coupled motor mounted on a common metal base ready for installation on concrete foundation. Concrete foundation and anchor bolts shall be included in the scope of work and shall conform to the general requirements of relevant Civil Works Specifications.

Pump Motor shall be selected so that the pump brake HP requirement throughout the entire capacity range shall be within the nameplate rating of the motor. Motors shall be capable of operating continuously at rated output within $\pm 5\%$ of rated frequency and at any voltage within $\pm 10\%$ of rated value.

Pump motor shall generally be of the squirrel cage rotor induction type and shall comply with ANSI Standards plus amendments. Standard frame sizes should be used.

Pump Motor shall be of the totally enclosed guarded fan cooled type, suitable for continuous operation and direct on line starting. Motors shall conform to the requirements specified in the electrical Works specifications.

The pump to be supplied shall be operated at 240V, 1-phase and 60 cycles.

Local panel shall be provided each at the fuel pumphouse and in the powerhouse. Local Panel at the Powerhouse shall be located midway of the fuel day tanks' area. Each local panel shall be provided with start and stop push buttons with respective status indicating lights. Local panel at the pump house shall be provided with local/remote selector switch which shall be utilized for preference of fuel pumps operation either from the powerhouse or fuel pump house. Provisions for monitoring of Start and Stop status for the pump in the Control Room Panel shall also be provided for future connections by NPC.

All cables and conduits including ground wire of appropriate size required for the connection of the motor to the existing station panelboard shall be provided by the Contractor in coordination with the plant management.

The Contractor shall furnish a UL/CSA listed molded-case circuit breaker equipped with thermal magnetic trip current protection, rated 50 AT, 240V, 1-phase, 60 Hz in an enclosure to be installed in the pump house and another unit of circuit breaker shall be provided and installed at the power station to be tapped at the existing 240 V system for the power source supply.

The local control panel shall be provided with start and stop push buttons with status indicating lights.

All cables and conduits of appropriate size required for the connection of motor from the existing station's panelboard shall be provided by the Contractor but not be less than 14.0 mm², THWN and 5.5 mm², THWN ground wire.

The technical requirements of the associated valves, flowmeter, strainers, gauges, testing and spare parts shall conform to the requirements specified in this section.

MW-4.3.4 Spare Parts

The Contractor shall supply the manufacturer's recommended spare parts for one (1) year operation of pump to be supplied which shall include the following as minimum:

- a) One (1) set of bearings for pump and motor; and
- b) One (1) set of bushings, wearing rings, packing and gaskets for the pump.

MW-4.3.5 Pump House

The Contractor shall construct a Pump House which will house the Fuel Oil Transfer Pump in accordance with the attached Civil Work drawings. The pump house shall be provided with lighting, drainage system and other amenities to conform with the requirements specified in this section and in the relevant Electrical and Civil Works Technical Specifications and drawings.

Lighting fixture to be used shall be of compact LED type, 9 watts, 230V, vapor tight and fitted with clear glass globe.

The Pump house shall be provided with the following:

- a) One (1) unit of (Convenience Outlet) 16 Amps, 230 V, duplex;
- b) One (1) unit of (Single) Convenience Outlet rated 16 Amps, 230 V;
- c) One (1) unit Single pole switch rated, 10 Amps, 230 V, 1 gang; and
- d) 2 x 2 Watts, 230 V, Emergency Lighting Fixture

MW-4.3.6 Submittal

The Contractor shall submit for NPC evaluation and approval for the following:

- a) Catalogues or brochures for pumps and associated electrical device technical data, outline drawings, single line diagram including detailed drawings of pump's concrete foundation;
- b) Test procedures prior to test; and
- c) Test and inspection reports

MW-4.3.7 Pump Testing

The pump and motor shall be subjected to factory tests to determine its conformance with the design and operating characteristics and shall be performed in accordance with the approved test procedures and applicable codes and standards which shall include the following:

- a) Pressure hydrostatic proof of the spiral case to 1.5 times the maximum pressure for 30 minutes;
- b) Report of the characteristic curve of at least one (1) pump of each type such as Height vs. Flow, Power absorbed against Flow, Efficiency against Flow;
- c) Test of uninterrupted operation to full flow and maximum height of each pump motor set for one (1) hour; and
- d) Test of uninterrupted operation without load for each pump motor set for one (1) hour.

MW-4.3.8 Painting

Pump's associated valves and other accessories are generally delivered with final paint applied at the manufacturer's shop. Any part of the final paint that will be damaged during transport and installation shall be re-painted or touched-up after installation and testing. Final color shall be per manufacturer's standard unless otherwise directed by NPC.

MW-4.4 Fuel Oil Transfer and Waste Oil/Water Piping System**MW-4.4.1 Scope of Works**

The Contractor shall supply, install and test a complete Fuel Oil Transfer and Waste Oil/Water Piping System including pipe supports, fittings, necessary accessories, all required excavation and backfill of pipe trenches, painting and other necessary accessories as required and shown on the attached drawings.

The F. O. Transfer piping system shall consist of piping interconnections for a rubber hose at fuel oil transfer pump inlet, pump bypass line from a fuel oil delivery truck up to the storage tank and storage tank to day tank through fuel oil transfer pump.

Waste Oil/Water shall consist of piping interconnections from the Fuel Oil Tank's drain pit to oil-water separator and waste water from oil-water separator to existing drainage system or to a discharge area.

The works shall include the supply and installation of piping materials, valves, asphalt tape/jute of embedded fuel oil piping and other accessories to complete and make ready for the safe and reliable operation of the fuel oil transfer system but not limited to those shown on the attached drawings.

MW-4.4.2 Piping

Fuel oil piping shall be constructed from ASTM A53 Gr. B, seamless pipe and schedule 40. All piping 65mm and larger shall be constructed with flanged joints or butt-welded joints and fittings. Piping 50mm and below shall be constructed with flanged joints or socket welded joints and fittings.

Fuel oil piping shall generally be installed above ground. In case fuel oil piping shall be installed underground, steel pipes shall be applied with tape wrapping with minimum thickness of 1 mm applied spirally with overlap of 50% in all parts of the pipe and fittings or approved equivalent. The tape wrapping brochures shall be submitted for NPC approval prior to procurement and application. The wrapping shall extend for 300 mm beyond the buried portion.

Waste oil/water piping shall be constructed of Unplasticized Polyvinyl Chloride (*uPVC*) pipe, schedule 80 or class 150, conforming to ASTM D-1784 or approved equivalent.

Unplasticized PVC pipe connection joints 80 mm (3") Ø and above shall be joined by rubber ring or solvent cement type connection. Smaller sizes shall be of solvent cement type connection. Flanged connections shall be used for connecting to flanged surfaces or to flanged-ends valve and shall be of the same material with the connected pipe with a rating of class 150 or ANSI 150.

The waste oil/water piping system shall generally be laid underground. All trenches shall be provided with a cushion pad of at least 100mm sand and sandy soil bedding materials. All pipeline excavations shall be backfilled up to the level of the finished grade surface in layers of 150 and each layer shall be thoroughly compacted. Backfill materials shall be compactable soil taken from trench excavation and approved by NPC.

All pipes that crosses roadways shall be provided with pipe sleeve made of steel material or RCP pipe to protect the pipe from various loads imposed by vehicles and shall extend 600mm beyond shoulder of each pavement side. Embedded pipes in open areas shall be laid not less than 300mm from the ground surface to the bottom of pipe.

PVC pipe installed aboveground or with associated isolation valve shall be properly supported to avoid pipe sagging. Pipe covering made of steel or metal shall be provided in case there is high risk of damaging the pipe during normal operation and maintenance.

All trench excavation and backfill works shall be done in accordance with pertinent provisions specified in the Civil Works Specifications.

MW-4.4.3 Valves

All gate or globe valves to be supplied shall be of the outside screw and yoke design or with rising stems. Valves body material shall be of cast iron for sizes more than 50mm diameter and cast bronze or stainless steel for 50mm and smaller. All valves shall have flanged ends with a rating of not less than 150 lb. The use of screwed ends may be applied to 50 mm diameter subject to the approval of NPC. Check valves shall be of swing type.

MW-4.4.4 Strainers

Strainers shall be of basket type or approved equivalent with body cast iron material and flanged ends. Body drain and vent connections shall be included. Drain plugs shall be threaded. Screen elements shall be of stainless steel construction with minimum 40-mesh size or as shown on the drawings. Magnets shall be included to trap small iron and steel particles for use in fuel oil lines.

MW-4.4.5 Pressure Gauges

Pressure gauges for fuel oil system shall be provided with dampener. Each pressure gauge shall be provided with isolation valve. Pressure gauge shall be of bourdon tube type with solid front case, and minimum size of dial gauge shall be of 100mm Ø.

MW-4.4.6 Flowmeters

Flowmeter shall be provided at fuel oil system. Accuracy of flow meters shall be $\pm 0.5\%$ of total flow with 0.2% repeatability. Flowmeters shall be of LCD display and capable of monitoring the Total/Accumulated Flow, resettable total flow and instantaneous flow rate. Design flow ranges shall be selected so that normal flow rate shall be in the 50 to 75 % region of design flow range. Simplex strainer with minimum 60 mesh size or as recommended by flowmeter manufacturer and with stainless steel filter element shall be provided upstream of the flowmeter. The flowmeter shall be made of aluminum or approved equivalent with flanged ends and shall utilize an internal battery that can last up to at least 5 years. The flowmeter shall be equipped with pulse generator or 4-20mA current output and ready for future interconnections.

MW-4.4.7 Testing

The piping system shall be hydrostatically tested at a pressure of 1.5 times the operating pressure of the system.

The assembled fuel oil piping system may be tested using a compressed air at a pressure of 1.25 times the operating pressure of the system and maintaining it for a minimum of 10 minutes, subject to the approval of NPC. Examination for leakage detected by soap bubble or equivalent method shall be made of all joints and connections. The piping system shall show no evidence of leaking.

During initial pipe filling and trial operation of the fuel oil piping system, piping fittings and joints shall be visually inspected against leak.

Waste oil/water may be applied to sections or the entire system. The test shall be made between valves and sections of not more than 305 m (1000 ft.) in accordance with the American Water Works Association (AWWA). There shall be no leakage whatsoever from the pipes, fittings and connections for each section tested while the system is under test pressure for the period of not less than thirty (30) minutes or the total time to inspect all portions of the waterline under test, whichever is longer. During the test, valves shall be opened and closed. Any leakage or any defect disclosed by the tests prior to the acceptance shall be corrected and repaired by the Contractor at his own expense to the satisfaction of NPC.

Before any test is made, the Contractor shall notify NPC in advance so that such test may be witnessed. All expenses that may be incurred during the tests shall be borne by the Contractor.

MW-4.4.8 Painting

All steel piping installed outdoors and indoors shall be prime coated with 80 microns DFT zinc rich epoxy paint and 80 microns DFT of chlorinated rubber for each intermediate and topcoat.

All steel pipes laid underground shall be applied with pipe wrapping or asphalt jute in accordance with the provisions specified in Clause MW 4.4.2

Painting for waste oil/water PVC piping is not required.

Final color for Fuel Oil piping and associated valves installed above ground shall conform to Munsell No. 7.5R 3/12 and/or similar to the existing facilities or as directed by NPC.

MW-5.0 DOMESTIC WATER SUPPLY SYSTEM

MW-5.1 General

This section provides the essential information for the design, supply, installation, construction and test of the Domestic Water Supply System to provide the water requirements of the proposed **Staff House for Balabac Diesel Power Plant** including all required excavation and backfilling works for the piping system.

The water supply shall be sourced and interconnected from the existing water supply line. Interconnection point shall be as directed by NPC representative/s.

MW-5.2 Domestic Water Supply Piping System**MW-5.2.1 Scope of Work**

The Contractor shall supply, install and test the Domestic Water Supply and Distribution Piping System including piping supports, fittings, all required excavation and backfill of pipe trenches.

The work shall include the installation of valves, valve boxes if necessary, gauges and other accessories to complete and make ready for safe and reliable operation of the system, but not limited to the following:

- a) One (1) unit of 20 mm Ø Gate Valve;
- b) One (1) unit of 20 mm Ø Hose Bibb; and
- c) One (1) lot of domestic water piping, pipe fittings and other necessary accessories.

MW-5.2.2 Pipe, Fittings and Accessories

Domestic water piping shall be constructed from Unplasticized Polyvinyl Chloride (*uPVC*) pipe schedule 80 or class 150, conforming to ASTM D-1784 or approved equivalent.

Unplasticized PVC pipe connection joints 80 mm (3") Ø and above shall be joined by rubber ring or solvent cement type connection. Smaller sizes shall be of solvent cement type connection.

Flanged connections may be used for connecting to flanged surfaces and shall be of the same material with the connected pipe with a rating of class 150 or ANSI 150. Flanged joints may use flat gaskets with serrated flange faces or O-rings with corresponding grooves. Gaskets and O-rings shall not be fabricated from plasticized PVC.

Union joints shall not be used with pipe diameters of more than 63 mm O.D. (2"). Joints between metal pipes and PVC pipes should be flanged type using a PVC flange on the PVC pipe and full face gasket.

Flange bolts shall be hexagonal head machine bolts with heavy semi-finished head nuts having dimensions in accordance with ANSI B18.2.

PVC pipe installed aboveground shall be properly supported to avoid pipe sagging. Pipe covering made of steel or metal shall be provided in case there is high risk of damaging the pipe during normal operation and maintenance.

All trench excavation and backfill works shall be done in accordance with pertinent provisions specified in the Civil Works Specifications.

MW-5.2.3 Valves and Accessories

All gate and globe valves, 65mm and over shall be of OS & Y with rising stem, solid wedge type disc for gate valves and plug type disc for globe valves, bolted, bonnet, bolted gland and have flanged ends with the following materials of components:

- | | | | |
|----|------------------|---|------------------------|
| a) | Body & bonnet | - | Cast iron |
| b) | Stem | - | Bronze or brass |
| c) | Seat ring & seat | - | Bronze or bronze faced |
| d) | Wedge or disc | - | Bronze or bronze faced |

Gate and globe valves, 50mm and smaller shall be made of bronze material, rising stem, union bonnet, inside screw, solid wedge or plug type disc, and screwed ends. Valves installed in valve boxes shall have flanged ends for easy replacement or if valves with screwed ends are used, appropriate unions shall be installed.

Valves of all sizes shall have a rating of not less than Class 150.

Garden hose connection valves or hose bibbs shall be of bronze material, 20mm size and outfitted with male thread hose connections.

Strainers, if required, shall be of Y-type with cast iron or PVC body material and flanged or screwed ends. Screen elements shall be of stainless steel construction with minimum of 40-mesh size.

MW-5.3 Installation

The Contractor shall install the piping system in a thorough manner and with good workmanship in accordance with the construction drawings and specification or as directed by NPC. No installation work for underground pipe shall commence unless trench excavation has been approved by NPC.

All pipes, fittings, valves and appurtenances shall be free from dirt or other foreign matters before laying. In the installation of the pipes, care shall be taken to prevent the pipes from becoming clogged during the progress of the work. Should any pipe become either partially or wholly clogged before final completion of the work, it shall be cleaned out by the Contractor in a manner satisfactory to NPC or shall be replaced by and at the expense of the Contractor. Open ends shall be temporarily plugged, otherwise suitably closed when necessary.

Special care shall be taken in carrying out the installation of joints, branches, valves and other fittings.

All piping works shall be coordinated with any other work at site and with existing installation so that interference between piping and other structural features will be avoided. In case interferences occur, NPC will decide which work is to be relocated.

Where pipeline are laid, the trench shall be provided with a cushion pad of at least 100 mm sand and sandy soil bedding materials.

Embedded water supply pipes in open areas shall be laid not less than 300mm from the ground surface to the bottom of pipe.

All pipeline excavation shall be backfilled up to the level of the finished grade surface in layers of 150 mm and thoroughly compacted. Backfill materials shall be compactable soil taken from trench excavation and approved by NPC. Trench excavation and backfilling works shall be done in accordance with the pertinent provisions of the Civil Works Technical Specifications.

PVC pipe installed aboveground shall be properly supported to avoid pipe sagging. Pipe covering made of steel or metal shall be provided in case there is high risk of damaging the pipe during normal operation and maintenance.

All existing facilities affected and damaged during the installation of piping shall be replaced and/or restored to its original appearance by the Contractor at his own expense.

Transportation, storage and erection shall be in strict accordance with manufacturer's recommendations. Erection shall be such as to prevent stress in the piping.

All trench excavation and backfill works shall be done in accordance with pertinent provisions specified in the Civil Works Specifications.

MW-5.4 Testing, Cleaning and Disinfection

The piping system shall be hydrostatically tested at a pressure 1.5 times the design pressure or maximum working pressure of the system for a period of not less than 30 minutes.

Before any test is made, the Supplier shall notify NPC in advance so that such test may be witnessed. All expenses that may be incurred during the tests shall be borne by the Supplier.

If applicable, test shall also include visual check on joints or welded parts, as applicable, during actual operation of each system to ensure that no leakage is observed on the joints.

Before starting the test procedure, the piping shall be flushed and cleaned thoroughly. When filling the line with water, all air shall be removed.

Tests may be applied to sections or the entire system. The test shall be made between valves and sections of not more than 305m (1000 ft) in accordance with the American Water Works Association (AWWA).

There shall be no leakage whatsoever from the pipes, fittings and connections for each section tested while the system is under the test pressure for the period of not less than thirty (30) minutes of the total time to inspect all portions of the waterline under test, whichever is longer.

During the test, valves shall be opened and closed. Any leakage or any defect disclosed by the tests prior to the acceptance shall be corrected and repaired by the Supplier at his own expense to the satisfaction of NPC.

The water piping system shall be disinfected after testing and before being put into use. Before disinfections, the piping should be drained, flushed, re-drained and refilled. In refilling, care must be taken to avoid entraining or entrapping air in the piping. The Supplier may use any of the methods of disinfections as recommended by the American Water Works Association (AWWA) or any of the following kinds of treatment:

- a) Chlorine Gas-Water Mixture;
- b) Calcium-Hypochlorite or equal; or
- c) Dry Calcium Hypochlorite or Chlorinated Lime and Water Mixture.

Retention period shall be at least 24 hours and shall produce not less than 10 ppm at extreme end of the lines at the end of the retention period. After flushing, residual chlorine must be reduced to less than 1 ppm.

The Supplier shall submit the following for review and/or approval by NPC:

- a) Test procedures prior to test; and
- b) Test and inspection reports.

MW-6.0 AIRCONDITIONING AND VENTILATION SYSTEM

MW-6.1 General

This section provides the essential information for the Air Conditioning and Ventilation System equipment to be supplied, installed and tested by the Supplier.

All air-conditioning equipment and Ventilation System shall preferably have one Brand name and shall be the standard product of a reputable A/C manufacturer. In case other brand of A/C and Ventilation equipment are to be used to meet with the specific requirements in the bid document, catalogues and other supporting documents shall be submitted for NPC's review and approval.

Power supply for the ventilation and air-conditioning equipment shall be 230V, single phase, 60 hz.

Refrigerant to be used shall be environment-friendly.

All necessary transformers and electrical materials shall be included in the Supplier's supply if power ratings provided are other than the one's specified above.

MW-6.2 Design Conditions

a) Outdoor Conditions:

Dry Bulb Temperature : 35°C
 Wet Bulb Temperature : 27°C
 Relative Humidity : 80% to 100%

b) Indoor Conditions (for air-conditioned areas):

Dry Bulb Temperature : 24°C ± 3°C
 Relative Humidity : 50% ± 5%

c) Area to be air-conditioned shall be:

- c.1) Personnel's Quarter
- c.2) Office

d) Area to be ventilated shall be:

- d.1) Comfort Room of Office - 10 changes per hour
- d.2) Kitchen - 20 changes per hour

MW-6.3 Schedule of Equipment

a) Air-Conditioning Unit

Location	Quantity	Cooling Load/Unit	Type
a.1) Personnel's Quarter	One (1) unit	11,500 kJ/hr	Inverter Window Type
a.2) Office	One (1) unit	8,000 kJ/hr	Inverter Window Type

b) Ventilation Unit

Location	Quantity	Rating/Unit	Type
b.1) Comfort Room of Office	One (1) unit	100 m ³ /hr	Wall Mounted Exhaust Fan
b.2) Kitchen	One (1) unit	300 m ³ /hr	Wall Mounted Exhaust Fan

MW-6.4 Air-Conditioning System**MW-6.4.1 Scope of Works**

The Work called for in this specification includes the design, furnishing, delivering, installing and testing of window type air conditioners (inverter type) to provide a fully ventilated and air conditioned rooms. The work shall include other accessories even though not specifically mentioned in this specification but are necessary to obtain a complete set for the safe and reliable operation of the system as a whole.

All electrical materials such as circuit breakers, automatic controls, including all power and control wires, supervision, electrical outlets and fittings shall be included and provided by the Supplier including complete system of automatic temperature controls.

The type and quantity of air conditioning equipment to be supplied shall be as specified in Clause 6.3 (Schedule of Equipment) or shown on the drawings.

All air conditioning units (window type) to be supplied and installed shall have the following features/accessories but not limited to:

- With Remote Controller and Holder
- With automatic and manual swing louver control
- With control switch
- Cool Mode
- Fan Mode
- Automatic Mode

MW-6.4.2 Window Type Air-Conditioning Systems

The Window Type Air Conditioning Units to be supplied and installed for specific areas in the bunker are as specified in the schedule of equipment or shown on the drawings.

The units shall be wall mounted room air conditioner and shall be provided with a room thermostat and sensing element which detect changes in room temperature and adjust it to desired cooling by automatic actuation of the compressor. Compressor shall be provided with thermal overload device that automatically shuts off the compressor during overheating.

Fan motor shall be permanently lubricated. The unit shall operate on a 230 V AC, single phase and 60 Hz power supply.

Mounting brackets which are properly fixed on the wall or structure shall be provided to support the suspended portion of the air conditioner unit. Weather seals shall be provided on the area between the air conditioner and wall opening.

Provision of wall opening for the installation of the window type air conditioning units shall be closely coordinated with the civil works.

MW-6.5 Ventilation Units**MW-6.5.1 General**

The Supplier shall furnish, deliver, install and test the ventilation system equipment complete with all the necessary appurtenances for its efficient operation. The scope of supply shall include all mounting supports and fixing materials required to complete the installation and ready for operation.

The unit shall be properly sized to conform to the required air changes per hour at free air for this particular application but in no case be less than those specified elsewhere in this specification. It shall be designed to continuously or intermittently operate on a 230 V, single phase, 60 Hz power supply, otherwise specified.

MW-6.5.2 Wall Mounted Exhaust Fans

Thru-the-wall propeller exhaust fans shall be provided at the area as specified in the schedule of equipment.

Each unit shall be properly sized to conform with the required air changes per hour at free air for this particular application but in no case be less than those specified elsewhere in this specification. Unit installed/mounted on the wall and directly discharges exhaust outside the building shall be provided with automatic shutter. It shall be of the direct driven type and corrosion resistant to operate on a 230 V, single phase, 60 Hz.

MW-6.6 Installation and Painting

The Air-Conditioning and Ventilation Units shall be installed as indicated in the drawings or as directed by NPC. After installation, all exposed and unfinished surfaces shall be thoroughly cleaned and washed possibly by chemical of all rust, oil and other foreign matters and shall be repainted in accordance with the manufacturer's standard or as approved by NPC.

Likewise, all surfaces and supports shall be thoroughly cleaned of rust, oil and other foreign matters and shall be painted with epoxy primer and two (2) coats of finish paint.

Painted surfaces of all equipment which are damaged during transport and installation shall be repaired or touched-up as necessary to prevent rusting, corrosion, etc. until the final finish painting application is made.

MW-6.7 Spare Parts and Tools

The Supplier shall supply the standard spare parts for one (1) year operation as recommended by the equipment manufacturer. Spare parts required during the warranty period shall be supplied by the Supplier at no Cost to NPC.

Special tools for normal operation and maintenance and are not usually available in a standard machine shop or retailing store shall also be provided as recommended by the manufacturer.

MW-6.8 Acceptance Test

Prior to acceptance of the Works, the equipment shall be tested in the presence of NPC to determine whether the requirements of the specifications have been met. Any defects found that are inherent in the equipment shall be remedied at the expense of the Supplier.

MW-6.9 Submittal

Prior to purchase and implementation of the works, the Supplier shall prepare and submit five (5) copies of the following drawings/documents for review/approval of NPC:

- a) Dimensional layout drawings of mechanical equipment and associated devices.
- b) Manufacturer's catalog sheets, marked as necessary, to indicate materials or equipment being furnished including instruments for control system;
- c) Complete control schematic and wiring diagrams for all equipment to be furnished;
- d) List of recommended Spare Parts and Special Tools; and
- e) Operation and Maintenance Manuals.

MW-7.0 FIRE EXTINGUISHER SYSTEM**MW-7.1 General**

This section provides the essential information for the design, manufacture, fabrication, supply, installation, delivery to site and test of the specified Fire Extinguisher System.

All equipment and materials necessary for the complete installation shall be furnished complete, even though not necessarily mentioned in this specification but are necessary for the safe and reliable operation of the Fire Extinguisher System.

All the Fire Fighting System equipment shall be supplied by the Contractor complete with their corresponding technical brochures written in English that would aid in the installation, operation and maintenance of the equipment.

The Fire Extinguisher System shall be designed, installed and tested in accordance with the requirements of National Fire Protection Association (NFPA) Standards.

The Contractor shall design, furnish, install and test all the equipment specified below.

MW-7.2 Portable Fire Extinguishers**MW-7.2.1 Scope of work**

The Contractor shall supply the specified number of UL/FM approved Portable Type Fire Extinguishers complete and ready for operation and shall be installed at their corresponding place of use as specified below and shown on the drawings.

- a) One (1) set of Foam (AFFF) wheeled type fire extinguisher complete with self-contained cylinder mounted on a frame with handle, floorstand and steel wheels, 125 L (33 gallons) capacity complete with associated valves, dial gauge indicator, nitrogen expellant tank for unit pressurization, appropriate size of discharge hose of 15 m long fitted with couplings and foam nozzle assembly;
- b) Six (6) units of Portable Type Fire Extinguisher, Clean Agent (HCFC or Halotron I Type), 7.1 kg. (15.5 lbs), wall-hung type and UL/FM approved;

MW-7.2.2 Technical Requirements

Fire extinguishers shall be Underwriter Laboratories and/or Factory Mutual approved. Each fire extinguisher cylinder shall be complete with release valve, dial gauge indicator, appropriate length of hose with nozzle and locking pin.

The 7.1 kg (15.5 lbs.) capacity wall-hung type fire extinguishers shall be complete with carrying handle and wall-mounting bracket. Portable fire extinguishers shall be suitable for the protection against class ABC fires using Clean Agent (HydroChloroFluoroCarbon or Halotron I Type) that is environmentally safe and leaves no residue.

The Foam (AFFF) wheeled type fire extinguisher units shall consist of a completely self-contained cylinder mounted on a frame with handle, floorstand and steel or rubberized wheels, 125 L (33 gallons) capacity complete with associated valves, dial gauge indicator, nitrogen expellant tank for unit pressurization, appropriate size of discharge hose of 15 m long fitted complete with couplings and foam nozzle assembly.

The fire extinguishers shall be check-weighed at interval of six (6) months from the date of delivery for a period of one (1) year and if found to be undercharged (unless used by an NPC personnel) shall be filled and recharged by the Contractor at no expense to NPC.

Painting of Fire Fighting Equipment and applicable piping shall be in accordance with Manufacturer's standard or as directed by NPC. Equipment with final painting have already been applied at the shop but have been damaged during transport and/or installation works, shall require touch-up painting.

MW-7.2.3 Submittals

The Contractor shall submit the type and model of the fire extinguishers for the approval of NPC prior to purchase.

MW-8.0 EQUIPMENT MARKING AND LABELING

All equipment and devices to be supplied by the Contractor under this contract shall be provided with a corrosion-resistant nameplate with clearly legible writing of approved size and pattern and shall be permanently attached at an easily visible place. It shall provide all necessary information or brief technical description under which the equipment has been designed to operate and shall include the following: manufacturer's name; type of equipment; serial number; year of manufacture; weight and other relevant information in compliance with applicable standards.

All labels and nameplates shall be of engraved stainless steel or equivalent non-corrodible material.

Tag Numbers for instruments and other devices shall also be provided as necessary and practicable.

Appropriate labels shall also be provided for equipment and devices mounted on control boards, relay cabinets, desks, and other places as required for proper identification, as well as for operational, functional, and safety reasons.

The labeling, size of label plates, and their location shall be subject to approval by NPC. A sample label-plate (with indication of material used) with lettering shall be submitted for this purpose. The inscription shall be printed or stenciled but in any case, water-proof, oil-proof and wear-resistant.

Each equipment, wherever necessary, shall be provided with cautionary and warning plates and signs.

Nameplates, labels, and warning plates shall be in English.

The nameplates and labels shall be protected during erection especially during painting. Damaged or illegible labels or nameplates shall be replaced by new ones.

No separate payment shall be made by NPC for nameplates and labels. Corresponding costs thereof shall be included by the Contractor in the bid price for each equipment to be furnished under the Contract.

MW-9.0 GUARANTEE

The Contractor shall guarantee that he will repair, and/or replace, at his own expense, equipment and materials against defect in design, materials and workmanship for a period of twelve (12) months after the issuance of the Certificate of Completion. The Contractor guarantees that when the equipment and/or material are placed in operation and/or use, it will perform in the manner as set forth in the Contract.

MW-10.0 MEASUREMENT OF PAYMENT

Measurement of payment for all Mechanical Works shall be based on the bid price of each item in the Bill of Quantities. The cost shall cover all works required and described in the pertinent provisions of the specifications.

Measurement of payment for pipes shall be based on the bid price of actual length of pipe installed as shown in the Bill of Quantities. The cost shall cover all works required including excavation, sand bedding, backfilling, testing, painting and other works and services described in the pertinent provisions of the specifications.

PART II – TECHNICAL DATA SHEETS**MW – MECHANICAL WORKS****TABLE OF CONTENTS**

SECTION	DESCRIPTION	PAGE
M-1.0	Fuel Oil Storage Tank	VI-TDS(MW)-1
M-2.0	Fuel Oil Transfer Pump	VI-TDS(MW)-2
M-3.0	Air-Conditioning and Ventilation Systems	VI TDS(MW)-3
M-4.0	Fire Extinguishers	VI-TDS(MW)-4

PART II – TECHNICAL DATA SHEETS**MW – MECHANICAL WORKS****NOTES**

1. The Bidder shall complete this technical data sheet and submit the filled-up forms with the technical proposal. The Bidder shall use continuation sheets as necessary for any other additional information keeping to the format shown herein or by reproducing the same.
2. NPC reserves the right to reject Bids without proper and/or specific data and information as required herein.
3. The data required are technical features and characteristics of the Equipment to be provided by the bidder. Bidder's proposal shall at least be equal or superior to the requirements specified by NPC.

Name of Firm

Name & Signature of Representative

Designation

M-1.0 FUEL OIL STORAGE TANK

ITEM	DESCRIPTION	UNIT	NPC REQUIREMENT	CONTRACTOR'S DATA
M-1.1	Capacity (Nominal)	m ³	60	
M-1.2	Design Code		API 650 or Approved Equivalent	
M-1.3	Quantity	set	1	
M-1.4	Empty Weight	kg	By Contractor	
M-1.5	Operating Weight	kg	By Contractor	
M-1.6	Size (diameter x height)	m x m	3.6 x 6.1	
M-1.7	Materials of Construction:			
	Plate	ASTM	A 36	
	Structurals	ASTM	A 36	
M-1.8	Shell Plate Thickness:			
	1 st Course	mm	6 minimum	
	2 nd Course to 5 th Course	mm	5 minimum	
M-1.9	Bottom Plate Thickness	mm	8 minimum	
M-1.10	Bottom Plate Slope	mm	1:100	
M-1.11	Roof Plate Thickness	mm	5 minimum	
M-1.12	Roof Plate Slope	degree	15	
M-1.13	Paint Specifications:			
	Shell Exterior		Per Specification	
	Shell Interior		Per Specification	
	Bottom Underside		Per Specification	
	Structurals		Per Specification	
M-1.14	Weld Examinations:			
	Shell	ASTM	Per Specification	
	Bottom Underside	ASTM	Per Specification	
	Roof	ASTM	Per Specification	
	Nozzles	ASTM	Per Specification	

Name of Firm

Name & Signature of Representative

Designation

NATIONAL POWER CORPORATION



VI-TDS (MW)-1

M-2.0 FUEL OIL TRANSFER PUMP

ITEM	DESCRIPTION	UNIT	NPC REQUIREMENT	CONTRACTOR'S DATA
M-2.1	Pump			
M-2.1.1	Manufacturer		By Contractor	
M-2.1.2	Place of Manufacture		By Contractor	
M-2.1.3	Quantity	Set	1	
M-2.1.4	Type		Gear	
M-2.1.5	Capacity	m ³ /hr	10	
M-2.1.6	Total Head	m	30	
M-2.1.7	Speed	rpm	By Contractor	
M-2.1.8	Efficiency	%	By Contractor	
M-2.1.9	Power Required	kW	≤ 3.73 (5.0 HP)	
M-2.1.10	Material:			
	Casing		Cast Iron	
	Gear		Ductile Iron	
	Shaft		H. Gr. Carbon Steel	
M-2.1.11	Weight	kg	By Contractor	
M-2.2	Motor			
M-2.2.1	Manufacturer		By Contractor	
M-2.2.2	Place of Manufacture		By Contractor	
M-2.2.3	Type & Protection		NEMA Standards	
M-2.2.4	Insulation Class		Class F	
M-2.2.5	Rating:			
	Voltage	V	240	
	Power Output	kW	≤ 3.73 (5.0 HP)	
	Phase		Single	
	Frequency	Hz	60	
M-2.2.6	Current at Rated Voltage:			
	Full Load	A	By Contractor	
	Locked Rotor	A	By Contractor	
M-2.2.7	Speed	rpm	By Contractor	
M-2.2.8	Weight	kg	By Contractor	

Name of Firm

Name & Signature of Representative

Designation



M-3.0 AIR-CONDITIONING AND VENTILATION SYSTEM

ITEM	DESCRIPTION	UNIT	NPC REQUIREMENT	CONTRACTOR'S DATA
M-3.1	Air-Conditioning System			
M-3.1.1	Manufacturer		By Contractor	
M-3.1.2a	Model		By Contractor	
	a.1) Cooling Capacity	kJ/hr	11,500 minimum	
	a.2) Quantity	set	1	
	a.3) Type		Window Type (Inverter)	
	a.4) Dimensions (W x D x H)	mm	By Contractor	
	a.5) Power Consumption	kW	By Contractor	
	a.6) Refrigerant type		By Contractor	
	a.7) Weight	kg	By Contractor	
M-3.1.2b	Model		By Contractor	
	b.1) Cooling Capacity	kJ/hr	8,000 minimum	
	b.2) Quantity	set	1	
	b.3) Type		Window Type (Inverter)	
	b.4) Dimensions (W x D x H)	mm	By Contractor	
	b.5) Power Consumption	kW	By Contractor	
	b.6) Refrigerant type		By Contractor	
	b.7) Weight	kg	By Contractor	
M-3.1.3	Electrical Supply (V/Ph/Hz)		230, 1Ø, 60	
M-3.1.4	Control System (with Remote Control Unit) – All A/C units		Included	
M-3.2	Ventilation System			
M-3.2.1	Manufacturer		By Contractor	
M-3.2.2a	Model		By Contractor	
	a.1) Air Flow	m ³ /hr	300 (minimum)	
	a.2) Quantity	set	1	
	a.3) Type		Wall Mounted	
	a.4) Dimensions (W x D x H)	mm	By Contractor	
	a.5) Power Consumption	kW	By Contractor	
M-3.2.2b	Model		By Contractor	
	b.1) Air Flow	m ³ /hr	100 (minimum)	
	b.2) Quantity	set	1	
	b.3) Type		Wall Mounted	
	b.4) Dimensions (W x D x H)	mm	By Contractor	
	b.5) Power Consumption	kW	By Contractor	

Name of Firm

Name & Signature of Representative

Designation

NATIONAL POWER CORPORATION



VI-TDS (MW)-3

M-4.0 FIRE EXTINGUISHER

ITEM	DESCRIPTION	UNIT	NPC REQUIREMENT	CONTRACTOR'S DATA
M-4.1	Foam Wheeled Fire Extinguishers			
M-4.1.1	Manufacturer		By Contractor	
M-4.1.2	Type		AFFF, Wheeled	
M-4.1.3	Quantity (with container of foam additive)	set	One (1)	
M-4.1.4	Capacity	Liter	125	
M-4.1.5	Filled Weight	kg	By Contractor	
M-4.1.6	Height	mm	By Contractor	
M-4.1.7	Width	mm	By Contractor	
M-4.1.8	Depth	mm	By Contractor	
M-4.1.9	Discharge Flow	L/min.	By Contractor	
M-4.1.10	Working Pressure	kPa	By Contractor	
M-4.1.11	Foam discharge hose diameter	mm	25 minimum	
M-4.1.12	Foam discharge hose length	m	15	
M-4.1.13	Volume of Nitrogen Tank	m ³	By Contractor	
M-4.1.14	Approving Authority		UL/FM	
M-4.2	Portable Fire Extinguishers			
M-4.2.1	Manufacturer		By Contractor	
M-4.2.2	Type		HCFC or Halotron I, Wall Hung	
M-4.2.3	Quantity	sets	6	
M-4.2.4	Capacity	kg	7.1	
M-4.2.5	Approving Authority		UL/FM	

Name of Firm

Name & Signature of Representative

Designation

NATIONAL POWER CORPORATION



VI-TDS (MW)-4

EW - ELECTRICAL WORKS

EW-1.0 GENERAL

This section covers the technical and associated requirements for the complete lighting and power system including other appurtenances for the Construction of Staffhouse, Warehouse, FOST and other facilities in Balabac DPP.

All electrical equipment shall be installed in accordance with the relevant sections of this specification. The Contractor shall submit all related drawings and document deemed necessary, prior to the execution of the work, subject to the approval of NPC.

The works shall be performed and completed in a satisfactory manner in accordance with generally accepted modern engineering practice.

EW-2.0 SCOPE OF WORK

The scope of electrical work covers the furnishing of all labor, materials, equipment, tools and other necessary incidentals required which shall essentially consist of all electrical equipment and materials enumerated herein:

1. Supply, Installation and Test of 25 kVA, 7.97kV/240V, 1-Phase, 60 Hz Station Service Transformer;
2. Supply, Installation and Test of 15 kV Fuse Disconnect Switches with Lightning Arrester Combination;
3. Supply, Installation and Test of Kilowatt-hour Meter and its accessories;
4. Supply, Laying and Test of Power, Control and Instrumentation Cables including appurtenances required for the interfacing of supplied equipment;
5. Supply, Installation and Test of Lighting and Power System of the Staffhouse, Warehouse, Pumphouse, Hazardous Waste Storage Facility and Materials Recovery Facility;
6. Supply, Installation and Test of Pump Motor Power Supply including necessary control, monitoring and protective devices;
7. Supply, Laying and Test of Insulated Copper Conductors;
8. Supply and Installation of Conduit System;
9. Dismantling of the existing station service transformer including power cables, kilowatt-hour meter, line hardware, terminal lugs & other appurtenances and stocking to the designated stockyard to be provided by the end user; and
10. All other works and services including those not specifically detailed herein but are required to fully complete the project.

In addition, the following shall be provided by the Contractor:

1. Provision of services of a highly qualified and competent Electrical Engineer with experience in the implementation of electrical works to perform/direct supervision during installation and test of all supplied devices, including cabling works; and
2. Conduct of inspection to verify and assess the extent of the related and incidental works needed to implement the project competently and efficiently.

The Contractor shall bear full responsibility that the materials have been designed and fabricated in accordance with all codes, standards, and applicable governmental regulations and performs under the conditions and to the standards specified herein.

EW-3.0 STANDARD OF MATERIALS

All materials to be used in the work shall be new, of high quality, free from all defects and of proven acceptability for the purpose of intended. Unless otherwise specified, materials shall conform to the latest applicable standard issued by the following authorities:

1. American National Standards Institute (ANSI)
2. Institute of Electrical and Electronic Engineers (IEEE)
3. Underwriter's Laboratory (UL)
4. National Electrical Manufacturer's Association (NEMA)
5. National Electrical Code (NEC)
6. Philippine Electrical Code (PEC)

Other recognized national standards maybe accepted if, in the opinion of NPC representatives, such will guarantee a quality not inferior to that guaranteed by the above standards.

In case of conflicting requirements between authorities cited above and those specified, such disagreement shall be resolved by representative of which his decision shall be final.

EW-4.0 STATION SERVICE TRANSFORMER

EW-4.1 General

This specification covers the technical and associated requirements for station service transformer including accessories for use in the plant.

The equipment furnished shall be in accordance with, but not limited to, the latest issues of the Applicable Codes and Standards, including all addenda, in effect at time of purchase order unless otherwise stated in this specification.

The equipment to be furnished shall be complete, with all parts in excellent working conditions, of new and high-grade materials and produced with first class workmanship. All materials though not expressly called for in this Specifications but which are necessary for the complete and proper operation of the station service transformer shall be furnished by the Contractor at no additional cost to NPC.

EW-4.2 Technical Description

The transformer covered by this specification is for use in an electric generating station. The application details are stated in the Technical Data Sheets.

EW-4.3 Design Requirements

Rating

The transformer rating shall be the basis of the Contractor's guarantee as to performance and temperature rise.

Short Circuit Withstand Capability

The transformer shall be capable of withstanding, without damage, the effects of external short circuit, on either the high or low voltage terminals with rated voltage opposite terminals.

The transformer shall withstand the thermal effects of such short circuit current for three (3) seconds.

Overload Capacity

The transformer/s shall be designed and manufactured with overload capacity in accordance with applicable ANSI/IEC/IEEE standards.

Electrical Insulating Oil

The Contractor shall furnish oil with quality suitable as an insulant and coolant for transformers. The oil shall be new naphthenic based mineral oil. It shall be free from moisture, acid, alkali and sulfur compounds and shall not form a deposit at normal operating temperatures. Except for inhibitor no additives are permitted. It shall meet the requirements of ASTM standard.

The Contractor shall state the commercial name and specifications of the oil to be furnished. NPC reserves the right in the future to use any oil which meets the above specifications and the use of such oil shall not affect the Contractor's guarantee.

Impedance and Reactance

The impedance and reactance shall be stated in the Proposal.

Corona Level

The station service transformer shall be free from corona when energized at 110% rated capacity.

EW-4.4 Design and Construction Features**General**

All transformers of the same design and rating shall be electrical duplicates, shall be mechanically interchangeable parts and shall be operable in parallel.

The transformer design, manufacture and assembly shall minimize vibration and shall prevent damage by inherent vibration and stress during operation, transportation and short circuits. Transformer construction shall include attached primary arrester, primary fuse and appropriate secondary over-load and short circuit protection.

Cores

Cores for the transformers shall be constructed of the highest quality, non-aging high permeability grain-oriented silicon steel. The steel shall be in thin laminations, annealed after cutting and rolled to ensure smooth surface at the edges.

The laminations must be free from impurities and must receive stress relief treatment after punching. The laminations shall be accurately flattened, especially at the edges and insulated by suitable procedures with long life heat resistant insulating coat.

Both sides of each sheet shall be insulated with a durable, heat resistant insulation. The cores shall be held firmly by core clamp and brace to ensure adequate mechanical strength to support the winding and to withstand without damage or deformation, the forces, caused by short circuit stresses, transportation or handling to prevent shifting of the core laminations.

Windings

Windings for transformer shall be of constant cross-section and uniform insulation or graded insulation as required. The coils shall be wound and supported in a manner to provide sufficient oil ducts which will be maintained without constriction.

End coils shall have extra insulation. Coils shall be made up, shaped and braced to provide for expansion and contraction due to temperature changes in order to avoid abrasion of insulation and provide rigidity to resist movement and distortion caused by abnormal operating conditions.

Adequate barriers shall be provided between windings and core and between high and low voltage windings. End coils shall have extra protection against abnormal line disturbances. Permanent current-carrying joint for splices shall be welded or brazed, properly formed and finished, and insulated to conform to the basic insulation.

The assembled core and coils shall be vacuum-dried, immediately impregnated and immersed in dry oil. They shall be adequately braced to withstand ocean shipment, short-circuit forces and earthquakes.

Bushings

All porcelain used in bushing shall be wet process, homogenous and free from cavities or other flaws. The glazing shall be uniform in color free from blisters, burrs and other defects. All porcelain parts shall be one piece.

The bushings of the same rating shall be interchangeable. Bushing up to 110 kV shall be porcelain bulk. Bushing shall have the continuous current-carrying capacity necessary to carry the full 65°C temperature rise current and shall be in accordance with ANSI standard.

Tanks

The transformers shall be housed in a steel tank with all permanent joints molded, backed up by a sturdy steel structure as required to obtain the desired rigidity and strength. The material shall be of high grade steel plate having good welding qualities. All seams, flanges, lifting and jacking lugs, braces and other parts attached to the tank shall be welded. No rivets shall be used. The cover shall be bolted type. The tank shall be able to withstand an internal pressure with oil at operating level.

All openings such as joint between the case and cover, bushings insulation mountings, etc., shall have welded on flanges to provide gaskets surfaces and allow for bolt holes. No bolts shall pass to the inside of the case and cover. Flanges shall have gaskets which will remain oil-tight and will not deteriorate under service conditions.

The transformer tank shall have solder-less type ground connector suitable for No. 8 to No. 2 AWG stranded conductor.

EW-4.5 Tolerances

The transformer/s shall be designed and manufactured with tolerances in accordance with applicable ANSI/IEC/IEEE standards.

EW-4.6 Accessories**Lifting Lugs**

Lugs shall be provided to lift the complete transformer by crane hooks. In addition, separate lugs shall be provided on all items which can be individually removed. Jacking lugs shall be provided to allow removal and rotation of wheels using the lifting jacks.

Gaskets

Gaskets shall be rubberized cork of ¼" thick. A complete set of spare gaskets for every transformer shall be supplied.

EW-4.7 Equipment and Marking

A stainless-steel rating plate shall be supplied for each transformer and shall be in accordance with ANSI standard. The diagram of connections shall show the tapping and polarity marking for instantaneous induced voltages for each transformer.

The minimum recommended dielectric strength of insulation oil for the transformer shall also be engraved on this plate. The rating plate and any other instructions or designations shall be in the English language.

EW-4.8 Test Requirements

The station service transformer shall be completely assembled and adjusted at the factory after all the standard and routine shop tests, such as temperature rise test, impulse test and other supplemental tests as required by ANSI and/or IEC standards are performed.

Test report on design and routine tests performed shall be submitted to NPC for evaluation and approval.

The Contractor shall submit for approval the brochures and/or catalogues with complete technical specification of the station service transformer to be supplied prior to fabrication and/or delivery at site.

EW-5.0 Fuse Cut-out with Lightning Arrester Combination

This specification covers the supply and delivery of fuse cutout with lightning arrester combination for use in the plant.

The materials furnished shall be in accordance with, but not limited to, the latest issues of the Applicable Codes and Standards, including all addenda, in effect at time of purchase order unless otherwise stated herein.

EW-5.1 Technical Characteristics and Requirements

Fuse Cut-Out

Fuse cut-outs shall be satisfactory used in a tropical climate with high relative humidity. The cut-outs will be mounted by means of steel brackets on steel poles cross arms.

The cut-outs are intended for use with button head type fuse links and must be able to accommodate fuse links meeting the interchangeability requirements of ANSI standard.

The cut-outs to be supplied shall include the following:

1. Fuse Support Assembly
2. Fuse Holder Assembly
3. Mounting Bracket
4. Lock Washers

Fuse Link

The fuse link to be supplied shall be universal button head type with tin fuse element suitable for 15 kV open type fuse cutout to be used in the overcurrent protection of circuits and are intended to coordinate with automatic circuit recloser and transformer protection equipment. The fuse link shall meet the electrical and mechanical interchangeability requirement in accordance with ANSI standard.

Lightning Arrester

Gapless arresters shall have elements fabricated from non-linear resistance metal oxide materials to perform both the surge discharge and power frequency reseal functions. Arresters of this type shall be protected in a hermetically sealed wet-process porcelain jacket, which shall have a high creepage distance and a high dielectric strength.

Both line lead and isolator terminals shall accommodate 1/0 AWG.

The arrester shall be supplied with a cross-arm-mounting bracket that conforms with the requirements of NEMA or with appropriate bracket as a cutout arrester combination on it.

All mounting bolts and conductor connection requires lock washer. Lock washers shall be fabricated from material that complies with the requirements as per ANSI standard.

All exposed steel or iron part of the arrester shall be hot-dipped galvanized in accordance with ASTM standard.

EW-5.2 Test Requirements

Test report on design and routine tests performed in accordance with ANSI and/or IEC standard shall be submitted to NPC for evaluation and approval.

EW-6.0 Kilowatt-Hour Meter

This specification covers the technical and associated requirements for the kilowatt-hour meter including instrument transformer and accessories required for the electric generating plants.

EW-6.1 Technical Characteristics and Requirements

The kilowatt-hour meter shall be furnished and installed by the Contractor as shown on the bid drawings complete with housing and associated metering instruments transformers (current and potential transformers) of appropriate burden and accuracy and other accessories for outdoor metering purposes. It shall be capable to measure the power generated by the plant and feedback power. It shall be designed to operate continuously for the normal life of the meter in an outdoor tropical location exposed to various elements which might affect the meter accuracy and reliability.

The Kilowatt-hour meter shall have the following features:

1. Pilferage Proof
2. Tamper Proof
3. Wrong Wiring Alarm
4. Current Flow display
5. Can withstand the temperature of -20°C to +70°C and Humidity of up to 95% non-condensing
6. With back light display
7. With built-in battery for LCD display and back-up battery
8. TOU Programmable Ready
9. Measure display (True RMS voltage, Current, Calendar, Time, etc.)

The kilowatt-hour meter and the required metering instruments shall be pole mounted and to be supplied complete with stainless steel bracket, bolts, etc. required for mounting onto flat-faced pole where pole drilling is permitted.

The Contractor shall submit for approval the brochures and/or catalogues with complete technical specification of the kilowatt-hour meter including instrument transformers and accessories to be supplied prior to delivery at site.

EW-7.0 POWER CABLES

This specification covers the technical and associated requirements of power, control and instrumentation cables for use in switchyards.

All cables shall be designed to withstand the short-circuit condition and voltage drop of 3% (maximum).

EW-7.1 Technical Characteristics and Requirements

EW-7.1.1 Stranded Aluminum Conductors

All wires of the stranded conductor shall be concentrically stranded. The wires in each layer shall be evenly and closely stranded around the underlying wire(s). The tension in individual wires in a layer shall be sufficient to hold each wire firmly in place with only enough strand separation to prevent crowding at the time of stranding and during installation. All steel and aluminum wires shall lie naturally in their position in the stranded conductor and, when the core and/or the aluminum wires are cut, the wire ends shall remain in position or be readily replaced by hand and then remain approximately in position.

The aluminum shall be of the higher purity commercially obtainable which shall not be less than 99.5%. The type of conductor to be supplied shall be stated in the Technical Data Sheets and shall be manufactured according to the applicable ASTM or equivalent IEC standards.

The completed conductor shall be smooth, free from nick, burrs, aluminum or steel particles, dirt and excessive die grease. The conductor shall be absolutely free of copper dust and copper particles.

EW-7.1.2 Insulated Copper Conductors

The cables to be supplied shall have insulation levels able to withstand any voltage surges which are normally expected to occur in the power system in which the cable is to be used, due to switching operations, sudden load variations, faults, etc. The medium voltage XLPE power cable and the 600V power, control and instrumentation cable to be supplied shall be compliant to ICEA S-66-524 or IEC 60502-2 and UL 83, PNS 35, ICEA S-73-532 specification and requirements of PEC respectively.

The cables shall be selected to withstand without distress any short-circuit currents in the conductor and sheath related to the existing fault levels.

The cables and its accessories shall be manufactured to fulfill the requirements when operating with full load or at any load factor.

Insulation

Insulation shall be of the type specified in the Technical Data Sheets.

Jacket

A tough, ozone, low chlorine, heat, flame and moisture-resistant PVC or Nylon jacket capable of providing protection against sunlight, acids, alkalis and oils shall be furnished for all cables.

Assembly

All multi-conductor cables shall be bundled together with non-hygroscopic fillers to assure a smooth circular assembly. A lapped core binding tape shall be applied over the assembly.

Application

All cables shall be suitable for installation in cable tray, conduit, trench, underground duct in wet and dry locations, and above ground raceway in damp and dry locations.

EW-8.0 LIGHTING AND POWER SYSTEM

The lighting system covered by this specification shall include all indoor and outdoor lighting system of an electric generating plants and/or switchyard. Lighting system includes outlets (convenience and power), switches, associated conduits and cables, lighting fixtures (indoor, outdoor and emergency), fittings, distribution panelboards, lighting transformers, contactors, timers, etc.

The devices/materials furnished shall be in accordance with, but not limited to, the latest issues of the Applicable Codes and Standards, including all addenda, in effect at time of purchase order unless otherwise stated in this specification.

All materials and parts which are not specifically mentioned herein but are necessary for the proper installation, assembly and safe operation of the lighting system shall be identified by the Contractor and furnished by the Contractor at no cost to the NPC. Any cost involve are deemed to be included in the price for the Lighting System.

EW-8.1 Technical Requirements and Characteristics

Lighting fixtures shall be controlled and switched locally approximately as shown on the drawings.

Normal lighting/small power outlet and emergency lighting systems shall consist of:

- a. 240 VAC, 1-phase, 60Hz, normal station lighting system, including outlets (indoor and outdoor) and emergency lighting system;
- b. Automatic Stand-alone Emergency Lamp (12 VDC), dual lamp, portable type emergency station lighting system for warehouse, door entrances,

guardhouse. This emergency lighting system must be switched on automatically in the event of a lighting failure.

The normal station lighting/small power and convenience outlet system, and the automatic stand-alone lamps power shall be supplied from the powerhouse 240 Volt AC lighting and power panelboard.

Replacement of fixture bulbs or tubes shall be possible without disconnecting any part of the power supply and risk of touching live parts of the installation.

EW-8.2 Lighting and Power Panelboard

The lighting and power panelboard shall be flush mounted rated at 240V, 60Hz, operating on a single-phase system.

Circuit breaker shall be quick-make, quick-break, thermal magnetic and trip indicating type with rating as required by connected load.

Nameplate shall be black plastic with engraved white letter. The Contractor shall be responsible for the proper identification and labelling of all branch circuits.

EW-8.3 Luminaires (Lighting Fixtures) and Accessories

The Contractor shall submit for approval complete photometry data and type of lighting fixture to be installed together with the shop drawings.

All luminaires when installed shall be free of leaks, warps, dents and other irregularities.

The hangers and brackets of all kinds for safety and proper installation of lighting fixtures shall be furnished and installed by the Contractor at his own expense.

The housings shall be fabricated of steel sheet, corrosion resistant, good ventilation and easy installation.

Samples and catalogues of all luminaires to be supplied shall be submitted for NPC's review and approval prior to the order. No luminaire shall be installed without approval of NPC.

Luminaires shall be wired with approved fixture wire, 90°C insulation. Each fixture shall be wired to a single point with an adequate slack for proper connection. All luminaires shall be protected from damage during installation. Any broken luminaire, receptacles, stems and the like, shall be replaced with new parts, at no cost to NPC.

Types of luminaires to be supplied, installed and tested are as follows:

Lighting Luminaires

a. Fixture Type A

IP20 Surface Mounted Lighting Fixture with Mirror Finish Aluminum Reflector, 1200mm x 600mm Zinc Phosphate Steel Sheet Housing and 2 x 16 Watts, Cool White, LED Linear Tube

b. Fixture Type B

IP20 Round Ceiling Luminaire, Surface Mounted, 350mm Diameter, White Steel Base, White Opal Glass Diffuser and Complete with 2 x 18 Watts, E27 Base, Frosted Finish Compact LED Bulb.

c. Fixture Type C

IP44 Wall Mounted Luminaire, 230V, 60Hz, Steel Base, White Satin Glass Diffuser and Complete with 12 Watts LED Lamp

d. Fixture Type D

IP65, Weatherproof Surface mounted type Lighting Fixture with 600mm long Polycarbonate Housing and 2 X 16 Watts LED Linear Tube.

e. Fixture Type E

IP20 Recessed Mounted Vertical Profile Downlight with Aluminum Reflector and Powder Coated Rim Fitted with Vertically Placed E27 Base 1 x 9 Watts, Compact LED Lamp.

f. Fixture Type F

IP65, Weatherproof Surface mounted type Lighting Fixture with 600mm long Polycarbonate Housing and 8 Watts LED Linear Tube.

g. Emergency Lighting Fixture

The Contractor shall supply and install the automatic stand-alone emergency lamp of the self-contained battery unit as specified herein.

When the AC main supply is interrupted, the lamps shall be automatically switched ON with a time delay of 1 second to the battery-powered operation. Lamps shall be switched OFF when the batteries are discharged at the low-level voltage (below 7.5V). The charging system of both maximum-constant voltage and constant current shall be able to recharge the completely discharged batteries to their full capacity within 20 hours or less. The charging system shall cut-off automatically and instantaneously upon reaching fully charged state.

Batteries shall be of long life, maintenance free, sealed lead acid type. The batteries shall have sufficient capacity to operate the lamps at full luminous efficiency for up to 3 hours after failure of the main supply.

Rated input voltage of the automatic stand-alone emergency lamps shall be 240 VAC, 1-phase, 60 Hz. Rated Output of the batteries shall be 12 Volt DC.

EW-8.4 Conductors

Conductors shall be stranded annealed copper conductor suitable for continuous temperature of 90°C when used in wet or dry location and 75°C when exposed to oil or coolant. The minimum size of conductor to be used shall be 3.5mm².

Insulation shall be suitable for wet and dry location, fungi resistant and ultra violet stable.

All conductors shall be moisture and heat resistant, flame retardant polyvinyl chloride insulation, chemical and abrasion resistant nylon sheath.

The conductor specification shall meet ASTM specification, PNS 35, UL standard 83 and requirements of PEC.

The Contractor shall submit catalogues and/or brochures showing details of insulation and ampacity ratings of all types of conductors to be supplied for approval of NPC.

EW-8.4.1 Conductor Installation

Conductors pulled through conduits shall be supported in an approved manner so as to avoid damage to the insulation. Grease or oily substances shall not be used to facilitate the passage of the conductor in conduits.

The pull shall be applied only by means of approved grips and the end portion, which has been marked or deformed by the grip, shall be cut-off by the Contractor.

All cable runs shall be continuous and all termination shall be at the terminal boards, equipment, etc. No splices are allowed in conduit or cable tray.

Prior to installation of conductors, conduits and cable trays shall be thoroughly cleaned to prevent damage to conductors during installation. After conductors have been installed, it shall be tested for continuity and insulation resistance and shall be tagged with respective conductor number.

EW-8.5 Conduit

All embedded and concealed in ceiling conduits, boxes and fitting required for the power and control conductors including all necessary hardware and accessories such as screws, bolts, concrete inserts, clamps, locknuts, couplings shall be furnished by the Contractor. The required quantities of various items of conduits and associated materials shall be furnished in accordance with the installation requirements.

During installation, due precaution shall be taken to protect the conduit and threads from mechanical injury. The ends of the conduit shall be sealed in an approved manner. Conduit runs shall be sealed by the use of caps and discs or plugs. The seals shall be maintained, except during inspection and tests, until the conductor is pulled in. Conduit shall be check to be free from obstructions by pulling a wooden mandrel of appropriate size through the conduit.

Conduits running in floors and terminating at equipment mounted on concrete bases shall be brought up to the equipment within the concrete bases, wherever possible.

All joints between lengths of conduits and threaded connection to boxes, fittings and equipment enclosures shall be made watertight.

Conduits installed outdoors running underground shall be buried to a minimum of 0.6 m.

Non-Metallic Conduits

Non-metallic conduit shall be made of un-plasticized polyvinyl chloride (uPVC) smooth walled inside and outside, colored red-orange, schedule 40.

The uPVC conduits shall be non-corrosive and weatherproof, resistant to the attacks of acids and alkalis and must have a self-extinguishing property hence shall not support combustion. It shall resist corrosion, rust and scale.

Metallic Conduits

Rigid steel conduits shall be hot-dipped galvanized. The inside of the conduit shall have stove enamelled coating to prevent erosion and assure smooth wire pulling.

Metal fittings and cover shall have the same property and finish as that of the metallic conduits.

Rigid metal expansion joints, where required, shall be of standard manufactured product, of watertight construction, equipped with approved means to provide electrical continuity of the conduit runs, zinc-coated, and so designed as to prevent damaged to the cables. They shall permit a small amount of transverse movement as well as the longitudinal movement.

EW-8.6 Junction / Utility and Pull Boxes

Junction / Utility Boxes

All junction/utility boxes for concealed work shall be of hot dip galvanized steel or un-plasticized polyvinyl Chloride. All wall boxes on exposed work shall be of aluminum blasted cast iron.

Utility boxes shall be firmly anchored in place and where required provided with fixture supports. The Contractor shall provide special supports for recessed lighting fixtures, etc. Suitable expansion screws shall be used for securing boxes to solid masonry and approved type toggles for securing to hollow masonry units.

Pull Boxes

Pull boxes shall be installed at all necessary points, to prevent damage to the insulation or other damage that might result from pulling resistance or for other reasons related to improper installation. All pull boxes shall be made of galvanized sheet steel not less than 2mm or un-plasticized polyvinyl chloride. Where pull boxes are used in connection with exposed conduits,

plain covers attached to the pull box with a suitable number of countersunk flathead machine screws may be used.

EW-9.0 CONTROL, PROTECTION AND MONITORING PANELS OF MOTOR PUMP

The control, protection and monitoring panels covered by this specification shall primarily be comprised of the combination motor starter with breaker unit, measuring devices, indicating lights and other associated components. The panels, depending on the location where it shall be installed, shall provide one or more of the following functions: control, protection, monitoring and disconnecting means of the FOST Pump Motor to be installed inside the pump house.

EW-9.1 Technical Requirements and Characteristics

The following are the minimum requirements for the operator interface with the Fuel Oil Storage Tank Pump Motor according to location where the panel shall be installed:

1. Pump House: Control Selection (Local/Remote), Motor Control (Start/Stop), Motor Protection (Relays, Contactors and Circuit Breaker) and Motor Status Display (Indicating Lights)
2. Engine Area: Motor Control (Start/Stop) and Motor Status Display (Indicating Lights)
3. Control Room: Motor Status Display (Indicating Lights)

The protection relay system shall be designed to bring the unit to automatic opening of breaker for electrical fault according to calculated tripping parameters.

The protection scheme shall be provided with adequate number of input/output contacts of suitable rating to carry out the prescribed tripping functions for the initiation of automatic closing/tripping or switching control.

All DC and AC power supply required for control, monitoring and protection of the system shall be integrated in the panels. The power and voltage requirements will be determined by the manufacturer in accordance with the ratings and consumption of its equipment/device.

The Contractor may offer a motor control, protection and/or monitoring panel with proprietary standard design of the manufacturer containing the required functions suitable to the offered pump motor.

EW-9.1.1 Panel Construction

The panel shall be constructed from a minimum of 2.0 mm thickness steel sheet with edges formed into a rectangular pattern welded steel sheets so that each section is rigid, self-supporting and enclosed. It shall be adequately protected and suitable for indoor and outdoor application and all climate condition.

The panel shall be labeled with ISO symbols and comply with IP 65 for external environmental resistance and IP 44 and NEMA 12 for the resistance of the internal sealed modules.

EW-9.1.2 Combination Motor Starter and Breaker Unit

The combination magnetic full voltage starter unit shall include contactors with manual reset thermal overload relays; and operating coils. The smallest combination starter unit shall be NEMA Type 1 or equivalent to IEC standard.

The combination starter unit shall have a symmetrical interrupting rating which exceeds the available short circuit current not less than 10,000 amperes.

Starter overload relay contacts, contactor operating coils, and starter auxiliary contacts shall be wired to marked unit terminal blocks.

Starters shall reliably operate with 85% of rated bus voltage applied and shall not drop out at voltage lesser than 75 % of rated bus voltage.

Combination starter units furnished shall be full voltage single-speed non-reversing (FVNR) or full voltage single-speed reversing (FVR) as determined by the Contractor and approved by NPC.

EW-9.1.2.1 Circuit Breaker

The combination motor starter unit shall include one miniature circuit breaker or molded case circuit breaker with symmetrical interrupting of at least 10,000 amperes or greater as determined by the Contractor. All breakers shall be manually operated with quick-make, trip-free mechanism of the toggle type.

The breakers shall be equipped with suitable arc quenching devices. Main current carrying contacts shall be silver plated and shall be capable of carrying their rated current without exceeding the Underwriters' Laboratories specified temperature rise. All circuit breakers shall be of the same manufacturer.

EW-9.1.2.1 Starter Contactors

The rated continuous current carrying capacity of each starter contactor to be used shall be as listed in NEMA or IEC Standard. Contactors shall be applied in accordance with their kW rating only. The interrupting capacity of each starter contactor shall be not less than 10 times the rated continuous current carrying capacity.

The electrical life, without maintenance, of each starter contactor to be used shall be not less than 500,000 operations with each opening or closing of the load contacts to constitute one complete operation. The mechanical life of each starter contactor shall be not less than 5,000,000 operations.

Combination starter units which require line voltage to energize the main contactor operating coils or those for which main contactor coil inrush exceeds 600VA shall be equipped with auxiliary contactors (interposing relays) for use in the operating coil circuit.

EW-9.1.2.2 Overload Relays

All starters shall be equipped with overload relays and shall operate within a range of plus or minus 5 percent of the overload relay trip setting. Assemblies which do not meet this requirement both when field tested and when in actual operation shall be replaced by the Contractor.

Alternative proposal shall be considered based on furnishing bimetallic type temperature compensated overload relays or electric alloy type overload relays, provided that such proposals are accompanied by manufacturing information clearly indicating details of construction and experience records of the overload relay proposed.

EW-9.1.2.3 Mechanically Operated Auxiliary Contacts (As applicable, to be determined by the Contractor)

Each single-speed non-reversing starter shall be furnished with a total of six (6) mechanically operated auxiliary contacts, three (3) normally open and three (3) normally closed, mounted in the main contactor.

If required, each single-speed reversing starter shall be furnished with a total of eight (8) mechanically operated auxiliary contacts, four (4) normally open and four (4) normally closed, mounted on each forward and each reversing main contactor.

If required, each two-speed non-reversing starter shall be furnished with a total of ten (10) mechanically operated auxiliary contacts, three (3) normally open and two (2) normally closed, mounted on each main contactor.

Auxiliary contacts shall be operated by the contactor, not by the operating handle or its mechanism. Contacts shall be wired out to terminal blocks. One (1) NC contact shall be for motor space heater use and shall be rated for 10 amperes or larger.

The use of auxiliary relays to furnish the specified quantities of auxiliary contacts will not be acceptable.

EW-9.1.2.4 Remote Control

Each magnetic starter will be controlled by remote contacts. All necessary internal wiring for this feature shall be furnished and connected to terminal blocks.

EW-9.1.2.5 Indicating Lights

Each reversing starters shall be furnished with two (2) indicating lights on the door to indicate open/close status. Each non-reversing starter shall be furnished with two (2) indicating lights on the door to indicate when the motor is stopped or running.

EW-9.1.3 Nameplate

The panel shall be provided with adequately sized nameplate made of black surface exposing the white core. In addition, each piece of equipment

mounted on or inside the panel shall also be provided with nameplate for easy and convenient identification.

EW-9.1.4 Equipment Grounding

The motor control, protection and monitoring panels shall be properly grounded in accordance with the latest electrical and electronics industry standards.

EW-10.0 DATA AND DOCUMENTATION REQUIREMENTS

Contractor-furnished data and information shall be guaranteed performance data, predicted performance, interface requirements and construction features of all Contractor's furnished equipment. The accuracy of such information and its compatibility with overall performance requirements specified by NPC are the sole responsibility of the Contractor.

All information submitted as part of Proposal Data would become part of contract data for successful bidder. Any deviation from such data requires NPC's approval.

EW-10.1 Data and Information to be Submitted During Post Qualification

Contractor shall furnish during the post qualification the filled-in Sections E-1.0 to E-4.0 of the Technical Data Sheets.

Filled-out data by the Contractor shall only serve as reference by NPC for the review and approval of brochures/drawings during implementation stage.

EW-10.2 Data and Information to be Submitted During Implementation

The following shall be the full technical data requirement of equipment indicated in Sections E-1.0 to E-4.0 of the Technical Data Sheets which shall be submitted by the Contractor together with Manufacturer's brochure/drawings during the Implementation stage.

E-1.0 Station Service Transformer

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-1.1	Manufacturer	By Contractor	
E-1.2	Class (indoor, outdoor)	Outdoor (Pole-mounted)	
E-1.3	Minimum Rated Capacity, kVA	25	
E-1.4	No. of Phase	One (1)	
E-1.5	Frequency, Hz	60	
E-1.6	Rated Voltage		
	a. Primary, kV	7.97	
	b. Secondary, kV	0.24	
E-1.7	Type of Cooling	ONAN	
E-1.8	Type of Oil	Mineral Oil with its electrical & chemical characteristics in compliance with IEC and is Polychlorinated Biphenyls (PCB) free	



ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-1.9	Type (specify 3-winding, 2-winding, auto-transformer)	2-winding	
E-1.10	Temperature		
	a. Ambient Temperature	40°C	
	b. Temperature Rise	65 °C	
E-1.11	Insulation Level		
	Nominal Voltage Level (kV)		
	i. H-Winding	7.97	
	ii. X-Winding	0.24	
	Highest Voltage Level (kV)		
	i. H-Winding	15	
	ii. X-Winding	1.2	
E-1.12	Basic Impulse Level (kV)		
	a. H-Winding	110	
	b. X-Winding	30	
E-1.13	Polarity	Additive	
E-1.14	Winding Material	Copper	
E-1.15	No. of Bushing	One (1)	
E-1.16	Bushing Material	Porcelain	
E-1.17	% Impedance at Rated kVA	Accdg. to ANSI Std.	
E-1.18	Tap Changer	No-Load	
E-1.19	Taps		
	i. HV Winding	7.97 kV ± 2 x 2.5%	
	ii. LV Winding	N/A	
E-1.20	Efficiency	97%	
E-1.21	Audible Sound Level	Accdg. to ANSI Std.	
E-1.22	Weight of oil, kg	Manufacturer's Data	
E-1.23	Total Weight, kg	Manufacturer's Data	
E-1.24	Transformer mounting brackets including bolts, nuts, etc.	Included	
E-1.25	Test Requirements		
	a. Routine Test to be performed	Yes	
	b. Certified Routine Test Reports to be submitted	Yes	

E-2.0 Fuse Cutout with Lightning Arrester Combination

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-2.1	Manufacturer	By Contractor	
E-2.2	Type	Open drop out and expulsion fuse cutout	
E-2.3	Class (indoor, outdoor)	Outdoor	
E-2.4	Rated voltage, kV	15	
E-2.5	Nominal system voltage, kV	13.8	
E-2.6	Frequency, Hz	60	
E-2.7	BIL, kV	110	
E-2.8	Ampere Frame	100	
E-2.9	Interrupting Capacity, kA	10	
E-2.10	Fuse Link		
	a. Type	Universal buttonhead design	
	b. Current Rating, A	5	
E-2.11	Lightning Arrester		
	a. Type	Metal Oxide Varistor (MOV), gapless	
	b. Nominal system voltage, kV	13.8	



ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
	c. Duty cycle voltage (rating), kVrms	12	
	d. Maximum Continuous Operating Voltage (MCOV), for the arresters having the following duty cycle voltage, kV rms	10.2	
	e. Nominal discharge current, kA	10	
	f. Creepage distance, mm	465	
	g. Supporting brackets, bolts, nuts, etc.	Yes	

3.0 Kilowatt-Hour Meter

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-3.1	Manufacturer	By Contractor	
E-3.2	Accuracy Class	Class 0.3 or better	
E-3.3	Number of Phase	1	
E-3.4	Wire	2	
E-3.5	Voltage, V	240	
E-3.6	Current Range	Class 200	
E-3.7	Frequency, Hz	60	
E-3.8	Register Type	LCD	
E-3.9	TOU (Time of Use)	Programmable Ready	
E-3.10	Soft Switches	Available	
E-3.11	LCD Display	Programmable	
E-3.12	Power Consumption	By Contractor	
E-3.13	The Kilowatt-hour meter to be provided is certified and approved by ERC	Yes	

4.0 Power, Control & Instrumentation Cable

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
15 kV Stranded Aluminum Conductor			
E-4.1	Manufacturer	By Contractor	
E-4.2	Type designation	Aluminum Conductor	
E-4.3	Code Name	By Contractor	
E-4.4	Conductor size	Refer to Single Line	
E-4.5	Voltage Rating, kV	15	
E-4.6	Ampacity, A	270	
E-4.7	Outer Layers		
	a. Material	Aluminum	
	b. Stranding No.	6	
	c. Calculated Cross-sectional Area, mm ²	Manufacturer's Data	
	d. Coefficient of Elongation	Manufacturer's Data	
E-4.8	Core		
	a. Material	Aluminum Clad Steel	
	b. Stranding No.	1	
	c. Calculated Cross-sectional Area, mm ²	Manufacturer's Data	
	d. Coefficient of Elongation	Manufacturer's Data	



ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-4.9	Conductor Coefficient of Linear Expansion (1°C)	Manufacturer's Data	
15 kV Insulated Copper Conductor			
E-4.10	Manufacturer	By Contractor	
E-4.11	Continuous current carrying capacity of conductor at 90°C Operating Temperature	Manufacturer's Data	
E-4.12	Conductor Cross-Section, mm ²	30	
E-4.13	Type of cable	Single Core	
E-4.14	Conductor Material	Annealed Copper	
E-4.15	Max. Outside Diameter, mm	Manufacturer's Data	
E-4.16	Conductor Shape	Circular Stranded Wire	
E-4.17	Conductor Material	Annealed Copper	
E-4.18	Insulation		
E-4.19	a. Material	Cross-linked polyethylene (XLPE)	
E-4.20	b. Thickness, mm	≥ 4.0	
E-4.21	Outer covering/Jacket		
E-4.22	a. Material	PVC Sheath Jacketing	
E-4.23	b. Thickness, mm	Manufacturer's Data	
E-4.24	c. Termite Protection Required	Yes	
E-4.25	Shielded (yes, no)	Yes	
E-4.26	a. Type of Shielding	Copper Tape Screen	
E-4.27	Provided with Filler and Binder Tape	Yes	
600 V Power Cable			
E-4.28	Manufacturer	By Contractor	
E-4.29	Type	THHN/THWN-2	
E-4.30	Continuous current carrying capacity of conductor at 90°C Operating Temperature	170	
E-4.31	Conductor Material	Annealed Copper	
E-4.32	Conductor Shape	Circular Stranded Conductors	
E-4.33	Type of Insulation	Lead Free, UL-listed PVC	
E-4.34	Outer covering/Jacket	Oil, Chemical and Abrasion Resistant Tough Polyamide (Nylon)	
E-4.35	Meets ASTM, UL 83 & 1063, and PNS 35 Specifications and requirements of PEC	Yes	

EW-11.0 MEASUREMENT OF PAYMENT

Measurement of payment for all electrical works shall be based on the bid price of each item as shown in the Bill of Quantities – Electrical Works, Section VII of the Tender Documents. The cost of each item shall cover all works required and described in the pertinent provisions of the specifications and bid drawings.



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PART II - TECHNICAL DATA SHEETS

EW – Electrical Works

SECTIONS E-1.0 – E-4.0

**Documents to be Submitted during the Post Qualification
 as Reference for the Approval of Manufacturer’s Brochures/Drawings**

1. The following shall be filled-out and to be submitted during the post qualification.
2. Filled-out data by the Contractor shall only serve as reference for the review and approval of brochures/drawings during implementation stage.
3. Full technical data of the equipment are indicated in the Technical Specifications (EW-10.2) which will be submitted during the implementation stage for review and approval.
4. Non-submission of the documents and non-compliance to the requirements shall be ground for disqualification.

 Name of Firm

 Name & Signature of Representative

 Designation



E-1.0 STATION SERVICE TRANSFORMER

ITEM	DESCRIPTION	NPC REQUIREMENTS	SUPPLIER'S DATA
E-1.1	Manufacturer	By Supplier	
E-1.2	Type	Completely Self-Protected	
E-1.3	Class (indoor, outdoor)	Outdoor (Pole-mounted)	
E-1.4	Minimum Rated Capacity, kVA	25	
E-1.5	No. of Phase	One (1)	
E-1.6	Frequency, Hz	60	
E-1.7	Rated Voltage		
	a. Primary, kV	7.97	
	b. Secondary, kV	0.24	
E-1.8	Type of Cooling	ONAN	

E-2.0 FUSE DISCONNECT SWITCH WITH LIGHTNING ARRESTER COMBINATION

ITEM	DESCRIPTION	NPC REQUIREMENTS	SUPPLIER'S DATA
E-2.1	Manufacturer	By Supplier	
E-2.2	Class (indoor, outdoor)	Outdoor	
E-2.3	Rated voltage, kV	15	
E-2.4	Frequency, Hz	60	
E-2.5	BIL, kV	110	
E-2.6	Ampere Frame	100	
E-2.7	Interrupting Capacity, kA	10	
E-2.8	Fuse Link		
	a. Type	Universal buttonhead design	
	b. Current Rating, A	3	
E-2.9	Lightning Arrester		
	a. Type	Metal Oxide Varistor (MOV), gapless	

Name of Firm

Name & Signature of Representative

Designation



E-3.0 KILOWATT-HOUR METER

ITEM	DESCRIPTION	NPC REQUIREMENTS	SUPPLIER'S DATA
240V Single Phase, Digital Kilowatt-Hour Demand Meter			
E-3.1	Manufacturer	By Supplier	
E-3.2	Accuracy Class	Class 0.3 or better	
E-3.3	Wire	2	
E-3.4	Current Range	Class 200	
E-3.5	Frequency, Hz	60	
E-3.6	The Kilowatt-hour meter to be provided is certified and approved by ERC	Yes	

E-4.0 POWER CABLES

ITEM	DESCRIPTION	NPC REQUIREMENTS	SUPPLIER'S DATA
15 kV Stranded Aluminum Conductor			
E-3.1	Manufacturer	By Supplier	
E-3.2	Type designation	Aluminum Conductor Steel Reinforced (ACSR)	
E-3.3	Conductor size	Refer to Single Line Diagram	
E-3.4	Ampacity, A	270	
15 kV Insulated Copper Conductor			
E-3.5	Manufacturer	By Supplier	
E-3.6	Continuous current carrying capacity of conductor at 90°C Operating Temperature	Manufacturer's Data	
E-3.7	Conductor Cross-Section, mm ²	30	
E-3.8	Conductor Material	Annealed Copper	
E-3.9	Insulation Material	Cross-linked polyethylene (XLPE)	
600 V Power Cable			
E-3.10	Manufacturer	By Supplier	
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PART I - TECHNICAL SPECIFICATIONS

EW - ELECTRICAL WORKS

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SECTION VII

BILL OF QUANTITIES

SECTION VII

BILL OF QUANTITIES ARCHITECTURAL WORKS

**BILL OF QUANTITIES
CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP
ARCHITECTURAL WORKS**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
AW-1.0	PREFAB CONTAINERIZED STAFF HOUSE						
AW-1.1	Office and Kitchen Dimensions: 6m length x 2.4m width x 2.6m height Flooring: Magnesium board with linoleum finish. Walls & Roofing: 50mm polysterene insulation with double sided 0.45mm thick pre-painted G.I. sheet for walling and partition. And 50mm thick glasswool insulation with pre-painted G.I. sheet roof and interior ceiling Windows: 3 pcs aluminum frame sliding, 6mm thick clear glass windows (1.0m x 1.0m), 1 pc aluminum frame awning 6mm thick clear glass window (0.5m x 0.5m) Door: 2pc steel door (0.80m x 1.2m) Additional: toilet(1.2x1.2) including fixtures & plumbing	furnish & install	Refer to NPC TS & Drawings AW.001 - AW.004	sets	1.00	_____ (P _____)	_____ (P _____)
AW-1.2	Personnel's Quarter Dimensions: 6m length x 2.4m width x 2.6m height Flooring: Magnesium board with linoleum finish. Walls & Roofing: 50mm polysterene insulation with double sided 0.45mm thick pre-painted G.I. sheet. And 50mm thick glasswool insulation with pre-painted G.I. sheet roof and interior ceiling Windows: 4 pcs aluminum frame sliding, 6mm thick clear glass windows (1.0m x 1.0m). Door: 1pc steel door (0.80m x 1.2m)	furnish & install	Refer to NPC TS & Drawings AW.001 - AW.004	sets	1.00	_____ (P _____)	_____ (P _____)
AW-1.3	Roofing For Steel Stairs 0.45mm THK G.I. Roofing	furnish & install	Refer to NPC TS & Drawing	sq.m.	7.00	_____ (P _____)	_____ (P _____)
AW-1.4	PLUMBING SYSTEM						
AW-1.4.1	50mm dia. uPVC Pipes (including fittings)	furnish and install	Refer to NPC TS & Drawing	li.m.	10.00	_____ (P _____)	_____ (P _____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
AW-1.4.2	100mm dia. uPVC Pipes	furnish and install	Refer to NPC	li.m.	5.00	_____	_____
AW-1.4.3	Floor Drain, Stainless Steel	furnish and install	Refer to NPC TS & Drawing	pcs.	1.00	_____ (P _____)	_____ (P _____)
AW-2.0 WAREHOUSE							
AW-2.1 WALL SYSTEM:							
	100mm thk (4") CHB Wall including mortars and reinforcing bars	furnish & lay	Refer to NPC TS & Drawing	sq.m.	71.00	_____ (P _____)	_____ (P _____)
AW-2.2 FLOOR AND WALL FINISHES							
	1. Plain Cement plaster wall finishes (Interior)	furnish & apply	Refer to NPC TS & Drawing	sq.m.	68.00	_____ (P _____)	_____ (P _____)
	2. Tooled joint cement wall finish (Exterior)	furnish & apply	Refer to NPC TS & Drawing	sq.m.	77.00	_____ (P _____)	_____ (P _____)
	3. Plain Cement plaster floor finish	furnish & apply	Refer to NPC TS & Drawing	sq.m.	40.00	_____ (P _____)	_____ (P _____)
AW-2.3 ROOFING SYSTEM							
	1. Roofing Sheets 0.5mm base metal thickness pre-painted long span G.I. roofing sheet including fasteners, sealant and 0.5mm base metal thickness pre-painted bended sheets such as barge cap flashing including fasteners, sealants, hardware, accessories and retouching paint	furnish & install	Refer to NPC TS & Drawing	sq.m.	90.00	_____ (P _____)	_____ (P _____)
	2. Fascia Board: 1/2" x 1/2" Fiber cement board including steel frame, hardware, and accessories	furnish & install	Refer to NPC TS & Drawing	l.m.	39.00	_____ (P _____)	_____ (P _____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
	3. Thermal Insulation; 10 mm thick polyethelene with aluminum foil on both faces above purfins	furnish & install	Refer to NPC TS & Drawing	sq.m.	88.00	_____ (P _____)	_____ (P _____)
AW-2.4 FENESTRATION							
	1. Doors: a) D-1 (1600mm x 2100mm) Flush Type Wooden Door Marine Plywood both sides, 2" x 4" hard wood jamb, including heavy duty loose pin hinges, door knob/lockset weather proof ang painting	furnish & install	Refer to NPC TS & Drawing	set	1.00	_____ (P _____)	_____ (P _____)
	2. Windows: a) W - 1 (3000mm x 1500mm) 2" x 3" Anodized Aluminum Frame, 5mm thick x 100mm wide Smoked Glass Jalousie Blade, Heavy duty jalousie mechanism and aluminum members, 12mm Square bar security grille w/ rust resistant coating	furnish & install	Refer to NPC TS & Drawing	set	4.00	_____ (P _____)	_____ (P _____)
AW-2.5 PAINTING							
	a) Interior Wall	furnish & apply	Refer to NPC TS & Drawing	sq.m.	68.00	_____ (P _____)	_____ (P _____)
	b) Exterior Wall	furnish & apply	Refer to NPC TS & Drawing	sq.m.	77.00	_____ (P _____)	_____ (P _____)
AW-2.6 CEILING SYSTEM							
	Ceiling; 5 mm cement fiber board on 2 x 2 wood nailers and 2 x 3 wood joists @ 1.20 O.C.B.W. respectively including 2 x 2 wood hangers @ 1.20 O.C.B.W.	furnish & install	Refer to NPC TS & Drawing	sq.m.	88.00	_____ (P _____)	_____ (P _____)

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**BILL OF QUANTITIES
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ARCHITECTURAL WORKS**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price In Pesos (Words and Figures)	Total Amount (In Figures)
AW-2.7 MISCELLANEOUS							
1.	Soil poisoning; authorized anti-termite liquid concentrate	furnish & apply	Refer to NPC TS & Drawing	lot	1.00	_____ (P _____)	_____ (P _____)
AW-3.0 MATERIALS RECOVERY AND HAZ-WASTE STORAGE FACILITY							
AW-3.1 ROOFING							
1.	Roofing Sheets (Roofing and Sidings) 0.5 mm base metal thickness pre-painted corrugated G.I. Roofing including fasteners, sealants, retouching paints hardware and accessories	furnish & install	Refer to NPC TS & Drawing	sq.m.	35.00	_____ (P _____)	_____ (P _____)
2.	Barge Cap Flashing 0.5 mm base metal thickness pre-painted long span corrugated G.I. Roofing including fasteners, sealants, retouching paints hardware and accessories	furnish & install	Refer to NPC TS & Drawing	l.m.	12.00	_____ (P _____)	_____ (P _____)
3.	Gutter: 0.6 mm base metal thickness zinc-aluminum-silicon coated pre-painted including fasteners, sealants, retouching paint, hardware and accessories	furnish & lay	Refer to NPC TS & Drawing	l.m.	6.00	_____ (P _____)	_____ (P _____)
4.	Downspout 3" (75 mm) 0 uPVC pipe series 1000 downspout including joint fittings, solvent and fasteners	furnish & install	Refer to NPC TS & Drawing	l.m.	9.00	_____ (P _____)	_____ (P _____)
5.	Roof Drain Removable PVC wire basket strainer	furnish & install	Refer to NPC TS & Drawing	pcs	3.00	_____ (P _____)	_____ (P _____)

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**BILL OF QUANTITIES
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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (in Figures)
6.	Fascla Board 1/2" x 12" x 12" Fiber cement board including steel frame hardware and accessories	furnish & install	Refer to NPC TS & Drawing	l.m.	18.00	(P _____)	(P _____)
AW-3.2 ENCLOSURE							
AW-3.2.1	Wire Mesh Enclosure Sidings (50mm x 50mm Gage #10, heavy galvanized) on 2" Ø Steel Pipe frame schedule 40, (including lockset, accessories and paintings)	furnish & install	Refer to NPC TS & Drawing	sq.m.	12.00	(P _____)	(P _____)
AW-3.2.2	2.1mx0.9m Wire Mesh Door (50mm x 50mm Gage #10, heavy galvanized) on LR 40x25x3mm Frame with lockset	furnish & install	Refer to NPC TS & Drawing	set	1.00	(P _____)	(P _____)
AW-3.2.3	2 - 2.1mx0.9m Wire Mesh Door (50mm x 50mm Gage #10, heavy galvanized) on LR 40x25x3mm Frame with lockset	furnish & install	Refer to NPC TS & Drawing	set	1.00	(P _____)	(P _____)
AW-3.2.4	100MM Thick CHB	furnish & lay	Refer to NPC TS & Drawing	sq.m.	11.00	(P _____)	(P _____)
AW-3.2.5	Plaster Plain Cement Finish	furnish & spread	Refer to NPC TS & Drawing	sq.m.	10.00	(P _____)	(P _____)
AW-4.0 PUMPHOUSE FOR 60 KL FOST							
AW-4.1 WALL SYSTEM AND FINISHES		furnish & construct	Refer to NPC TS & Drawing	lot	1.00	(P _____)	(P _____)
AW-4.1.1	150mm thk (6") CHB Wall including mortars and reinforcing bars	furnish & lay	Refer to NPC TS & Drawing	sq.m.	14.00	(P _____)	(P _____)
AW-4.1.2	Plastering (Plain Cement Plaster Wall Finish)	furnish & apply	Refer to NPC TS & Drawing	sq.m.	31.00	(P _____)	(P _____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
AW-4.1.3	Pre-cast concrete louvers	furnish & install	Refer to NPC TS & Drawing	pc	1.00	_____ (P_____)	_____ (P_____)
AW-4.2 FLOOR FINISHES							
4.2.1	Plain Cement Finish with floor hardener light traffic density	furnish & install	Refer to NPC TS & Drawing	sq.m.	3.00	_____ (P_____)	_____ (P_____)
AW-4.3 FENESTRATION							
AW-4.3.1 Doors							
	D - 1 (2100mm x 900mm) Flush Type Wooden Door Marine Plywood K.D. first group Lumber jamb, including heavy duty loose pin hinges, door knob/lockset weather proof and painting	furnish & install	Refer to NPC TS & Drawing	pc	1.00	_____ (P_____)	_____ (P_____)
AW-4.4 PAINTING							
	All concrete surfaces	furnish & apply	Refer to NPC TS & Drawing	sq.m.	37.00	_____ (P_____)	_____ (P_____)
AW-4.5 MISCELLANEOUS							
	Soil poisoning; authorized anti-termite liquid concentrate	furnish & apply	Refer to NPC TS & Drawing	liter	16.00	_____ (P_____)	_____ (P_____)
SUB-TOTAL AMOUNT OF ARCHITECTURAL WORKS						_____ (P_____)	_____ (P_____)

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SECTION VII

BILL OF QUANTITIES CIVIL WORKS



**BILL OF QUANTITIES
CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP
CIVIL WORKS**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
CW-1.0	PREFAB CONTAINERIZED STAFF HOUSE						
CW-1.1	CONCRETE STEPS						
CW-1.1.1	Structural Excavation	excavate & reuse	Refer to NPC TS & Drawing	cu.m.	0.60	_____ (P_____)	_____ (P_____)
CW-1.1.2	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	0.80	_____ (P_____)	_____ (P_____)
CW-1.1.3	Concrete (17.30 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	0.90	_____ (P_____)	_____ (P_____)
CW-1.1.4	Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	21.00	_____ (P_____)	_____ (P_____)
CW-1.2	PREFAB CONTAINERERIZED HOUSE FOUNDATION						
CW-1.2.1	Structural Excavation	excavate & reuse	Refer to NPC TS & Drawing	cu.m.	8.50	_____ (P_____)	_____ (P_____)
CW-1.2.2	Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	5.00	_____ (P_____)	_____ (P_____)
CW-1.2.3	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	0.70	_____ (P_____)	_____ (P_____)
CW-1.2.4	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	3.00	_____ (P_____)	_____ (P_____)
CW-1.2.5	Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	535.00	_____ (P_____)	_____ (P_____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price In Pesos (Words and Figures)	Total Amount (In Figures)
CW-1.2.6	Structural Steel (A36) (Including base plate & anchor bolts for pedestal)	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	kgs.	68.00	_____ (P _____)	_____ (P _____)
CW-1.3	STEEL STAIRS WITH ROOFING SYSTEM						
CW-1.3.1	Structural Excavation	excavate & reuse	Refer to NPC TS & Drawing	cu.m.	3.00	_____ (P _____)	_____ (P _____)
CW-1.3.2	Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	1.50	_____ (P _____)	_____ (P _____)
CW-1.3.3	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	0.50	_____ (P _____)	_____ (P _____)
CW-1.3.4	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	1.00	_____ (P _____)	_____ (P _____)
CW-1.3.5	Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	77.00	_____ (P _____)	_____ (P _____)
CW-1.3.6	Structural Steel (A36) including 80 MM Ø G.I. PIPE	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	kgs.	1261.00	_____ (P _____)	_____ (P _____)
CW-2.0	SEPTIC TANK						
		excavate, furnish and construct	Refer to NPC TS & Drawing	pc	1.00	_____ (P _____)	_____ (P _____)
CW-3.0	WAREHOUSE						
CW-3.1	Structural Excavation	excavate & reuse	Refer to NPC TS & Drawing	cu.m.	10.00	_____ (P _____)	_____ (P _____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
CW-3.2	Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	6.00	_____ (P _____)	_____ (P _____)
CW-3.3	Structural Fill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	8.00	_____ (P _____)	_____ (P _____)
CW-3.4	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	1.00	_____ (P _____)	_____ (P _____)
CW-3.5	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	10.00	_____ (P _____)	_____ (P _____)
CW-3.6	Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	780.00	_____ (P _____)	_____ (P _____)
CW-3.7	Structural Steel (A36) (Including 16mm Ø sag rods)	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	kgs.	608.00	_____ (P _____)	_____ (P _____)
CW-4.0	60 KL FOST						
CW-4.1	Structural Excavation	excavate stockpile & dispose	Refer to NPC TS & Drawing	cu.m.	23.00	_____ (P _____)	_____ (P _____)
CW-4.2	Earth Fill	furnish, place, spread & compact	Refer to NPC TS & Drawing	cu.m.	9.50	_____ (P _____)	_____ (P _____)
CW-4.3	Sand Cushion	furnish, place, spread & compact	Refer to NPC TS & Drawing	cu.m.	0.75	_____ (P _____)	_____ (P _____)
CW-4.4	Crushed Stone	furnish, place, spread & compact	Refer to NPC TS & Drawing	cu.m.	7.50	_____ (P _____)	_____ (P _____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price In Pesos (Words and Figures)	Total Amount (In Figures)
CW-4.5	Sand & Gravel Bedding	furnish, place, spread & compact	Refer to NPC TS & Drawing	cu.m.	2.00	_____ (P _____)	_____ (P _____)
CW-4.6	Concrete (17.25 Mpa) (floor slab)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	4.50	_____ (P _____)	_____ (P _____)
CW-4.7	Concrete (20.7 Mpa) (FOST Foundation)	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	kgs.	19.50	_____ (P _____)	_____ (P _____)
CW-4.8	Reinforcing Steel Bars (Gr. 275) (including floor slab)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	1475.00	_____ (P _____)	_____ (P _____)
CW-4.9	Concrete Epoxy Grout (2-component)	furnish & place	Refer to NPC TS & Drawing	lit.	40.00	_____ (P _____)	_____ (P _____)
CW-4.10	2"Ø Upvc Drain Pipe	furnish & install	Refer to NPC TS & Drawing	l.m.	2.00	_____ (P _____)	_____ (P _____)
CW-4.11	PVC WATERSTOP (6" x 3/16" plain Dumbbell Type)	furnish & install	Refer to NPC TS & Drawing	l.m.	31.00	_____ (P _____)	_____ (P _____)
CW-4.12	High Density Polyehylene Liner 1.0mm (40 mils) thick	furnish & install	Refer to NPC TS & Drawing	sq.m.	11.00	_____ (P _____)	_____ (P _____)
CW-4.13	Steel Staircase	furnish & construct	Refer to NPC TS & Drawing	lot	1.00	_____ (P _____)	_____ (P _____)
CW-5.0	16 KL FOST						
CW-5.1	Structural Excavation	excavate stockpile & dispose	Refer to NPC TS & Drawing	cu.m.	28.00	_____ (P _____)	_____ (P _____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
CW-5.2	Earth Fill	furnish, place, spread & compact	Refer to NPC TS & Drawing	cu.m.	13.00	(P_____)	(P_____)
CW-5.3	Sand & Gravel Bedding	furnish, place, spread & compact	Refer to NPC TS & Drawing	cu.m.	1.50	(P_____)	(P_____)
CW-5.4	Concrete (17.25 Mpa) (floor slab)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	7.00	(P_____)	(P_____)
CW-5.5	Concrete (20.7 Mpa) Containment wall including concrete stairs	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	kgs.	18.00	(P_____)	(P_____)
CW-5.6	Reinforcing Steel Bars (Gr. 275) (including floor slab)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	944.00	(P_____)	(P_____)
CW-5.7	Concrete Epoxy Grout (2-component)	furnish & place	Refer to NPC TS & Drawing	lit.	30.00	(P_____)	(P_____)
CW-5.8	PVC WATERSTOP (6" x 3/16" plain Dumbbell Type)	furnish & install	Refer to NPC TS & Drawing	l.m.	36.00	(P_____)	(P_____)
CW-6.0	DRAINAGE APPURTENANCES						
CW-6.1	Oil Water Separator	Furnish & Construct	Refer to NPC TS & Drawing	pc	1.00	(P_____)	(P_____)
CW-6.2	Drain Pit (DP)	furnish & construct	Refer to NPC TS & Drawing	pc	3.00	(P_____)	(P_____)
CW-6.3	Valve Box	furnish & construct	Refer to NPC TS & Drawing	pc	3.00	(P_____)	(P_____)

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CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP
CIVIL WORKS**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
CW-7.0	PUMPHOUSE FOR 60 KL FOST	furnish & construct	Refer to NPC TS & Drawing	lot	1.00	_____ (P _____)	_____ (P _____)
CW-7.1	Structural Excavation	excavate & reuse	Refer to NPC TS & Drawing	cu.m.	9.50	_____ (P _____)	_____ (P _____)
CW-7.2	Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	2.00	_____ (P _____)	_____ (P _____)
CW-7.3	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	0.30	_____ (P _____)	_____ (P _____)
CW-7.4	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	3.50	_____ (P _____)	_____ (P _____)
CW-7.5	Reinforcing Steel Bar (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	303.00	_____ (P _____)	_____ (P _____)
CW-7.6	Application of Concrete Epoxy	furnish & apply	Refer to NPC TS & Drawing	gal	1.00	_____ (P _____)	_____ (P _____)
CW-8.0	HAZ WASTE AND MATERIALS RECOVERY FACILITY						
CW-8.1	Structural Excavation	excavate, stockpile & dispose	Refer to NPC TS & Drawing	cu.m.	9.00	_____ (P _____)	_____ (P _____)
CW-8.2	Structural Backfill	place, level & compact	Refer to NPC TS & Drawing	cu.m.	1.00	_____ (P _____)	_____ (P _____)
CW-8.3	Sand and Gravel Bedding	furnish, spread, level & compact	Refer to NPC TS & Drawing	cu.m.	1.00	_____ (P _____)	_____ (P _____)

Name of Firm

NATIONAL POWER CORPORATION

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Designation

VII-BOQ(CW)-6

**BILL OF QUANTITIES
CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP
CIVIL WORKS**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
CW-8.4	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	4.00	_____ (P_____)	_____ (P_____)
CW-8.5	Reinforcing Steel Bar (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	165.00	_____ (P_____)	_____ (P_____)
CW-8.6	Structural Steel (A36 Steel including nuts and bolts)	furnish, fabricate & install	Refer to NPC TS & Drawing	kgs	410.00	_____ (P_____)	_____ (P_____)
SUB-TOTAL AMOUNT OF CIVIL WORKS						_____	_____

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VII-BOQ(CW)-7

BOQ - BILL OF QUANTITIES
1 X 60 M³ FUEL OIL STORAGE TANK FOR BALABAC DPP

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW MECHANICAL WORKS							
MW-1.0 FUEL OIL STORAGE TANK							
MW-1.1	Diesel Oil Storage Tank, 3.6 M Nominal Diameter x 6.1 M Height, complete with tank appurtenances, caged vertical ladder, top railings, anchor bolts, level gauge nozzles, associated piping & other accessories such as UL listed lightning rod, cables, grounding rod, etc as described in the technical specifications and/or bid drawing	Supply, Fabrication, Erection and Test	MW-4.2 & Drawings	set	1	_____ P _____ _____ (P _____)	_____
MW-1.2	Tank Inspection/testing, liquid penetrant examination and hydrotesting	Conduct/Perform Testing		lot	1	_____ P _____ _____ (P _____)	_____
MW-1.3	Tank sandblasting and painting	Supply, Apply and Test		lot	1	_____ P _____ _____ (P _____)	_____
MW-1.4	Tank Calibration	Perform & Conduct Calibration		lot	1	_____ P _____ _____ (P _____)	_____
MW-1.5	Fuel oil tank sounding tape, 10m long, aluminum alloy frame, stainless steel tape with brass dropper	Supply and Test		set	1	_____ P _____ _____ (P _____)	_____

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BOQ - BILL OF QUANTITIES
1 X 60 M³ FUEL OIL STORAGE TANK FOR BALABAC DPP

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-1.6	Gate Valve, 65mm Ø, cast iron, flanged ends, OSY or rising stem, Class 150	Supply, Install and Test		sets	3	_____ P _____ (P _____)	_____ P _____
MW-1.7	Gate Valve, 50mm Ø, cast bronze, flanged ends, OSY or rising stem, Class 150	Supply, Install and Test		set	1	_____ P _____ (P _____)	_____ P _____
MW-1.8	Butterfly Valve, 150mm Ø, cast iron, wafer type, flanged connections, 150 lb	Supply, Install and Test		set	1	_____ P _____ (P _____)	_____ P _____
MW-2.0	FUEL OIL TRANSFER PUMP						
MW-2.1	Fuel Oil Transfer Pump, 10m ³ /h @ 30m head, 240V, 1-phase, 60 hertz, gear type, horizontal, complete with built-in relief valve, anchor bolts, control panel (both at the powerhouse and pumphouse), equipped with circuit breaker and controls, monitoring and protection, cables safety laid in a conduit from the pumphouse to the power supply source and other accessories described in the technical specifications.	Supply, Erection and Test	MW-4.3 & Drawings	set	1	_____ P _____ (P _____)	_____ P _____
MW-2.2	Gate Valve, 65 mm Ø, OSY or rising stem, cast iron, flanged ends, Class 150	Supply, Install & Test		sets	6	_____ P _____ (P _____)	_____ P _____

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BOQ - BILL OF QUANTITIES
1 X 60 M³ FUEL OIL STORAGE TANK FOR BALABAC DPP

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-2.3	Gate Valve, 50mm Ø, cast bronze, flanged ends, OSY or rising stem, Class 150	Supply, Install and Test		set	1	_____ P _____ _____ (P _____)	_____ P _____
MW-2.4	Globe Valve, 25mm Ø, cast bronze, flanged or screwed ends, OSY or rising stem, Class 150	Supply, Install and Test		sets	6	_____ P _____ _____ (P _____)	_____ P _____
MW-2.5	Check Valve, 65 mm Ø, swing type, cast iron, flanged ends, Class 150	Supply, Install & Test		sets	2	_____ P _____ _____ (P _____)	_____ P _____
MW-2.6	Simplex strainer, 65mm Ø, basket type, cast iron body, stainless steel element with magnet, flanged ends, 40 mesh minimum	Supply, Install & Test		sets	2	_____ P _____ _____ (P _____)	_____ P _____
MW-2.7	Flowmeter, 10 m ³ /hr rated flow, aluminum body, flanged ends, with LCD display, internal battery to last at least 5 years, ±0.5% accuracy, 0.2% repeatability, monitors accumulated total flow, resettable total flow and instantaneous flow, equipped with pulse generator or 4-20mA current output	Supply, Install & Test		set	1	_____ P _____ _____ (P _____)	_____ P _____
MW-2.8	Pressure gauge, 100 mm Ø dial gauge, buordon tube type, with dampener and isolation valve	Supply, Install & Test		sets	2	_____ P _____ _____ (P _____)	_____ P _____

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BOQ - BILL OF QUANTITIES
1 X 60 M³ FUEL OIL STORAGE TANK FOR BALABAC DPP

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-2.9	Spare parts for fuel oil transfer pump for one (1) year operation per Manufacturer's recommendation and as specified in the technical specifications	Supply and Deliver		lot	1	_____ P _____ _____ (P _____)	
MW-3.0	FUEL & WASTE OIL TRANSFER PIPING SYSTEM						
MW-3.1	Fuel transfer pipe, 80mm Ø, ASTM A 53 Gr. B, seamless, schedule 40 and its associated fittings, pipe supports, gaskets, supports, flanges, bolts and other accessories	Supply, Install & Test	MW-4.4 & Drawings	lm	12	_____ P _____ _____ (P _____)	
MW-3.2	Fuel transfer pipe, 65mm Ø, ASTM A 53 Gr. B, seamless, schedule 40 and its associated fittings, pipe supports, gaskets, supports, flanges, bolts and other accessories	Supply, Install & Test		lm	24	_____ P _____ _____ (P _____)	
MW-3.3	Fuel transfer pipe, 50mm Ø, ASTM A 53 Gr. B, seamless, schedule 40 and its associated fittings, pipe supports, gaskets, supports, flanges, bolts and other accessories including application of tape wrapping for pipes laid underground	Supply, Excavate, Install, Test, & Backfill		lm	54	_____ P _____ _____ (P _____)	
MW-3.4	Fuel transfer pipe, 25mm Ø, ASTM A 53 Gr. B, seamless, schedule 40 and its associated fittings, pipe supports, gaskets, supports, flanges, bolts and other accessories.	Supply, Install & Test		lm	18	_____ P _____ _____ (P _____)	

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BOQ - BILL OF QUANTITIES
1 X 60 M³ FUEL OIL STORAGE TANK FOR BALABAC DPP

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-3.5	Pipe, 160mm O.D. (150mm DN), unplasticized PVC, Sch 80 or class 150, conforming to ASTM D-1784, and its associated fittings, pipe supports and other accessories as described in the technical specifications or drawings.	Supply, Excavate, Install, Test, & Backfill		lm	24	_____ P _____ (P _____)	_____
MW-4.0	DOMESTIC WATER SUPPLY PIPING SYSTEM						
			MW-5.0				
MW-4.1	Gate Valve, 20 mm Ø, rising stem, cast bronze, screwed ends, Class 150	Supply, Install and Test		set	1	_____ P _____ (P _____)	_____
MW-4.2	Hose Bibb, 20 mm Ø, bronze body, Class 150	Supply, Install and Test		set	1	_____ P _____ (P _____)	_____
MW-4.3	Water Pipe, 25 mm O.D. (20mm Ø N.D.), uPVC pipe, sch. 80 or class 150, and its associated fittings, pipe supports and other accessories	Supply, Excavate, Install, Backfill, Test & Disinfection		lm	36	_____ P _____ (P _____)	_____
MW-4.4	Water Pipe, 20 mm O.D. (15mm Ø N.D.), uPVC pipe, sch. 80 or class 150, and its associated fittings, pipe supports and other accessories	Supply, Excavate, Install, Backfill, Test & Disinfection		lm	12	_____ P _____ (P _____)	_____

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BOQ - BILL OF QUANTITIES
1 X 60 M³ FUEL OIL STORAGE TANK FOR BALABAC DPP

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-5.0 AIR CONDITIONING & VENTILATION SYSTEM				MW-6.0			
5.1 Air-Conditioning System							
5.1.1	Air conditioning unit for Pesonnel's Quarter, 11,500 kJ/hr minimum cooling capacity, window type, inverter-type, complete with necessary mounting accessories and controls (infrared remote) and other necessary accessories as described in the technical specifications.	Supply, Install and Test		set	1	_____ P _____ (P _____)	
5.1.2	Air conditioning unit for Office, 8,000 kJ/hr minimum cooling capacity, window type, inverter-type, complete with necessary mounting accessories and controls (infrared remote) and other necessary accessories as described in the technical specifications.	Supply, Install and Test		set	1	_____ P _____ (P _____)	
5.2 Ventilation System							
5.2.1	Exhaust fan for Comfort Room, 100 m ³ /h wall mounted, propeller type, direct driven, complete with automatic shutter, mounting accessories and controls	Supply, Install and Test		set	1	_____ P _____ (P _____)	
5.2.2	Exhaust fan for Kitchen, 300 m ³ /h wall mounted, propeller type, direct driven, complete with automatic shutter, mounting accessories and controls	Supply, Install and Test		set	1	_____ P _____ (P _____)	

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BOQ - BILL OF QUANTITIES
1 X 60 M³ FUEL OIL STORAGE TANK FOR BALABAC DPP

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-6.0 FIRE EXTINGUISHERS							
			MW-7.0				
MW-6.1	Wheeled Type Fire Extinguisher (Foam-AFFF) complete with self-contained cylinder mounted on frame with handle, floorstand and steel or rubberized wheels, 125 L (33 gallons) capacity, associated valves, dial gauge indicator, nitrogen expellant tank for unit pressurization, 15 m long discharge hose of appropriate size fitted with couplings and foam nozzle assembly, UL/FM approved	Supply & Install		set	1	_____ P _____ _____ (P _____)	
MW-6.2	Portable Fire Extinguisher, clean agent, (HCFC or Halotron I Type), 7.1 kg. (15.5 lbs), wall-hung type with bracket and accessories and UL/FM approved	Supply & Install		set	6	_____ P _____ _____ (P _____)	
MW-7.0 MISCELLANEOUS							
MW-7.1	Tagging or Labels for Equipment, Valves, Piping, Instruments and its fixing accessories as described in the bid documents.	Supply & Install	MW-3.8	Lot	1	_____ P _____ _____ (P _____)	
MW-7.2	Painting for Fuel Oil Piping & Equipment its associated valves, fittings, supports and other accessories including touch-up for supports and other accessories	Supply & Apply	MW-3.7	Lot	1	_____ P _____ _____ (P _____)	
TOTAL MECHANICAL WORKS						_____ P _____ _____ (P _____)	

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SECTION VII - BILL OF QUANTITIES

**ELECTRICAL WORKS
BALABAC DPP**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
1.0	PANELBOARD AND CIRCUIT BREAKERS						
a.	Main Distribution Panelboard (MDP) 225AF/125AT, 2-Pole Main MCCB with branch circuits of: 1 - 100AF/50AT, 2-Pole MCCB 1 - 50AF/25AT, 2-Pole MCCB 1 - 50AF/15AT, 2-Pole MCCB 1 - 100AF/70AT, 2-Pole MCCB 1 - 225AF/100AT, 2-Pole MCCB	Furnish, Install and Test	EW-TS & BD	set	1	_____ (P _____) P _____	
b.	Lighting and Power Panelboard (LPP1) 100AF/50AT, 2-Pole Main MCB with branch circuits of: 1 - 50AF/25AT, 2-Pole MCB 4- 50AF/20AT, 2-Pole MCB 2 - 50AF/15AT, 2-Pole MCB	Furnish, Install and Test	EW-TS & BD	set	1	_____ (P _____) P _____	
c.	Lighting and Power Panelboard (LPP2) 50AF/25AT, 2-Pole Main MCB with branch circuits of: 2 - 50AF/20AT, 2-Pole MCB 1 - 50AF/15AT, 2-Pole MCB	Furnish, Install and Test	EW-TS & BD	set	1	_____ (P _____) P _____	
d.	Lighting and Power Panelboard (LPP3) 50AF/15AT, 2-Pole MCB with NEMA 3 Enclosure	Furnish, Install and Test	EW-TS & BD	set	1	_____ (P _____) P _____	
e.	Lighting and Power Panelboard (LPP4) 100AF/70AT, 2-Pole MCCB with NEMA 1 enclosure and 50 AF/15AT, 2-Pole MCB with NEMA 1 enclosure	Furnish, Install and Test	EW-TS & BD	set	1	_____ (P _____) P _____	

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SECTION VII - BILL OF QUANTITIES

**ELECTRICAL WORKS
BALABAC DPP**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
2.0	PUMP MOTOR CONTROL, PROTECTION AND MONITORING PANEL						
a.	Local Control and Protection Panel including NEMA-1 Class Combination Motor Starter with 100AF/70AT MCCB, 1-Phase, Indicating Lights, etc. (to be installed in the Pump House)	Furnish, Install and Test	EW-TS & BD	set	1	_____ (P _____) P _____	
b.	Remote Control Panel including Start/Stop Button, Indicating Lights, Instrumentation Cables, etc. (to be installed in the Engine Area)	Furnish, Install and Test	EW-TS & BD	set	1	_____ (P _____) P _____	
c.	Monitoring Panel including Indicating Lights, Instrumentation Cables, etc. (to be installed in the Control Room)	Furnish, Install and Test	EW-TS & BD	set	1	_____ (P _____) P _____	
3.0	LIGHTING FIXTURES						
a.	Fixture Type A 2 x 16W LED Tube Lighting Fixture, with mirror finished aluminum reflector, 1200mm x 600mm zinc phosphate steel sheet housing	Furnish, Install and Test	EW-TS & BD	sets	2	_____ (P _____) P _____	

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SECTION VII - BILL OF QUANTITIES

**ELECTRICAL WORKS
BALABAC DPP**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
b.	Fixture Type B Round Ceiling Luminaire Steel Base, Opal Glass Diffuser and 2x18W LED Bulb with E27 Base	Furnish, Install and Test	EW-TS & BD	sets	3	(P _____) P _____	
c.	Fixture Type C Wall Mounted Luminaire Steel Base, White Satin Glass Diffuser, 12W Compact LED Lamp	Furnish, Install and Test	EW-TS & BD	sets	3	(P _____) P _____	
d.	Fixture Type D IP65 water and dust proof lighting fixture with Polycarbonate housing and 2 x 16 Watts, 1200mm, High Output, LED Tube	Furnish, Install and Test	EW-TS & BD	sets	9	(P _____) P _____	
e.	Fixture Type E 9W, Cool White, LED Bulb, Classic Globe Shape with E27 Base	Furnish, Install and Test	EW-TS & BD	sets	4	(P _____) P _____	
f.	Fixture Type F IP65 water and dust proof lighting fixture with Polycarbonate housing and 1 x 8 Watts, 1200mm, High Output, LED Tube	Furnish, Install and Test	EW-TS & BD	sets	3	(P _____) P _____	
g.	Fixture Type G 2 x 2W LED Emergency Lighting Fixture with Built-in Sealed Lead Acid Battery	Furnish, Install and Test	EW-TS & BD	sets	3	(P _____) P _____	

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SECTION VII - BILL OF QUANTITIES

**ELECTRICAL WORKS
BALABAC DPP**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
4.0	OUTLETS AND SWITCHES, INCLUDING PLATE COVER, FLUSH-MOUNTED						
a.	Convenience Outlet, Universal, Duplex with Cover, 20 A, 230 V, 1-phase	Furnish, Install and Test	EW-TS & BD	sets	10	_____ (P _____) P _____	
b.	Outlet for ACU, Single Receptacle, 25 A, 230 V, 1-phase	Furnish, Install and Test	EW-TS & BD	sets	2	_____ (P _____) P _____	
c.	Outlet for Exhaust Fan, Single Receptacle, 16 A, 230 V, 1-phase	Furnish, Install and Test	EW-TS & BD	sets	2	_____ (P _____) P _____	
d.	Outlet for Emergency light, Single Receptacle, 16 A, 230 V, 1-phase	Furnish, Install and Test	EW-TS & BD	sets	4	_____ (P _____) P _____	
e.	Single Gang Wall Switch, 10A, 230 V	Furnish, Install and Test	EW-TS & BD	sets	4	_____ (P _____) P _____	
f.	Double Gang Wall Switch, 10A, 230 V	Furnish, Install and Test	EW-TS & BD	sets	2	_____ (P _____) P _____	
g.	Triple Gang Wall Switch, 10A, 230 V	Furnish, Install and Test	EW-TS & BD	sets	1	_____ (P _____) P _____	
h.	Three Way Wall Switch, 10A, 230 V	Furnish, Install and Test	EW-TS & BD	sets	2	_____ (P _____) P _____	

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SECTION VI - BILL OF QUANTITIES

**ELECTRICAL WORKS
BALABAC DPP**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
	i. Boxes, Fittings, and Accessories	Furnish and Install	EW-TS	lot	1	_____ (P _____) P _____	
5.0	INSULATED COPPER CONDUCTORS INCLUDING TERMINAL LUGS, CONNECTORS, CABLE TIES, IDENTIFICATION TAGS, ETC.	Furnish, Lay and Test		lot	1	_____ (P _____) P _____	
	a. 60 mm ² , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor						
	a. 22 mm ² , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor						
	b. 14 mm ² , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor						
	b. 8.0 mm ² , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor						
	c. 5.5 mm ² , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor						
	d. 3.5 mm ² , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor						

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SECTION VII - BILL OF QUANTITIES

**ELECTRICAL WORKS
BALABAC DPP**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
6.0	EMBEDDED AND/OR NON-EMBEDDED CONDUITS INCLUDING BOXES, LOCKNUTS, ELBOWS, BOLTS AND OTHER FITTINGS	Furnish and Lay		lot	1	(P _____) P _____	
	a. 50 mmØ uPVC						
	b. 25 mmØ uPVC						
	c. 20 mmØ uPVC						
	c. 20 mmØ RSC						
	d. Boxes, Locknuts, Elbows, Bolts and other fittings						
7.0	GROUNDING MATERIALS						
	a. Ground Rod, Copper Bonded, 16mmØ x 3m with Ground Clamp	Furnish, Install		set	3	(P _____) P _____	
8.0	TRANSFORMER						
	a. 25kVA, 7.97kV/240V, 1-Phase, 60Hz, Pole-Mounted Type, Station Service Transformer	Furnish, Install and Test	EW-TS TDS & BD	set	1	(P _____) P _____	

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SECTION VII - BILL OF QUANTITIES

**ELECTRICAL WORKS
BALABAC DPP**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
9.0	FUSE DISCONNECT SWITCH WITH LIGHTNING ARRESTER						
a.	15 kV, 100 A, 10 kA, Fuse Disconnect Switch with Lightning Arrester Combination complete with the required fuse link (3A), brackets and accessories	Furnish, Install and Test	EW-TS TDS & BD	set	1	(P _____) P _____	
10.0	KILOWATT-HOUR METER						
a.	240V, Single-phase Kilowatt-hour Meter	Furnish and Install	EW-TS TDS & BD	set(s)	2	(P _____) P _____	
11.0	POWER CABLES						
a.	2/0 AWG, 15kV, ACSR	Furnish, Lay and Test	EW-TS TDS & BD	lot	1	(P _____) P _____	
b.	30 mm ² , 15kV, Crosslink-Polyethylene (XLPE) Power Cable	Furnish, Lay and Test	EW-TS TDS & BD	lot	1	(P _____) P _____	
c.	Line Hardwares such compression clamps, etc.	Furnish, Install	EW-TS	lot	1	(P _____) P _____	
12.0	DISMANTLING OF EXISTING STATION SERVICE TRANSFORMER INCLUDING POWER CABLES, LINE HARDWARES & OTHER APPURTENANCES AND STOCKING TO THE DESIGNATED STOCKYARD	Dismantle and Stock	EW-TS TDS & BD	lot	1	(P _____) P _____	

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SECTION VII - BILL OF QUANTITIES

**ELECTRICAL WORKS
BALABAC DPP**

Item No.	Description of Work or Materials	Work to Be Done	Pef.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
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SUB-TOTAL AMOUNT OF BID (ELECTRICAL WORKS)

_____ (P _____) P _____

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SECTION VIII

BIDDING FORMS



SECTION VIII – BIDDING FORMS

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Standard Form No: NPCSF-INFR-01

Checklist of Technical & Financial Envelope Requirements for Bidders

A. THE 1ST ENVELOPE (TECHNICAL COMPONENT) SHALL CONTAIN THE FOLLOWING:

1. ELIGIBILITY DOCUMENTS

a. (CLASS A)

➤ Any of the following:

- PhilGEPS Certificate of Registration and Membership under Platinum Category in accordance with Section 8.5.2 of the IRR;

OR:

- The following updated and valid Class "A" eligibility documents enumerated under "Annex A" of the Platinum Membership:

- Registration Certificate from the Securities and Exchange Commission (SEC) for corporations, Department of Trade and Industry (DTI) for sole proprietorship, or Cooperative Development Authority (CDA) for cooperatives;
- Mayor's/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.

In cases of recently expired Mayor's/Business permits, it shall be accepted together with the official receipt as proof that the bidder has applied for renewal within the period prescribed by the concerned local government unit, provided that the renewed permit shall be submitted as a post qualification requirement in accordance with Section 34.2 of the Revised IRR of RA 9184.

- 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.
- Tax clearance per Executive Order 398, Series of 2005, as finally reviewed and approved by the BIR;
- Valid Philippine Contractors Accreditation Board (PCAB) license and registration for the type and cost of the contract for this Project or Special PCAB License in case of Joint Ventures.

OR:

- A combination thereof.

➤ Statement of all its ongoing government and private contracts if any, whether similar or not similar in nature and complexity to the contract to be bid (NPCSF-INFR-02)

➤ The Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid, and whose value, adjusted to current prices using the Philippine Statistics Authority (PSA) consumer price index, must be at least 50% of the ABC (NPCSF-INFR-03) complete with the following supporting documents:

- Contract
- Owner's Certificate of Final Acceptance issued by the project owner other than the contractor or a final rating of at least Satisfactory in the Constructors Performance Evaluation System (CPES). In case of contracts with the private sector, an equivalent document (Ex. Official Receipt or Sales Invoice) shall be submitted

(The Single Largest Completed Contract (SLCC) as declared by the bidder shall be verified and validated to ascertain such completed contract. Hence, bidders must ensure access to sites of such projects/equipment to NPC representatives for verification and validation purposes during post-qualification process.

It shall be a ground for disqualification, if verification and validation cannot be conducted due to inaccessibility of the site for whatever reason or fault of the bidder.)

- Special PCAB License in case of Joint Ventures
- Duly signed computation of its Net Financial Contracting Capacity (NFCC) at least equal to the ABC (NPCSF-INFR-04);

b. (CLASS B)

- Valid Joint Venture Agreement, if applicable (NPCSF-INFR-05)

2. Technical Documents

- Bid Security, any one of the following:
 - Bid Securing Declaration (NPCSF-INFR-06c)
OR
 - Cash or Cashier's/Manager's check issued by a Universal or Commercial Bank – 2% of ABC;
OR
 - Bank draft/guarantee or irrevocable letter of credit issued by a Universal or Commercial Bank: (NPCSF-INFR-06a) - 2% of ABC;
OR
 - Surety Bond callable upon demand issued by a reputable surety or insurance company (NPCSF-INFR-06b) - 5% of ABC, with
 - Certification from the Insurance Commission as authorized company to issue surety
- Duly signed, completely filled-out and notarized Omnibus Sworn statement (Revised) (NPCSF-INFR-07), complete with the following attachments:
 - For Sole Proprietorship:
 - Special Power of Attorney
 - For Partnership/Corporation/Cooperative/Joint Venture:
 - Document showing proof of authorization (e.g., duly notarized Secretary's Certificate, Board/Partnership Resolution, or Special Power of Attorney, whichever is applicable)
- Organization Chart for the project (NPCSF-INFR-08)
- Duly Signed List of Contractor's Key Personnel (based on the minimum key personnel) with complete supporting documents (NPCSF-INFR-09, 10a, 10b & 11)
- Duly Signed List of Contractor's Equipment (owned, leased or under purchase agreement (NPCSF-INFR-12), with
 - Proof of ownership and/or certificate of availability issued by Equipment Lessors
- Duly signed and completely filled-out Technical Data Sheets (Mechanical Works) – Section VI – Part II (MW)

Standard Form No: NPCSF-INFR-01
Page 3 of 3

- Complete eligibility documents of proposed sub-contractor, if applicable

B. THE 2ND ENVELOPE (FINANCIAL COMPONENT) SHALL CONTAIN THE FOLLOWING:

- Duly signed Bid Letter indicating the total bid amount in accordance with the prescribed form (NPCSF-INFR-13)
- Duly signed and completely filled-out Bill of Quantities (Section VII) indicating the unit and total prices per item and the total amount in the prescribed Bill of Quantities form.
- Duly Signed Detailed Estimates for each items of work showing the computations in arriving at each item's unit prices used in coming up with the bid (NPCSF-INFR-14)
- Summary sheets indicating the direct unit prices of construction materials, labor rates and equipment rental rates used in coming up with the bid (NPCSF-INFR-15)

CONDITIONS:

1. *Each Bidder shall submit one copy of the first and second components of its Bid. NPC 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.*
2. *A Bidder not submitting bid for reason that his cost estimate is higher than the ABC, is required to submit his letter of non-participation/regret supported by corresponding detailed estimates. Failure to submit the two (2) documents shall be understood as acts that tend to defeat the purpose of public bidding without valid reason as stated under Section 69.1.(i) of the revised IRR of R.A. 9184.*

Standard Form Number: NPCSF-INFR-02

List of All Ongoing Government and Private Contracts Including Contract Awarded But Not Yet Started

Business Name : _____
 Business Address : _____

Name of Contract/Location/ Project Cost	a. Owner's Name b. Address c. Telephone Nos.	Nature of Work	Contractor's Role		n. Date Awarded b. Date Started c. Date of Completion or Estimated Completion Time	Value of Outstanding Works
			Description	%		
<u>Government</u>						
<u>Private</u>						
					Total Cost	

The bidder shall declare in this form all his on-going government and private contracts including contracts where the bidder (either as individual or as a Joint Venture) is a partner in a Joint Venture agreement other than his current joint venture where he is a partner. Non declaration will be a ground for disqualification of bid.

- Note : This statement shall be supported with the following documents for all the contract(s) stated above which shall be submitted during Post-qualification:
1. Contract/Purchase Order and/or Notice of Award
 2. Certification coming from the project owner/client that the performance is satisfactory as of the bidding date.

Submitted by : _____
 (Printed Name & Signature)
 Designation : _____
 Date : _____

Standard Form Number: NPCSF-INFR-03

The Statement of the bidder’s Single Largest Completed Contract (SLCC) similar to the contract to be bid

Business Name : _____
 Business Address : _____

Name of Contract	a. Owner’s Name b. Address c. Telephone Nos.	Nature of Work	Contractor’s Role		a. Amount at Award b. Amount at Completion c. Duration	a. Date Awarded b. Contract Effectivity c. Date Completed
			Description	%		

- Notes: 1. The bidder must state only one (1) Single Largest Completed Contract (SLCC) similar to the contract to be bid.
 2. Supporting documents such as Contract/Purchase Order and any of the following: Owner’s Certificate of Final Acceptance issued by the project owner other than the contractor; or A final rating of at least Satisfactory in the Constructors Performance Evaluation System (CPES); or Official Receipt (O.R); or Sales Invoice for the contract stated above shall be submitted during Bid Opening.

Submitted by _____
 (Printed Name & Signature)
 Designation : _____
 Date : _____

Standard Form Number: NPCSF-INFR-04

NET FINANCIAL CONTRACTING CAPACITY (NFCC)

A. Summary of the Bidder's/Contractor's assets and liabilities on the basis of the income tax return and audited financial statement for the immediately preceding calendar year are:

		Year 20__
1.	Total Assets	
2.	Current Assets	
3.	Total Liabilities	
4.	Current Liabilities	
5.	Net Worth (1-3)	
6.	Net Working Capital (2-4)	

B. The Net Financial Contracting Capacity (NFCC) based on the above data is computed as follows:

NFCC = [(Current assets minus current liabilities) x 15] minus the value of all outstanding or uncompleted portions of the projects under ongoing contracts, including awarded contracts yet to be started coinciding with the contract for this Project.

NFCC = P _____

Herewith attached is certified true copy of the audited financial statement, stamped "RECEIVED" by the BIR or BIR authorized collecting agent for the immediately preceding calendar year.

Submitted by:

Name of Bidder/Contractor

Signature of Authorized Representative

Date : _____

Standard Form Number: NPCSF-INFR-05

JOINT VENTURE AGREEMENT

KNOW ALL MEN BY THESE PRESENTS:

That this JOINT VENTURE AGREEMENT is entered into by and between:
_____, of legal age, *(civil status)* _____, authorized representative of
_____ and a resident of _____.

- and -

_____, of legal age, *(civil status)* _____, authorized representative of
_____ a resident of _____.

That both parties agree to join together their capital, manpower, equipment, and other resources and efforts to enable the Joint Venture to participate in the Bidding and Undertaking of the hereunder stated Contract of the **National Power Corporation**.

NAME OF PROJECT

CONTRACT AMOUNT

That the capital contribution of each member firm:

NAME OF FIRM	CAPITAL CONTRIBUTION
1.	P
2.	P

That both parties agree to be jointly and severally liable for their participation in the Bidding and Undertaking of the said contract.

That both parties agree that _____ and/or _____ shall be the Official Representative/s of the Joint Venture, and are granted full power and authority to do, execute and perform any and all acts necessary and/or to represent the Joint Venture in the Bidding and Undertaking of the said contract, as fully and effectively and the Joint Venture may do and if personally present with full power of substitution and revocation.

That this Joint Venture Agreement shall remain in effect only for the above stated Contract until terminated by both parties.

Name & Signature of Authorized Representative

Official Designation

Name of Firm

Name & Signature of Authorized Representative

Official Designation

Name of Firm

Witnesses

1. _____

2. _____

[Jurat]

[Format shall be based on the latest Rules on Notarial Practice]

Standard Form Number: NPCSF-INFR-06a

FORM OF BID SECURITY (BANK GUARANTEE)

WHEREAS, *(Name of Bidder)* _____ (hereinafter called “the Bidder”) has submitted his bid dated *(Date)* _____ for the *[name of project]* (hereinafter called “the Bid”).

KNOW ALL MEN by these presents that We *(Name of Bank)* _____ of *(Name of Country)* _____ having our registered office at _____ (hereinafter called “the Bank” are bound unto National Power Corporation (hereinafter called “the Entity”) in the sum of *[amount in words & figures as prescribed in the bidding documents]* for which payment well and truly to be made to the said Entity the Bank binds himself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _____ day of _____ 20____.

THE CONDITIONS of this obligation are that:

- 1) If the Bidder withdraws his Bid during the period of bid validity specified in the Bidding Documents; or
- 2) if the Bidder does not accept the correction of arithmetical errors of his bid price in accordance with the Instructions to Bidder; or
- 3) if the Bidder, having determined as the LCB, fails or refuses to submit the required tax clearance, latest income and business tax returns and PhilGEPs registration certificate within the prescribed period; or
- 4) if the Bidder having been notified of the acceptance of his bid and award of contract to him by the Entity during the period of bid validity:
 - a) fails or refuses to execute the Contract; or
 - b) fails or refuses to submit the required valid JVA, if applicable; or
 - c) fails or refuses to furnish the Performance Security in accordance with the Instructions to Bidders;

we undertake to pay to the Entity up to the above amount upon receipt of his first written demand, without the Entity having to substantiate its demand, provided that in his demand the Entity will note that the amount claimed by it is due to the occurrence of any one or combination of the four (4) conditions stated above.

The Guarantee will remain in force up to 120 days after the opening of bids or as it may be extended by the Entity, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

DATE _____ SIGNATURE OF THE BANK _____

WITNESS _____ SEAL _____

(Signature, Name and Address)

Standard Form Number: NPCSF-INFR-06b

FORM OF BID SECURITY (SURETY BOND)

BOND NO.: _____ DATE BOND EXECUTED: _____

By this bond, We (Name of Bidder) _____ (hereinafter called "the Principal") and (Name of Surety) _____ of (Name of Country of Surety) _____, authorized to transact business in the Philippines (hereinafter called "the Surety") are held and firmly bound unto National Power Corporation (hereinafter called "the Employer") as Obligee, in the sum of (amount in words & figures as prescribed in the bidding documents), callable on demand, for the payment of which sum, well and truly to be made, we, the said Principal and Surety bind ourselves, our successors and assigns, jointly and severally, firmly by these presents.

SEALED with our seals and dated this _____ day of _____ 20 _____

WHEREAS, the Principal has submitted a written Bid to the Employer dated the _____ day of _____ 20 _____, for the _____ (hereinafter called "the Bid").

NOW, THEREFORE, the conditions of this obligation are:

- 1) if the Bidder withdraws his Bid during the period of bid validity specified in the Bidding Documents; or
- 2) if the Bidder does not accept the correction of arithmetical errors of his bid price in accordance with the Instructions to Bidder; or
- 3) if the Bidder, having determined as the LCB, fails or refuses to submit the required tax clearance, latest income and business tax returns and PhilGEPs registration certificate within the prescribed period; or
- 4) if the Bidder having been notified of the acceptance of his bid and award of contract to him by the Entity during the period of bid validity:
 - d) fails or refuses to execute the Contract; or
 - e) fails or refuses to submit the required valid JVA, if applicable; or
 - f) fails or refuses to furnish the Performance Security in accordance with the Instructions to Bidders;

then this obligation shall remain in full force and effect, otherwise it shall be null and void.

PROVIDED HOWEVER, that the Surety shall not be:

- a) liable for a greater sum than the specified penalty of this bond, nor
- b) liable for a greater sum than the difference between the amount of the said Principal's Bid and the amount of the Bid that is accepted by the Employer.

Standard Form Number: NPCSF-INFR-06b
Page 2 of 2

This Surety executing this instrument hereby agrees that its obligation shall be valid for 120 calendar days after the deadline for submission of Bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Surety is hereby waived.

PRINCIPAL _____ SURETY _____

SIGNATURE(S) _____ SIGNATURES(S) _____

NAME(S) AND TITLE(S) _____ NAME(S) _____

SEAL _____ SEAL _____

Standard Form No: NPCSF-INFR-06c

REPUBLIC OF THE PHILIPPINES)
CITY OF _____) S.S.

BID-SECURING DECLARATION
CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN
BALABAC DPP (LuzP21Z1326Sc)

To: **National Power Corporation**
BIR Road cor. Quezon Ave.
Diliman, Quezon City

I/We¹, the undersigned, declare that:

1. I/We understand that, according to your conditions, bids must be supported by a Bid Security, which may be in the form of a Bid-Securing Declaration.
2. I/We accept that: (a) I/we will be automatically disqualified from bidding for any contract with any procuring entity for a period of two (2) years upon receipt of your Blacklisting Order; and, (b) I/we will pay the applicable fine provided under Section 6 of the Guidelines on the Use of Bid Securing Declaration, within fifteen (15) days from receipt of the written demand by the Procuring Entity for the commission of acts resulting to the enforcement of the Bid Securing Declaration under Sections 23.1 (b), 34.2, 40.1 and 69.1, except 69.1 (f) of the IRR of R.A. 9184; without prejudice to other legal action the government may undertake.
3. I/We understand that this Bid-Securing Declaration shall cease to be valid on the following circumstances:
 - (a) Upon expiration of the bid validity period, or any extension thereof pursuant to your request;
 - (b) I am/we are declared ineligible or post-disqualified upon receipt of your notice to such effect, and (i) I/we failed to timely file a request for reconsideration or (ii) I/we filed a waiver to avail of said right;
 - (c) I am/we are declared as the bidder with the Lowest Calculated and Responsive Bid, and I/we have furnished the performance security and signed the Contract.

IN WITNESS WHEREOF, I/we have hereunto set my hand this ____ day of ____
20____ at _____, Philippines.

[Name and Signature of Bidder's Representative/
Authorized Signatory] [Signatory's legal capacity]
Affiant

[Jurat]
[Format shall be based on the latest Rules on Notarial Practice]

¹ Select one and delete the other. Adopt same instruction for similar terms throughout the document.

Standard Form No: NPCSF-INFR-07b

Omnibus Sworn Statement (Revised)REPUBLIC OF THE PHILIPPINES)
CITY/MUNICIPALITY OF _____) S.S.**AFFIDAVIT**

I, [Name of Affiant], of legal age, [Civil Status], [Nationality], and residing at [Address of Affiant], after having been duly sworn in accordance with law, do hereby depose and state that:

1. *[Select one, delete the other:]*

[If a sole proprietorship:] I am the sole proprietor or authorized representative of [Name of Bidder] with office address at [address of Bidder];

[If a partnership, corporation, cooperative, or joint venture:] I am the duly authorized and designated representative of [Name of Bidder] with office address at [address of Bidder];

2. *[Select one, delete the other:]*

[If a sole proprietorship:] As the owner and sole proprietor, or authorized representative of [Name of Bidder], I have full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached duly notarized Special Power of Attorney;

[If a partnership, corporation, cooperative, or joint venture:] I am granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached [state title of attached document showing proof of authorization (e.g., duly notarized Secretary's Certificate, Board/Partnership Resolution, or Special Power of Attorney, whichever is applicable)];

3. [Name of Bidder] is not "blacklisted" or barred from bidding by the Government of the Philippines or any of its agencies, offices, corporations, or Local Government Units, foreign government/foreign or international financing institution whose blacklisting rules have been recognized by the Government Procurement Policy Board, by itself or by relation, membership, association, affiliation, or controlling interest with another blacklisted person or entity as defined and provided for in the Uniform Guidelines on Blacklisting;

4. Each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;

5. [Name of Bidder] is authorizing the Head of the Procuring Entity or its duly authorized representative(s) to verify all the documents submitted;

6. *[Select one, delete the rest:]*

[If a sole proprietorship:] The owner or sole proprietor is not related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

[If a partnership or cooperative:] None of the officers and members of [Name of Bidder] is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project

Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

[If a corporation or joint venture:] None of the officers, directors, and controlling stockholders of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

7. *[Name of Bidder]* complies with existing labor laws and standards; and
8. *[Name of Bidder]* is aware of and has undertaken the responsibilities as a Bidder in compliance with the Philippine Bidding Documents, which includes:
 - a. Carefully examining all of the Bidding Documents;
 - b. Acknowledging all conditions, local or otherwise, affecting the implementation of the Contract;
 - c. Making an estimate of the facilities available and needed for the contract to be bid, if any; and
 - d. Inquiring or securing Supplemental/Bid Bulletin(s) issued for the *[Name of the Project]*.
9. *[Name of Bidder]* did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.
10. In case advance payment was made or given, failure to perform or deliver any of the obligations and undertakings in the contract shall be sufficient grounds to constitute criminal liability for Swindling (Estafa) or the commission of fraud with unfaithfulness or abuse of confidence through misappropriating or converting any payment received by a person or entity under an obligation involving the duty to deliver certain goods or services, to the prejudice of the public and the government of the Philippines pursuant to Article 315 of Act No. 3815 s. 1930, as amended, or the Revised Penal Code.

IN WITNESS WHEREOF, I have hereunto set my hand this ___ day of ___, 20__ at _____, Philippines.

[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]

[Insert signatory's legal capacity]

Affiant

[Jurat]

[Format shall be based on the latest Rules on Notarial Practice]

Standard Form Number: NPCSF-INFR-08

CONTRACTOR'S ORGANIZATIONAL CHART FOR THE CONTRACT

Submit Copy of the Organizational Chart that the Contractor intends to use to execute the Contract if awarded to him. Indicate in the chart the names of the Project Manager, Project Engineer, Foreman and other Key Engineering Personnel.

Attach the required Proposed Organizational Chart for the Contract as stated above

NOTES:

1. *This organization chart should represent the "Contractor's Organization" required for the Project, and not the organizational chart of the entire firm.*
2. *Each such nominated engineer/key personnel shall comply with and submit duly accomplished forms NPCSF-INFR-10a, NPCSF-INFR-10b and NPCSF-INFR-11.*
3. *All these are required to be in the Technical Envelope of the Bidder.*

Standard Form Number: NPCSF-INFR-09

LIST OF KEY PERSONNEL PROPOSED TO BE ASSIGNED TO THE CONTRACT
(Based on the Minimum Key Personnel Required in the Bidding Documents)

Business Name: _____
Business: _____

	DESIGNATION				
1 Name					
2 Address					
3 Date of Birth					
4 Employed Since					
5 Experience					
6 Previous Employment					
7 Education					
8 PRC License					

Required Attachments:

1. Certificate of Employment, Bio Data and Construction Safety and Health Training Certificate of the Safety Officer
2. Certificate of Employment, Bio Data and valid PRC License of the (professional) personnel
3. Certificate of Employment, Bio Data and accreditation from DPWH as Materials Engineer for the Materials Engineer

Submitted by: _____
(Printed Name & Signature)

Designation: _____

Date: _____

One of the requirements from the bidder to be included in its Technical Envelope is a list of contractor's key personnel (based on the minimum key personnel required in the bidding documents) to be assigned to the contract to be bid, with their complete qualification and experience data (including the key personnel's signed written commitment to work for the project once awarded the contract).

Standard Form Number: NPCSF-INFR-10a

KEY PERSONNEL'S CERTIFICATE OF EMPLOYMENT (PROFESSIONAL PERSONNEL)

Issuance Date

THE PRESIDENT

National Power Corporation
BIR Road cor. Quezon Ave.
Diliman, Quezon City

Dear Sir:

I am (Name of Nominee) a Licensed Engineer with Professional License No. issued on (date of issuance) at (place of issuance).

I hereby certify that (Name of Bidder) has engaged my services as (Designation) for the (Name of Project), if awarded to it.

As (Designation), I supervised the following completed projects similar to the contract under bidding:

Table with 4 columns: NAME OF PROJECT, OWNER, COST, DATE COMPLETED

At present, I am supervising the following projects:

Table with 4 columns: NAME OF PROJECT, OWNER, COST, DATE COMPLETED

In case of my separation for any reason whatsoever from the above-mentioned Contractor, I shall notify the National Power Corporation at least twenty one (21) days before the effective date of my separation.

As (Designation), I know I will have to stay in the job site all the time to supervise and manage the Contract works to the best of my ability, and aware that I am authorized to handle only one (1) contract at a time.

I do not allow the use of my name for the purpose of enabling the above-mentioned Contractor to qualify for the Contract without any firm commitment on my part to assume the post of (Designation) therefor, if the contract is awarded to him since I understand that to do so will be a sufficient ground for my disqualification as (Designation) in any future National Power Corporation bidding or employment with any Contractor doing business with the National Power Corporation.

(Name and Signature)
AFFIANT

[Jurat]

[Format shall be based on the latest Rules on Notarial Practice]

One of the requirements from the bidder to be included in its Technical Envelope is a list of contractor's key personnel (viz. Project Manager, Project Engineer, Construction Safety Officer, Foremen, etc), to be assigned to the contract to be bid, with their complete qualification and experience data (including the key personnel's signed written commitment to work for the project once awarded the contract).

Standard Form Number: NPCSF-INFR-10b

**KEY PERSONNEL'S CERTIFICATE OF EMPLOYMENT
(CONSTRUCTION SAFETY AND HEALTH OFFICER)**

Issuance Date

THE PRESIDENT

National Power Corporation
BIR Road cor. Quezon Ave.
Diliman, Quezon City

Dear Sir:

I am (Name of Nominee) an Construction Safety & Health Officer with Certificate No. _____ issued on (date of issuance) at (place of issuance).

I hereby certify that (Name of Bidder) has engaged my services as Construction Safety & Health Officer for the (Name of Project), if awarded to it.

I am the Construction Safety & Health Officer of the following completed projects similar to the contract under bidding:

NAME OF PROJECT	OWNER	COST	DATE COMPLETED
_____	_____	_____	_____
_____	_____	_____	_____

At present, I am the Construction Safety & Health Officer of the following projects:

NAME OF PROJECT	OWNER	COST	DATE COMPLETED
_____	_____	_____	_____
_____	_____	_____	_____

In case of my separation for any reason whatsoever from the above-mentioned Contractor, I shall notify the National Power Corporation at least twenty one (21) days before the effective date of my separation.

As Construction Safety & Health Officer, I know I will have to stay in the job site all the time and aware that I am authorized to handle only one (1) contract at a time.

I do not allow the use of my name for the purpose of enabling the above-mentioned Contractor to qualify for the Contract without any firm commitment on my part to assume the post of Construction Safety & Health Officer, if the contract is awarded to him since I understand that to do so will be a sufficient ground for my disqualification as Construction Safety & Health Officer in any future National Power Corporation bidding or employment with any Contractor doing business with the National Power Corporation.

(Name and Signature)
AFFIANT

[Jurat]

[Format shall be based on the latest Rules on Notarial Practice]

One of the requirements from the bidder to be included in its Technical Envelope is a list of contractor's key personnel (viz. Project Manager, Project Engineer, Construction Safety Officer, Foremen, etc), to be assigned to the contract to be bid, with their complete qualification and experience data (including the key personnel's signed written commitment to work for the project once awarded the contract).

Standard Form Number: NPCSF-INFR-11

**KEY PERSONNEL
(FORMAT OF BIO-DATA)**

Give the detailed information of the following personnel who are scheduled to be assigned as full-time field staff for the project. Fill up a form for each person.

- 1. Name : _____
- 2. Date of Birth : _____
- 3. Nationality : _____
- 4. Education and Degrees : _____
- 5. Specialty : _____
- 6. Registration : _____
- 7. Length of Service with the Firm : _____ Year from _____ (months) _____ (year)
To _____ (months) _____ (year)
- 8. Years of Experience : _____

9. If Item 7 is less than ten (10) years, give name and length of service with previous employers for a ten (10)-year period (attached additional sheet/s), if necessary:

<u>Name and Address of Employer</u>	<u>Length of Service</u>
_____	_____ year(s) from _____ to _____
_____	_____ year(s) from _____ to _____
_____	_____ year(s) from _____ to _____

10. Experience:
This should cover the past ten (10) years of experience. (Attached as many pages as necessary to show involvement of personnel in projects using the format below).

One of the requirements from the bidder to be included in its Technical Envelope is a list of contractor's key personnel (viz. Project Manager, Project Engineer, Construction Safety Officer, Foremen, etc), to be assigned to the contract to be bid, with their complete qualification and experience data (including the key personnel's signed written commitment to work for the project once awarded the contract).

Standard Form Number: NPCSF-INFR-11
Page 2 of 2

1. Name : _____
2. Name and Address of Owner : _____
3. Name and Address of the
Owner's Engineer
(Consultant) : _____
4. Indicate the Features of Project
(particulars of the project
components and any other particular
interest connected with the project): _____
5. Contract Amount Expressed in
Philippine Currency : _____
6. Position : _____
7. Structures for which the employee
was responsible : _____
8. Assignment Period : from _____ (months) _____ (years)
: to _____ (months) _____ (years)

Name and Signature of Employee

It is hereby certified that the above personnel can be assigned to this project, if the contract is awarded to our company.

(Place and Date)

(The Authorized Representative)

One of the requirements from the bidder to be included in its Technical Envelope is a list of contractor's key personnel (viz. Project Manager, Project Engineer, Construction Safety Officer, Foremen, etc), to be assigned to the contract to be bid, with their complete qualification and experience data (including the key personnel's signed written commitment to work for the project once awarded the contract).

Standard Form Number: NPCSF-INFR-12

LIST OF EQUIPMENT, OWNED OR LEASED AND/OR UNDER PURCHASE AGREEMENTS
(Based on the Minimum Equipment Required in the Bidding Documents)

Business Name: _____
Business: _____

Description	Model/Year	Capacity / Performance / Size	Plate No.	Motor No. / Body No.	Location	Condition	Proof of Ownership / Lessor or Vendor
A. Owned							
i.							
ii.							
iii.							
iv.							
v.							
B. Leased							
i.							
ii.							
iii.							
iv.							
v.							
C. Under Purchase Agreements							
i.							
ii.							
iii.							
iv.							
v.							

Submitted by: _____
(Printed Name & Signature)

Designation: _____

Date: _____

One of the requirements from the bidder to be included in its Technical Envelope is the list of its equipment units pledged for the contract to be bid, based on minimum equipment required in the bidding docs. which are owned (supported by proof/s of ownership), leased, and/or under purchase agreements (with corresponding engine numbers, chassis numbers and/or serial numbers), supported by certification of availability of equipment from the equipment lessor/vendor for the duration of the project

Standard Form No. : NPCSF-INFR-13

BID LETTER

Date: _____

To: **THE PRESIDENT**
National Power Corporation
BIR Road cor. Quezon Ave.
Diliman, Quezon City

We, the undersigned, declare that:

(a) We have examined and have no reservation to the Bidding Documents, including Addenda, for the Contract **CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP (LuzP21Z1326Sc)**.

(b) We offer to execute the Works for this Contract in accordance with the Bid Documents, Technical Specifications, General and Special Conditions of Contract accompanying this Bid;

The total price of our Bid, excluding any discounts offered below is: [insert information] _____;

The discounts offered and the methodology for their application are: [insert information] _____;

(c) Our Bid shall be valid for a period of [insert number] _____ days from the date fixed for the Bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(d) If our Bid is accepted, we commit to obtain a Performance Security in the amount of [insert percentage amount] _____ percent of the Contract Price for the due performance of the Contract;

(e) Our firm, including any subcontractors or suppliers for any part of the Contract, have nationalities from the following eligible countries: [insert information] _____;

(f) We are not participating, as Bidders, in more than one Bid in this bidding process, other than alternative offers in accordance with the Bidding Documents;

(g) Our firm, its affiliates or subsidiaries, including any subcontractors or suppliers for any part of the Contract, has not been declared ineligible by the Funding Source;

(h) We understand that this Bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal Contract is prepared and executed; and

(i) We understand that you are not bound to accept the Lowest Calculated Bid or any other Bid that you may receive.

- (j) We likewise certify/confirm that the undersigned, is the duly authorized representative of the bidder, and granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for the **CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP (LuzP21Z1326Sc)** of the National Power Corporation.

- (k) We acknowledge that failure to sign each and every page of this Bid Letter, including the Bill of Quantities, shall be a ground for the rejection of our bid.

Name: _____

In the capacity of: _____

Signed: _____

Duly authorized to sign the Bid for and on behalf of: _____

Date: _____

Standard Form No. : NPCSF-INFR-15

**SUMMARY SHEETS OF MATERIALS PRICES, LABOR RATES
AND EQUIPMENT RENTAL RATES**

Name of Bidder : _____

I. Unit Prices of Materials

Materials Description	Unit	Unit Price
1.		
2.		
3.		
4.		
5.		
6.		
7.		

II. Manpower Hourly Rates

Designation	Rate/Hr.
1.	
2.	
3.	
4.	
5.	
6.	
7.	

III. Equipment Hourly Rental Rates

Equipment Description	Rental Rate/Hr.
1.	
2.	
3.	
4.	
5.	
6.	
7.	

Name, Signature of Authorized Representative

Designation

SECTION IX

BID DRAWINGS



SECTION IX

BID DRAWINGS

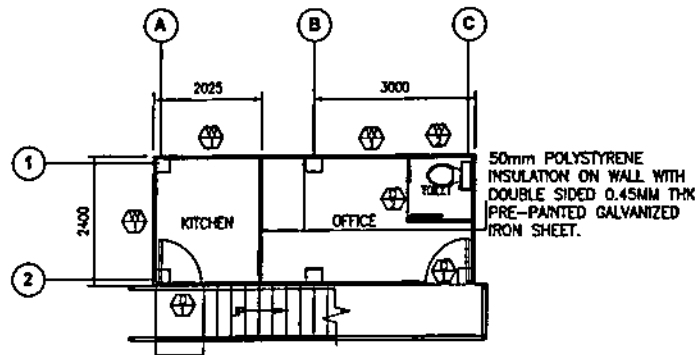
ARCHITECTURAL WORKS



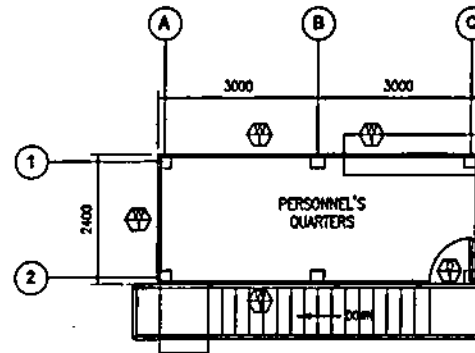
SECTION IX – BID/REFERENCE DRAWINGS**AW – ARCHITECTURAL WORKS**

<u>DRAWING NO.</u>	<u>TITLE</u>
VFBD-BDA-13.001	FLOOR AND ROOF PLAN AND PLUMBING LAYOUT
VFBD-BDA-13.002	ELEVATION
VFBD-BDA-13.003	SCHEDULE OF DOORS AND WINDOWS
VFBD-BDA-13.004	WAREHOUSE (FLOOR AND ROOF PLAN)
VFBD-BDA-13.005	WAREHOUSE (ELEVATIONS)
VFBD-BDA-13.006	WAREHOUSE (SCHEDULE OF DOORS AND WINDOWS)
VFBD-BDA-13.007	HAZ-WASTE AND MATERIALS RECOVERY (FLOOR PLAN AND CONCRETE PAD PLAN)
VFBD-BDA-13.008	HAZ-WASTE AND MATERIALS RECOVERY FRONT AND REAR ELEVATION
VFBD-BDA-13.009	HAZ-WASTE AND MATERIALS RECOVERY SIDE ELEVATION
VFBD-BDA-13.010	HAZ-WASTE AND MATERIALS RECOVERY (ROOF PLAN)





GROUND FLOOR PLAN
SCALE 1:100



SECOND FLOOR PLAN
SCALE 1:100

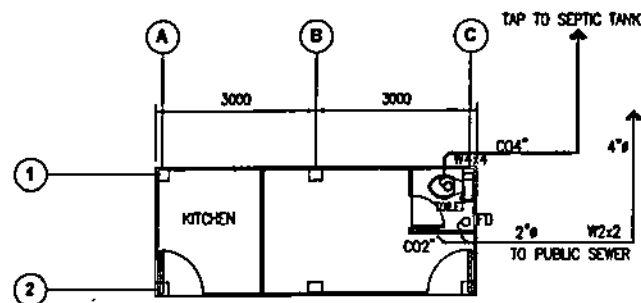
50mm POLYSTYRENE INSULATION ON WALL WITH DOUBLE SIDED 0.45MM THK PRE-PANDED GALVANIZED IRON SHEET.

NOTES:

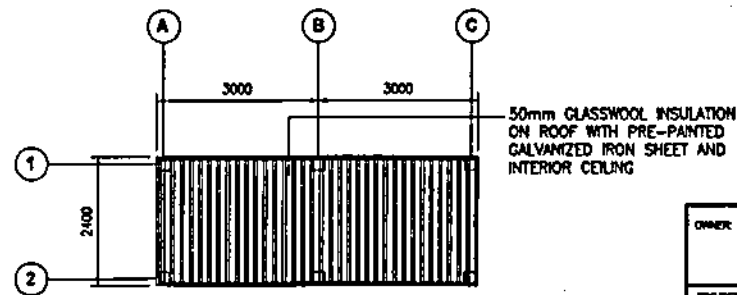
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. LOCATION OF BUNKHOUSE SHALL BE VERIFIED AT SITE.

LEGEND:

FD - FLOOR DRAIN
CO - CLEAN OUT






GROUND FLOOR PLUMBING LAYOUT
SCALE 1:100

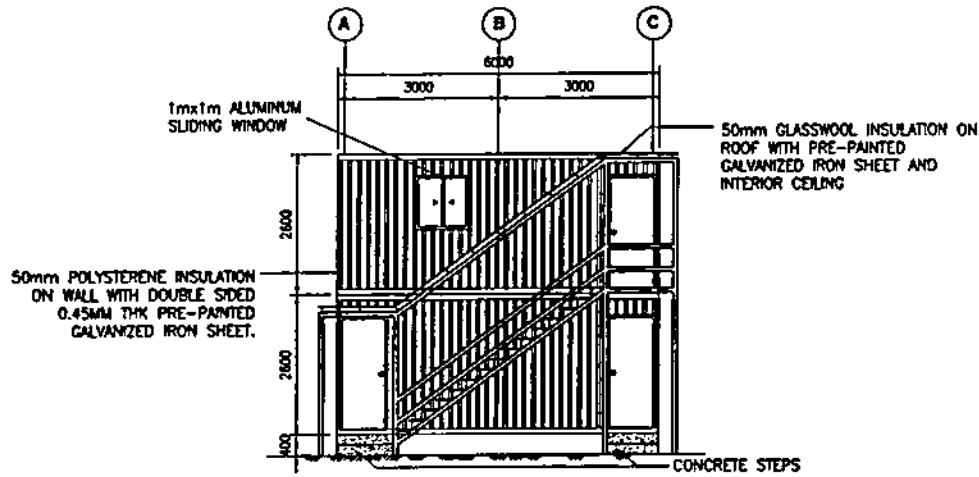


ROOF PLAN
SCALE 1:100

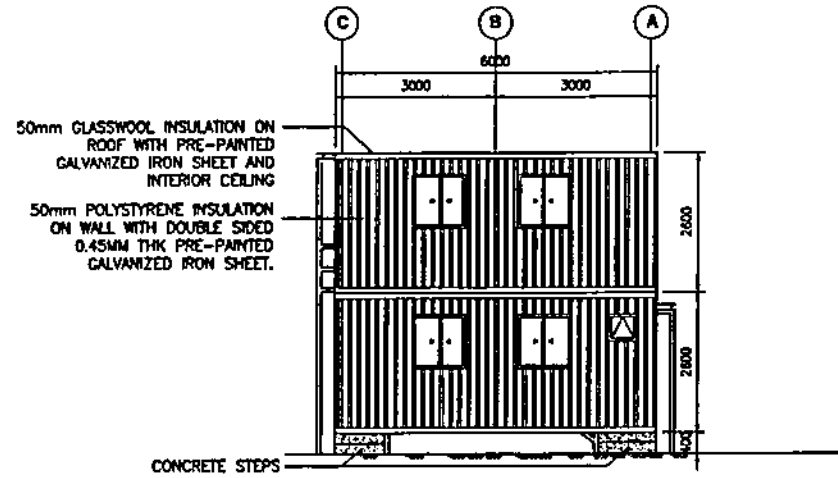
50mm GLASSWOOL INSULATION ON ROOF WITH PRE-PANDED GALVANIZED IRON SHEET AND INTERIOR CEILING

OWNER:				NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, PORT AND OTHER FACILITIES IN BALABAC DPP					
LOCATION: BRGY 1, POBLACION, BALABAC, PALAWAN					
TITLE: FLOOR AND ROOF PLAN AND PLUMBING LAYOUT					
DESIGNED	BY	CHKD	DATE	SUBMITTED	
DRAWN	DISCUSP			PRINCIPAL ARCHITECT & CEAD	R.R. VILLANUEVA
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED		MANAGER/CEAD	
ENLARGED		APPROVED		MANAGER, DOD	H. G. SORIANO
ELEC.					
META					
DWG. NO. VFBD-BDA-13.001			SPEC. NO. LUPZP21Z1326Sc		
SCALE: AS SHOWN		BID DRAWING		REV. 0	

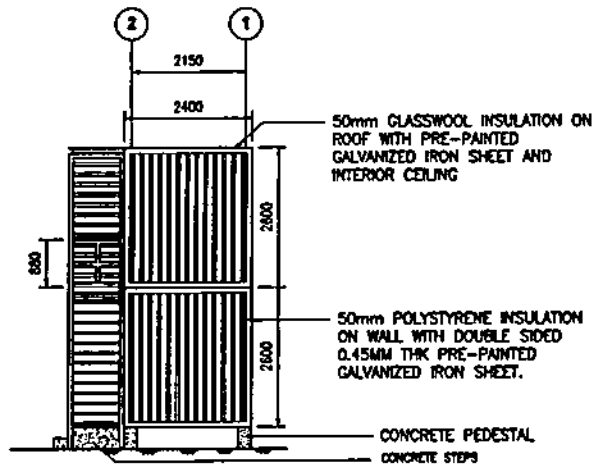
REV.	DATE	NATURE OF REVISION	BY	CHKD.	REC'D.	APP'D.



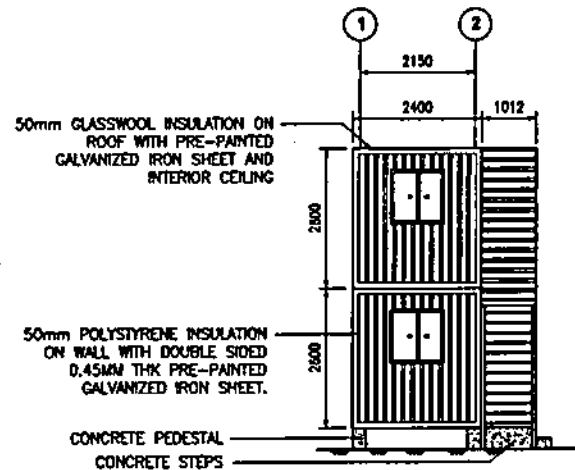
FRONT ELEVATION
SCALE 1:100



REAR ELEVATION
SCALE 1:100




RIGHT SIDE ELEVATION
SCALE 1:100



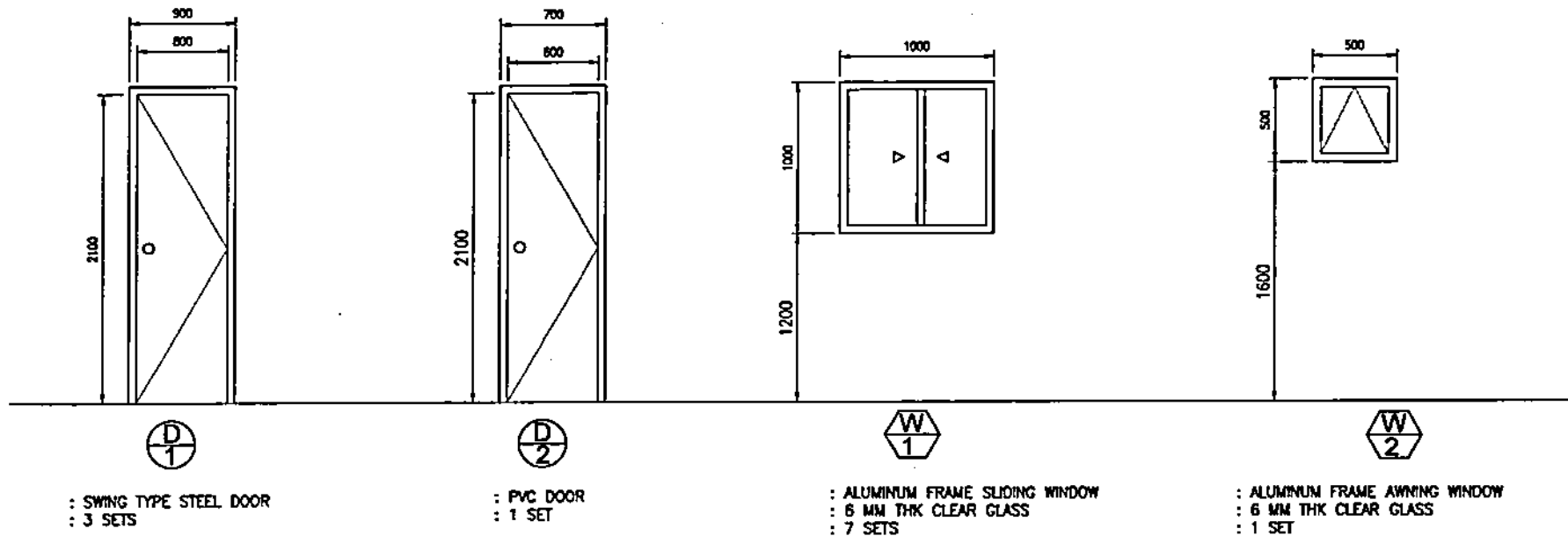
LEFT SIDE ELEVATION
SCALE 1:100


NOTES:


1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. LOCATION OF BUNKHOUSE SHALL BE VERIFIED AT SITE.

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY 1, POBLACION, BALABAC, PALAWAN			
TITLE: ELEVATION			
DESIGNED	BY	CHKD	DATE
DRAWN	DURLOPS		
REVIEWED	PRINCIPAL ENGR / ARCHT.	RECOMMENDED	
CIVIL/ARCHT		APPROVED	
ELEC.			
MECH.			
DWG. NO. VFB-D-BDA-13.002		SPEC. NO. LuzP2121328Sc	
SCALE: AS SHOWN		BID DRAWING	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.

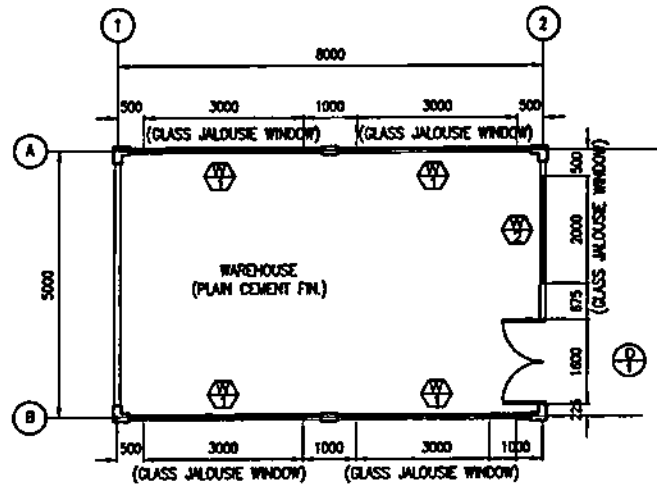



SCHEDULE OF DOORS AND WINDOWS
 SCALE _____ NTS

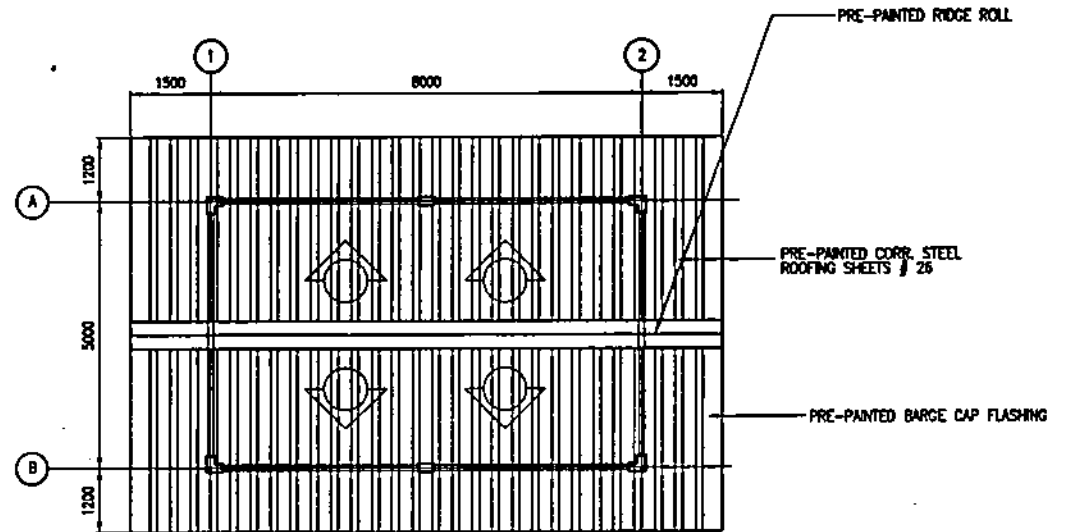
OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY 1, POBLACION, BALABAC, PALANAN			
TITLE: SCHEDULE OF DOORS AND WINDOWS			
DESIGNED	BY	CHKD	DATE
DRAWN	CHECKED		
REVIEWED	PRINCIPAL ENGR./ ARCHT.	RECOMMENDED	
CHALNDRY		APPROVED	
ELEC.			
MECH.			
DATE		NATURE OF REVISION	
BY	CHKD	RECD	APPD
SPEC. NO. VFBD-BDA-13.003		SPEC. NO. LUDZP21Z1328Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. 0			

NOTES:



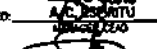
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. ALL WALLS SHALL BE TOOL-FINISH ONLY.



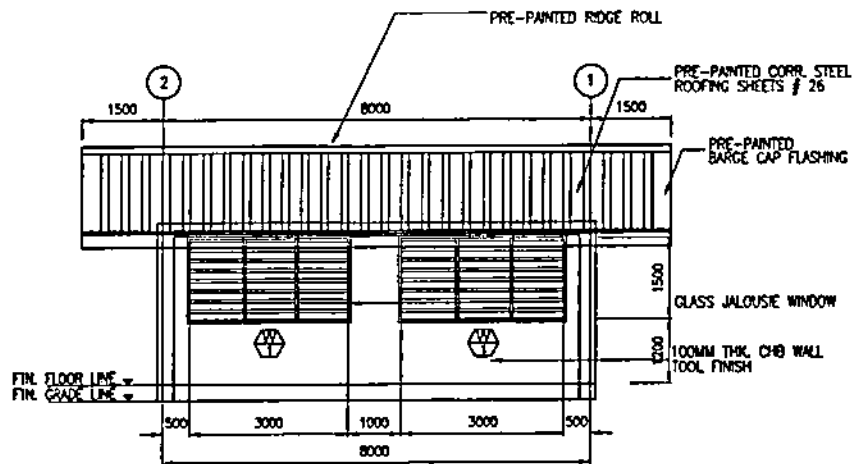
FLOOR PLAN
SCALE 1:100



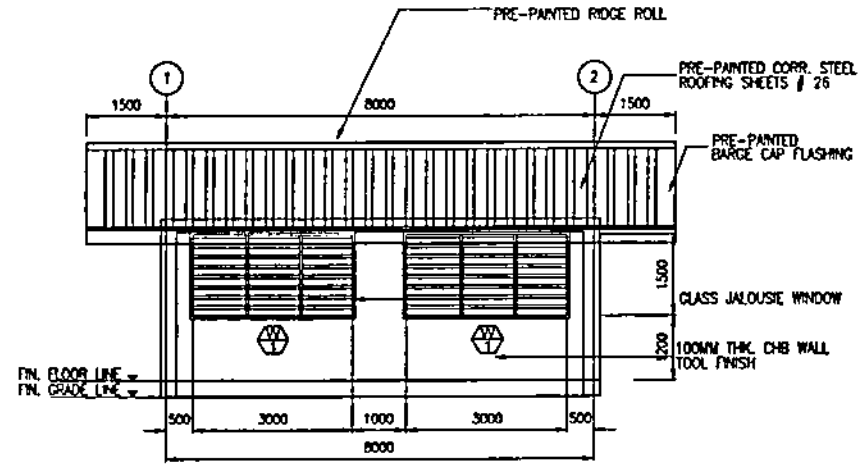
ROOF PLAN
SCALE 1:100

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY 1, POBLACION, BALABAC PALAWAN			
TITLE:		WAREHOUSE (FLOOR AND ROOF PLAN)	
DESIGNED	BY	CHKD	DATE
DRAWN	SUBJ. ENG.		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED:	 R. R. R. VELAZQUEZ PRINCIPAL ARCHITECT, CEAD
CIVIL ARCHT.		APPROVED:	 R. R. R. VELAZQUEZ MANAGER, CEAD
ELEC.			
MECH.			
DWG NO. VFB-D-BDA-17.004		SPECS NO. LuzP2121326Sc	
SCALE: AS SHOWN		BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY

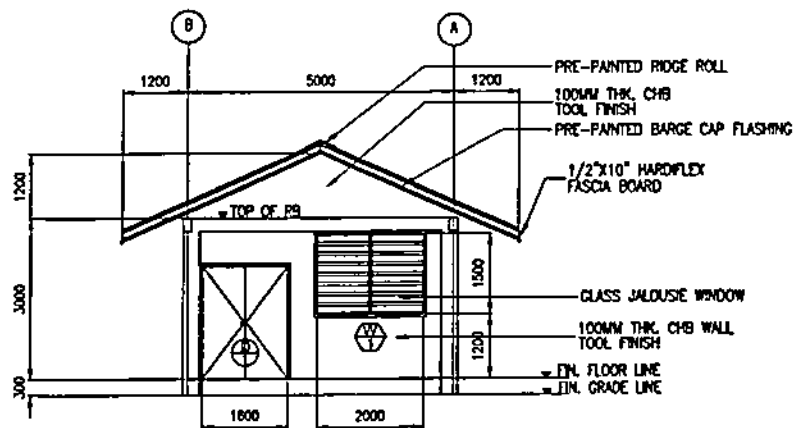
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



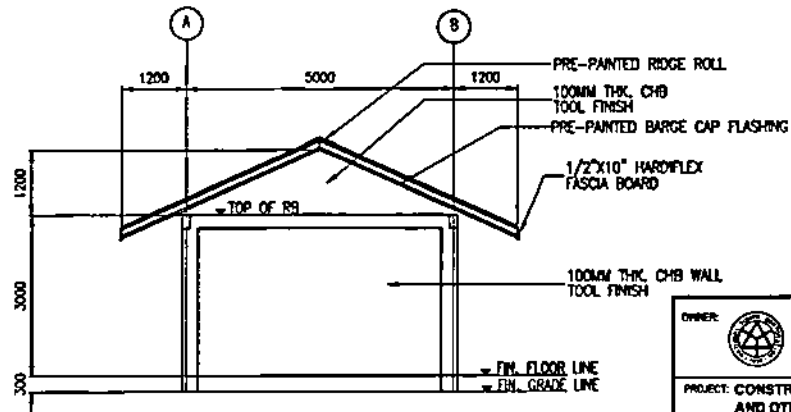
RIGHT SIDE ELEVATION
SCALE 1:100




LEFT SIDE ELEVATION
SCALE 1:100



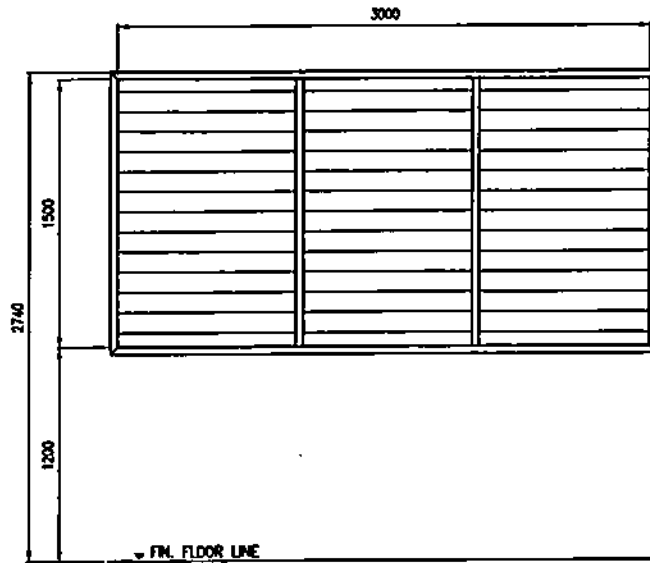
FRONT ELEVATION
SCALE 1:100



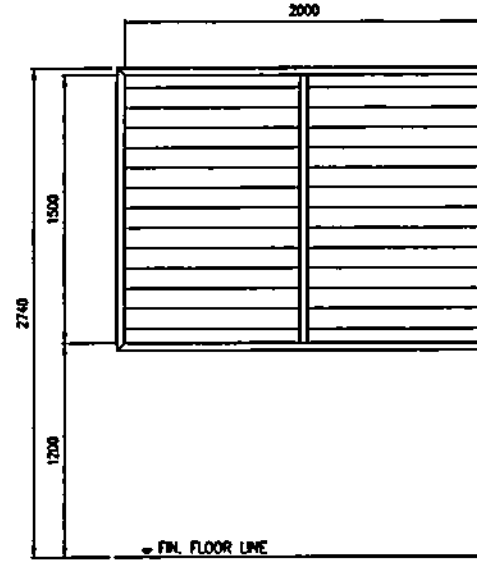
REAR ELEVATION
SCALE 1:100

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY 1, POBLACION, BALABAC PALAWAN			
TITLE:		WAREHOUSE (ELEVATIONS)	
DESIGNED	BY	CHKD	DATE
DRAWN	SUBSIGNED		SUBMITTED
REVIEWED	PRINCIPAL ENGR./ ARCHT.		RECOMMENDED
CHECKED			APPROVED
ELEC.			
MECH.			
DWG. NO. VFB-D-A-17.005		SPEC. NO. LuzP21Z1326Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. #		REV. #	

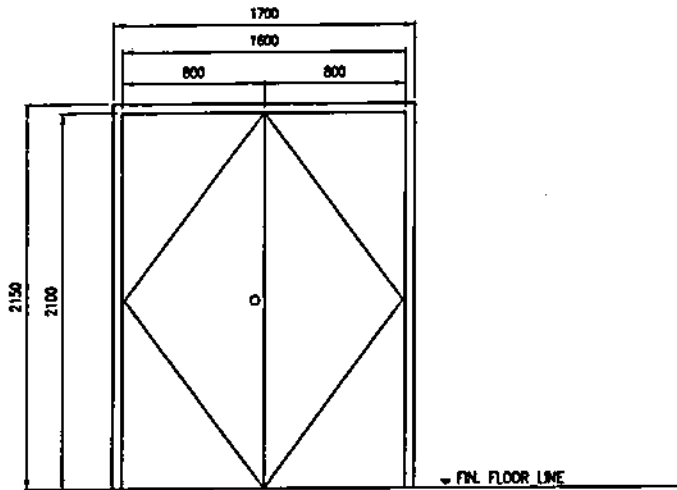
REV.	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPL.



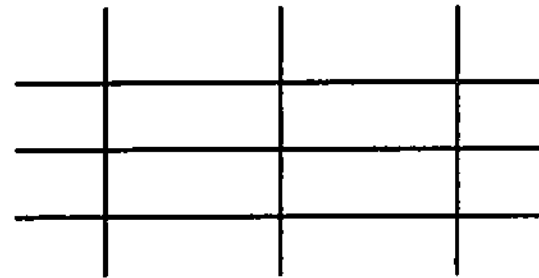
- 2x3 ANODIZED ALUMINUM MULLION FRAME
- 5MM THK x 100 WIDE SMOKE GLASS JALOUSIE BLADE
- HEAVY DUTY JALOUSIE MECHANISM AND ALUMINUM MEMBERS
- 12 MM SQUARE BAR SECURITY GRILLE W/ RUST RESISTANT COATING



- 2x3 ANODIZED ALUMINUM MULLION FRAME
- 5MM THK x 100 WIDE SMOKE GLASS JALOUSIE BLADE
- HEAVY DUTY JALOUSIE MECHANISM AND ALUMINUM MEMBERS
- 12 MM SQUARE BAR SECURITY GRILLE W/ RUST RESISTANT COATING




- MARINE PLYWOOD FLASH DOOR
- 2 X 4 HARD WOOD JAMB
- 8 PIECES OF HEAVY DUTY LOOSE PIN HINGES
- ONE SET DOOR KNOB, WEATHERPROOF
- 2 SETS HEAVY DUTY BARRIL BOLTS



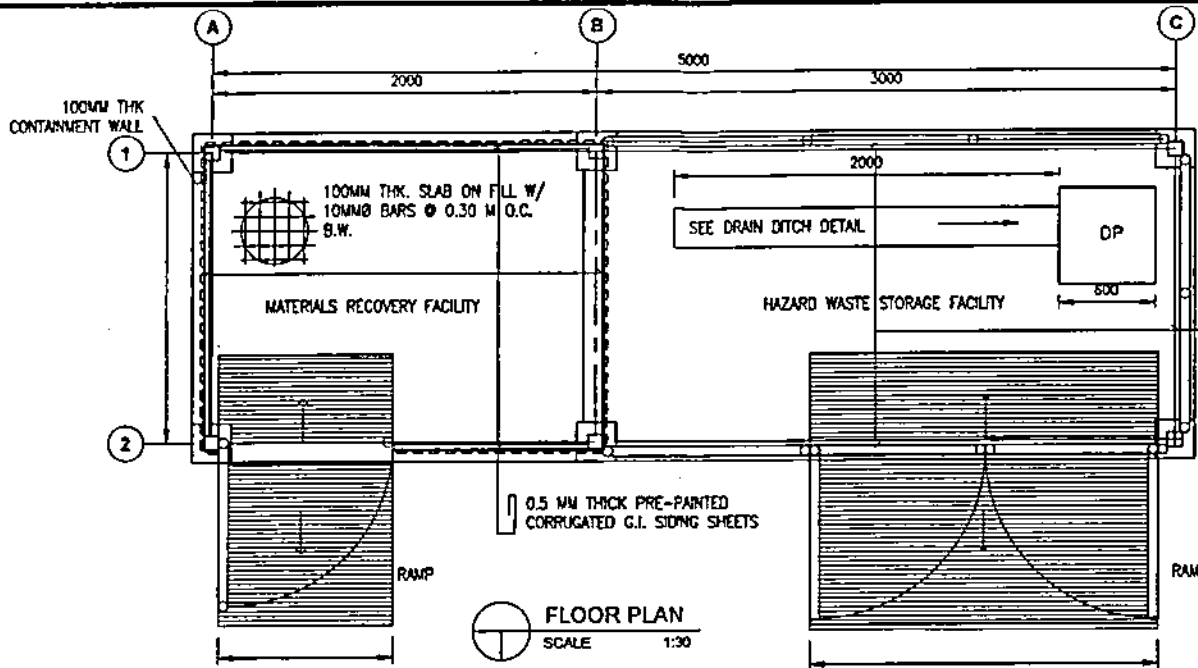
SECURITY GRILLE DETAIL
SCALE 1:100



PLAN DETAIL
SCALE 1:100

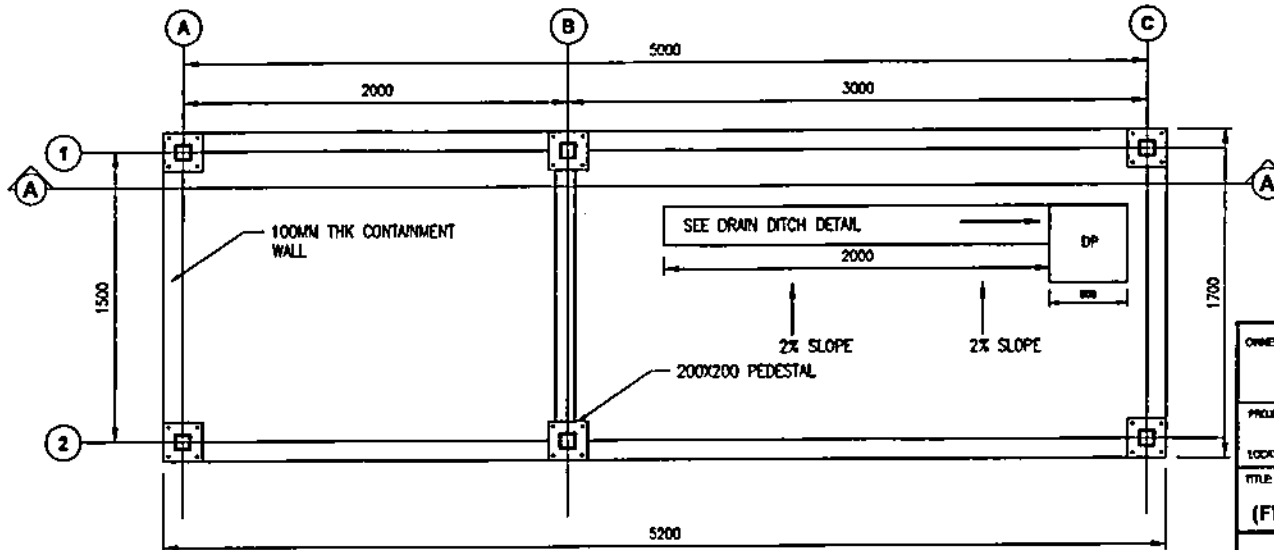
OWNER:				NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP					
LOCATION: BROY I, POBLACION, BALABAC PALAWAN					
TITLE: WAREHOUSE (SCHEDULE OF DOORS AND WINDOWS)					
DESIGNED BY	CHKD	DATE	SUBMITTED:	R. R. R. VILLANUEVA PRINCIPAL ARCHITECT, CEAD	
DRAWN	DUBOAS		RECOMMENDED:	A. C. ESPINILLO MANAGER, EOD	
REVIEWED	PRINCIPAL ENGR. / ARCHT.		APPROVED:	R. R. R. VILLANUEVA MANAGER, EOD	
CHECKED					
ELEC.					
MECH.					
DWG. NO. VFBD-BDA-17.006			SPEC. NO. LuzP21Z1326Sc		
SCALE: AS SHOWN			BID DRAWING		REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPR.




WIRE MESH ENCLOSURE SIDINGS AND STEEL DOOR: 50MMX 50MM GAGE #10 WIRE MESH HEAVY GALVANIZED ON 2"Ø STEEL PIPE FRAME SCHEDULE 40, INCLUDING LOCKSET, ACCESSORIES AND PAINTING.

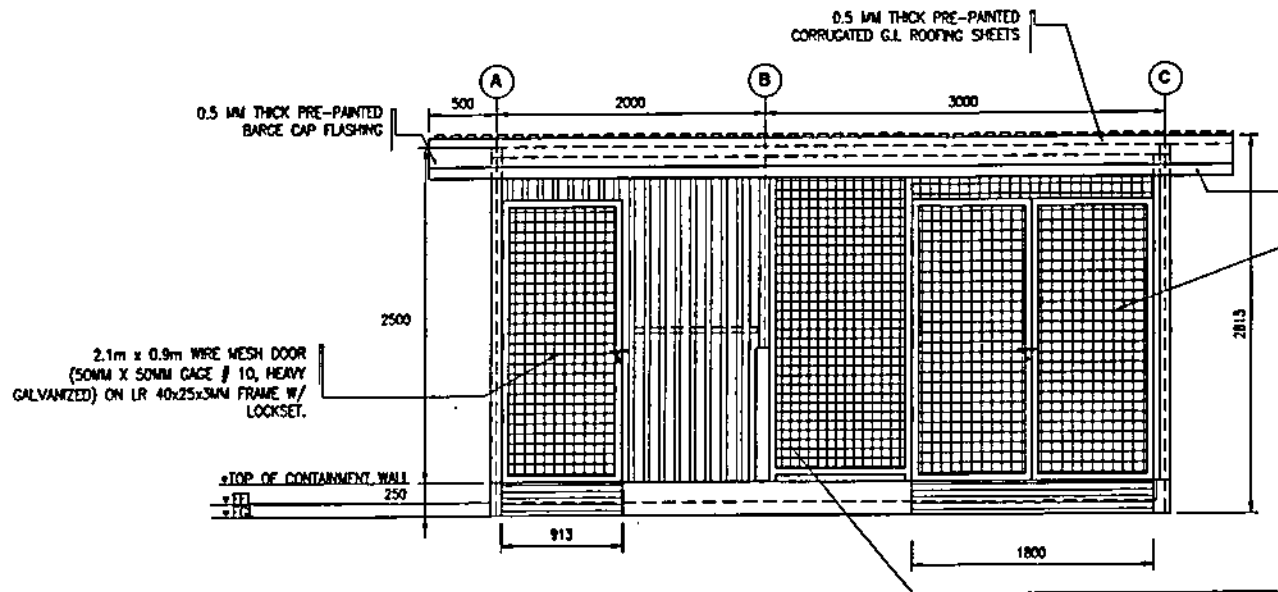
FLOOR PLAN
SCALE 1:30



CONCRETE PAD PLAN
SCALE 1:30

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY 1, POBLACION, BALABAC PALAWAN			
TITLE: HAZ-WASTE AND MATERIALS RECOVERY (FLOOR PLAN AND CONCRETE PAD PLAN)			
DESIGNED	BY	CHKD	DATE
DRAWN	BURZMAS		
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	
CIVIL/ARCHT		APPROVED	
ELEC.			
MECH.			
DWG. NO. VFBD-BDA-17.007		SPEC. NO. LuzP2121328Sc	
SCALE: AS SHOWN		BID DRAWING REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPL.



NOTES:

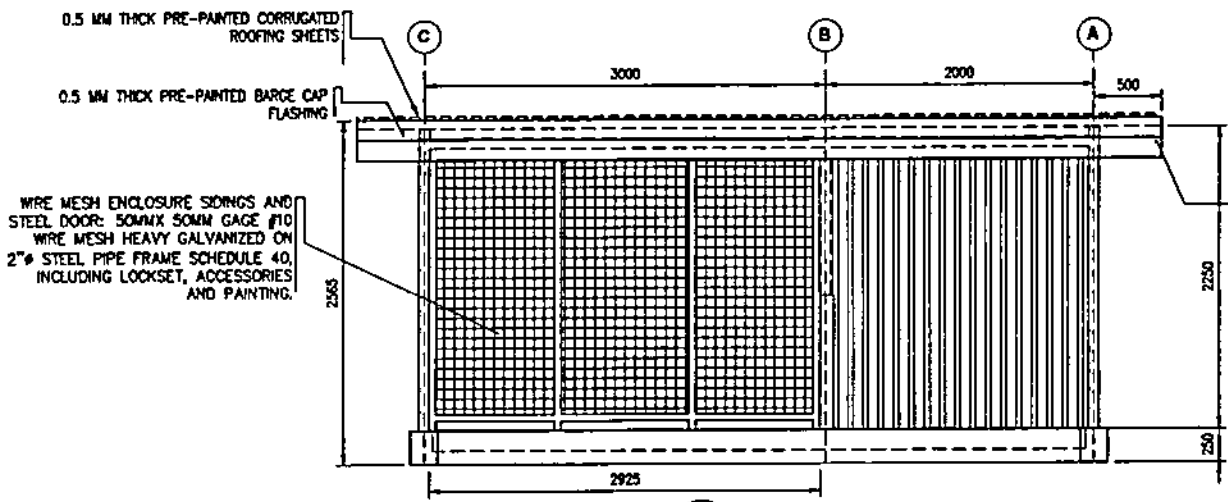
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. WORK THIS DRAWING WITH CIVIL & ELECTRICAL DRAWINGS.

1/2" x 12" x 12" FIBER CEMENT FASCIA BOARD

2 - 2.1m x 0.9m WIRE MESH DOOR (50MM X 50MM GAGE # 10, HEAVY GALVANIZED) ON LR 40x25x3MM FRAME W/ LOCKSET.

WIRE MESH ENCLOSURE SIDINGS AND STEEL DOOR: 50MM X 50MM GAGE #10 WIRE MESH HEAVY GALVANIZED ON 2" STEEL PIPE FRAME SCHEDULE 40, INCLUDING LOCKSET, ACCESSORIES AND PAINTING.


FRONT ELEVATION
SCALE 1:40



1/2" x 12" x 12" FIBER CEMENT FASCIA BOARD

WIRE MESH ENCLOSURE SIDINGS AND STEEL DOOR: 50MM X 50MM GAGE #10 WIRE MESH HEAVY GALVANIZED ON 2" STEEL PIPE FRAME SCHEDULE 40, INCLUDING LOCKSET, ACCESSORIES AND PAINTING.

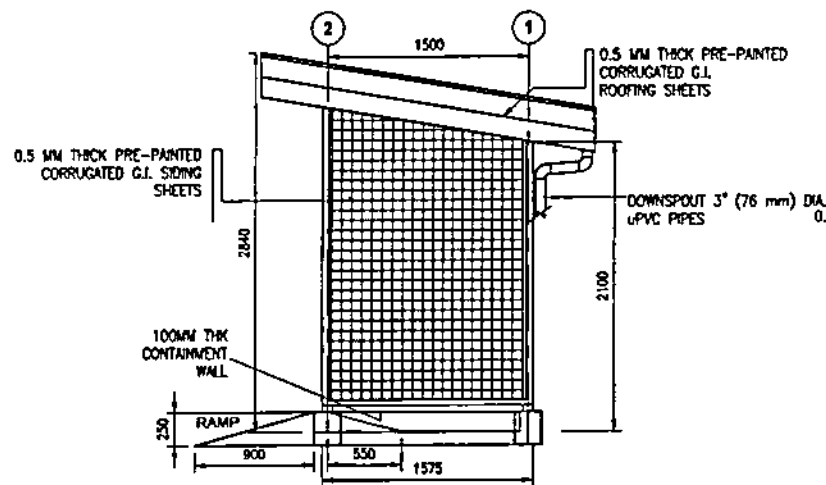
REAR ELEVATION
SCALE 1:40

OWNER:  NATIONAL POWER CORPORATION AGHAM ROAD, DILMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN SALABAG DPP LOCATION BRGY L, POBLACION, SALABAG PALAWAN	
TITLE: HAZ-WASTE AND MATERIALS RECOVERY FRONT AND REAR ELEVATION	
DESIGNED BY: [Signature]	SUBMITTED BY: R. R. R. VILLANUEVA PRINCIPAL ARCHITECT/LEAD
DRAWN BY: DUBOANE	RECOMMENDED BY: A. DESPILITO MANAGER/LEAD
REVIEWED BY: PRINCIPAL ENGR./ARCHT.	APPROVED BY: [Signature] ENGINEER/LEAD
CHECKED BY:	
ELEC.	
MECH.	

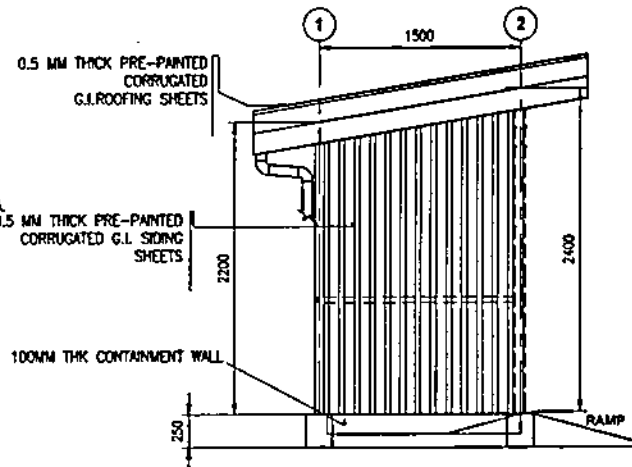
DWG. NO. VFBD-BDA-17,008 SPEC. NO. LuzP2121326Sc

REV.	DATE	DESCRIPTION OF REVISION	BY	CHKD.	RECD.	APPD.

SCALE: AS SHOWN **BID DRAWING** REV. 0




RIGHT SIDE ELEVATION
SCALE 1:40



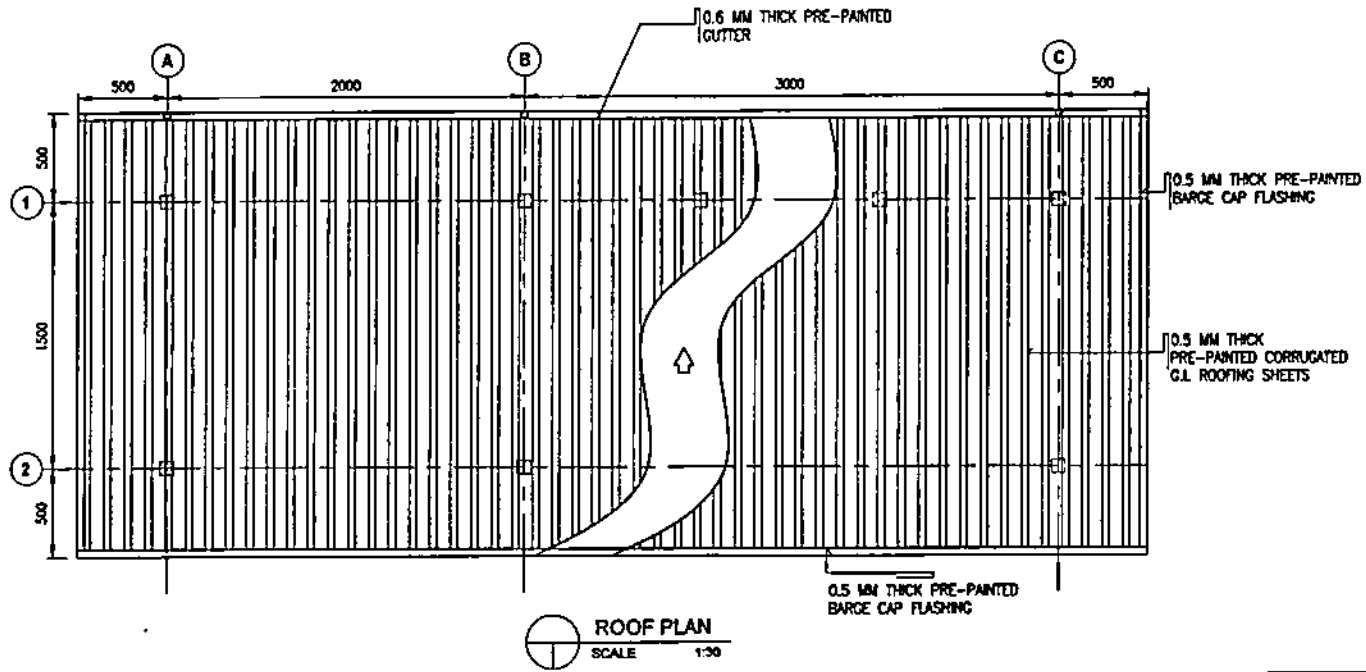
LEFT SIDE ELEVATION
SCALE 1:40

NOTES:


1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. WORK THIS DRAWING WITH CIVIL & ELECTRICAL DRAWINGS.

OWNER		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAG DPP			
LOCATION: BRGY 1, POBLACION, BALABAG PALAWAN			
TITLE: HAZ-WASTE AND MATERIALS RECOVERY SIDE ELEVATION			
DESIGNED	BY	CHKD	DATE
DRAWN	D.BOLINAS		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED	
ENCL. ARCHT.		MANAGER/LEAD	
ELEC.		APPROVED	
MECH.		MANAGER/LEAD	
DWG. NO. VFBD-BDA-17.009		SPEC. NO. LuzP21Z1326Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. #		REV. #	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.



ROOF PLAN
SCALE 1:30

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY I, POBLACION, BALABAC PALAWAN			
TITLE: HAZ-WASTE AND MATERIALS RECOVERY (ROOF PLAN)			
DESIGNED	BY	CHKD	DATE
DRAWN	DUBOUNG		
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	
ENLARGED		APPROVED	
ELEC.			
MECH.			
SUBMITTED:  R.R.R. VILLANUEVA PRINCIPAL ARCHT./A. ENGR.		RECOMMENDED:  R.R.R. VILLANUEVA MANAGER, ESD	
APPROVED:  R.R.R. VILLANUEVA MANAGER, ESD			
DWE NO. VFBD-BDA-17.010		SPEC NO. LuzP21Z1326Sc	
SCALE: AS SHOWN		BID DRAWING REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPR.

SECTION IX

BID DRAWINGS

CIVIL WORKS



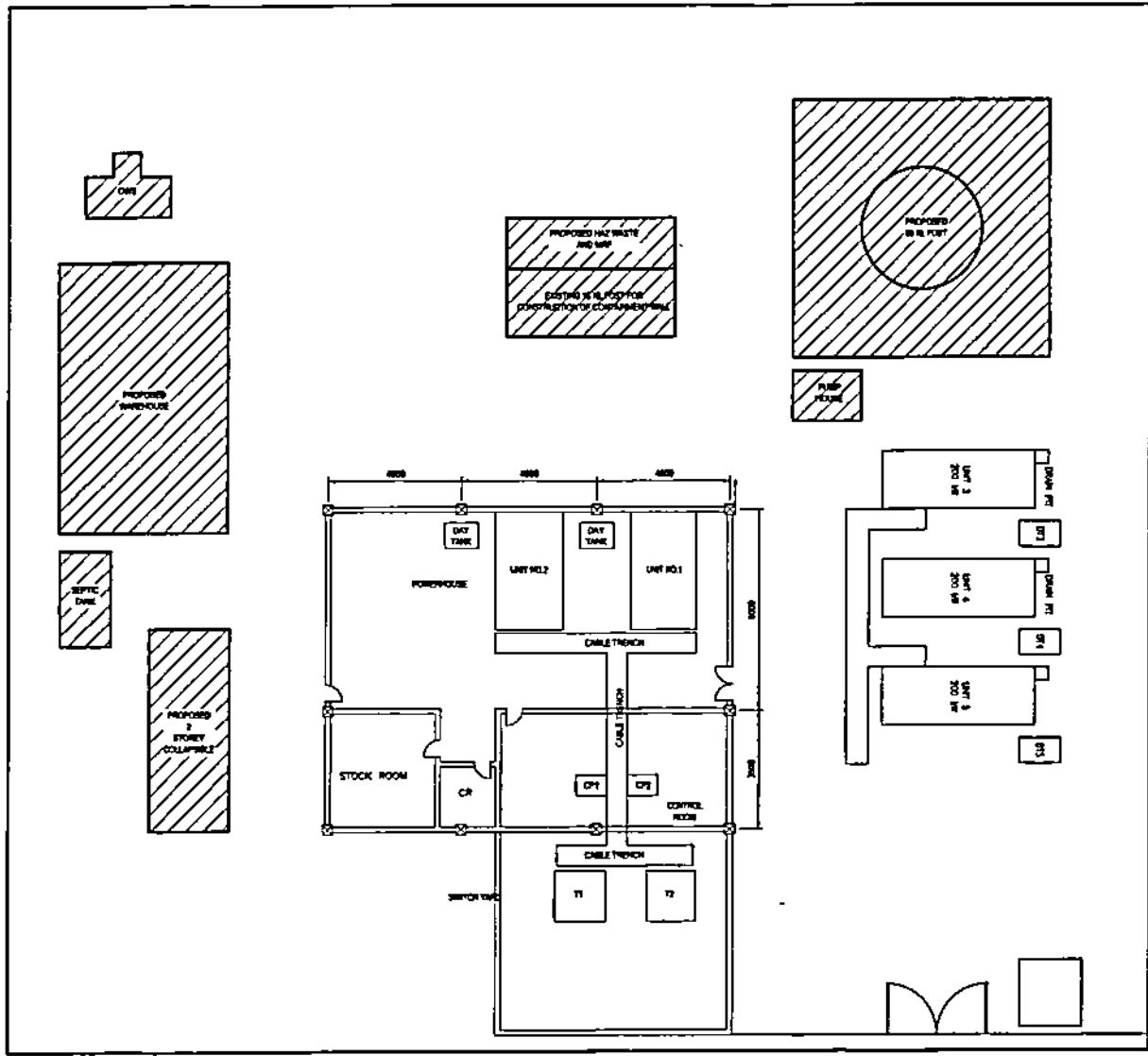
SECTION IX – BID/REFERENCE DRAWINGS**CW – CIVIL WORKS**

<u>DRAWING NO.</u>	<u>TITLE</u>
VFBD-BDC-13.001	SITE DEVELOPMENT PLAN (BALABAC DPP)
VFBD-BDC-13.002	FOUNDATION PLAN, PEDESTAL AND CONCRETE STEPS DETAILS
VFBD-BDC-13.003	STEEL STAIRS ELEVATION, DETAILS AND FOUNDATION
VFBD-BDC-13.004	SEPTIC TANK (PLAN, SECTION & DETAIL)
VFBD-BDC-13.005	WAREHOUSE (FOUNDATION AND ROOF FRAMING PLAN)
VFBD-BDC-13.006	WAREHOUSE (DETAILS OF C1-F1, C2-F2, WF-1)
VFBD-BDC-13.007	WAREHOUSE (RB AND LB DETAILS)
VFBD-BDC-13.008	WAREHOUSE (TYPICAL TRUSS ELEVATION)
VFBD-BDC-13.009	60 KL FUEL OIL STORAGE TANK (PLAN, SECTION & DETAILS)
VFBD-BDC-13.010	60 KL FUEL OIL STORAGE TANK (PLAN, SECTION & DETAILS)
VFBD-BDC-13.011	16 KL FUEL OIL STORAGE TANK CONTAINMENT WALL

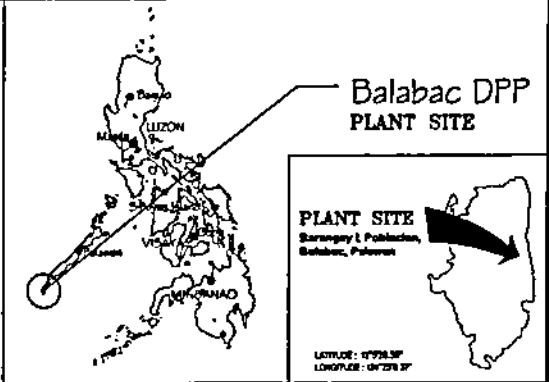


VFBD-BDC-13.012	TYPICAL DRAIN PIT, VALVE BOX & CONC. DITCH (PLAN & DETAILS)
VFBD-BDC-13.013	TYPICAL STEEL STAIR CASE DETAIL, PLAN & SECTION
VFBD-BDC-13.014	PUMP HOUSE PLAN & ELEVATION
VFBD-BDC-13.015	PUMP HOUSE FOUNDATION PLAN, SECTION & DETAILS
VFBD-BDC-13.016	PUMP HOUSE ROOF BEAM & ROOF SLAB, SECTION & DETAILS
VFBD-BDC-13.017	OIL WATER SEPARATOR (PLAN, SECTION & DETAILS)
VFBD-BDC-13.018	HAZ-WASTE AND MATERIALS RECOVERY (FOUNDATION & ROOF FRAMING PLAN)
VFBD-BDC-13.019	HAZ-WASTE AND MATERIALS RECOVERY (CONCRETE PAD, PEDESTAL AND CONTAINMENT WALL DETAILS)
VFBD-BDC-13.020	HAZ-WASTE AND MATERIALS RECOVERY (WALL FRAMING PLAN)
VFBD-BDC-13.021	HAZ-WASTE AND MATERIALS RECOVERY (DRAIN DITCH AND DRAIN PIT DETAILS)





SITE DEVELOPMENT
SCALE NTS



LOCATION MAP
NOT TO SCALE



NOTE:

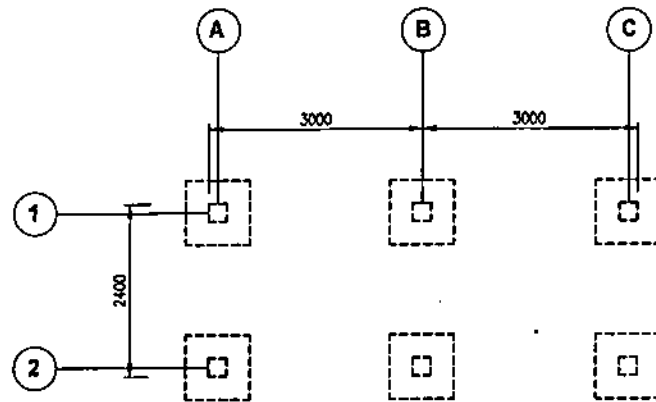
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. LOCATION OF BUNGHOUSE SHALL BE VERIFIED AT SITE

LEGENDS:

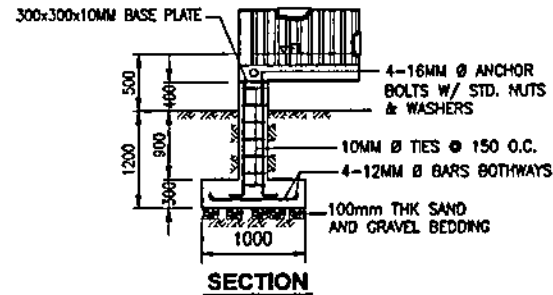
- EXISTING FACILITIES/STRUCTURE/EQUIPMENT
- PROPOSED STRUCTURES

OWNER		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY I, POBLACION, BALABAC PALAWAN			
TITLE: SITE DEVELOPMENT PLAN (BALABAC DPP)			
DESIGNED	BY	CHKD	DATE
DRAWN	DUBOJAS		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		RECOMMENDED:
CHECKED			APPROVED:
DATE			
DWG. NO. VFBD-BDC-17.001		SPEC. NO. LuzP21Z1326Sc	
SCALE: AS SHOWN		BID DRAWING	

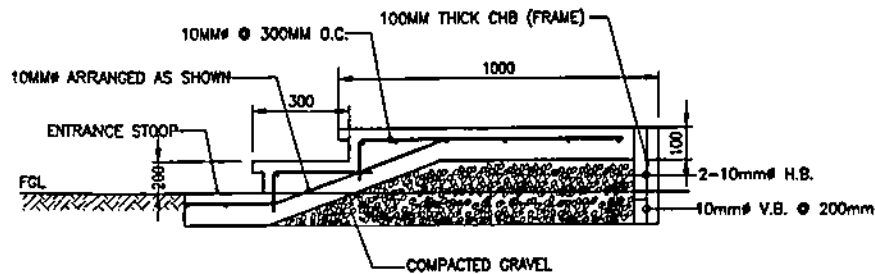
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



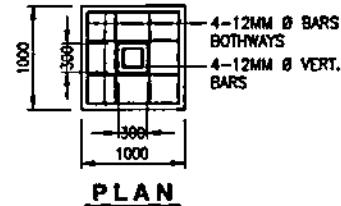
FOUNDATION PLAN
SCALE 1:100



SECTION




CONCRETE STEPS DETAIL
SCALE 1:75

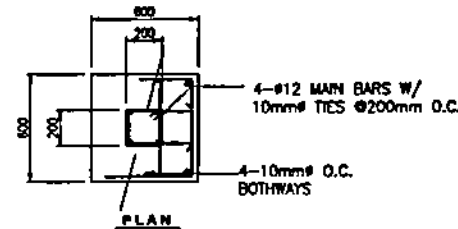
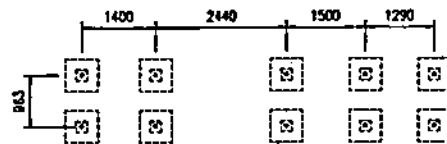
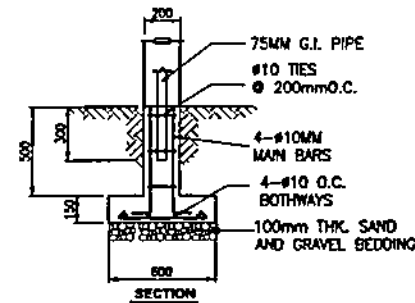
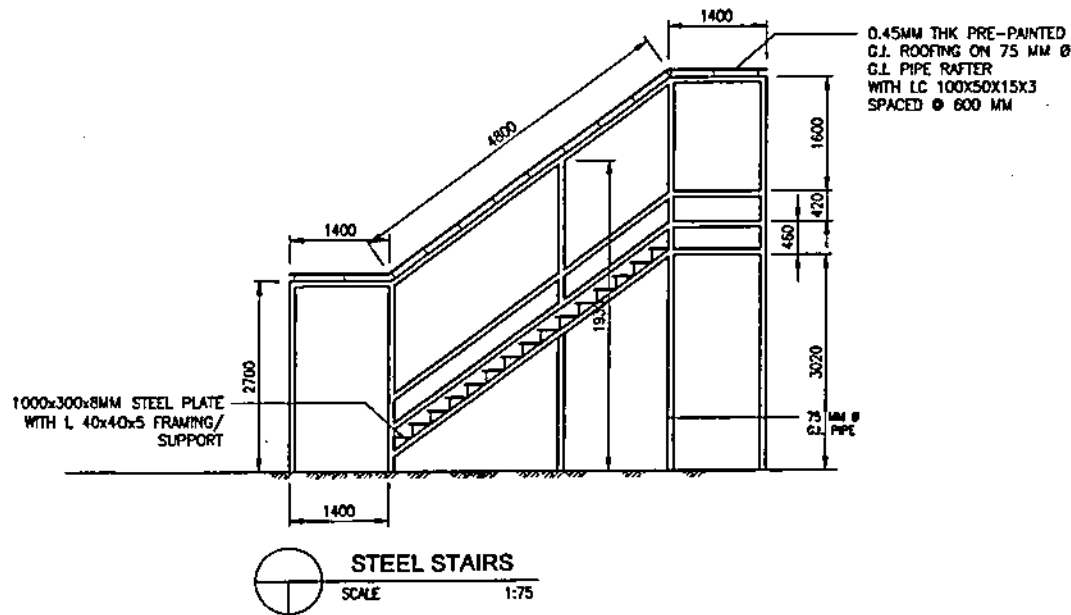


DETAILS OF PEDESTAL FOOTING
SCALE NTS

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. FOOTING DESIGN BASED ON ALLOWABLE SOIL PRESSURE OF 144 KPa AND TO BE VERIFY BASED ON ACTUAL SOIL CONDITION.
3. UNLESS OTHERWISE INDICATED IN THE PLANS OR NOTED IN THE SPECIFICATIONS, THE MINIMUM 28 DAY CYLINDER COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 20.7MPa FOR PEDESTAL AND 17.30 MPa FOR CONCRETEWALK.
4. UNLESS OTHERWISE INDICATED SPECIFIED IN THE PLANS, THE MINIMUM YIELD STRENGTH OF REINFORCEMENT TO BE USED SHALL BE GRADE 40 (276MPa).
5. ALL REINFORCING STEEL SHALL BE DETAILED AND PLACED IN CONFORMANCE WITH ACI-318.
6. ALL STRUCTURAL STEEL CONNECTIONS FOR STEEL STAIRS MUST BE DESIGNED BY THE CONTRACTOR.


OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY I, POBLACION, BALABAC, PALAWAN			
TITLE: FOUNDATION PLAN, PEDESTAL AND CONCRETE STEPS DETAILS			
DESIGNED	BY	CHKD	DATE
DRAWN	D.BOLINAS		
REVIEWED	PRINCIPAL ENGR, I.ARCHT.	RECOMMENDED	
ENLARGED		APPROVED	
D.E.C.			
MECL			
DWS NO. VFBD-BDC-13.002		SPEC NO. LUZP21Z13265c	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPD.	
SCALE: AS SHOWN		BID DRAWING	
		KEY: 0	

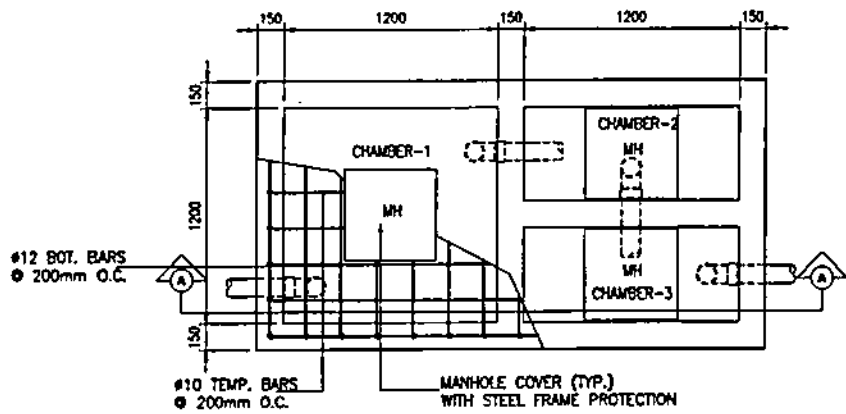


G.I. PIPE PEDESTAL PLAN AND DETAILS
SCALE 1:20

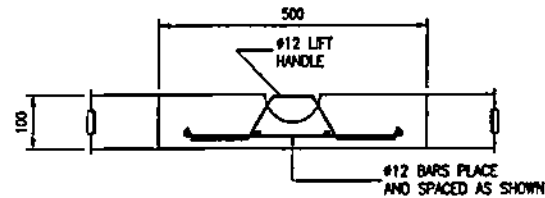
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. FOOTING DESIGN BASED ON ALLOWABLE SOIL PRESSURE OF 140 KPa AND TO BE VERIFY BASED ON ACTUAL SOIL CONDITION.
3. UNLESS OTHERWISE INDICATED IN THE PLANS OR NOTED IN THE SPECIFICATIONS, THE MINIMUM 28 DAY CYLINDER COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 20.7MPa FOR PEDESTAL.
4. UNLESS OTHERWISE INDICATED SPECIFIED IN THE PLANS, THE MINIMUM YIELD STRENGTH OF REINFORCEMENT TO BE USED SHALL BE GRADE 40 (276MPa).
5. ALL REINFORCING STEEL SHALL BE DETAILED AND PLACED IN CONFORMANCE WITH ACI-318.
6. ALL STRUCTURAL STEEL CONNECTIONS FOR STEEL STAIRS MUST BE DESIGNED BY THE CONTRACTOR.
7. USE STRUCTURAL GRADE STEEL SHAPES, BARS AND PLATES CONFORMING TO ASTM A36.
8. ALL WELDING WORKS SHALL BE IN ACCORDANCE OF THE LATEST EDITION OF THE AMERICAN WELDING SOCIETY.
9. ALL STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE AISC SPECIFICATION AND CODE OF STANDARD PRACTICE.

OWNER:				NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAG DDP					
LOCATION: BRGY I, POBLACION, BALABAG, PALAWAN					
TITLE: STEEL STAIRS ELEVATION, DETAILS AND FOUNDATION					
DESIGNED	BY	CHKD	DATE	SUBMITTED	<i>H.L. REMOZA</i> PRINCIPAL ENGINEER/LEAD
DRAWN	DUBOINS			RECOMMENDED	<i>A.C. SANTI</i> MANAGER/LEAD
REVIEWED	PRINCIPAL ENGR./ARCHT.			APPROVED	<i>H.L. REMOZA</i> MANAGER, EDD
CONTRACT					
MECH.					
CHAL. NO. VFB-D-13.003			SPEC. NO. LUZP21Z1326Sc		
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.
SCALE: AS SHOWN			BID DRAWING		REV. 0



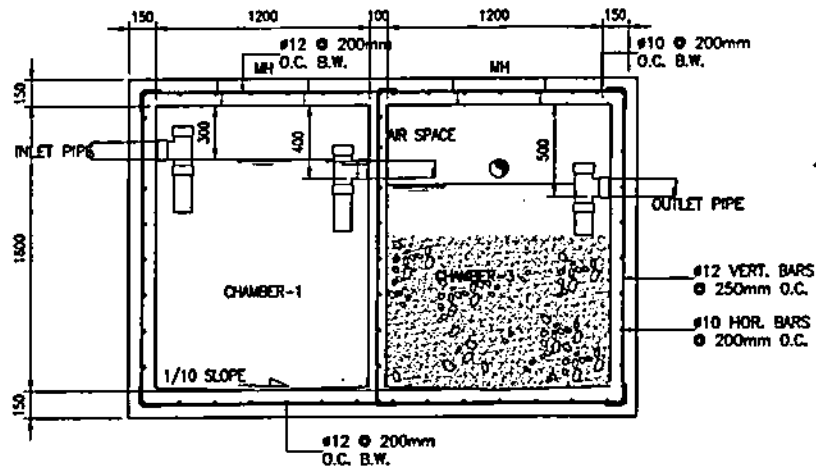
PLAN



SECTION 'B'

NOTES:

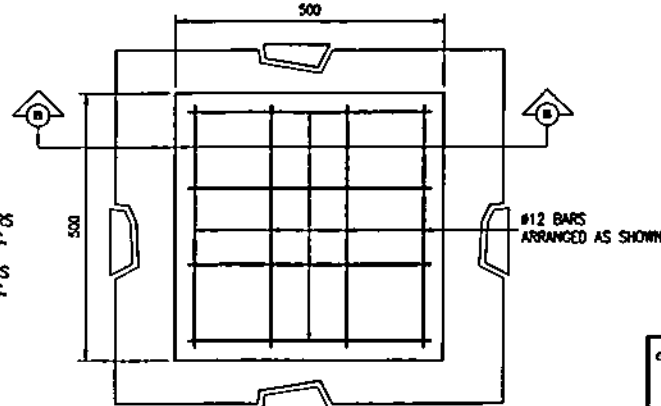
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED IN THE DRAWING.
2. USE 17.30MPa CONCRETE FOR ALL DRAINAGE APPURTENANT STRUCTURES UNLESS OTHERWISE INDICATED.
3. REINFORCING STEEL BARS SHALL CONFORM TO THE REQUIREMENTS OF THE PMS FOR DEFORMED STEEL BARS GRADE 275.
4. POLYVINYL CHLORIDE (PVC) PIPE SHALL BE UNPLASTICIZED CONFORMING TO ISO4433 OR EQUIVALENT.



SECTION 'A'


NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. LOCATION OF BUNKHOUSE SHALL BE VERIFIED AT SITE.



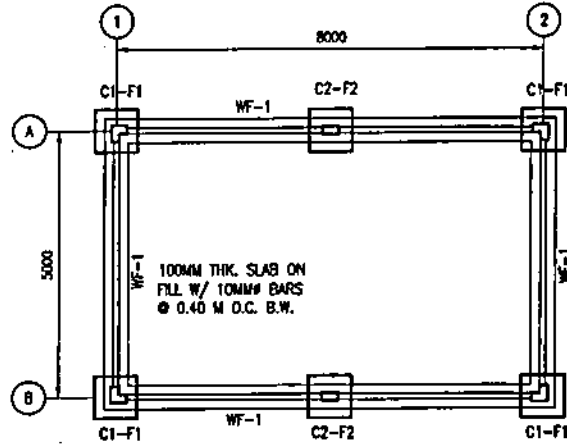
PLAN



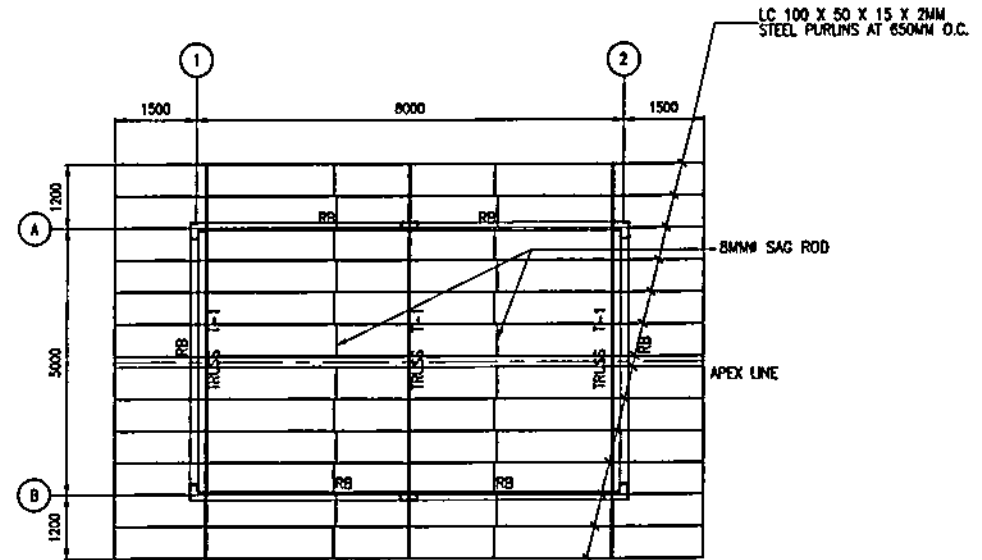
OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY I, POBLACION, BALABAC, PALAWAN			
TITLE: SEPTIC TANK (PLAN, SECTION & DETAIL)			
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	PRINCIPAL ENGR./ARCHT.		RECOMMENDED
CONSULTANT			APPROVED
ELEC.			
MEDICAL			
DWG. NO. VFB-D-BDC-13.004		SPEC. NO. LuzP21Z1326Sc	
REV.	DATE	NATURE OF REVISION	BY
SCALE AS SHOWN		BID DRAWING	
		REV. 0	

NOTES:


1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. WORK THIS WITH ARCHITECTURAL AND MECHANICAL DRAWINGS.



FOUNDATION PLAN
SCALE 1:100



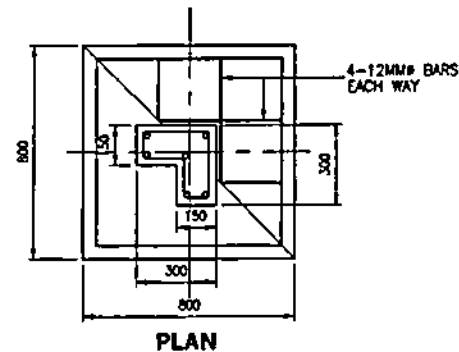
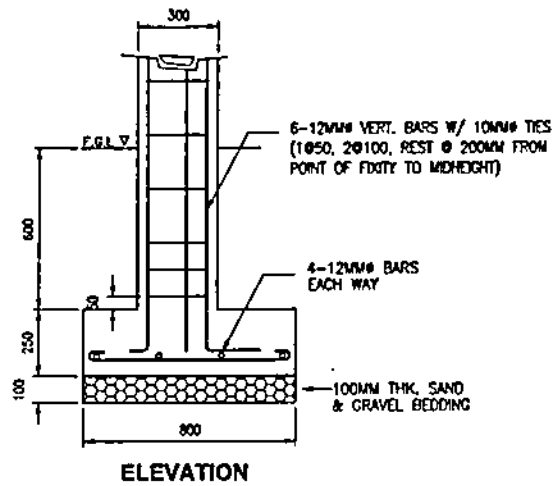
ROOF FRAMING PLAN
SCALE 1:100

OWNER:				NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP					
LOCATION: BRGY I, POBLACION, BALABAC PALAWAN					
TITLE: WAREHOUSE (FOUNDATION AND ROOF FRAMING PLAN)					
DESIGNED	BY	CHKD	DATE	SUBMITTED:	<i>H.L. MENDOZA</i> PRINCIPAL ENGINEER / LEAD
DRAWN	ALBUQUAS			RECOMMENDED:	<i>A.G. BASTU</i> MANAGER / LEAD
REVIEWED	PRINCIPAL ENGR. / ARCHT.			APPROVED:	<i>R. G. ...</i> MANAGER / OOO
CHECKED					
ELEC.					
MECH.					
DWG. NO. VFB0-BDC-17.005			SPEC. NO. LuzP21Z1326Sc		
SCALE: AS SHOWN			BID DRAWING		REV. 0

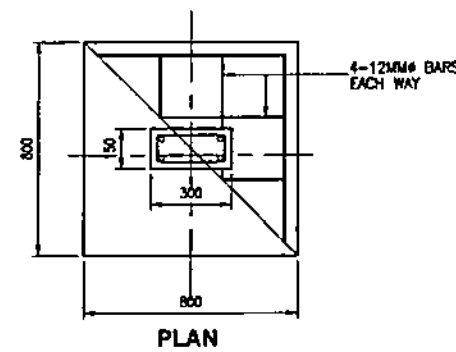
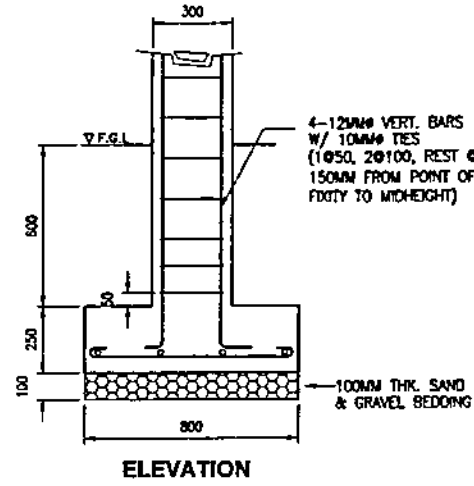
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.

NOTES:

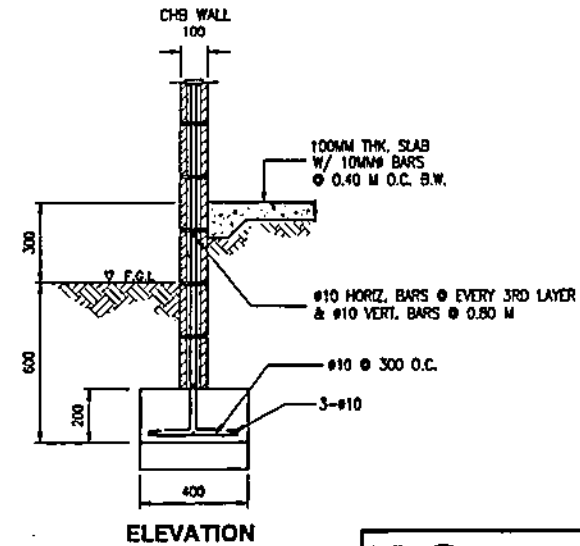
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE AT 28-DAY PERIOD SHALL BE 20.70 MPa (3000 PSI).
3. REINFORCING STEEL BARS SHALL CONFORM TO THE LATEST REQUIREMENTS OF PNS FOR DEFORMED STEEL BARS GRADE 275.
4. ALL ASPECTS OF CONSTRUCTION AND DETAILING OF REINFORCEMENTS SHALL BE IN ACCORDANCE WITH THE LATEST PROVISIONS OF ACI CODE.
5. DEGREE OF COMPACTION OF BACKFILL SHALL BE 90% OF RELATIVE DENSITY.




C1-F1
SCALE 1:20



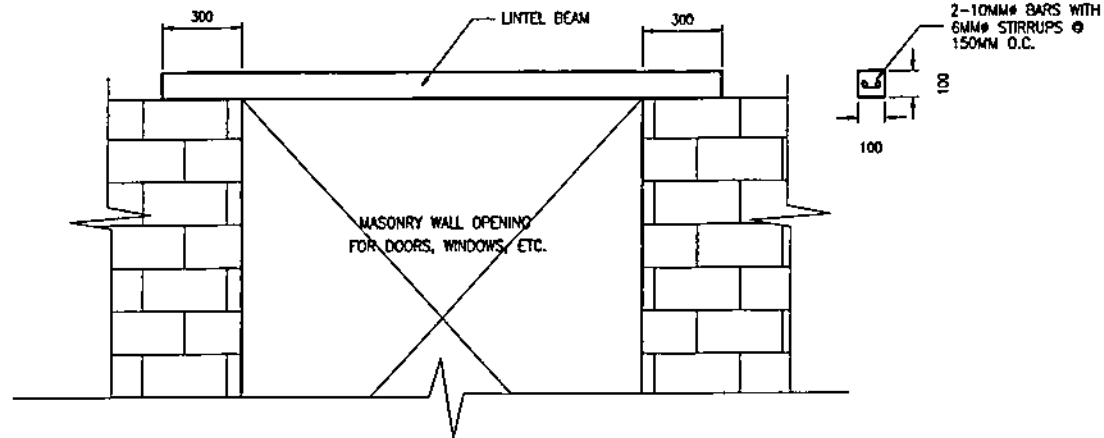
C2-F2
SCALE 1:20



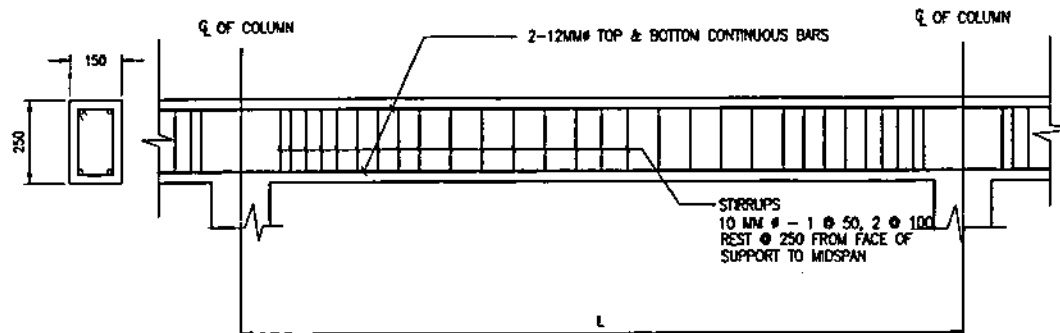
WF-1
SCALE 1:20

OWNER:				NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP					
LOCATION: BIRGY I, POBLACION, BALABAC PALAWAN					
TITLE: WAREHOUSE (DETAILS OF C1-F1, C2-F2, WF-1)					
DESIGNED	BY	CHKD	DATE	SUBMITTED:	<i>H.L. MENDOZA</i> PRINCIPAL ENGINEER & CHD
DRAWN	DURQUAN			RECOMMENDED:	<i>A. SORIANO</i> SUPERVISOR
REVIEWED	PRINCIPAL ENGR. (ARCHT.)			APPROVED:	<i>H.L. MENDOZA</i> MANAGER, DCD
OVERSIGHT					
ELEC.					
MECH.					
DWD NO. VFB-D-DC-17.006			SPEC. NO. LUZP21Z1326Sc		
SCALE: AS SHOWN			BID DRAWING		REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPR.




TYPICAL LINTEL BEAM (LB) DETAILS
SCALE 1:20



TYPICAL ROOF BEAM (RB) DETAILS
SCALE NTS

NOTES:

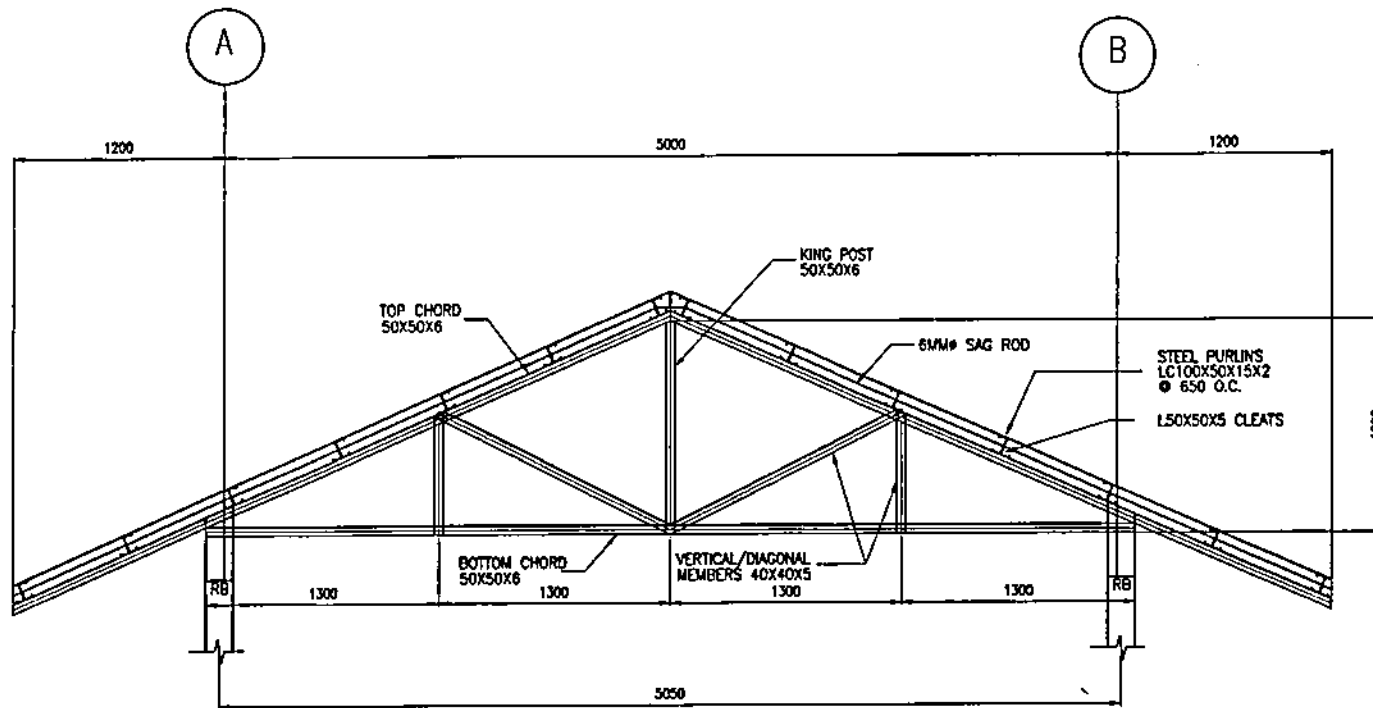
1. DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 20.70 MPa AT 28 DAYS PERIOD.
3. REINFORCING STEEL BARS SHALL CONFORM TO THE LATEST REQUIREMENTS OF PNS FOR DSB GRADE 275.
4. ALL ASPECTS OF CONSTRUCTION AND DETAILING OF REINFORCEMENTS SHALL BE IN ACCORDANCE WITH THE LATEST ACI CODE.
5. MASONRY WALL OPENINGS FOR DOORS, WINDOWS, ETC. SHALL BE PROVIDED WITH R.C. LINTELS TO SUPPORT WALLS ABOVE THE OPENINGS.

OWNER:				NATIONAL POWER CORPORATION AGHAM ROAD, DRILMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP					
LOCATION: BRGY 1, POBLACION, BALABAC PALAWAN					
TITLE: WAREHOUSE (RB AND LB DETAILS)					
DESIGNED	BY	CHKD	DATE	SUBMITTED:	<i>H.L. MENDOZA</i> PRINCIPAL ENGINEER, LEAD
DRAWN	CHKD			RECOMMENDED:	<i>A.C. ESPRITU</i> MANAGER, LEAD
REVIEWED	PRINCIPAL ENGR./ARCHT.			APPROVED:	<i>H.C. SORIANO</i> MANAGER, OOO
CIVIL/ARCHT					
ELEC.					
MECH.					
DWG. NO. VFB-DGC-17.007			SPEC. NO. LuzP2121328Sc		
SCALE: AS SHOWN			BID DRAWING		REV. 0


REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

NOTES:

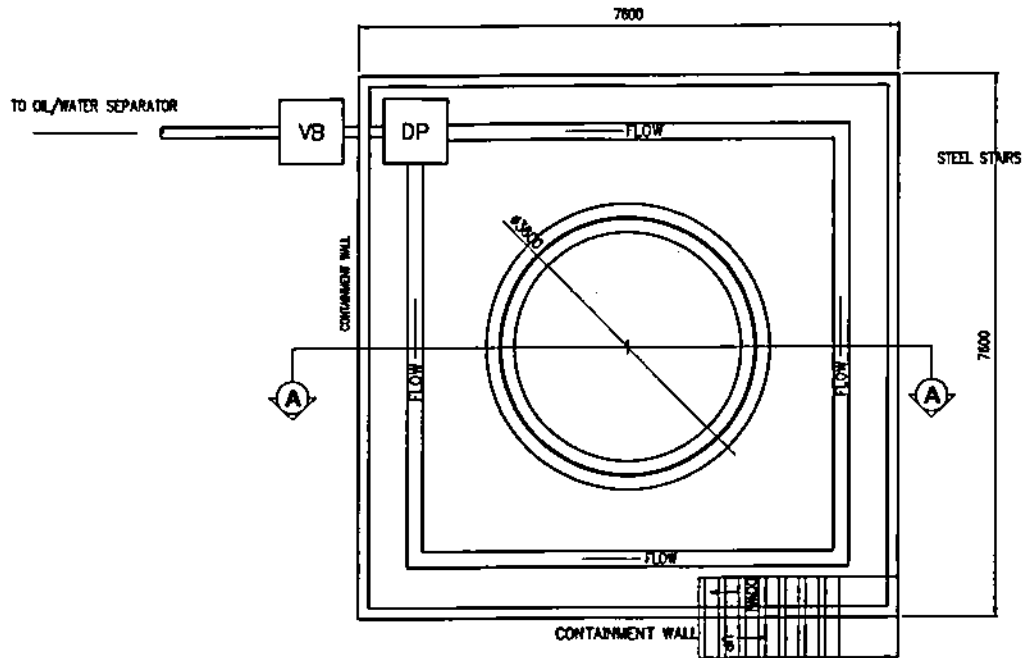
1. DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. USE STRUCTURAL GRADE STEEL SHAPES, BARS AND PLATES CONFORMING TO ASTM A36.
3. WELDING SHALL CONFORM TO E70 SERIES OF SPECIFICATIONS FOR MILD STEEL ARC WELDING ELECTRODES ASTM A233, LATEST EDITION.
4. ALL STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE AISC SPECIFICATIONS AND CODE OF STANDARD PRACTICE.



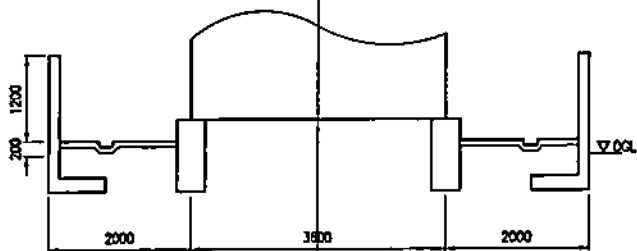
TYPICAL TRUSS ELEVATION
SCALE 1:30

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP LOCATION: BRGY I, POBLACION, BALABAC PALAWAN			
TITLE: WAREHOUSE (TYPICAL TRUSS ELEVATION)			
DESIGNED	BY	CHKD	DATE
DRAWN	DUBOUMS		
REVIEWED	PRINCIPAL ENGR./ARCHT.		RECOMMENDED
CIVIL/ARCHT			
ELEC.			
MECH			
SUBMITTED:		H. L. BENDOZA PRINCIPAL ENGINEER/CEAD	
RECOMMENDED:		C. S. BRITU MANAGER/CEAD	
APPROVED:		F. S. BENDICENA MANAGER/DOO	
DWG. NO. VFBD-BDC-17.008		SPEC. NO. LuzP21Z1326Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. #		REV. #	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



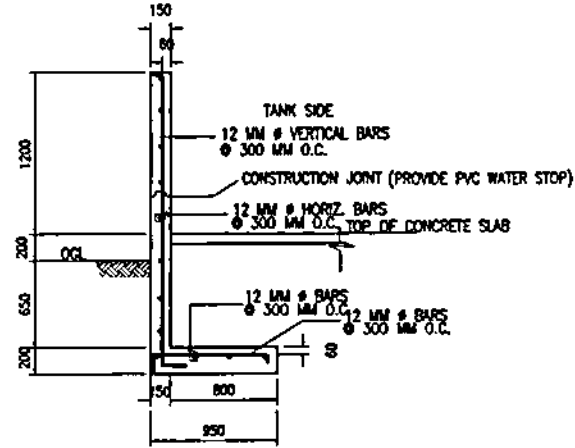
PLAN
SCALE 1:75




SECTION THRU A
SCALE 1:75

NOTES:

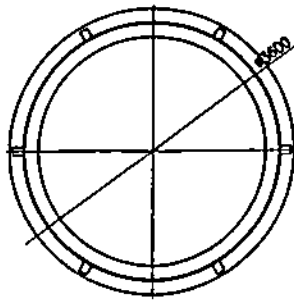
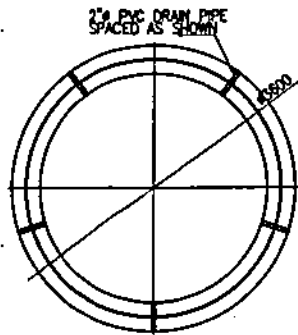
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. LOCATION OF BUNKHOUSE SHALL BE VERIFIED AT SITE.



CONTAINMENT WALL SECTION & DETAILS
SCALE 1:40

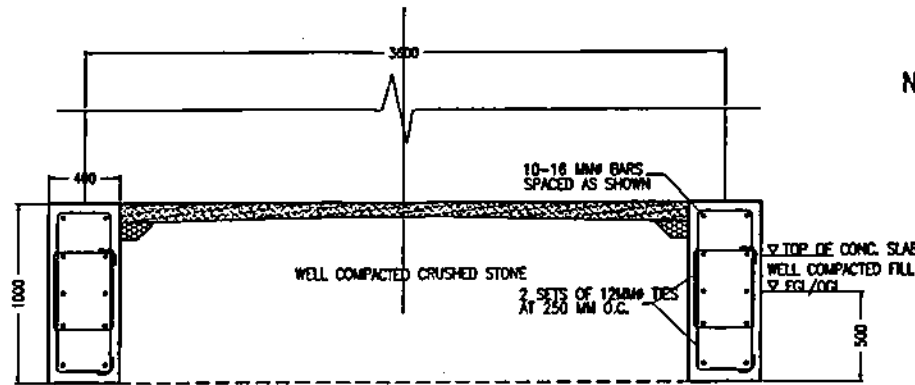
OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN SALABAC DPP			
LOCATION: BRGY 4, POBLACION, BALABAC PALAWAN			
TITLE: 60 KL FUEL OIL STORAGE TANK (PLAN, SECTION & DETAILS)			
DESIGNED	BY	CHKD	DATE
DRAWN	DATE		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED:	
CONTRACT		APPROVED:	
RECD			
DRG. NO. VFBD-BDC-17.009		SPECS. NO. L12P21Z1326Sc	
SCALE: AS SHOWN		BID DRAWING REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPL.



DRAIN PLAN
SCALE 1:75

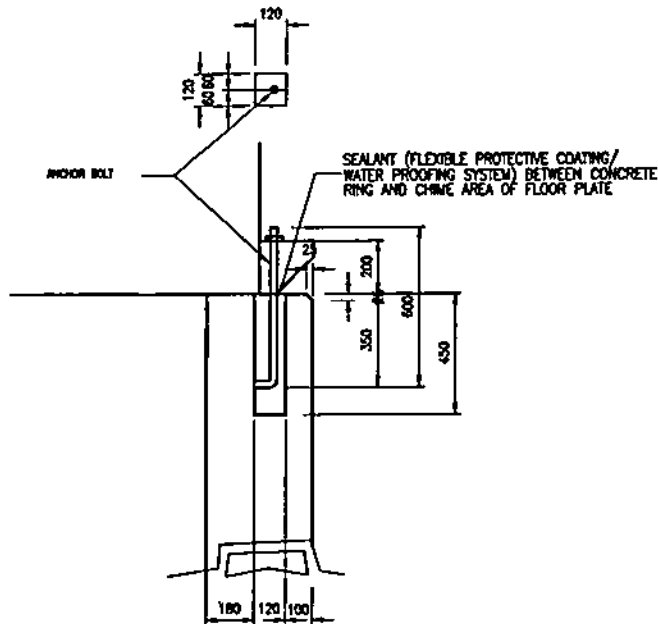
PLAN (BLOCKOUTS)
SCALE 1:75



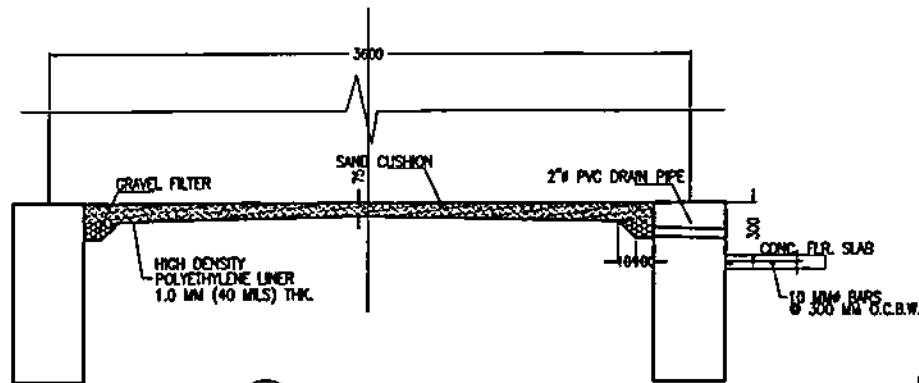
FOUNDATION SECTION
SCALE 1:30

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE IS $f_c = 20.7 \text{ MPa}$ (3,000 psi).
3. REINFORCING STEEL BARS SHALL CONFORM TO THE REQUIREMENTS THE PHILIPPINE NATIONAL STANDARD (LATEST EDITION) FOR DEFORMED BARS GRADE 275.
4. ASSUMED ALLOWABLE BEARING CAPACITY IS 180 KPa WITHOUT THE PRESENCE OF WATER TABLE.
5. FINAL LAYOUT AND DETAILS OF ANCHOR BOLTS AND TANK SHELL INCLUDING ALL MECHANICAL AND PIPING SYSTEMS WILL BE REFERRED RELEVANT MECHANICAL DRAWINGS.
6. PVC DRAIN PIPES SHALL BE PROVIDED WITH DEPENDABLE SCREENS HOLD THE GRAVEL FILTER FROM PASSING THROUGH.
7. ALL ANCHOR BOLT BLOCKOUTS SHALL BE FILLED WITH CEMENT.
8. WORK THIS DRAWING WITH MECHANICAL DRAWINGS.



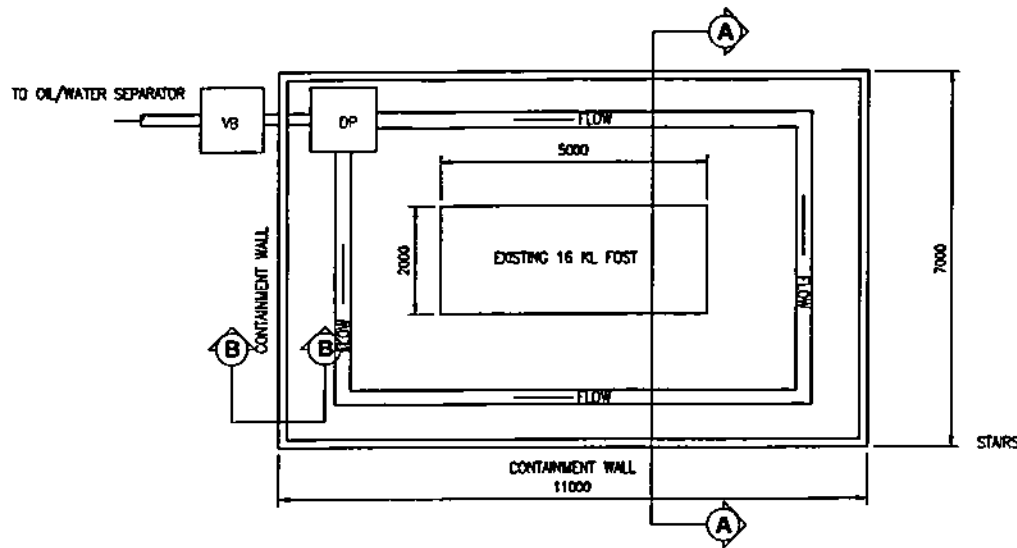
BLOCKOUT DETAILS
SCALE 1:20



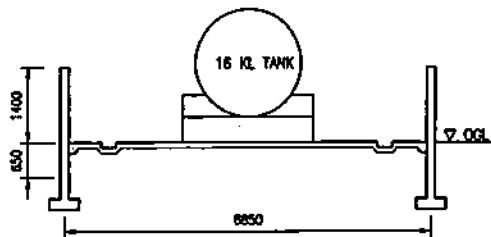
DRAIN SECTION
SCALE 1:30

OWNER:		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAG OPP			
LOCATION: BRGY 4, POBLACION, BALABAG PALAWAN			
TITLE: 60 KL FUEL OIL STORAGE TANK (FOUNDATION PLAN, SECTION & DETAILS)			
DESIGNED BY	CHKD	DATE	SUBMITTED BY <i>M.L. MENDOZA</i> PRINCIPAL ENGINEER / LEAD
DRAWN BY DILIGAN			
REVIEWED BY PRINCIPAL ENGR / ARCHT.			RECOMMENDED BY <i>A.C. SORIANO</i> ARCHITECT
CONTRACTOR			APPROVED BY <i>M.L. MENDOZA</i> ENGINEER
ELEC.			
MECH.			
DWG. NO. VFBD-BDC-17.010		SPEC. NO. L122P21Z1328Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. 0		REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPL.



PLAN
SCALE 1:100



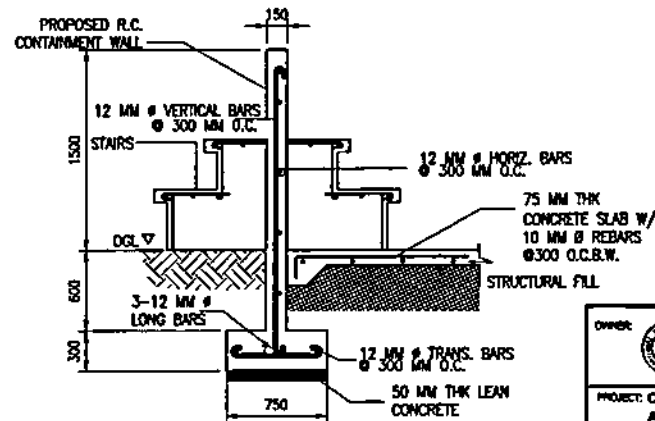
SECTION THRU A-A
SCALE 1:100

LEGEND:


DP - DRAIN PIT
VB - VALVE BOX

NOTES:

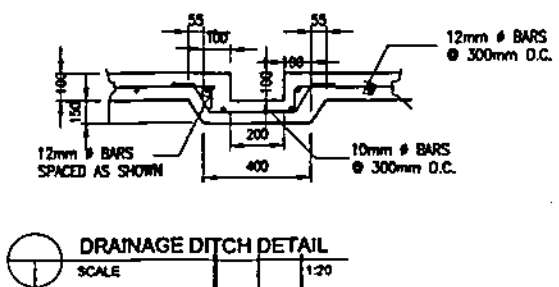
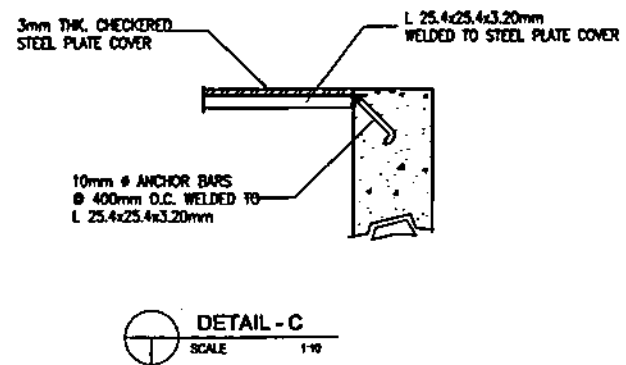
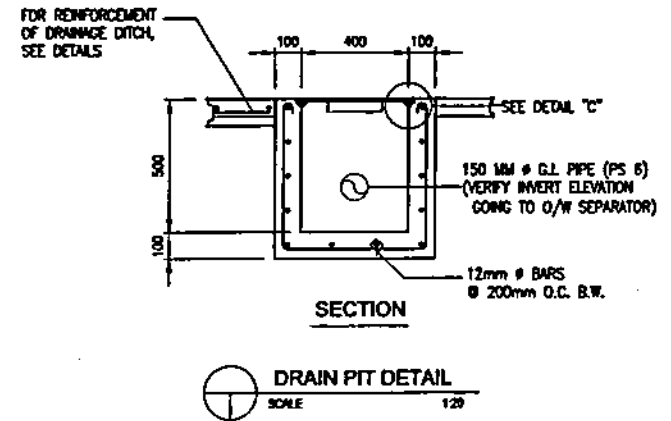
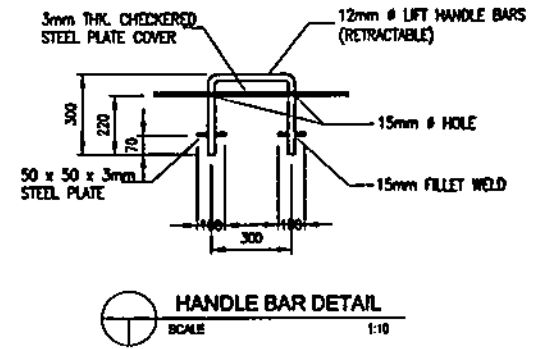
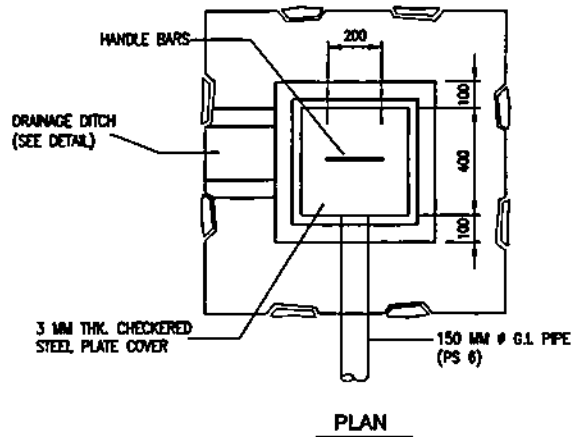
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE SHALL BE $f_c = 20.70$ MPa AT 28 DAYS PERIOD.
3. ALL REINFORCING BARS SHALL CONFORM TO THE LATEST REQUIREMENTS OF PHS FOR DSB GRADE 275.
4. ALL ASPECTS OF CONSTRUCTION AND DETAILING OF REINFORCEMENTS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE ACI CODE.



SECTION THRU B-B
SCALE 1:40

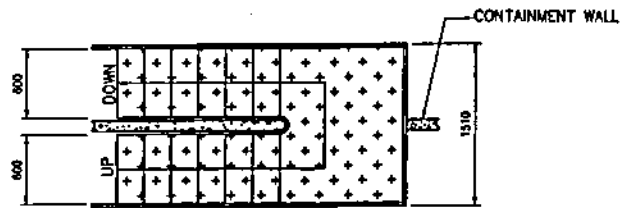
 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY			
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP LOCATION: BRGY 1, POBLACION, BALABAC PALAWAN			
TITLE: 16 KL FUEL OIL STORAGE TANK CONTAINMENT WALL			
DESIGNED	BY	CHKD	DATE
DRAWN	DURING		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED:	
CHECKED		APPROVED:	
MECH.			
DWR. NO. VFBD-SDC-17.011		SPEC. NO. LuzP21Z1326Sc	
SCALE: AS SHOWN		BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



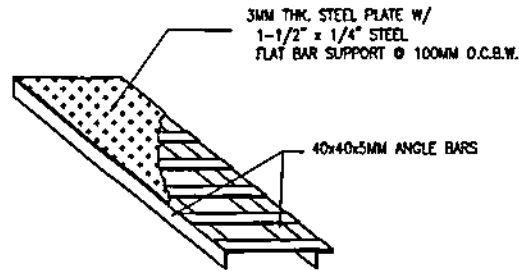
OWNER		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DFP			
LOCATION: BRGY L, POBLACION, BALABAC PALAWAN			
TITLE: TYPICAL DRAIN PIT, VALVE BOX & CONC. DITCH (PLAN & DETAILS)			
DESIGNED	BY	CHKD	DATE
DRAWN	D.SOLDS		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED	
CHECKED		APPROVED	
ELEC.			
MECH.			
DRAWN NO. VFB-D-17.012		SPECS NO. LUZP21Z1326Sg	
SCALE: AS SHOWN		BID DRAWING REV. 0	

REV	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPL



PLAN

SCALE 1:50

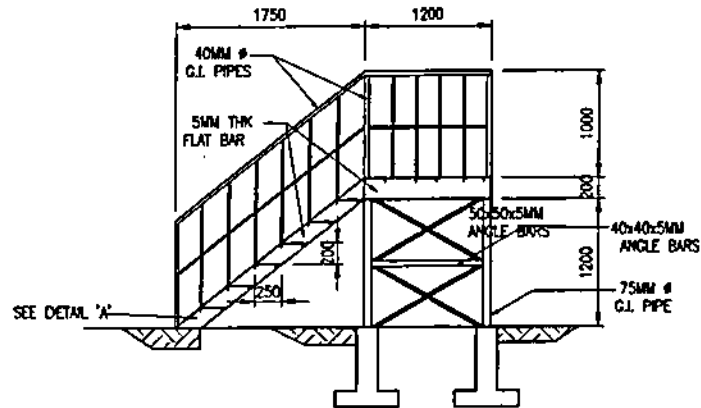


SECTION 'A'

SCALE 1:20

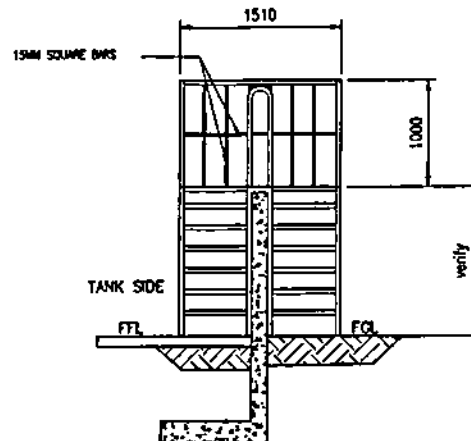
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. USE STRUCTURAL GRADE STEEL SHAPES, BARS AND PLATES CONFORMING TO ASTM A36.
3. ALL WELDING WORKS SHALL BE IN ACCORDANCE OF THE LATEST EDITION OF THE AMERICAN WELDING SOCIETY.
4. ALL STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE AISC SPECIFICATION AND CODE OF STANDARD PRACTICE.



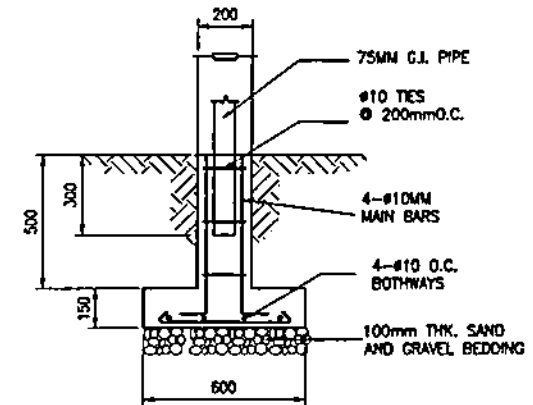
SIDE ELEVATION

SCALE 1:50



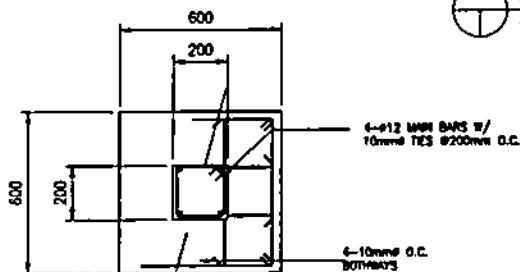
FRONT ELEVATION

SCALE 1:50




SECTION

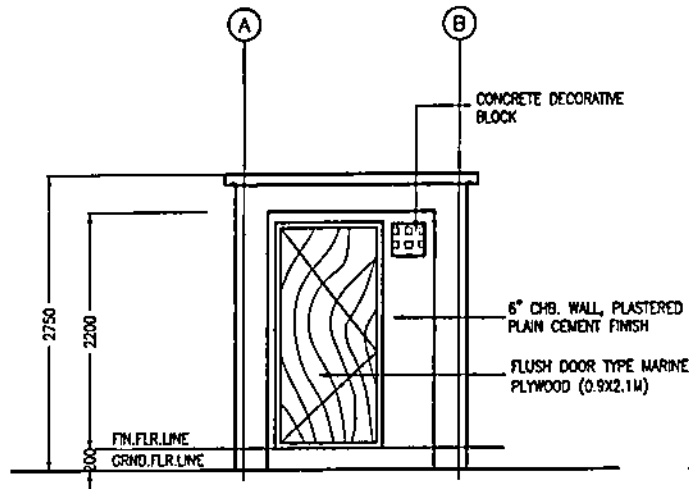
STEEL STAIRCASE DETAIL
SCALE AS SHOWN



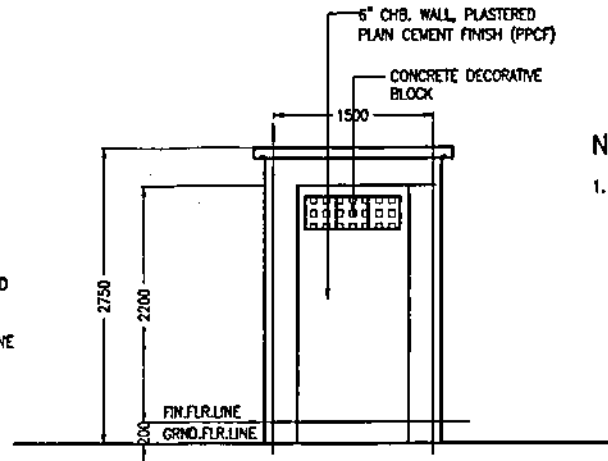
PLAN

OWNER		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY I, POBLACION, BALABAC PALAWAN			
TITLE: TYPICAL STEEL STAIR CASE DETAIL PLAN & SECTION			
DESIGNED	BY	CHKD	DATE
DRAWN	DIBUJING		
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	
CHECKED		APPROVED	
ELEC.			
MECH.			
DWG. NO. VFBD-BDC-17.013		SPECS NO. LuzP21Z1326Sc	
SCALE: AS SHOWN		BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



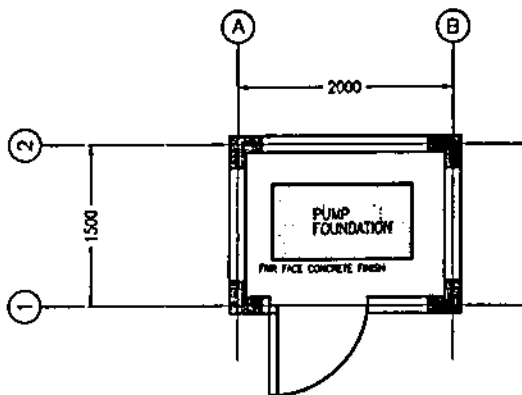
FRONT ELEVATIONS
SCALE 1:50



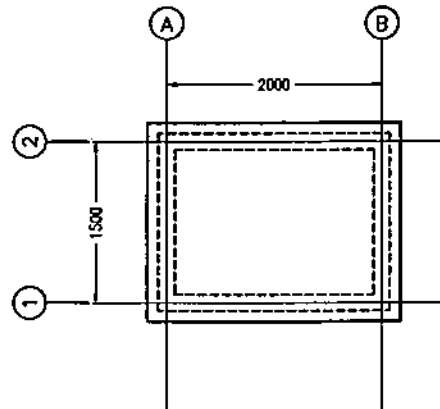
SIDE ELEVATIONS
SCALE 1:50

NOTES:


1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.



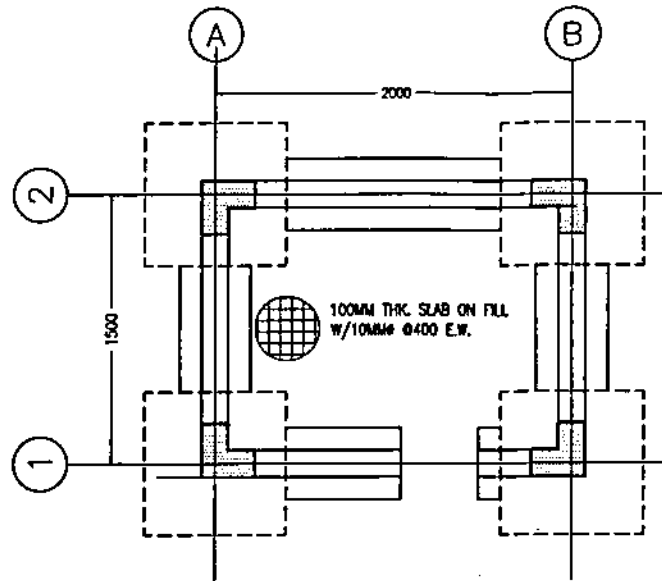
PLAN
SCALE 1:50



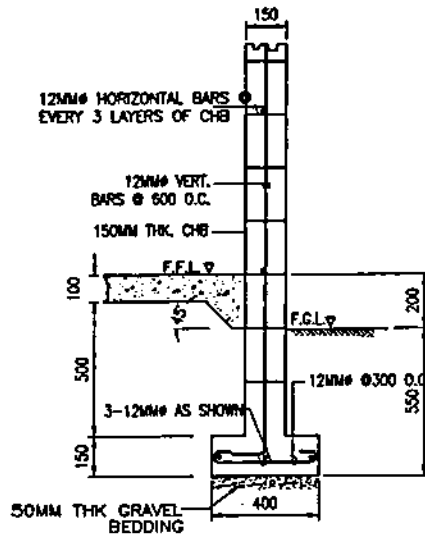
ROOF PLAN
SCALE 1:50

OWNER		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY I, POBLACION, BALABAC PALAWAN			
TITLE: PUMP HOUSE PLAN & ELEVATION			
DESIGNED	BY	CHKD	DATE
DRAWN	DUROLAS		
REVIEWED	PRINCIPAL ENGR./ARCHT.		RECOMMENDED:
CHECKED/ARCHT			MANAGER/CEAD
ELEC.			APPROVED:
MECH.			MANAGER, DCO
DWG. NO. VFB0-BDC-17.014		SPEC. NO. LuzP21Z1326S0	
SCALE: AS SHOWN		BID DRAWING	

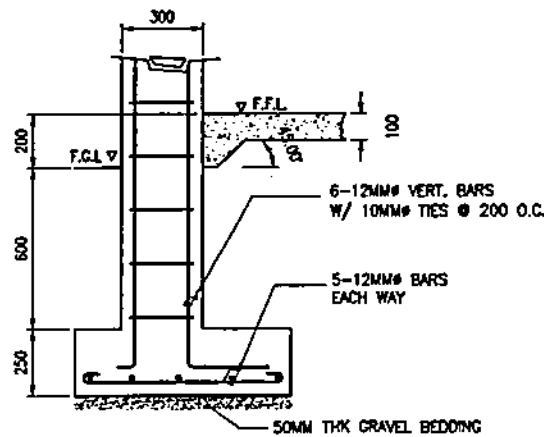
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPL.



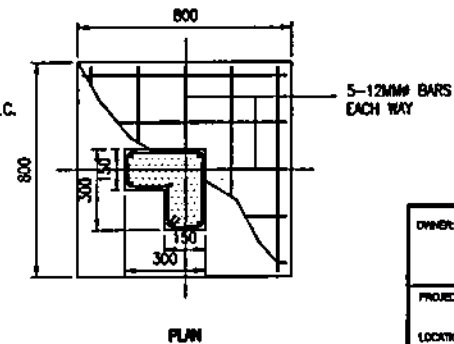
FOUNDATION PLAN
SCALE 1:30



WALL SECTION
SCALE 1:20




ELEVATION
SCALE 1:20

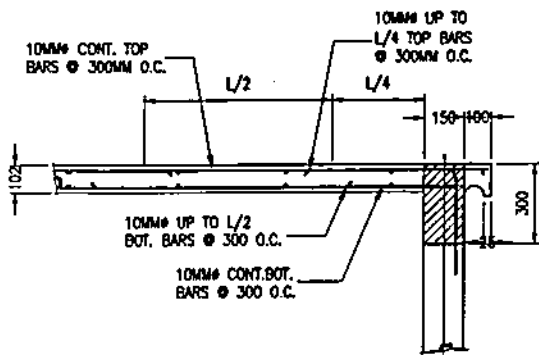


COLUMN FOOTING
SCALE 1:20

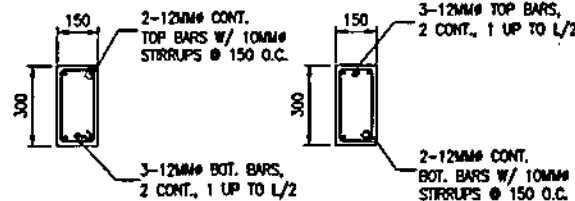
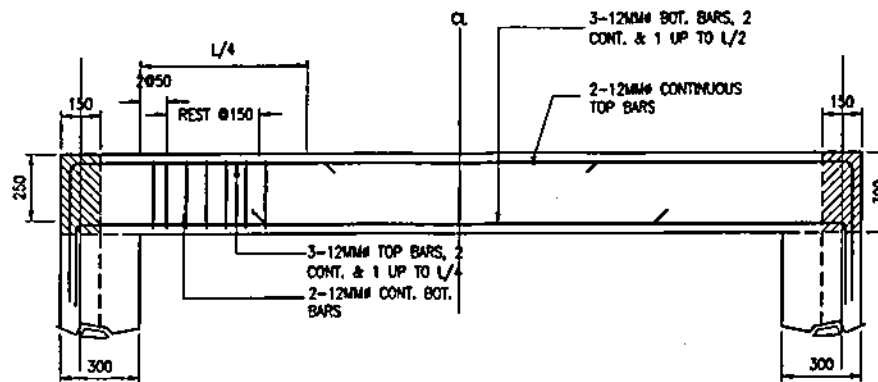
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE SHALL BE $F_c = 20.70$ MPA @ 28 DAYS PERIOD.
3. REINFORCING BARS MUST CONFORM TO THE LATEST PHS FOR DSB GRADE 275.
4. ENGINEERED FILL TO BE COMPACTED TO 95% MAXIMUM DRY DENSITY TO ACHIEVE A MINIMUM BEARING CAPACITY OF 14,670 KG/SQ.M.
5. ALL ASPECTS OF CONSTRUCTION AND DETAILING OF REINFORCEMENTS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE ACI CODE.

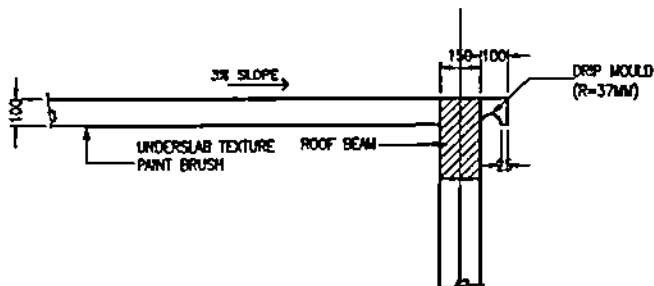
OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY I, POBLACION, BALABAC PALAWAN			
TITLE: PUMP HOUSE FOUNDATION PLAN, SECTION & DETAILS			
DESIGNED	BY	CHKD	DATE
DRAWN	DATE	SUBMITTED: <i>H.L. MENDOZA</i> PRINCIPAL ENGINEER, LEAD	
REVIEWED	PRINCIPAL ENGR. I. RIGHT.	RECOMMENDED: <i>M.C. ESPINOSA</i> ENGINEER	
CHIEF ARCHT		APPROVED: <i>C.E. ...</i> MANAGER, DDO	
ELEC.			
MECH.			
DWG. NO. VFBD-BDC-17.015		SPEC. NO. LuzP21Z1328Sc	
SCALE: AS SHOWN		BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY
			CHKD
			RECD
			APPR.
			REV. #



ROOF SLAB REINFORCEMENT
SCALE 1:20




BEAM DETAIL
SCALE 1:20

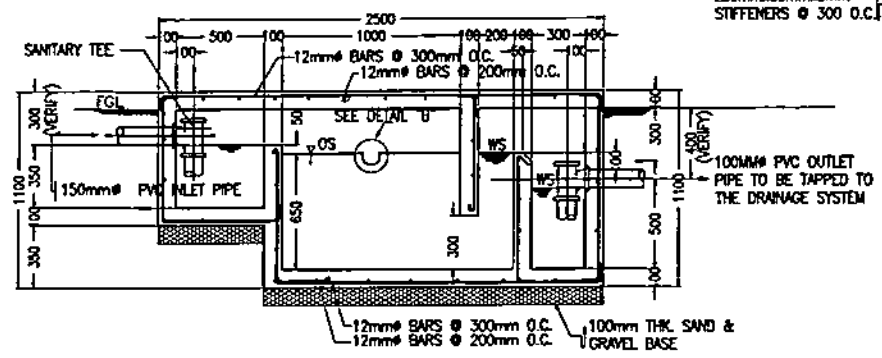
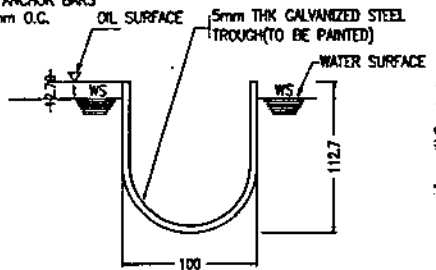
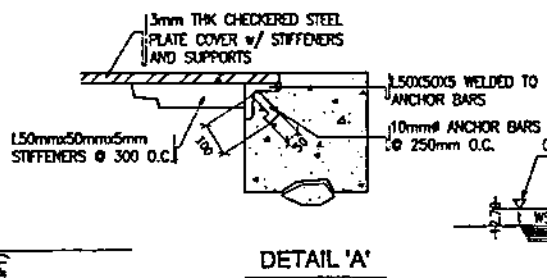
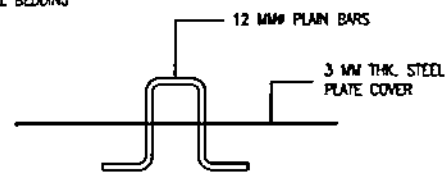
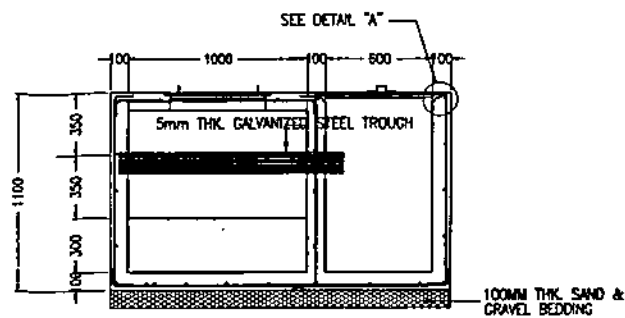
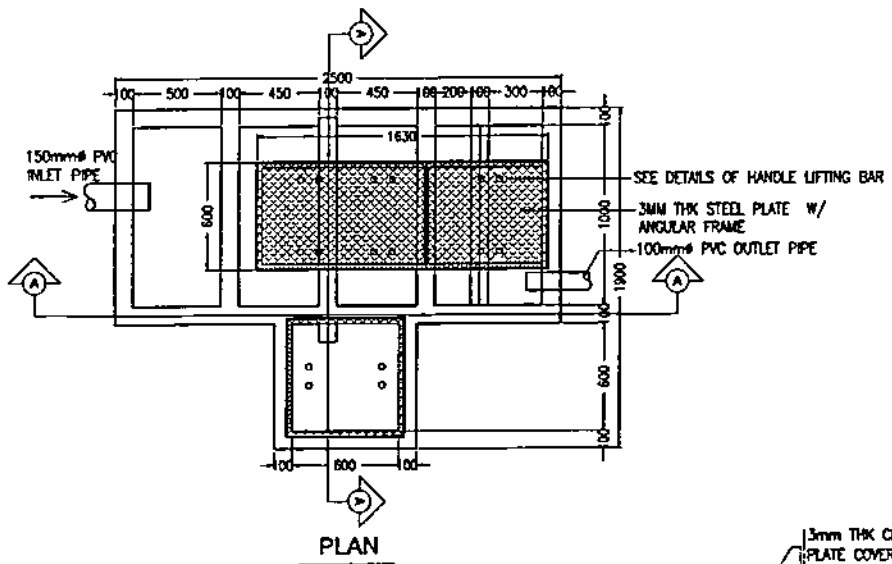


ROOF SLAB DETAIL
SCALE 1:20

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE AT 28-DAY PERIOD SHALL BE 20.70 MPa (3000 PSI).
3. REINFORCING STEEL BARS SHALL CONFORM TO THE LATEST REQUIREMENTS OF PNS FOR DEFORMED STEEL BARS GRADE 275.
4. ALL ASPECTS OF CONSTRUCTION AND DETAILING OF REINFORCEMENTS SHALL BE IN ACCORDANCE WITH THE LATEST PROVISIONS OF ACI CODE.

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DULAMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRDY I, POBLACION, BALABAC PALAWAN			
TITLE: PUMP HOUSE ROOF BEAM & ROOF SLAB, SECTION & DETAILS			
DESIGNED	BY	CHKD	DATE
DRAWN	ELUCIANO		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED:	H. L. MENDOZA PRINCIPAL ENGINEER & HEAD
CIVIL ARCHT.			L. C. B. WITLI SUPERVISOR
ELEC.		APPROVED:	C. O. SERRANO MANAGER, DDD
MECH.			
DWG. NO. VFB-D-BDC-17.016		SPEC. NO. LULZP21Z1326Sc	
REV.	DATE	NATURE OF REVISION	BY
			CHKD. RECD. APPD.
SCALE: AS SHOWN		BID DRAWING	
		REV. 1	

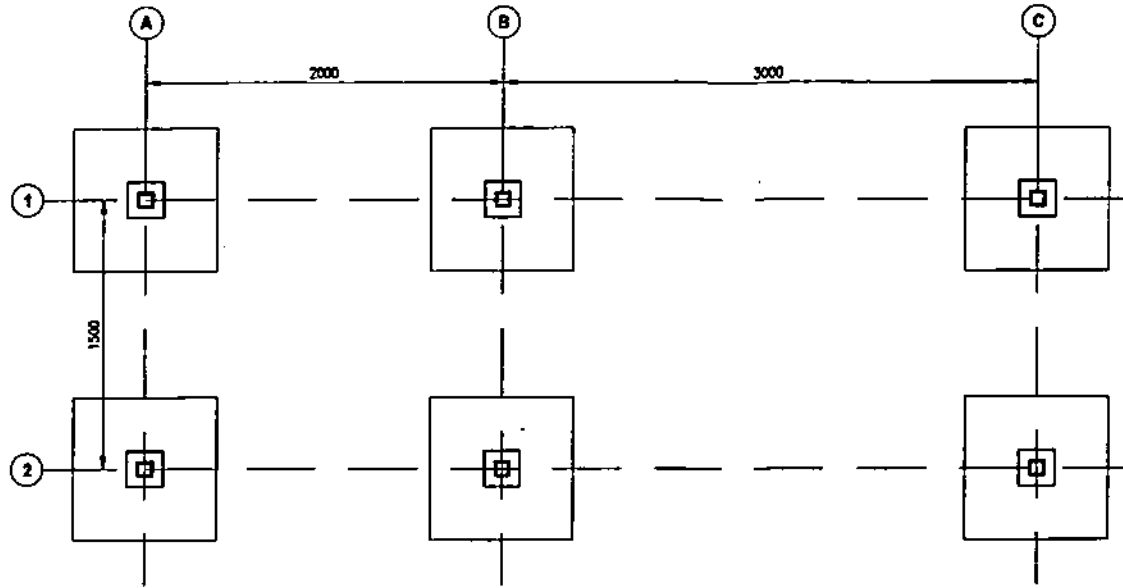


OIL WATER SEPARATOR

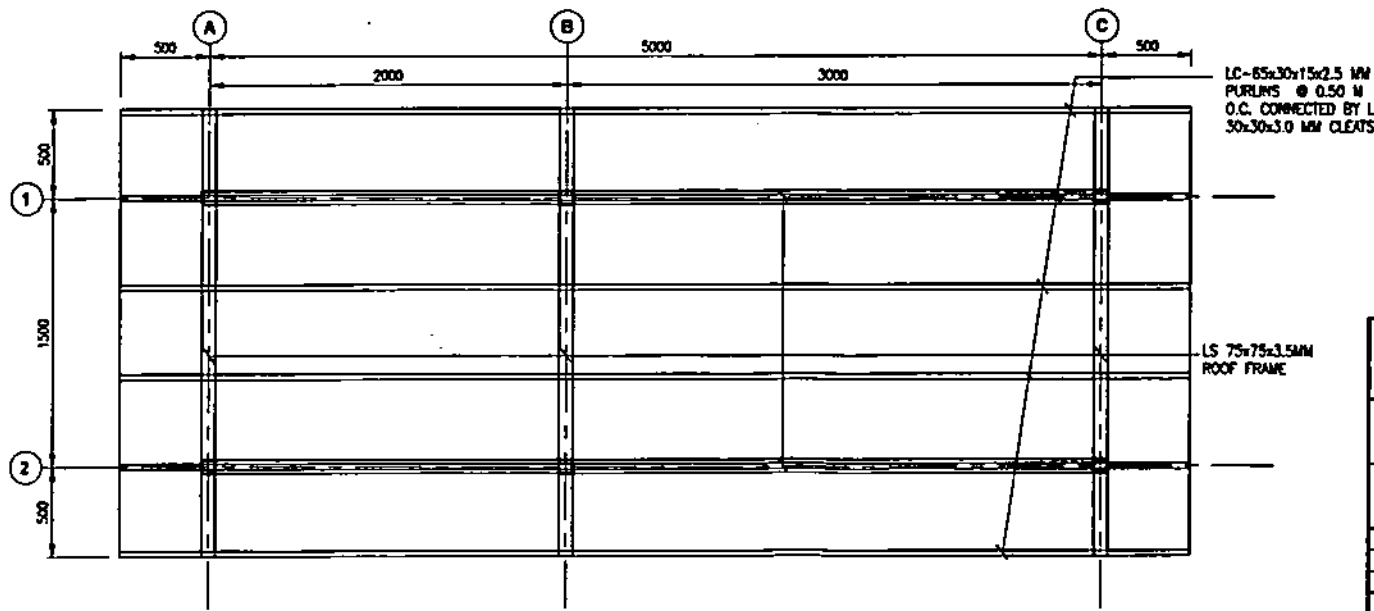
SCALE 1:30

OWNER:				NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP					
LOCATION: BRGY L, POBLACION, BALABAC PALAWAN					
TITLE: OIL WATER SEPARATOR (PLAN, SECTION & DETAILS)					
DESIGNED	BY	CHKD	DATE	SUBMITTED	<i>H. L. MEMOZA</i> PRINCIPAL ENGINEER, CEAD
DRAWN	CHECKING			RECOMMENDED	<i>M. C. G. ESTU</i> MANAGER, DDO
REVIEWED	PRINCIPAL ENGR./ARCHT.			APPROVED	<i>H. A. ...</i> MANAGER, DDO
CONFORMITY					
ELEC.					
MECH.					
DWG. NO. VFBD-DBC-17.017				SPEC. NO. LuzP21Z1326Sc	
SCALE: AS SHOWN			BID DRAWING		REV. 0


REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.



FOUNDATION PLAN
SCALE 1:30

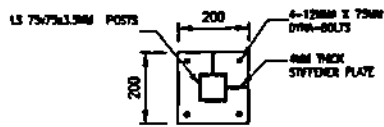


ROOF FRAMING PLAN
SCALE 1:30

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY 1, POBLACION, BALABAC PALAWAN			
TITLE: HAZ-WASTE AND MATERIALS RECOVERY (FOUNDATION AND ROOF FRAMING PLAN)			
DESIGNED	BY	CHKD	DATE
DRAWN	DURLANE		
REVIEWED	PRINCIPAL ENGR. J. ARDIT	RECOMMENDED	A. C. ERMITA
CHKD BY		APPROVED	H. L. BENDOZA
PLC.			
MDPT			
DWG. NO. VFB-D-BDC-17.018		SPEC. NO. LUZP2121326Sc	

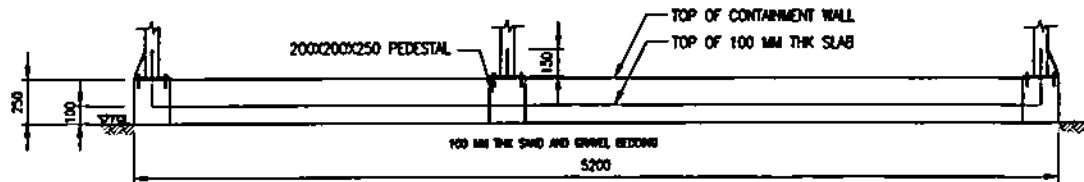
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

SCALE: AS SHOWN **BID DRAWING** REV. 0



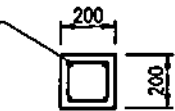
TYPICAL BASE PLATES DETAILS

SCALE NTS

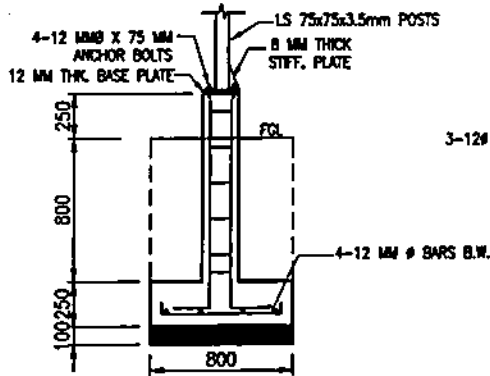


SECTION A
SCALE 1:30

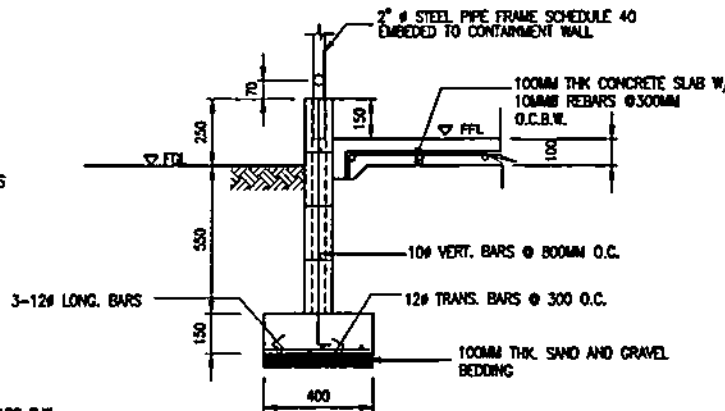
4-12 MM # VERT. BARS W/
10 MM # TIES SPACED 1 @
50 MM, 1 @ 100 MM, REST @
200 MM FROM SUPPORT TO
MIDHEIGHT



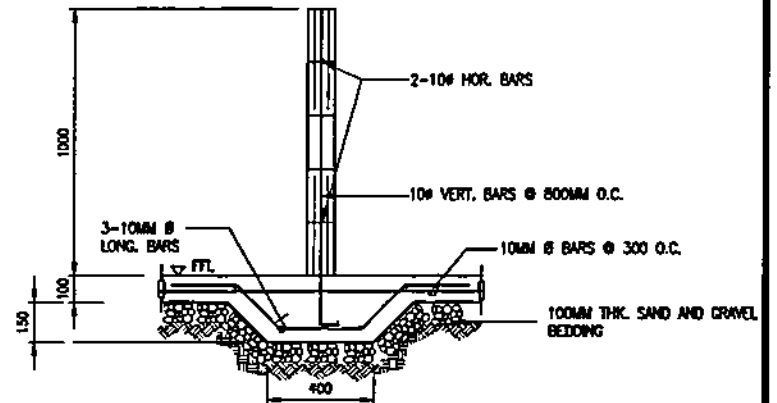
PEDESTAL PLAN



PEDESTAL DETAILS
SCALE 1:30



CONTAINMENT WALL DETAILS
SCALE 1:20



PARTITION WALL DETAILS
SCALE 1:20

NOTES:

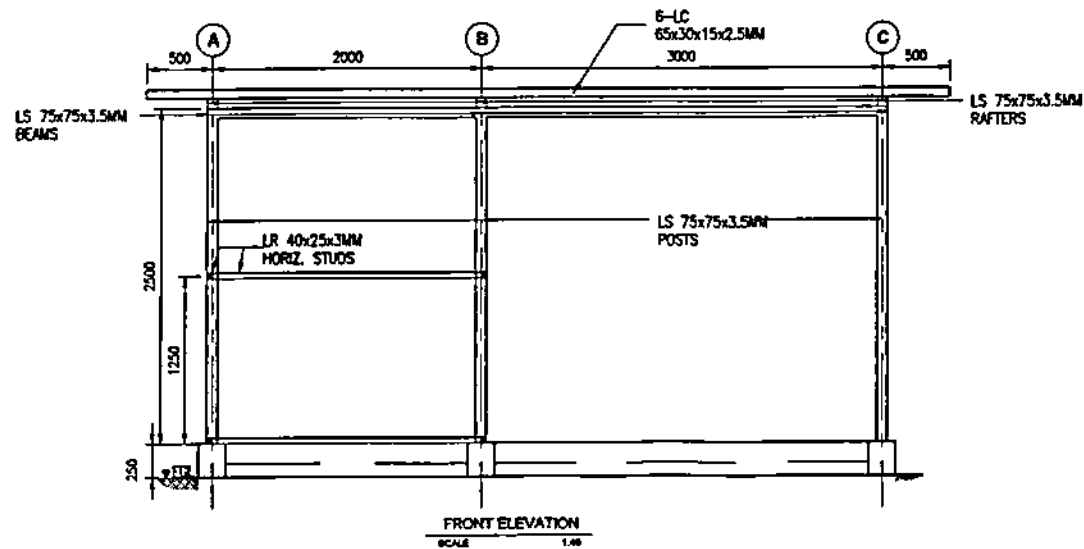
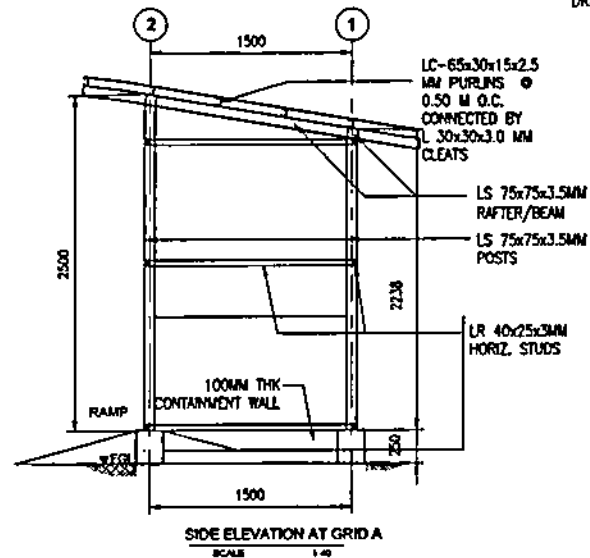
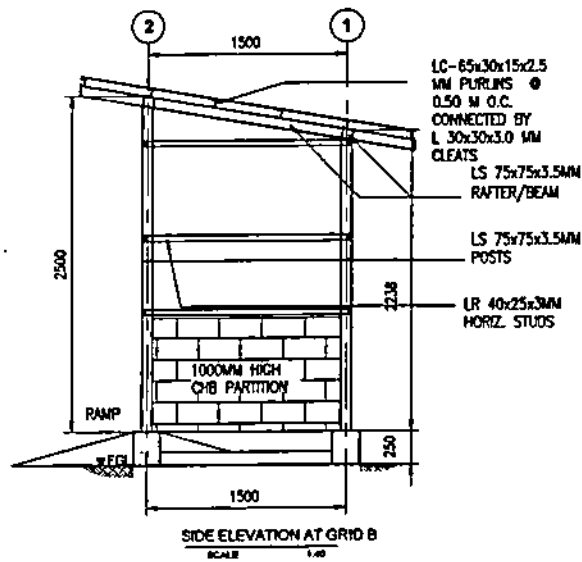
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE SHALL BE $f_c = 20.7 \text{ MPa}$ AT 28 DAYS PERIOD.
3. REINFORCING BARS SHALL CONFORM TO THE LATEST PHILIPPINE REINFORCING BARS SHALL CONFORM TO THE LATEST PHILIPPINE.
4. ALL ASPECTS OF CONSTRUCTION AND DETAILING OF REINFORCEMENTS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE ACI CODE.
5. ALL STRUCTURAL STEEL SHALL CONFORM TO SPECIFICATIONS FOR A36 STEEL WHILE ALL ANCHOR BOLTS TO A325 SPECIFICATIONS.
6. ALL CONNECTIONS SHALL BE WELDED IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY.
7. WORK THIS DRAWING WITH ARCHITECTURAL DRAWINGS.


OWNER		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY 1, POBLACION, BALABAC PALAWAN			
TITLE: HAZ-WASTE AND MATERIALS RECOVERY (CONCRETE PAD, PEDESTAL AND CONTAINMENT WALL DETAILS)			
DESIGNED	BY	CHKD	DATE
DRAWN	DISIGNED		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED:	
CONTRACT		APPROVED:	
ELC.			
MECH.			
DWG. NO. VFBD-BDC-17.019		SPEC. NO. LUZP21Z13265G	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.

NOTES:

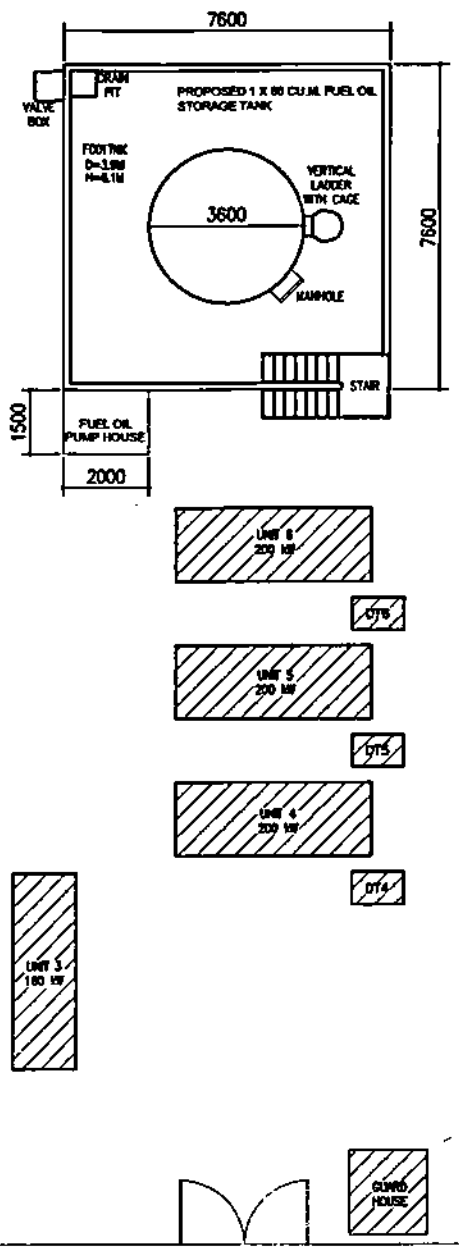
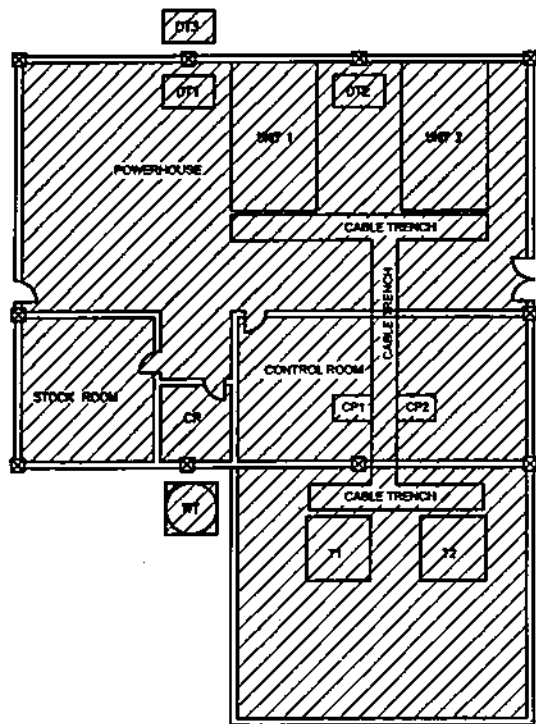
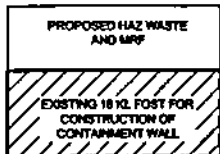
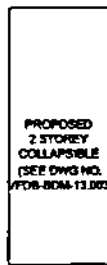
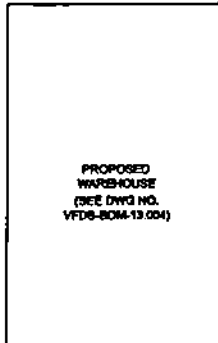
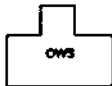
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. WORK THIS DRAWING WITH CIVIL & ELECTRICAL DRAWINGS.



OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY 1, POBLACION, BALABAC PALAWAN			
TITLE: HAZ-WASTE AND MATERIALS RECOVERY (WALL FRAMING PLAN)			
DESIGNED	BY	CHKD	DATE
DRAWN	CHECKED		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED	
CHIEF ARCHT.		APPROVED	
ELEC.			
MECH.			
ENGR. NO. VFB-D-BDC-17.020		SPEC. NO. LuzP21Z1326Sc	
SCALE: AS SHOWN		BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY
			CHKD
			RECD.
			APPL.
			REV. 9

SECTION IX - BID DRAWINGS**MW - MECHANICAL DRAWINGS**

DRAWING NO.	TITLE
VFBD-BDM-13.001	EQUIPMENT/PLANT LAYOUT
VFBD-BDM-13.002	FUEL OIL STORAGE AND PIPING LAYOUT
VFBD-BDM-13.003	AIR CONDITIONING, VENTILATION, FIRE FIGHTING AND DOMESTIC WATER SUPPLY SYSTEM
VFBD-BDM-13.004	FIRE FIGHTING SYSTEM (WARE HOUSE)
VFBD-BDM-13.005	FUEL OIL STORAGE AND TRANSFER SYSTEM P AND I DIAGRAM (1 X 60M ³ FUEL OIL STORAGE TANK)
VFBD-BDM-13.006	PLAN AND SECTION (1 X 60M ³ FUEL OIL STORAGE TANK)
VFBD-BDM-13.007	PLATE ARRANGEMENT AND DETAILS (1 X 60M ³ FUEL OIL STORAGE TANK)
VFBD-BDM-13.008	ORIENTATION AND DETAILS (1 X 60M ³ FUEL OIL STORAGE TANK)
VFBD-BDM-13.009	NOZZLE DETAILS (SHEET 1 OF 2)
VFBD-BDM-13.010	NOZZLE ARRANGEMENT AND OTHER DETAILS (SHEET 2 OF 2)
VFBD-BDM-13.011	TANK NOZZLES AND PIPE (1 X 60M ³ FUEL OIL STORAGE TANK)
VFBD-BDM-13.012	ROOF AND SHELL MANHOLE DETAILS (1 X 60M ³ FUEL OIL STORAGE TANK)
VFBD-BDM-13.013	LEVEL GAUGE INDICATOR DETAILS (1 X 60M ³ FUEL OIL STORAGE TANK)
VFBD-BDM-13.014	RAFTER DETAILS (1 X 60M ³ FUEL OIL STORAGE TANK)



NOTES:

1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. THE CONTRACTOR SHALL SUBMIT DESIGN CALCULATIONS AND FOUNDATION DETAILS FOR ALL EQUIPMENT TO BE SUPPLIED UNDER THIS SCOPE FOR APPROVAL OF NPC. E.G. FUEL OIL TRANSFER PUMP.
4. THE DIMENSION SHOWN MAY BE ADJUSTED BASED ON THE ACTUAL DIMENSION OF THE EQUIPMENT TO BE SUPPLIED BY THE CONTRACTOR.
5. ALL EQUIPMENT INCLUDING BALANCE OF PLANT AND ITS ASSOCIATED CIVIL STRUCTURES SHOWN IN THIS DRAWING SHALL BE SUPPLIED, CONSTRUCTED, TESTED AND COMMISSIONED BY THE CONTRACTOR.
6. WORK THIS DRAWING WITH APPLICABLE CIVIL AND ELECTRICAL DRAWINGS.

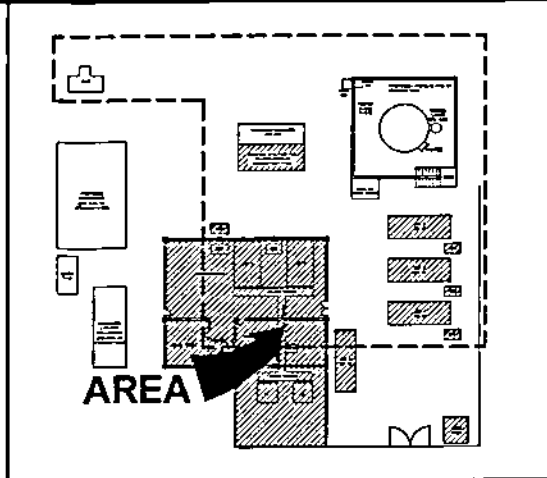
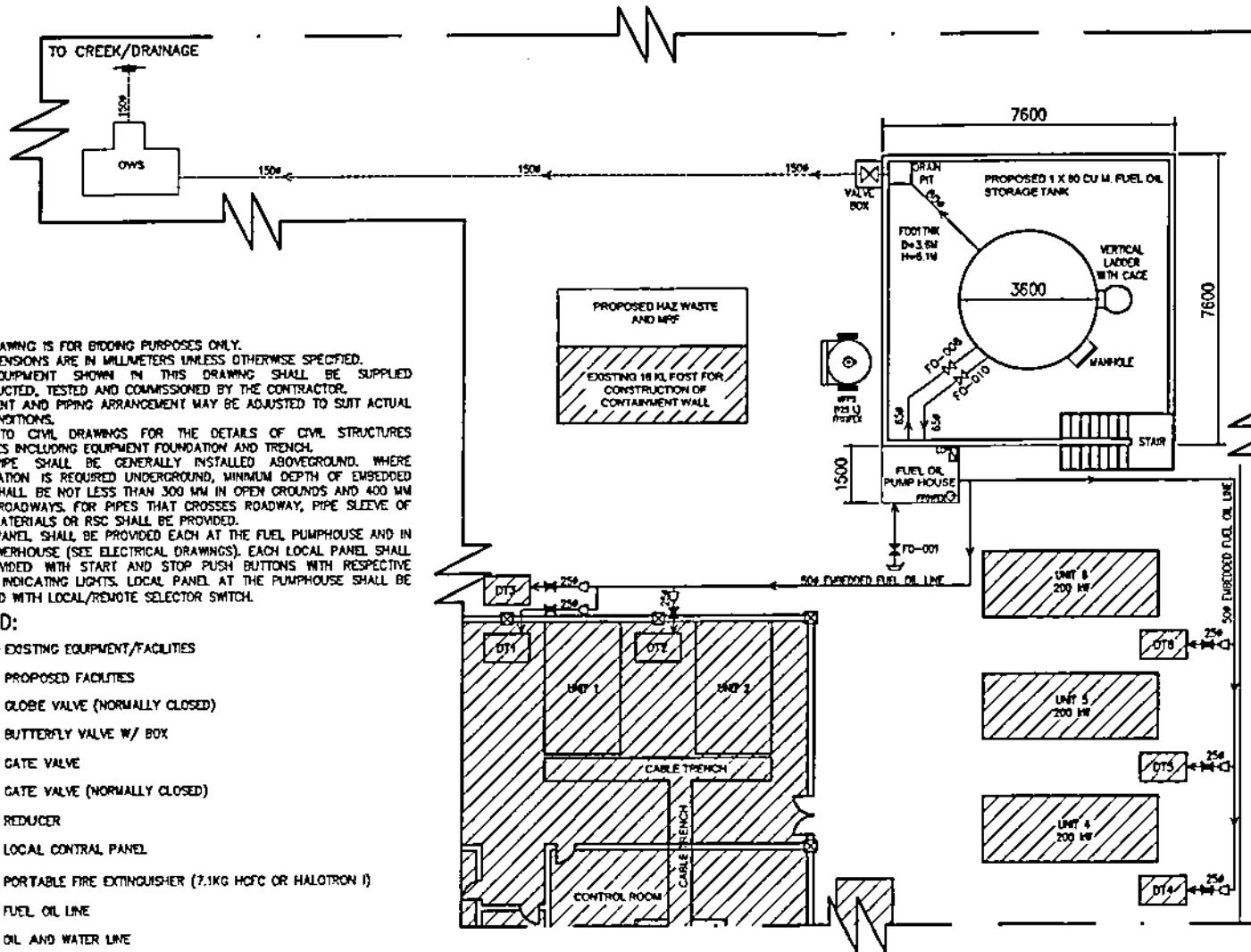
LEGEND:

- EXISTING EQUIPMENT/FACILITIES
- PROPOSED FACILITIES
- DT - DAY TANK
- OWS - OIL WATER SEPARATOR
- WT - WATER TANK

OWNER:				NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP					
LOCATION: BRGY 1, Poblacion, BALABAC PALMISTAN					
TITLE: EQUIPMENT/PLANT LAYOUT					
DESIGNED	BY	CHKD	DATE	SUBMITTED	<i>R.M. CASAWAN</i>
DRAWN	EAA				<i>R.M. CASAWAN</i>
REVIEWED	PRINCIPAL ENGR. / AGENT			RECOMMENDED	<i>J. Lopez</i>
OVERSIGHT				APPROVED	<i>M.G. SANCHEZ</i>
ELEC.					
MECH.					
DWG. NO. VFDB-BDM-13.001			SPEC. NO. LutzP21Z1326Sc		

REV.	DATE	AMOUNT OF REVISION	BY	CHKD	REVL	APPD

SCALE: 1:125 **BID DRAWING** BY 0



NOTES:

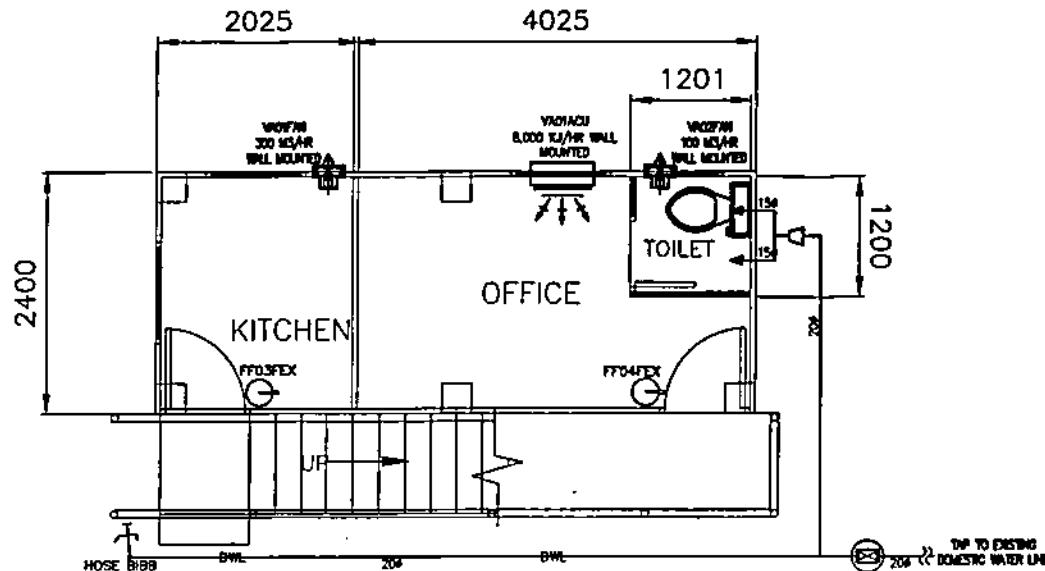
1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. ALL EQUIPMENT SHOWN IN THIS DRAWING SHALL BE SUPPLIED CONSTRUCTED, TESTED AND COMMISSIONED BY THE CONTRACTOR.
4. EQUIPMENT AND PIPING ARRANGEMENT MAY BE ADJUSTED TO SUIT ACTUAL SITE CONDITIONS.
5. REFER TO CIVIL DRAWINGS FOR THE DETAILS OF CIVIL STRUCTURES FACILITIES INCLUDING EQUIPMENT FOUNDATION AND TRENCH.
6. FUEL PIPE SHALL BE GENERALLY INSTALLED ABOVEGROUND. WHERE INSTALLATION IS REQUIRED UNDERGROUND, MINIMUM DEPTH OF EMBEDDED PIPES SHALL BE NOT LESS THAN 300 MM IN OPEN GROUNDS AND 400 MM UNDER ROADWAYS. FOR PIPES THAT CROSSES ROADWAY, PIPE SLEEVE OF STEEL MATERIALS OR RSC SHALL BE PROVIDED.
7. LOCAL PANEL SHALL BE PROVIDED EACH AT THE FUEL PUMPHOUSE AND IN THE POWERHOUSE (SEE ELECTRICAL DRAWINGS). EACH LOCAL PANEL SHALL BE PROVIDED WITH START AND STOP PUSH BUTTONS WITH RESPECTIVE STATUS INDICATING LIGHTS. LOCAL PANEL AT THE PUMPHOUSE SHALL BE PROVIDED WITH LOCAL/REMOTE SELECTOR SWITCH.

LEGEND:

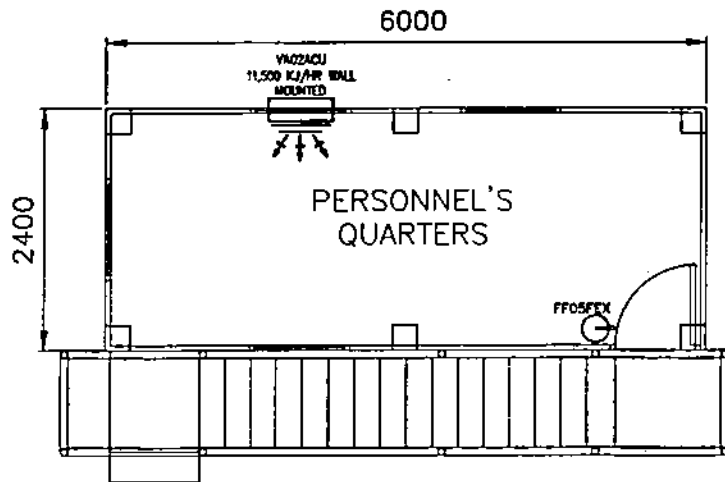
- EXISTING EQUIPMENT/FACILITIES
- PROPOSED FACILITIES
- GLOBE VALVE (NORMALLY CLOSED)
- BUTTERFLY VALVE W/ BOX
- GATE VALVE
- GATE VALVE (NORMALLY CLOSED)
- REDUCER
- LOCAL CONTROL PANEL
- PORTABLE FIRE EXTINGUISHER (7.1KG HOFC OR HALOTRON I)
- FUEL OIL LINE
- OIL AND WATER LINE
- FOAM WHEELED EXTINGUISHER (AFF, 125 L OR 33 GALLONS)

OWNER		NATIONAL POWER CORPORATION ACHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN SALABAC DPP			
LOCATION: BRGY 1, POBLACION, SALABAC, PALAWAN			
TITLE: FUEL OIL STORAGE AND PIPING LAYOUT			
DESIGNED	BY: EAA	CHKD	DATE
DRAWN	REVIEWED		PRINCIPAL ENGR. / ARCHT.
DEVELOPMT	ELEC.		APPROVED
HECK			
DWG NO. VFBD-BDM-13.002		SPECS NO. LUP2121326Sc	
SCALE: 1:125		BID DRAWING	

REV	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPD



GROUND FLOOR PLAN




SECOND FLOOR PLAN

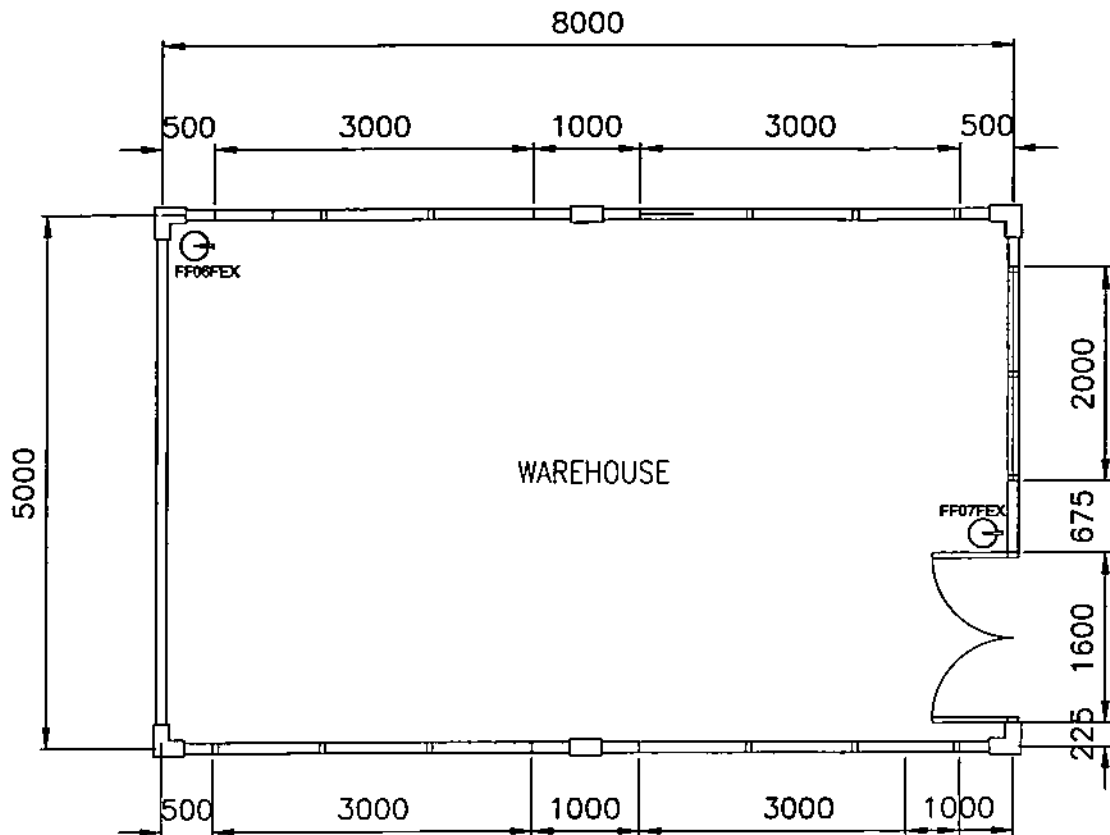
NOTES:

1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. EQUIPMENT TO BE FURNISHED SHALL BE DESIGNED & CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE SPECIFICATIONS & SHALL FIT INTO THE SPACE AVAILABLE WITH PROPER REGARD TO ACCESSIBILITY, PASSAGEWAY, HANDLING AND STRUCTURE LIMITATIONS.
4. ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
5. ALL EXHAUST FAN AND AIRCONDITIONING EQUIPMENT BROCHURES/CATALOGUES SHALL BE SUBMITTED BY THE SUPPLIER, FOR NPC'S REVIEW AND APPROVAL, PRIOR TO PROCUREMENT/INSTALLATION.
6. ALL PIPES, CABLES, FITTINGS, AND ANGLE SUPPORTS SHALL BE INSTALLED FOR THE EFFICIENT AND PROPER OPERATION OF THE AIRCONDITIONING SYSTEM.
7. PIPING LAID UNDERGROUND SHALL NOT BE LESS THAN 300MM FROM THE GROUND SURFACE TO THE BOTTOM OF PIPE.
8. FOR PIPES THAT CROSSES ROADWAYS, PIPE SLEEVE OF STEEL MATERIAL SHALL BE PROVIDED.
9. ALL PIPES, VALVES, VALVE BOXES, FITTINGS, AND PIPE SUPPORTS SHALL BE INSTALLED FOR THE EFFICIENT AND PROPER OPERATION OF THE SYSTEM.
10. ALL PIPES, VALVES AND OTHER EQUIPMENT BROCHURES/CATALOGUES SHALL BE SUBMITTED BY THE SUPPLIER, FOR NPC'S REVIEW AND APPROVAL, PRIOR TO PROCUREMENT/INSTALLATION.
11. FINAL DETAILS AND ADJUSTMENT SHALL BE DONE IN THE FIELD BY THE SUPPLIER DURING INSTALLATION TO SUIT ACTUAL SITE CONDITIONS. ALL WORKS SHALL BE EXECUTED IN CLOSE COORDINATION WITH ALL TRADES.
12. ALL PVC/PE PIPE DIMENSIONS SHOWN ARE IN NOMINAL DIAMETER (MM) WITH THE FOLLOWING EQUIVALENTS:
 20MM (3/4") = 25MM O.D. (OUTSIDE DIAMETER)
 15MM (1/2") = 20MM O.D.

LEGEND:


- X - HOSE BIBB
- - REDUCER
- ◇ - GATE VALVE
- ⊞ - WINDOW TYPE AIR CONDITIONING UNIT (INVERTER)
- ⊞ - EXHAUST FAN (WALL MOUNTED)
- ⊞ - PORTABLE FIRE EXTINGUISHER (7.1KG HCFC OR HALOTRON)

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY. POBLACION, BALABAC, PALAWAN			
TITLE: AIR CONDITIONING, VENTILATION, FIRE FIGHTING AND DOMESTIC WATER SUPPLY SYSTEM			
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	BY	CHKD	DATE
ENLARGED	BY	CHKD	DATE
PLC	BY	CHKD	DATE
RECK	BY	CHKD	DATE
DESIGNED: EAA		SUBMITTED: R. J. ROSAWAN	
DRAWN: PRINCIPAL ENGR. J. ANOY		RECOMMENDED: J. A. FELIZ	
ENLARGED: PRINCIPAL ENGR. J. ANOY		APPROVED: H. G. S. ...	
PLC: PRINCIPAL ENGR. J. ANOY		RECK: PRINCIPAL ENGR. J. ANOY	
DWG NO. VFBD-BDM-13.003		SPCS NO. LuzP2121326Sc	
SCALE: 1:50		BID DRAWING	
REV. DATE		NATURE OF REVISION	
BY		CHKD	
RECD		APPD	
REV 0		REV 0	



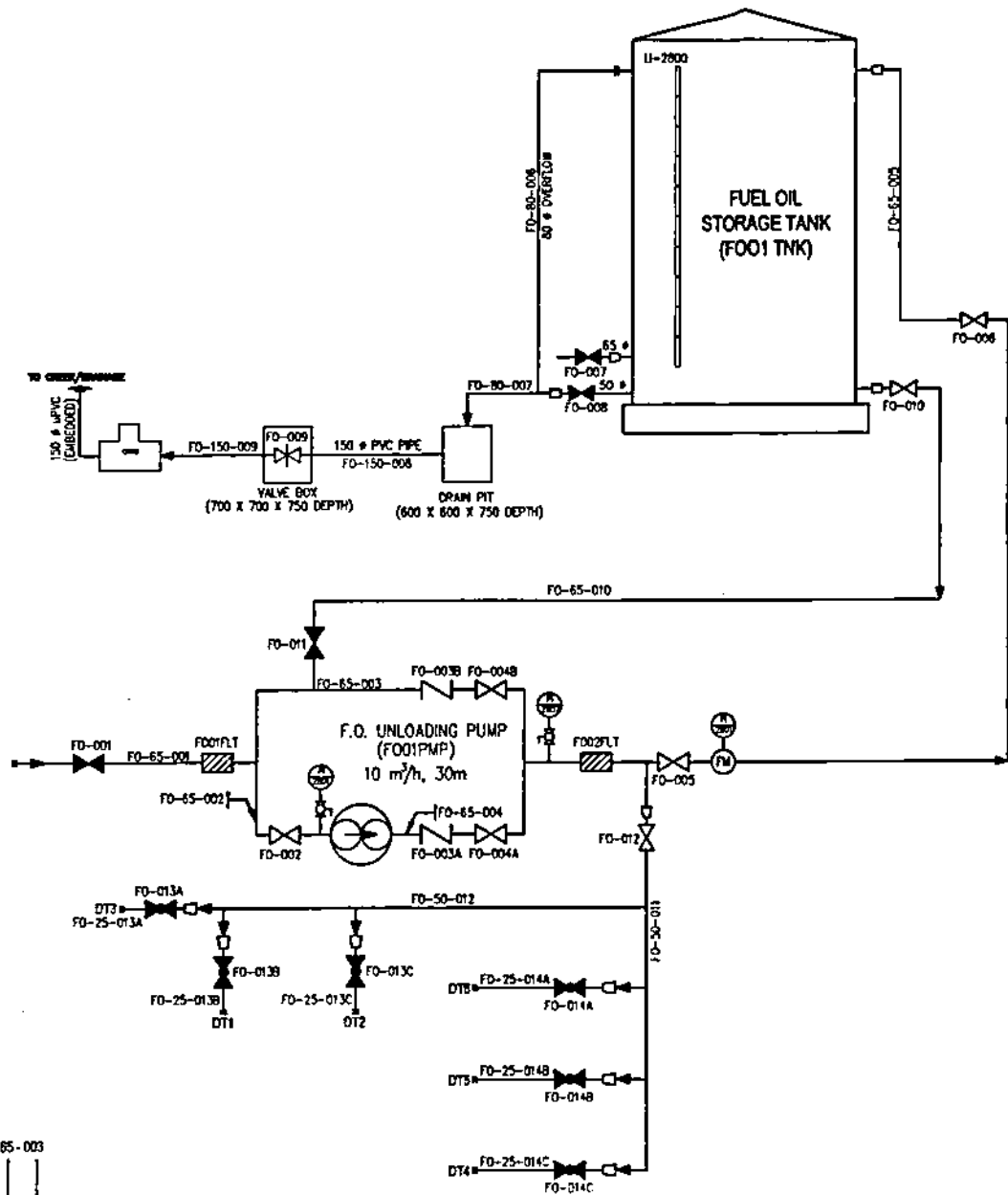
NOTES:
 1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
 2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

LEGEND:
 ⊕ - PORTABLE FIRE EXTINGUISHER
 (7.1KG HOFC OR HALOTRON)

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAG DPP			
LOCATION: BRGY 4 Poblacion, BALABAG, PALANAN			
TITLE: FIRE FIGHTING SYSTEM (WARE HOUSE)			
DESIGNED	BY: EAM	DATE:	SUBMITTED: R. B. CALLESERWAN <small>Principal Engineer A</small>
DRAWN			RECOMMENDED: J. A. B. JR. <small>Manager</small>
REVIEWED	PRINCIPAL ENGR. / ARCHT.		APPROVED: N. G. S. S. S. S. <small>Manager, DDO</small>
ENVIRONMENT			
ELEC.			
MECH.			
DWG. NO. VFBD-BDM-13.004		SPEC. NO. LuzP21Z1326Sc	
SCALE: 1:50		REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

BID DRAWING



PIPE DESIGNATION LEGEND:

SYSTEM (FUEL) ——— FO - 65 - 003

NOMINAL PIPE SIZE (DIAMETER) ———

SEQUENCE NO. ———

NOTES:

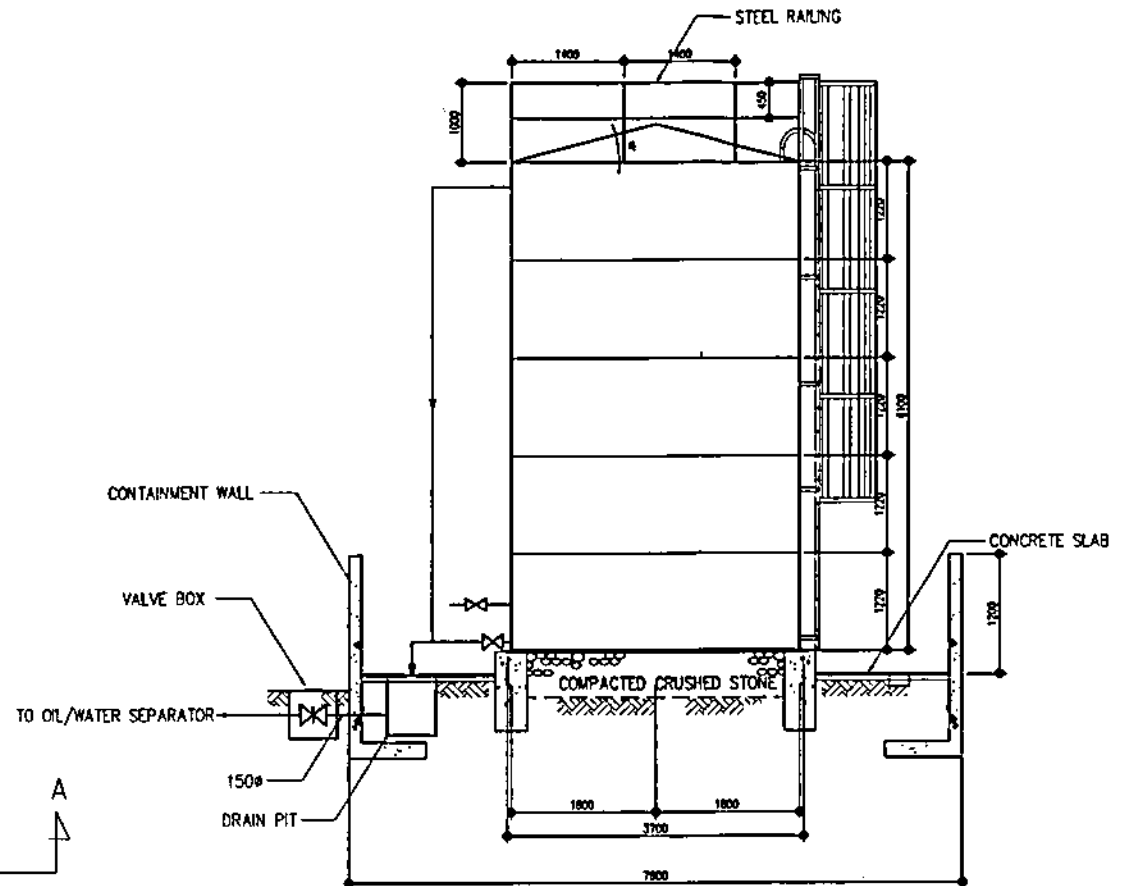
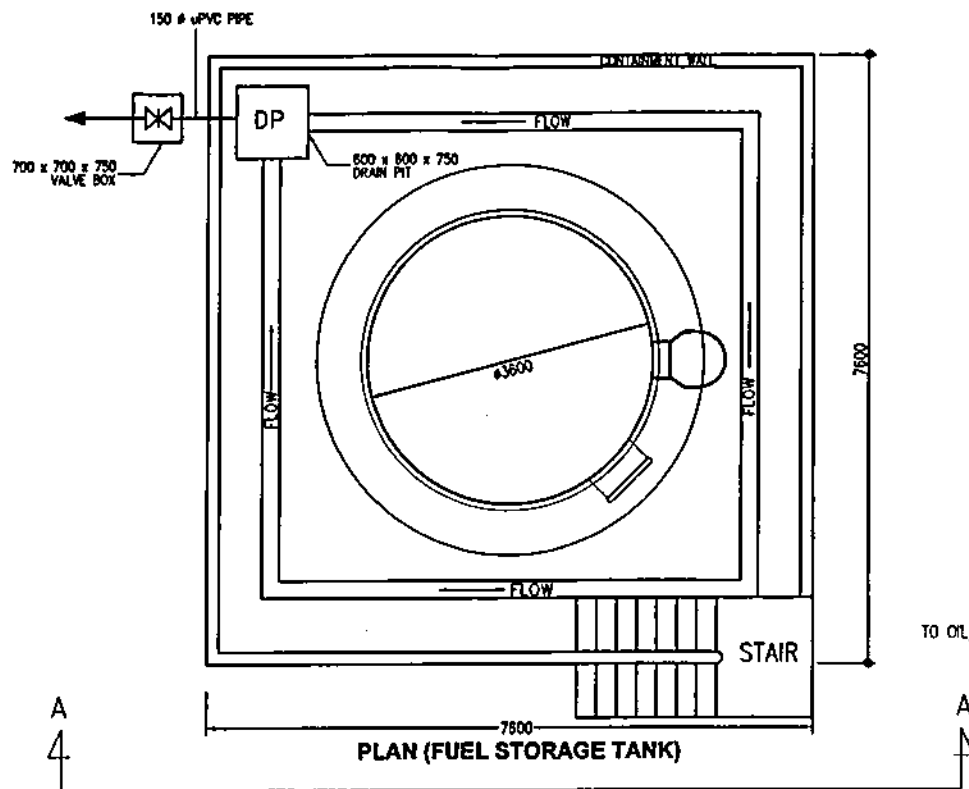
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ALL PIPING, PIPE SUPPORTS AND FITTINGS, VALVES AND ACCESSORIES SHALL BE SUPPLIED, INSTALLED AND TESTED BY THE CONTRACTOR. PIPES ARE GENERALLY INSTALLED ABOVE GROUND UNLESS OTHERWISE SHOWN ON THE DRAWING. PIPES TO BE INSTALLED UNDERGROUND SHALL BE NOT LESS THAN 300 MM.
3. FUEL OIL PIPES SHALL CONFORM TO ASTM A53 GR. B, SEAMLESS PIPE AND SCHEDULE 40. MATERIALS FOR VALVES 65 MM# AND ABOVE SHALL BE CAST IRON AND CAST BRONZE FOR 50 MM# AND BELOW.
4. REFER TO CIVIL DRAWINGS FOR THE DETAILED DRAWINGS OF TANK FOUNDATION/BUND WALL, DRAIN PIT AND VALVE BOX.
5. VALVE INSIDE DRAIN VALVE BOX SHALL BE PROPERLY SUPPORTED.
6. DRAIN PIPE FROM DRAIN PIT UP TO THE EXISTING DRAINAGE SYSTEM SHALL BE MADE OF UPVC, SCHEDULE 80 OR CLASS 150 CONFORMING TO ASTM D-1784 OR APPROVED EQUIVALENT.
7. F.O. STEEL PIPES WHICH ARE BURIED UNDERGROUND SHALL BE APPLIED WITH TAPE WRAPPING OF 1 MM THICKNESS OR 8 MM THICKNESS OF ASPHALT JUTE. PRIOR TO APPLICATION OF TAPE, BITUMEN BASED PRIMER SHALL BE APPLIED TO PIPE. EXTERNAL SURFACES OR SHALL BE PRIMED WITH 2 COATS OF COAL TAR EPOXY POLYAMIDE OF 170 MICRONS PFT EACH COAT PRIOR TO APPLICATION OF ASPHALT JUTE.
8. THE CONTRACTOR SHALL SUPPLY FLEXIBLE HOSE NOT LESS THAN 50 MM# AND 3 METERS LONG FITTED WITH STEEL PIPE NOT LESS THAN 50 MM # FOR HANDLING FUEL OIL FROM A 210 L DRUM AND FLANGE CONNECTION AT F. O. TRANSFER PUMP SUCTION. THE FLEXIBLE HOSE SHALL BE MADE OF SYNTHETIC RUBBER TUBE, REINFORCED WITH SPIRAL-PLUED SYNTHETIC FABRIC WITH WIRE HELIX.

LEGEND:

- ☒ - GLOBE VALVE
- ☒ - GLOBE VALVE (NORMALLY CLOSED)
- ☒ - BUTTERFLY VALVE W/ BOX
- ☒ - GATE VALVE
- ☒ - GATE VALVE (NORMALLY CLOSED)
- ☒ - CHECK VALVE
- ☒ - FUEL FILTER
- ☒ - REDUCER
- PM - PRESSURE GAUGE
- FI - FLOW INDICATOR
- FM - FLOW METER
- DT - DAY TANK

OWNER		NATIONAL POWER CORPORATION AGHAM ROAD, DILMAN, QUEZON CITY	
PROJECT CONSTRUCTION OF STAIRHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAG BPP			
LOCATION BRGY 1 POBLACION BALABAG PALAWAN			
TITLE FUEL OIL STORAGE AND TRANSFER SYSTEM P AND I DIAGRAM			
1 X 60M ³ FUEL OIL STORAGE TANK			
DESIGNED	BY	CHKD	DATE
DRAWN	EAA		
REVIEWED	PRINCIPAL ENGR (INDY)	RECOMMENDED	R. N. S. SAWAN
CIVIL ARCHT		APPROVED	J. ANTONIO JR
ELEC			
MECH			
DWG NO VFBD-BDM-13.005		SPCS NO LuzP2121326Sc	
SCALE NTS		BID DRAWING	
REV		REV 0	





REV	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPR



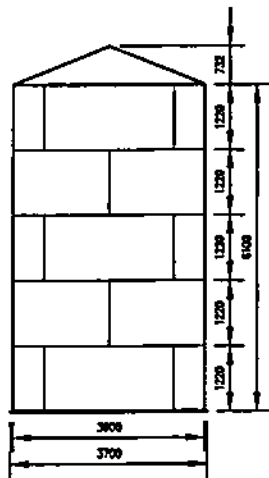
SECTION THRU A

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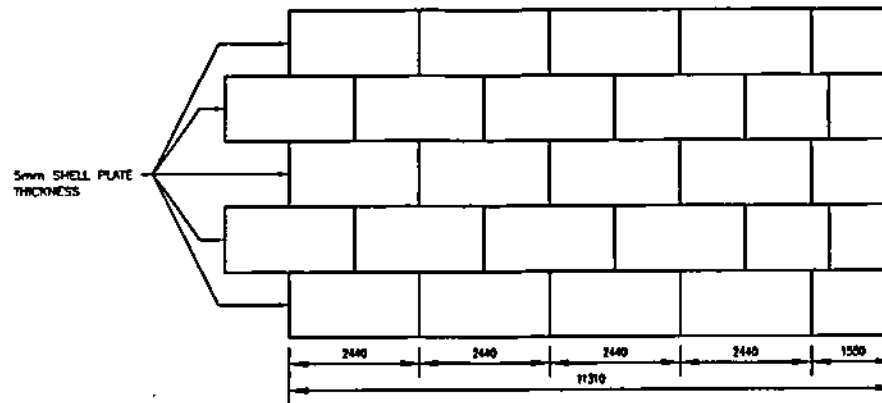
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. REFER TO CIVIL DRAWINGS FOR THE DETAILS OF TANK FOUNDATION, CONTAINMENT WALL, DRAIN PIT/DITCH AND CONTAINMENT ACCESS LADDER.
3. VERTICAL LADDER OF TANK SHALL BE PROVIDED WITH SAFETY CAGE AS SHOWN ON DETAILED DRAWINGS.
4. REFER TO DRAWINGS NOS. VFBD-BDM-13.007 TO D14 FOR DETAILS OF TANK APPURTENANCES.

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, PORT AND OTHER FACILITIES @ BALABAC DPP			
LOCATION: BRIS 1, POBLACION, BALABAC, PALAUAN			
TITLE: PLAN AND SECTION 1 X 60M³ FUEL OIL STORAGE TANK			
DESIGNED	BY: EAA	CHKD:	DATE:
DRAWN			
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED:	 R. R. CAUSAWAN Principal Engineer
CHECKED		APPROVED:	 J. A. DELA CRUZ Engr.
E.L.C.		APPROVED:	 N. G. S. S. S. Engr.
M.E.C.			
DWG. NO. VFBD-BDM-13.006		SPEC. NO. LuzP2121326Sc	
SCALE: NTS		BID DRAWING	
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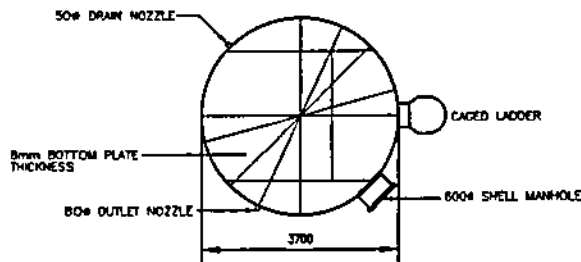
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



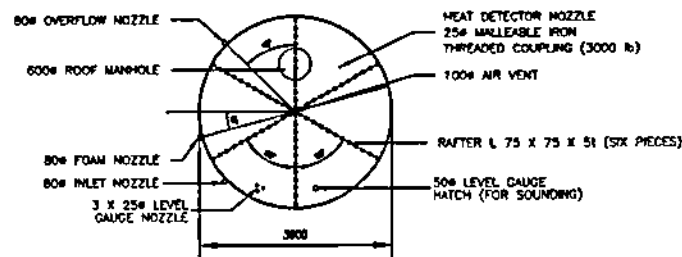
SIDE ELEVATION



SHELL PLATE ARRANGEMENT






BOTTOM PLATE ARRANGEMENT



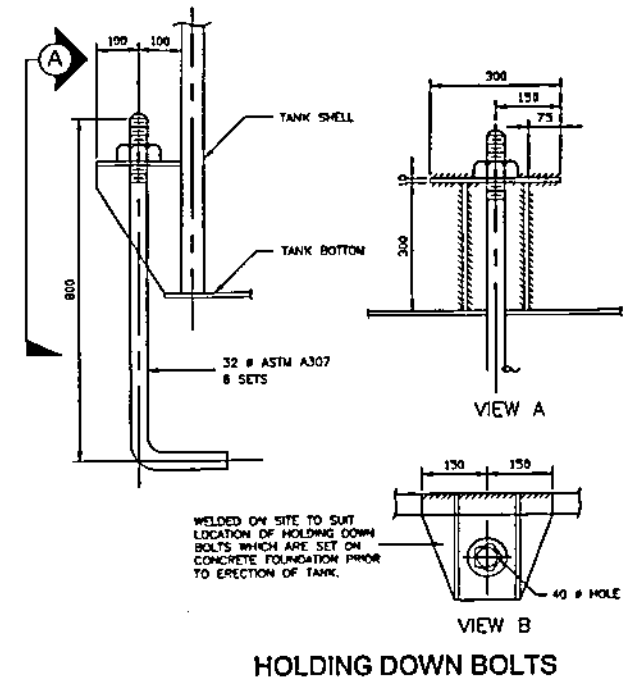
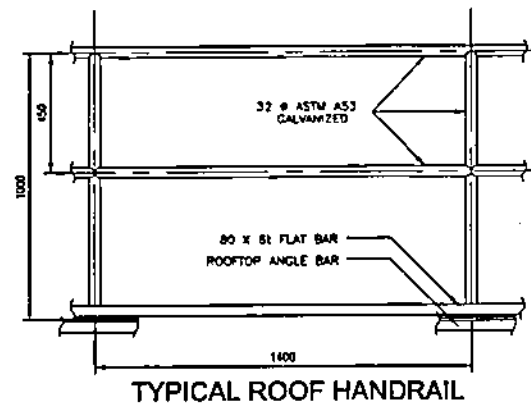
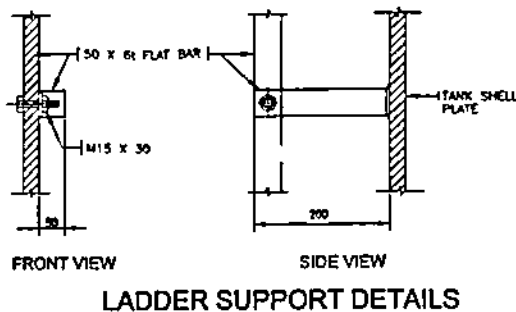
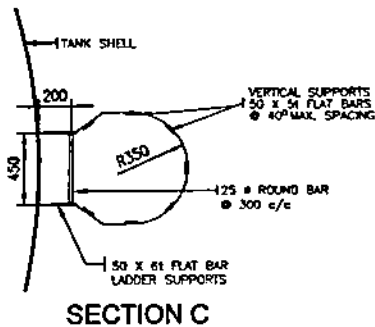
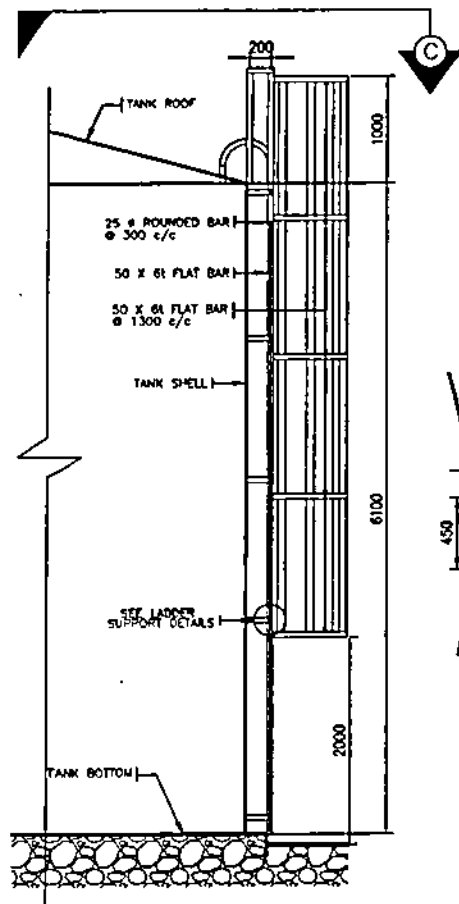
ROOF PLATE ARRANGEMENT

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE FUEL OIL STORAGE TANK SHALL BE CONSTRUCTED TO CONFORM WITH THE LATEST EDITION OF THE APPLICABLE STANDARDS AND THE MINIMUM REQUIREMENTS SHOWN ON THIS DRAWING AND AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS.
3. DETAILED DRAWINGS IF NECESSARY SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC REVIEW AND APPROVAL.
4. NOZZLES FOR HEAT DETECTOR AND FOAM NOZZLE SHALL BE SUPPLIED WITH THREADED CAP AND BLIND FLANGE, RESPECTIVELY.
5. ALL WELDING WORKS SHALL CONFORM TO THE REQUIREMENTS OF THE SPECIFICATION AND API 650.
6. FLANGED REDUCER (80 # X 65#) SHALL BE PROVIDED EACH AT OUTLET, INLET AND FOAM NOZZLES.

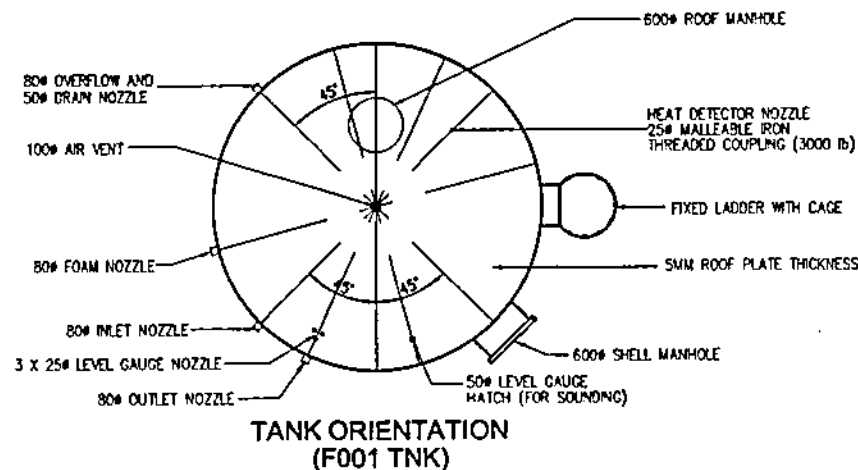
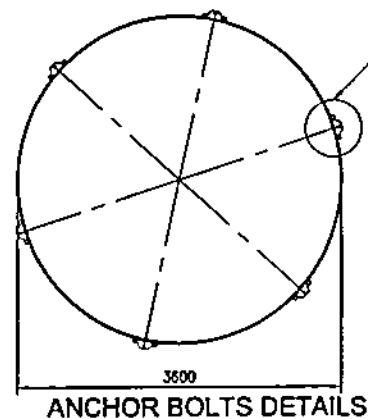
OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, PORT AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BINTI L FOR ACOOL BALABAC DAM/RYN			
TITLE: PLATE ARRANGEMENT AND DETAILS 1 X 60M³ FUEL OIL STORAGE TANK			
DESIGNED	BY: EAA	CHKD:	DATE:
DRAWN			
REVIEWED	PRINCIPLE ENGR. I. ARCTY.	RECOMMENDED	 R. M. CLAUSAWAN Principal Engineer
CIVIL/ENGR		APPROVED	 J. A. ... Engr.
ELEC.			
MISC.			
DWG. NO. VFBD-BDM13.007		SPEC. NO. LUZP21Z1326Sc	
SCALE: NTS	BID DRAWING		REV 0


REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

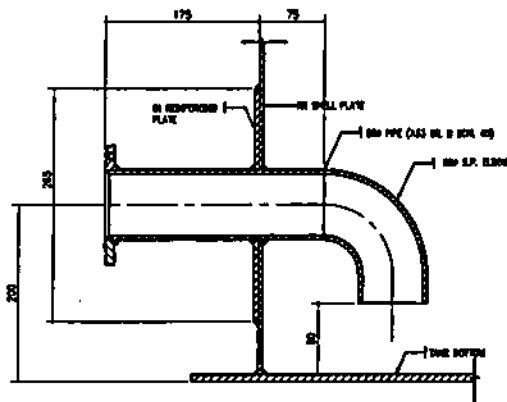


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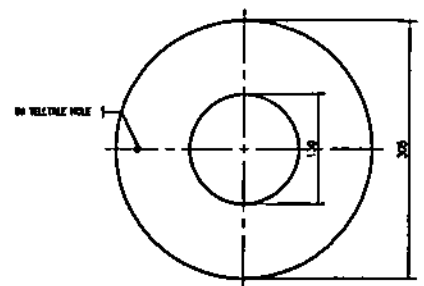
1. ALL DIMENSIONS ARE IN ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE FUEL OIL STORAGE TANK SHALL BE CONSTRUCTED TO CONFORM WITH THE LATEST EDITION OF THE APPLICABLE STANDARDS AND THE MINIMUM REQUIREMENTS SHOWN ON THIS DRAWING AND AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS.
3. DETAILED DRAWINGS IF NECESSARY SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC REVIEW AND APPROVAL.
4. NOZZLE SIZES FOR HEAT DETECTOR, FOAM NOZZLE AND LEVEL GAUGE HATCH SHALL BE SUPPLIED WITH PLUGS/BLIND FLANGES.
5. ALL WELDING WORKS SHALL CONFORM TO THE REQUIREMENTS OF THE SPECIFICATION AND API 650.
6. NOZZLE FOR TANK SHALL BE INSTALLED BASED ON TANK ORIENTATION SHOWN ON RESPECTIVE PLANT'S LAYOUT.



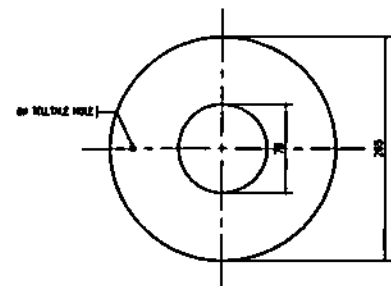
OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY 1, Poblacion, BALABAC, PALAMAN			
TITLE: ORIENTATION AND DETAILS 1 X 60M² FUEL OIL STORAGE TANK			
DESIGNED	BY: EAA	CHKD	DATE
DRAWN		SUBMITTED	R. N. CHOSAWAN
REVIEWED	PRINCIPAL SHEET, FAVORITE	RECOMMENDED	J. A. S. J. R.
CHECKED		APPROVED	N. S. S. S.
ELEC.			
MECH.			
DWG. NO. VFBD-BDM-13.008		SPEC. NO. LUP21Z13255c	
REV. DATE		NATURE OF REVISION	
BY	CHKD	RECD	APPR.
SCALE: NTS		BID DRAWING	
		REV. 0	



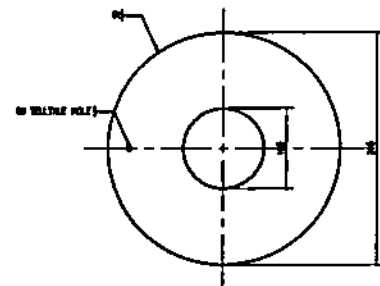
OUTLET NOZZLE



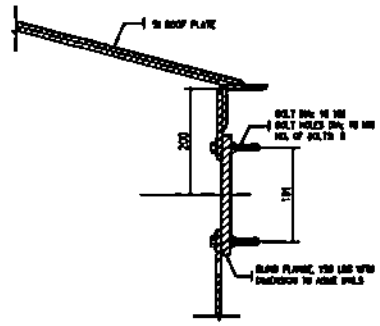
REINFORCING PLATE FOR 100mm NOZZLE



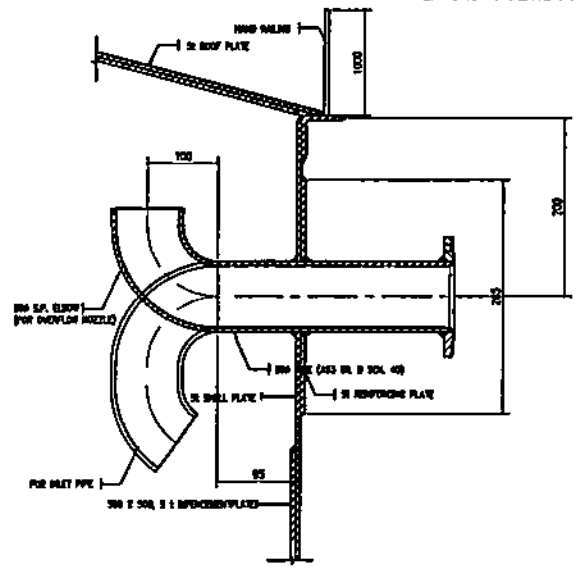
REINFORCING PLATE FOR 50mm NOZZLE



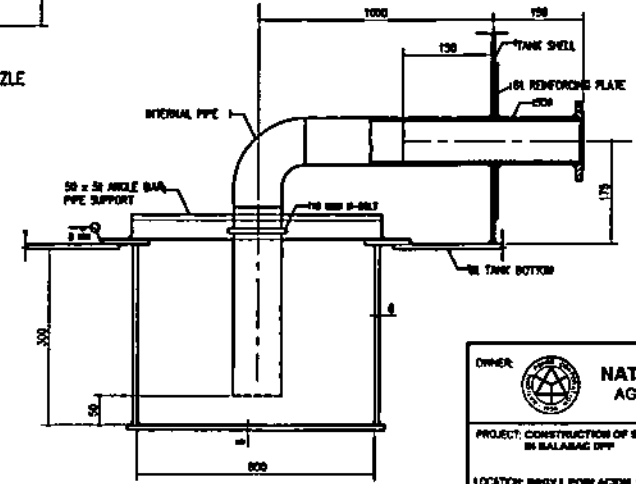
REINFORCING PLATE FOR 80mm NOZZLE



FOAM CHAMBER OPENING




INLET/OVERFLOW NOZZLES (TYPICAL)



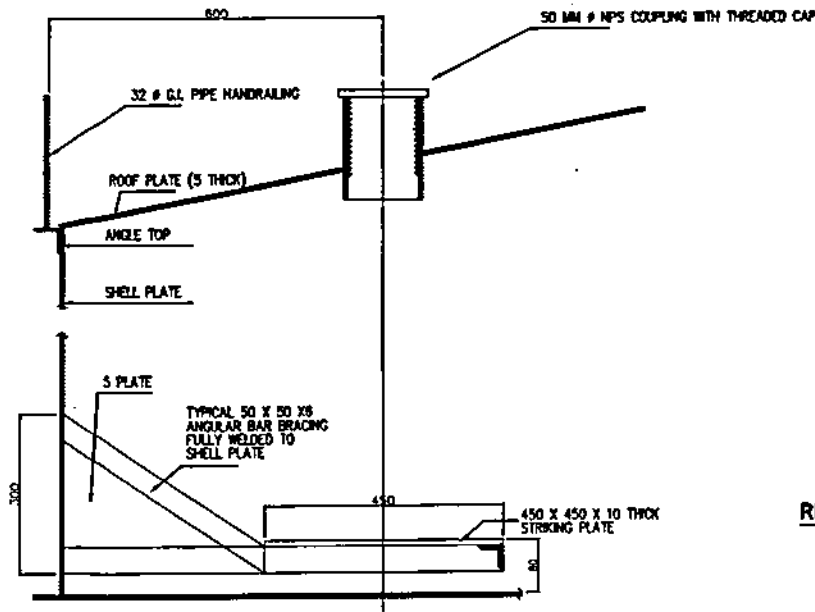
WATER DRAW-OFF SUMP

NOTES:

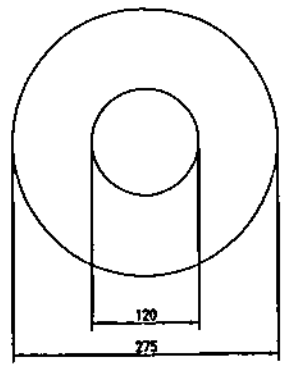
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE FUEL OR STORAGE TANK SHALL BE CONSTRUCTED TO CONFORM WITH THE LATEST EDITION OF API 650 AND THE MINIMUM REQUIREMENTS SHOWN ON THIS DRAWING OR AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS.
3. DETAIL DRAWINGS, IF NECESSARY SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC REVIEW/APPROVAL.
4. ALL WELDING WORKS SHALL CONFORM TO THE REQUIREMENTS OF THE SPECIFICATION AND API 650.
5. INLET AND OVERFLOW NOZZLES SHALL BE SEPARATELY LOCATED DEPENDING ON THE ORIENTATION OF THE TANK SHOWN ON RESPECTIVE PLANT'S LAYOUT.
6. THE DIRECTION PROCEDURE FOR DRAW OFF NOZZLE SHALL INCLUDE THE FOLLOWING STEP PER API 650:
 - A. A HOLE SHALL BE CUT IN THE BOTTOM PLATE OR A SUMP SHALL BE PLACED IN THE FOUNDATION BEFORE BOTTOM PLACEMENT;
 - B. A NEAT EXCAVATION SHALL BE MADE TO CONFORM TO THE SHAPE OF THE DRAWOFF SUMP, THE SUMP SHALL BE PUT IN PLACE, AND THE FOUNDATION SHALL BE COMPACTED AROUND THE SUMP AFTER PLACEMENT; AND
 - C. THE SUMP SHALL BE WELDED TO THE BOTTOM.

OWNER		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAG DIV.			
LOCATION: BRGY. 1 POLARON, BALABAG, PULATIAN			
TITLE: NOZZLE DETAILS (SHEET 1 OF 2)			
DESIGNED	BY	CHKD	DATE
DRAWN	EAAL		
REVIEWED	PRINCIPLE ENGINEER/ENGR.	RECOMMENDED	
OVERLAYOUT		APPROVED	
ELEC.			
MECH.			
DWG. NO. VFBD-BDM-13.009		SPEC. NO. LUZP21Z13265c	
SCALE	NTS	BID DRAWING	
REV.	DATE	DESCRIPTION OF REVISION	BY

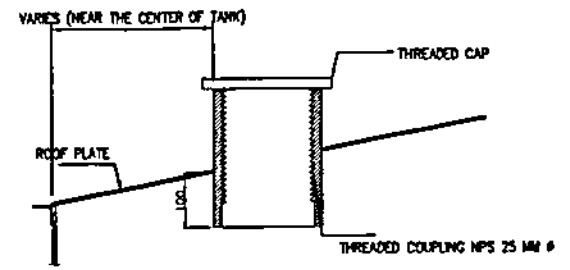
REV.	DATE	DESCRIPTION OF REVISION	BY	CHKD	RECD	APPD



GAUGE HATCH NOZZLE AND STRIKING PLATE

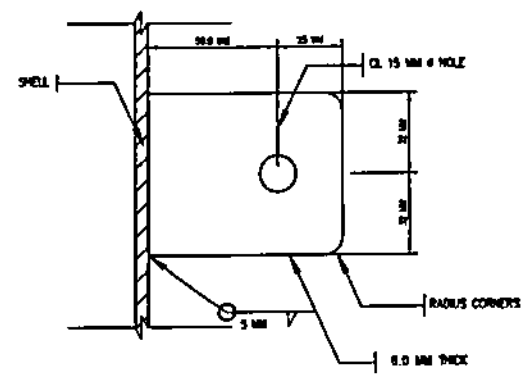


REINFORCING PLATE FOR 100 Ø VENT NOZZLE



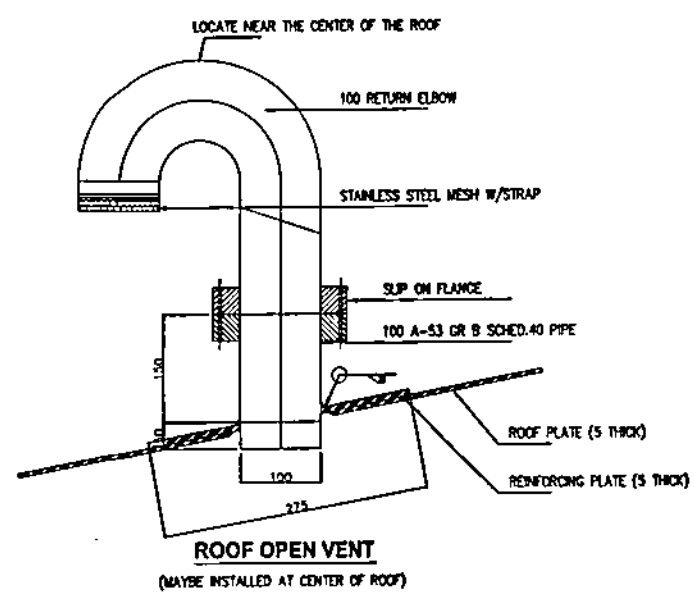
HEAT DETECTOR NOZZLE

- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
 2. THE FUEL OR STORAGE TANK SHALL BE CONSTRUCTED TO CONFORM WITH THE LATEST EDITION OF API 650 AND THE MINIMUM REQUIREMENTS SHOWN ON THIS DRAWING OR AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS.
 3. DETAILED DRAWINGS, IF NECESSARY SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC REVIEW/APPROVAL.
 4. ALL WELDING WORKS SHALL CONFORM TO THE REQUIREMENTS OF THE SPECIFICATION AND API 650.




GROUNDING LUG

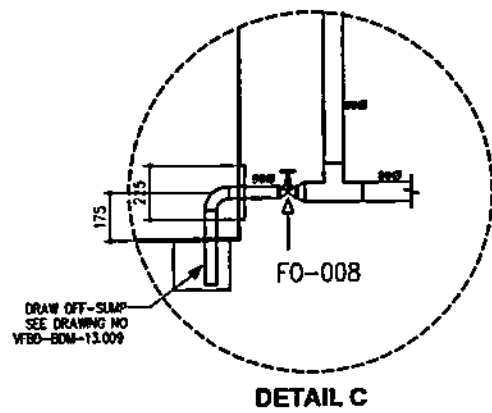
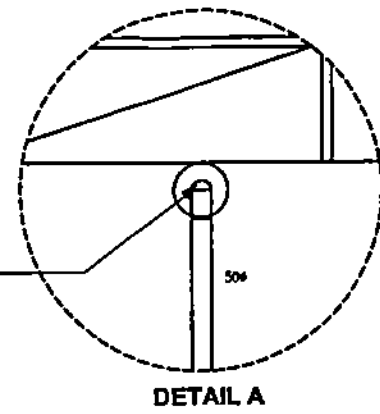
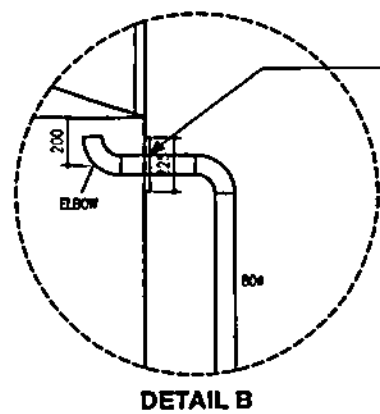
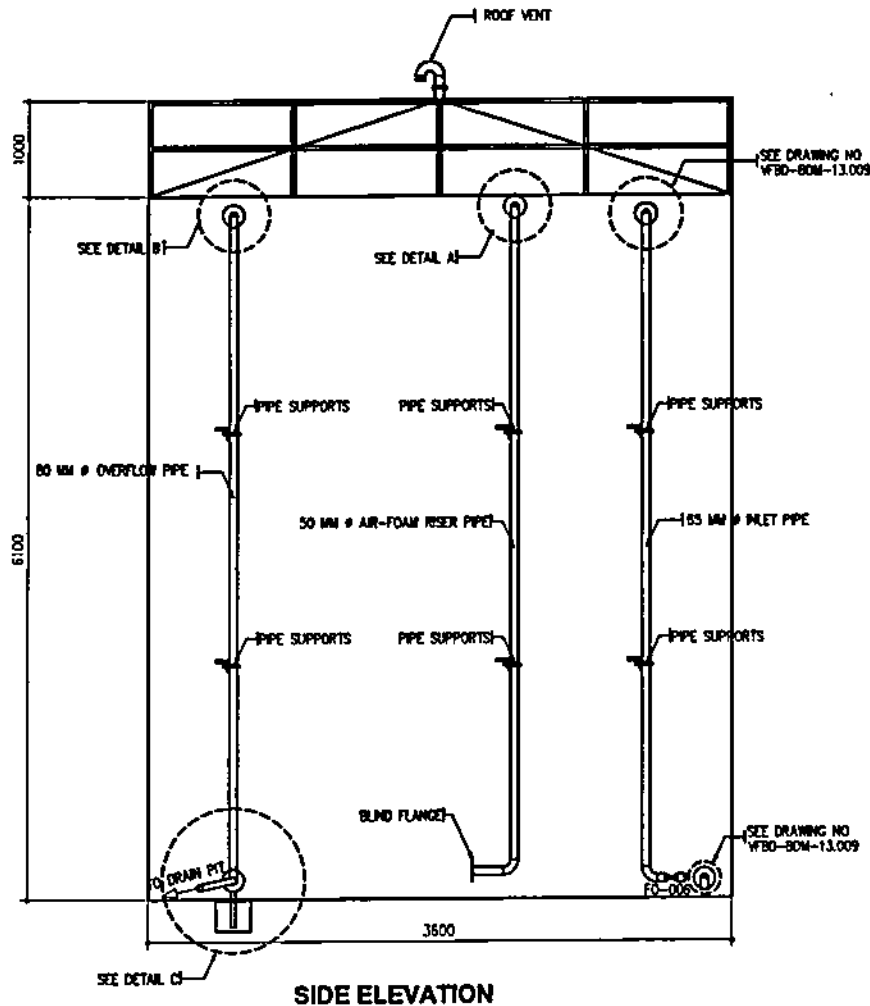
- NOTES FOR GROUNDING LUG:**
1. LUG MATERIAL SHALL BE AUSTENITIC STAINLESS STEEL WHEN ATTACHED TO CARBON OR LOW ALLOY STEEL PARTS.
 2. TWO SETS INCLUDING 3 M LENGTH, 20 MM Ø COPPER GROUNDING ROD ARE REQUIRED FOR EACH TANK.




ROOF OPEN VENT
(MAYBE INSTALLED AT CENTER OF ROOF)

OWNER		 NATIONAL POWER CORPORATION AGHAM ROAD, DILMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAG DPP			
LOCATION: FIRST FLOOR, BALABAG PALAYAN			
TITLE: NOZZLE ARRANGEMENT AND OTHER DETAILS (SHEET 2 OF 2)			
DESIGNED	BY: EAA	CHKD	DATE
DRAWN		SUBMITTED	R. A. CASSAWAN
REVIEWED	PRINCIPAL ENGR. (ARQ/IT)	RECOMMENDED	J. A. TAYLOR JR.
ENCLARIGHT		APPROVED	M. C. SOMERSON
ELEC.			
MECA.			
DWG. NO. VFBD-BDM-13.010		SPEC. NO. LuzP21Z1326Sc	
SCALE: NTS		BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY
			CHKD. RECD. APPL.

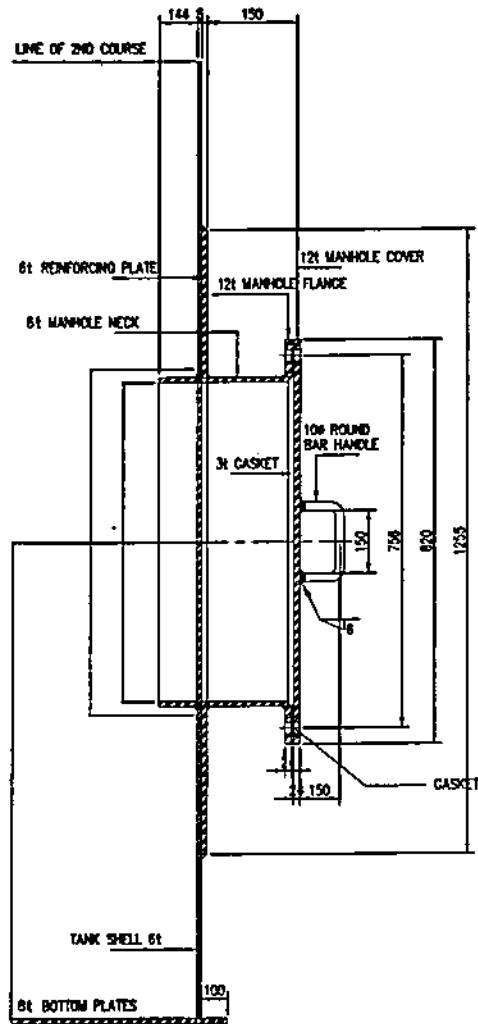
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPL.



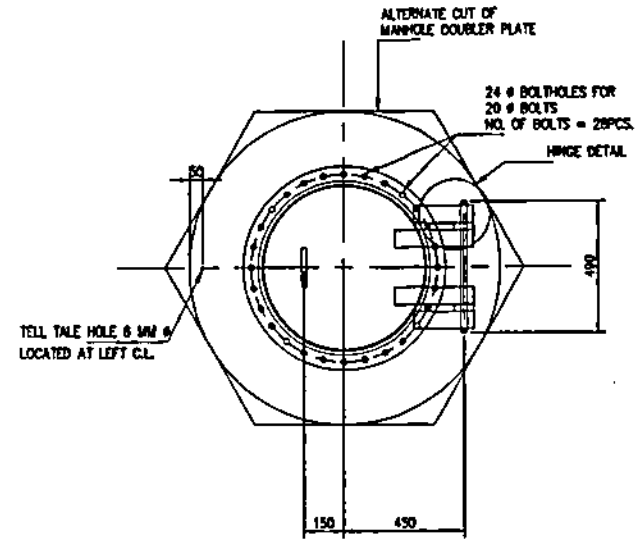
- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
 2. THE FUEL OIL STORAGE TANK SHALL BE CONSTRUCTED TO CONFORM WITH THE LATEST EDITION OF API 650 AND THE MINIMUM REQUIREMENTS SHOWN ON THIS DRAWING OR AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS.
 3. DETAILED DRAWINGS, IF NECESSARY SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC REVIEW/APPROVAL.
 4. ALL WELDING WORKS SHALL CONFORM TO THE REQUIREMENTS OF THE SPECIFICATION AND API 650.
 5. PIPE SHALL CONFORM TO ASTM A. 53 GR. B, SCHEDULE 40 AND SEAMLESS PIPE

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC OFF.			
LOCATION: BRGY. 1 POBLACION, BALABAC, PALAWAN			
TITLE: TANK NOZZLES AND PIPE 1 X 60M³ FUEL OIL STORAGE TANK			
DESIGNED	BY	CHKD	DATE
DRAWN	EAM		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED	
CHECKED/NOTY		APPROVED	
ELEC.			
MECH.			
DWG. NO. VFB0-BDM-13.011		SPECS. NO. LUZP21Z1324Sc	
SCALE: NTS		BID DRAWING	
REV. 0			

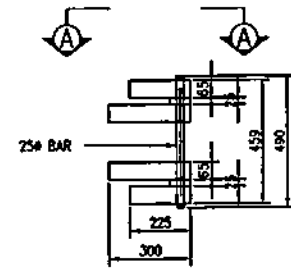
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



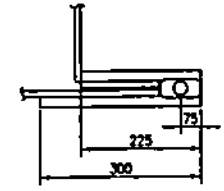
SHELL MANHOLE SECTION



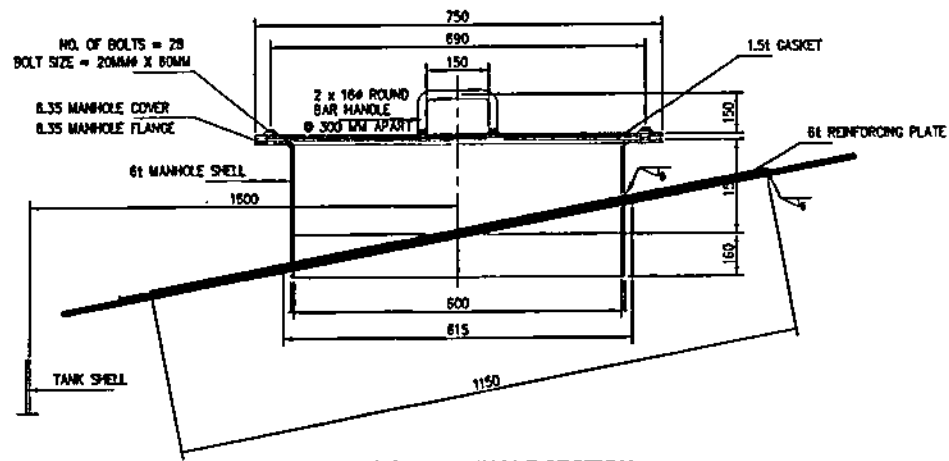
SHELL MANHOLE PLAN



HINGE DETAIL




DETAIL A

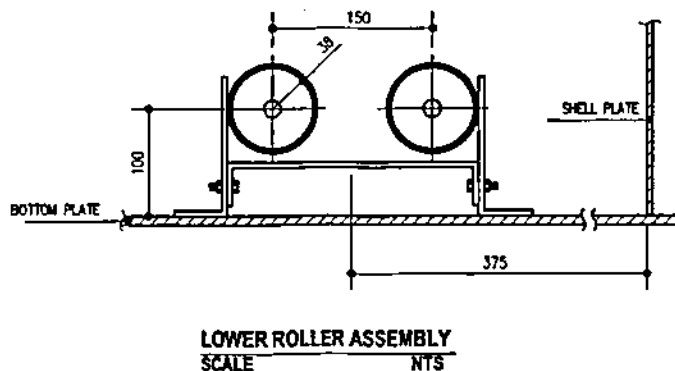
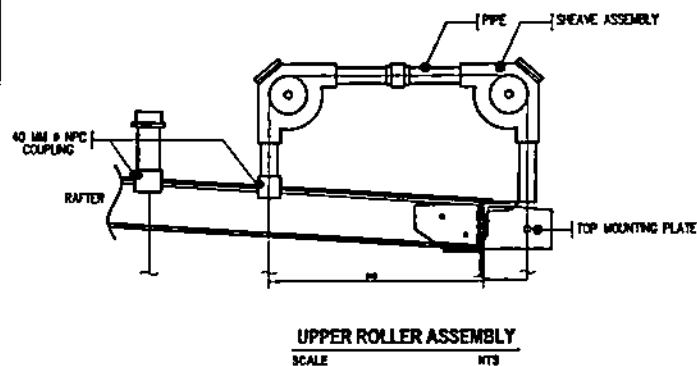
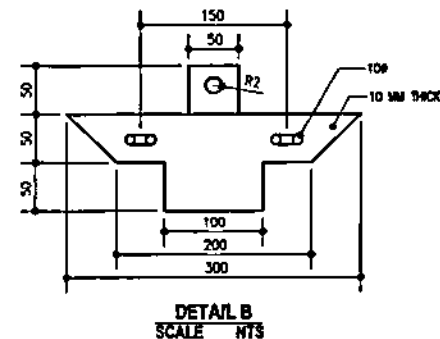
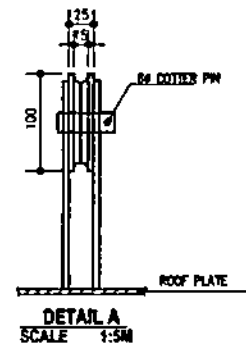
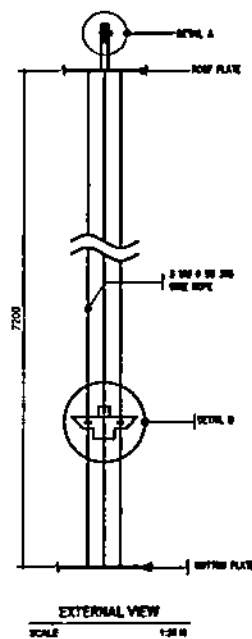
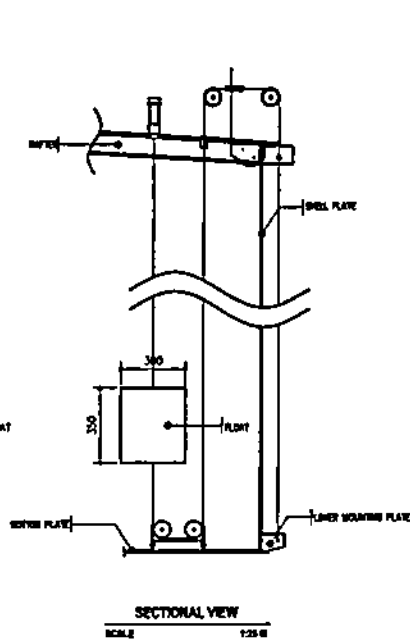
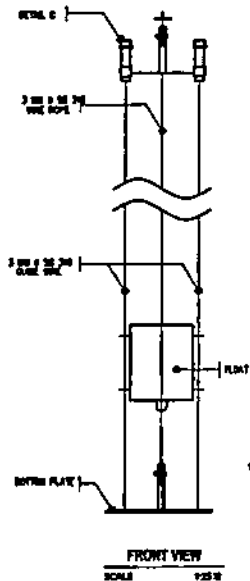
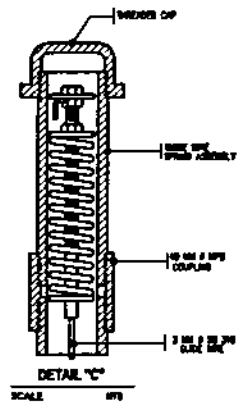


ROOF MANHOLE SECTION

- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
 2. THE FUEL OIL STORAGE TANK SHALL BE CONSTRUCTED TO CONFORM WITH THE LATEST EDITION OF API 650 AND THE MINIMUM REQUIREMENTS SHOWN ON THIS DRAWING OR AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS.
 3. DETAILED DRAWINGS, IF NECESSARY SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC REVIEW/APPROVAL.
 4. THE CONTRACTOR MAY PROPOSE DIFFERENT MANHOLE HINGE DETAILS, SUBJECT TO NPC'S APPROVAL.
 5. ALL WELDING WORKS SHALL CONFORM TO THE REQUIREMENTS OF THE SPECIFICATION AND API 650.


OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: WEST L POBLACION, BALABAC PALANAN			
TITLE: ROOF AND SHELL MANHOLE DETAILS 1 X 60M³ FUEL OIL STORAGE TANK			
DESIGNED	BY: EAA	CHKD	DATE: 12/12/13
DRAWN		SUBMITTED	R. B. CADSAWAN Principal Engineer A
REVIEWER	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED	J. A. MEL... Manager
CIVIL/ARCHT		APPROVED	M. G. ... Manager, DDO
ELEC.			
MECH.			
DWG NO. VFBD-BDM-13.012		SPEC NO. LuzP21Z13263c	
SCALE: NTS		BID DRAWING	
REV. 0		REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPR.



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE FUEL OIL STORAGE TANK SHALL BE CONSTRUCTED TO CONFORM WITH THE LATEST EDITION OF API 650 AND THE MINIMUM REQUIREMENTS SHOWN ON THIS DRAWING OR AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS.
3. DETAILED DRAWINGS, IF NECESSARY SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC REVIEW/APPROVAL.
4. ALL WELDING WORKS SHALL CONFORM TO THE REQUIREMENTS OF THE SPECIFICATION AND API 650.
5. CALIBRATION SCALES SHALL BE PAINTED ON THE TANK AND SHALL BE LARGE ENOUGH SO IT CAN EASILY BE VISIBLE FROM THE CONTROL ROOM / POWERHOUSE
6. SIZE AND DIMENSIONS OF FLOAT AND BOARD TANK GAUGE ASSEMBLY MAY BE MODIFIED IN COORDINATION WITH THE DEVICE SUPPLIER.

OWNER		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY. 1, Poblacion, BALABAC, PALAUAN			
TITLE: LEVEL GAUGE INDICATOR DETAILS 1 X 60M³ FUEL OIL STORAGE TANK			
DESIGNED	BY: EAA	CHKD	DATE
DRAWN	SUBMITTED		R. M. CASAWAN
REVIEWED	RECOMMENDED		J. A. DELA CRUZ
CIVIL ARCHT.	APPROVED		M. G. S. S. S. S.
ELEC.			
MECH.			
DWG. NO. VFBD-BDM-13.013		SPEC. NO. LuzP21Z1326Sc	
SCALE: NTS		BID DRAWING	
REV. DATE		NATURE OF REVISION	
BY	CHKD	RECD.	APPD.

SECTION IX

BID DRAWINGS
ELECTRICAL WORKS



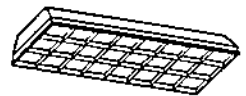






SECTION IX - BID DRAWINGS

EW - ELECTRICAL DRAWINGS

DRAWING NO.	TITLE
VFBD-BDE-17.001	GENERAL NOTES, DETAILS OF LIGHTING FIXTURES AND LEGEND
VFBD-BDE-17.002	LIGHTING LAYOUT (STAFFHOUSE)
VFBD-BDE-17.003	POWER LAYOUT (STAFFHOUSE)
VFBD-BDE-17.004	SCHEDULE OF LOAD AND RISER DIAGRAM (LIGHTING AND POWER PANELBOARD 1)
VFBD-BDE-17.005	LIGHTING LAYOUT (WAREHOUSE)
VFBD-BDE-17.006	POWER LAYOUT (WAREHOUSE)
VFBD-BDE-17.007	SCHEDULE OF LOAD AND RISER DIAGRAM (LIGHTING AND POWER PANELBOARD 2)
VFBD-BDE-17.008	LIGHTING LAYOUT & POWER LAYOUT AND SINGLE LINE DIAGRAM (PUMPHOUSE)
VFBD-BDE-17.009	PUMP MOTOR CONTROL AND PROTECTION PANEL DETAILS
VFBD-BDE-17.010	LIGHTING LAYOUT (HAZARDOUS WASTE STORAGE FACILITY AND MATERIALS RECOVERY FACILITY)
VFBD-BDE-17.011	SCHEDULE OF LOAD AND RISER DIAGRAM (MAIN DISTRIBUTION PANELBOARD)
























GENERAL NOTES:



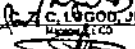
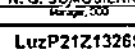
- ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE LATEST PROVISIONS OF THE PHILIPPINE ELECTRICAL CODE, LAWS AND ORDINANCES OF THE LOCAL CODE ENFORCING AUTHORITIES.
- POWER SUPPLY SHALL BE FROM THE NEW 25 KVA STATION SERVICE TRANSFORMER WITH FUSE DISCONNECT SWITCH AND LIGHTNING ARRESTER COMBINATION AND KILOWATT-HOUR METER TO BE SUPPLIED, INSTALLED, TESTED AND COMMISSIONED.
- CONDUCTOR FROM THE NEW STATION SERVICE TRANSFORMER TO THE NEW FUSE DISCONNECT SWITCH WITH LIGHTNING ARRESTER COMBINATION SHALL BE 30mm² 15kV XLPE POWER CABLE WHILE CONDUCTOR FROM THE NEW FUSE DISCONNECT SWITCH WITH LIGHTNING ARRESTER COMBINATION TO THE EXISTING 15kV BUS SHALL BE 2/0 AWG 15kV AC SR.
- ALL SWITCHES AND CONVENIENCE OUTLETS SHALL BE FLUSH-MOUNTED. SWITCHES SHALL BE 1.37 METERS ABOVE THE FINISHED FLOOR WHILE CONVENIENCE OUTLETS SHALL BE MOUNTED 0.30 METERS ABOVE THE FINISHED FLOOR AND 0.15 METERS ABOVE WORKING TABLE.
- OUTLETS FOR EXHAUST FAN SHALL BE FLUSH-MOUNTED, 2.0 METERS ABOVE THE FINISHED FLOOR.
- CONDUIT RUNS ARE INDICATIVE ONLY. THE ACTUAL RUNS SHALL BE DETERMINED IN THE FIELD.
- MINIMUM SIZE OF CONDUCTOR TO BE USED FOR THE BRANCH CIRCUITS SHALL BE 3.5 mm² THHN/THWN-2 IN 20 mm² SCH.40 UPVC CONDUIT UNLESS OTHERWISE SPECIFIED IN THE PLAN.
- METHOD OF WIRING SHALL BE IN UPVC WITH PROPER FITTINGS, DEVICES, BOXES AND SUPPORTS. WORK SHALL BE AS PER PLAN AND SPECIFICATIONS AS TO LOCATION, TYPE AND USE.
- ALL EQUIPMENT SHALL BE PROPERLY GROUNDING.
- WRES, BOXES, ELECTRICAL AS WELL AS NON-ELECTRICAL MATERIALS NOT INCLUDED IN THE PLANS AND SPECIFICATIONS BUT NECESSARY TO COMPLETE THE JOB SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.
- ALL ELECTRICAL MATERIALS TO BE USED IN THE INSTALLATION SHALL BE NEW, STANDARD AND APPROVED TYPE AS TO LOCATION, TYPES AND PURPOSE.
- ELECTRICAL WORKS SHALL BE DONE UNDER THE DIRECT SUPERVISION OF A DULY LICENSED ELECTRICAL ENGINEER.

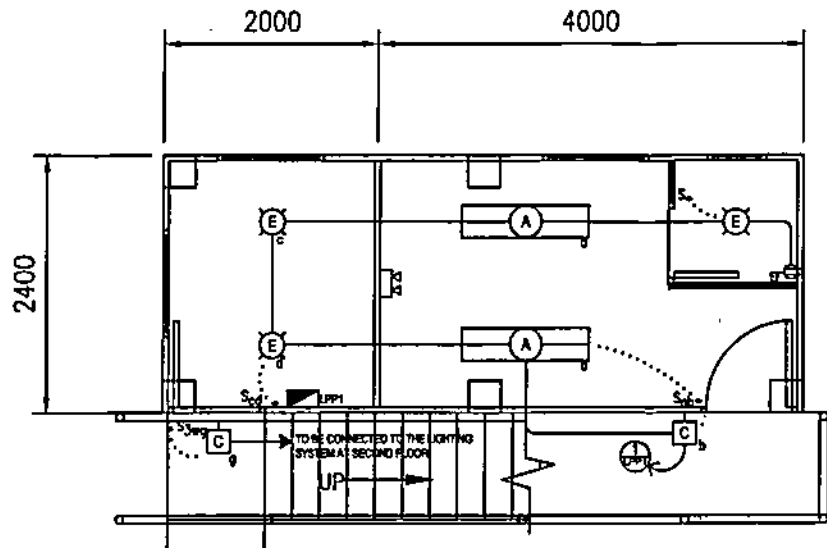
			
<p>IP20 SURFACE MOUNTED LUMINAIRE, 1200 mm IN LENGTH, WITH MIRROR FINISH ALUMINUM REFLECTOR AND 2 X 16 WATTS COOL WHITE LED LINEAR TUBE</p>	<p>IP20 ROUND CEILING LIGHTING FIXTURE, SURFACE MOUNTED, 350 mm DIAMETER, WHITE STEEL BASE, WHITE OPAL GLASS DIFFUSER AND COMPLETE WITH 2 x 18 WATTS, E27 BASE, FROSTED FINISH LED BULB</p>	<p>IP44 WALL MOUNTED LUMINAIRE, STEEL BASE, WHITE SATINATED GLASS DIFFUSER WITH 1 x 12 WATTS COMPACT LED LAMP</p>	<p>IP65 WATER AND DUST PROOF LIGHTING FIXTURE WITH POLYCARBONATE HOUSING AND 2 x 16 WATTS, 1200mm, HIGH OUTPUT, LED TUBE</p>
			
<p>IP20 1 x 9 WATTS COOL WHITE, CLASSIC GLOBE SHAPE, FROSTED FINISH, E27 BASE, LED BULB</p>	<p>IP65 WATER AND DUST PROOF LIGHTING FIXTURE WITH POLYCARBONATE HOUSING AND 1 x 8 WATTS, 1200mm, HIGH OUTPUT, LED TUBE</p>	<p>PORTABLE EMERGENCY LIGHTING FIXTURE, 2 x 2 WATTS LED WARM WHITE WITH BUILT-IN SEALED LEAD ACID BATTERY. CHARGING TIME < 20 HRS; USAGE TIME < 4 HRS</p>	

DETAILS OF LIGHTING LUMINAIRES

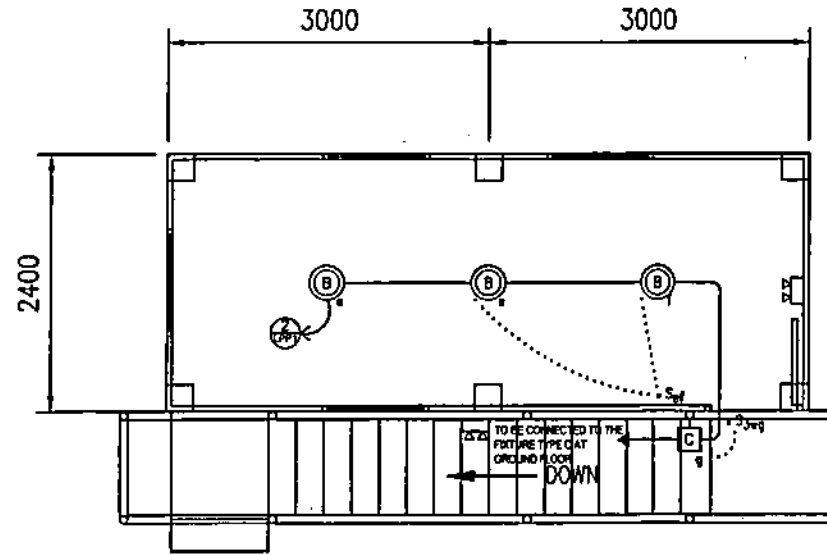
LEGEND:

- | | | |
|---|---|---|
|  - FIXTURE TYPE A |  - SINGLE GANG WALL SWITCH |  - CONTROL CIRCUIT |
|  - FIXTURE TYPE B |  - DOUBLE GANG WALL SWITCH (SUBSCRIPT DENOTES LAMP/S BEING CONTROLLED) |  - CIRCUIT HOMERUN |
|  - FIXTURE TYPE C |  - TRIPLE GANG WALL SWITCH (SUBSCRIPT DENOTES LAMP/S BEING CONTROLLED) |  - LIGHTING AND POWER PANEL |
|  - FIXTURE TYPE D |  - THREE WAY SWITCH (SUBSCRIPT DENOTES LAMP/S BEING CONTROLLED) |  - ENCLOSED CIRCUIT BREAKER |
|  - FIXTURE TYPE E |  - 200 VA, DUPLEX CONVENIENCE OUTLET |  - PUMP MOTOR LOCAL CONTROL AND PROTECTION PANEL |
|  - FIXTURE TYPE F |  - EXHAUST FAN OUTLET |  - KILOWATT-HOUR METER |
|  - FIXTURE TYPE G |  - AIR CONDITIONING UNIT (ACU) OUTLET (SUBSCRIPT DENOTES HP RATING) | |
|  - SINGLE GANG WALL SWITCH |  - CIRCUIT RUNNING ON CEILING | |
| |  - CIRCUIT RUNNING ON WALL | |

OWNER:  NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN BALABAC OFF	
LOCATION: BRGY 1 POBLACION, BALABAC PALAWAN	
TITLE: GENERAL NOTES, DETAILS OF LIGHTING LUMINAIRES AND LEGENDS	
DESIGNED: RLD	DATE: _____
DRAWN: RLD	SUBMITTED: 
REVIEWED: PRINCIPAL ENGR. (AEC)	RECOMMENDED: 
CHECKED: A	APPROVED: 
MECH:	
DWG NO: VFB-D-BE-17.001	SPEC NO: LuzP21Z1326Sc
SCALE: N.T.S.	BID DRAWING
REV. DATE	NATURE OF REVISION
BY	CHKD
REC'D	APPR.
	REV. 0



LIGHTING LAYOUT
(GROUND FLOOR)




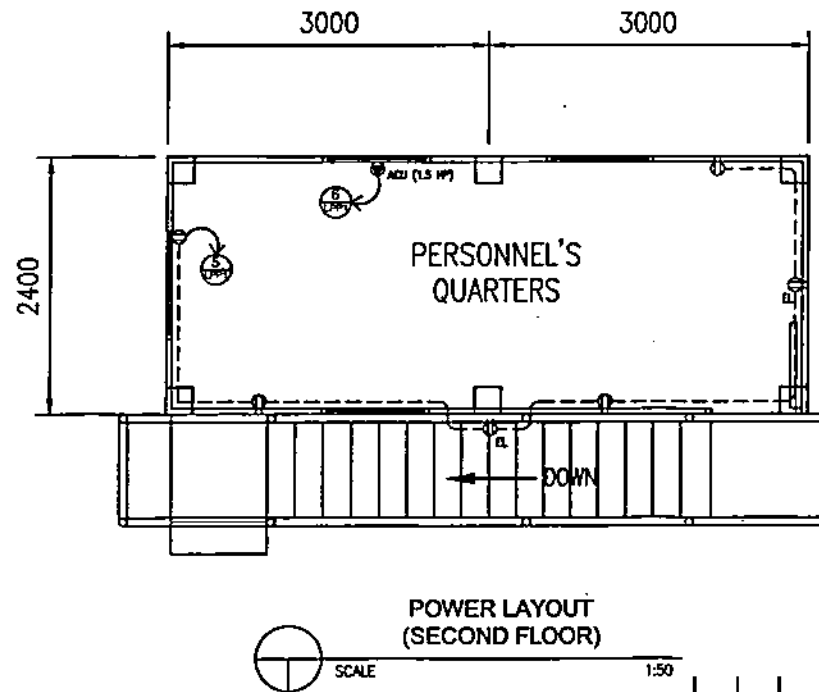
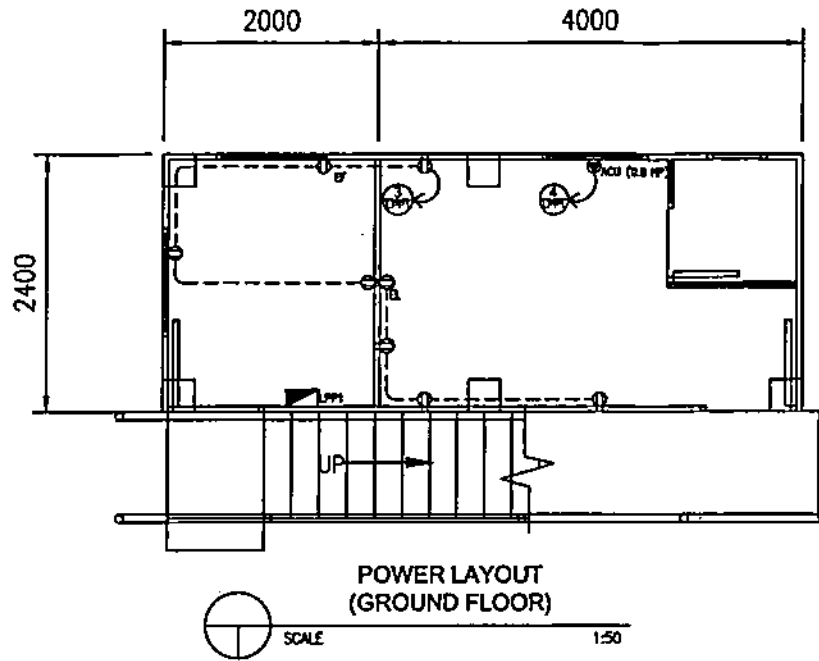
LIGHTING LAYOUT
(SECOND FLOOR)



NOTES:


1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. THIS DRAWING SHALL BE WORKED WITH CIVIL AND MECHANICAL BID DRAWINGS.

OWNER:				NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT-CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN SALABAC DPP					
LOCATION: BRGY 1, POBLACION, SALABAC PALAMARAN					
TITLE: LIGHTING LAYOUT (STAFFHOUSE)					
DESIGNED	BY	CHKD	DATE	SUBMITTED:	<i>B. M. AGUIA</i>
DRAWN	RLD			RECOMMENDED:	<i>C. C. LUGOD, JR.</i>
REVIEWED	PRINCIPAL ENGR / ARCHT.			APPROVED:	<i>[Signature]</i>
CHECKED					Manager, DDO
ELEC.	1				
MECH.					
DWG. NO. VFB-DDE-17.002			SPEC. NO. LuzP21Z1326Sc		
REV.		DATE	NATURE OF REVISION		BY
SCALE: AS SHOWN		BID DRAWING		REV. 5	



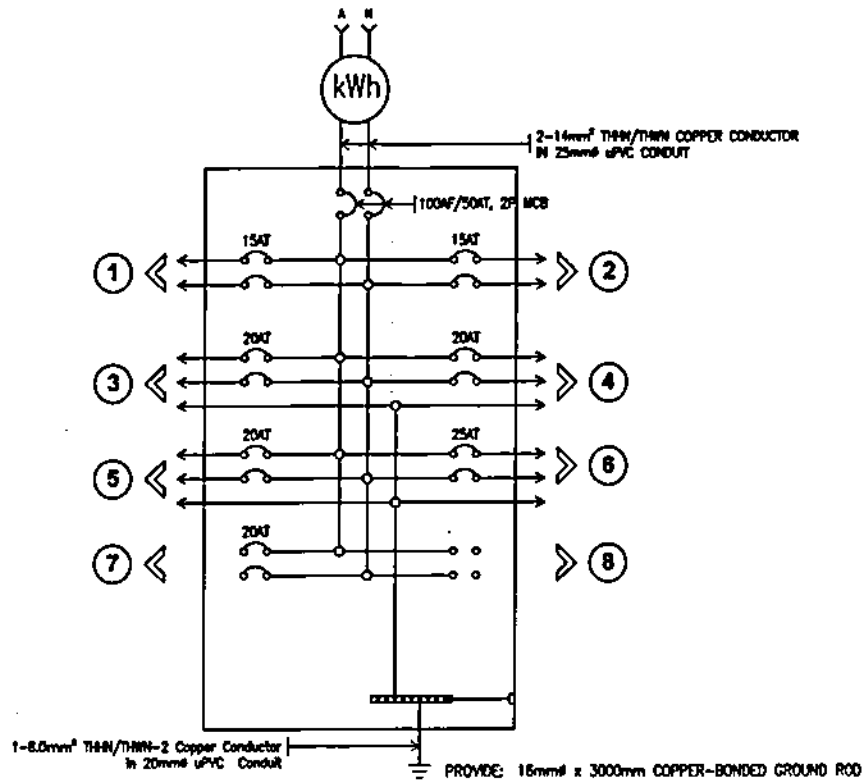
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. THIS DRAWING SHALL BE WORKED WITH CIVIL AND MECHANICAL BID DRAWINGS.

OWNER:				NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP					
LOCATION: BRGY 1, POBLACION, BALABAC PALAMIN					
TITLE: POWER LAYOUT (STAFFHOUSE)					
DESIGNED	BY	CHKD	DATE	SUBMITTED	
DRAWN	RLD			E. M. ABUJILA	
REVIEWED	PRINCIPAL ENGR. / ARCHT.			RECOMMENDED	
CIVIL/ARCHT				C. L. LUGOD, JR.	
ELEC.				APPROVED	
MECH.				M. G. SORIANO	
DWG. NO. VFBD-BDE-17.003			SPEC. NO. LuzP21Z1326Sc		
SCALE: AS SHOWN		BID DRAWING		REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPL.

FROM THE MAIN DISTRIBUTION PANELBOARD
TO BE SUPPLIED



RISER DIAGRAM
(LIGHTING AND POWER PANEL 1)

SCHEDULE OF LOADS							
CKT NO.	DESCRIPTION	VA	V	A	SIZES		
					BREAKER	WPC	CONDUIT
1	2 - 2 X 15W FUTURE TYPE A 1 - 1 X 12W FUTURE TYPE C 3 - 1 X 9W FUTURE TYPE E 1 - 100WA OUTLET FOR EXHAUST FAN	229	230	1.00	50AF / 15AT	2 - 3.5mm² THHN/THWN-2	20mmØ uPVC
2	3 - 2 X 10W FUTURE TYPE B 2 - 1 X 12W FUTURE TYPE C	185	230	0.72	50AF / 15AT	2 - 3.5mm² THHN/THWN-2	20mmØ uPVC
3	8 - 200WA COMMERCIAL OUTLET 1 - 100WA EXHAUST FAN OUTLET 1 - 2 X 2W EMERGENCY LIGHT OUTLET	1325	230	5.67	50AF / 20AT	2 - 3.5mm² THHN/THWN-2 1 - 3.5mm² THHN/THWN-2	20mmØ uPVC
4	1 - 0.8 HP AIR CONDITIONING UNIT	1637.80	230	7.12	50AF / 20AT	2 - 3.5mm² THHN/THWN-2 1 - 3.5mm² THHN/THWN-2	20mmØ uPVC
5	4 - 200WA COMMERCIAL OUTLET 2 - 2 X 2W EMERGENCY LIGHT OUTLET	810	230	3.52	50AF / 20AT	2 - 3.5mm² THHN/THWN-2 1 - 3.5mm² THHN/THWN-2	20mmØ uPVC
6	1 - 1.5HP AIR CONDITIONING UNIT	2300	230	10	50AF / 25AT	2 - 3.5mm² THHN/THWN-2 1 - 3.5mm² THHN/THWN-2	20mmØ uPVC
7	SPARE	1500	230	6.52	50AF / 20AT		
8	SPARE						
TOTAL		4148.80	230	34.55			

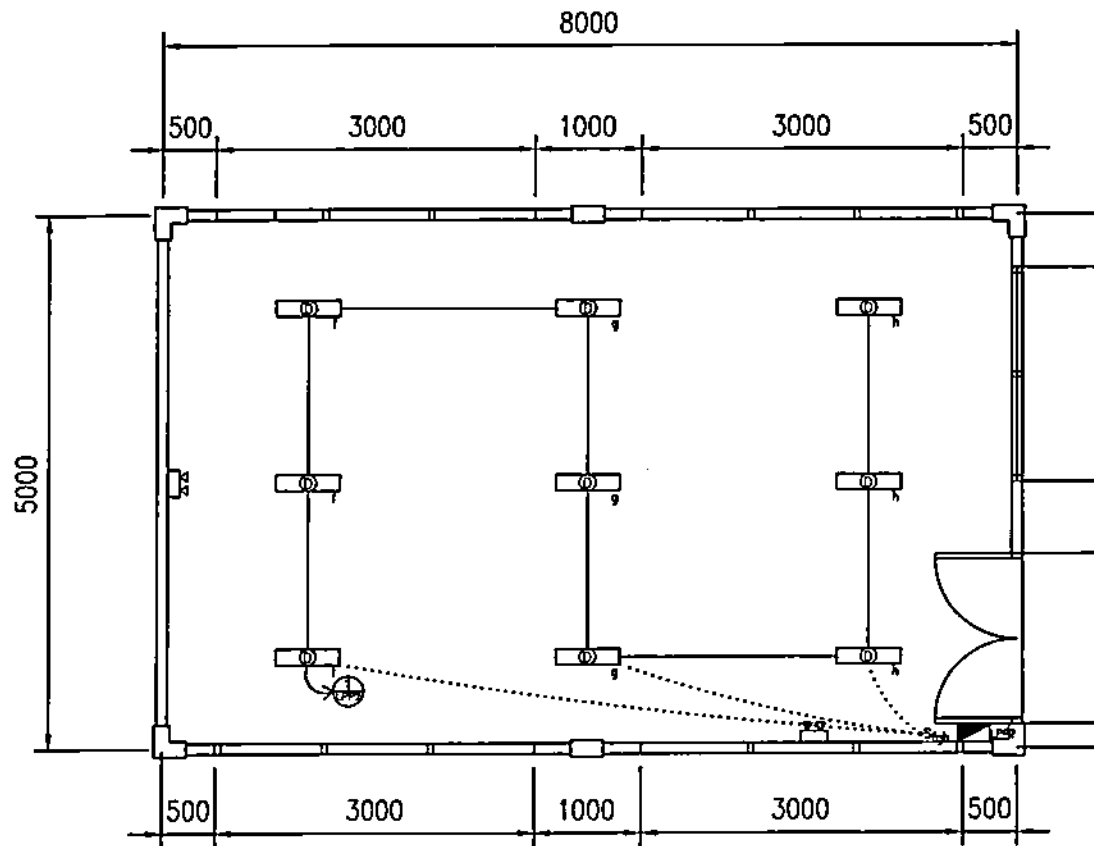
PROVIDE: 100 AF / 50 AT, 2P MCB
WITH BRANCH CIRCUITS OF:
1 - 50AF/25AT, 2P, MCB
4 - 50AF/20AT, 2P, MCB
2 - 50AF/15AT, 2P, MCB

PROVIDE: 2 - 14 mm² THHN/THWN-2 Copper Conductor
1 - 8.0 mm² THHN/THWN-2 Copper Conductor
in 25mmØ uPVC Conduit

SCHEDULE OF LOADS
(LIGHTING AND POWER PANEL 1)

OWNER:		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRBY I, POBLACION, BALABAC PALABAN			
TITLE: SCHEDULE OF LOADS & RISER DIAGRAM (LIGHTING AND POWER PANELBOARD 1)			
DESIGNED	BY: RLB	CHKD:	DATE:
DRAWN	BY: RLB	RECOMMENDED:	DATE:
REVIEWED	PRINCIPAL ENGR./ARCHT.:	APPROVED:	DATE:
CHECKED	BY: [Signature]		
NOTED			
DWG. NO. VFB-D-BDE-17.004		SPEC. NO. LuzP21Z1326Sc	
SCALE: N.T.S.		BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY
			CHKD. RECD. APPD.

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



NOTES:

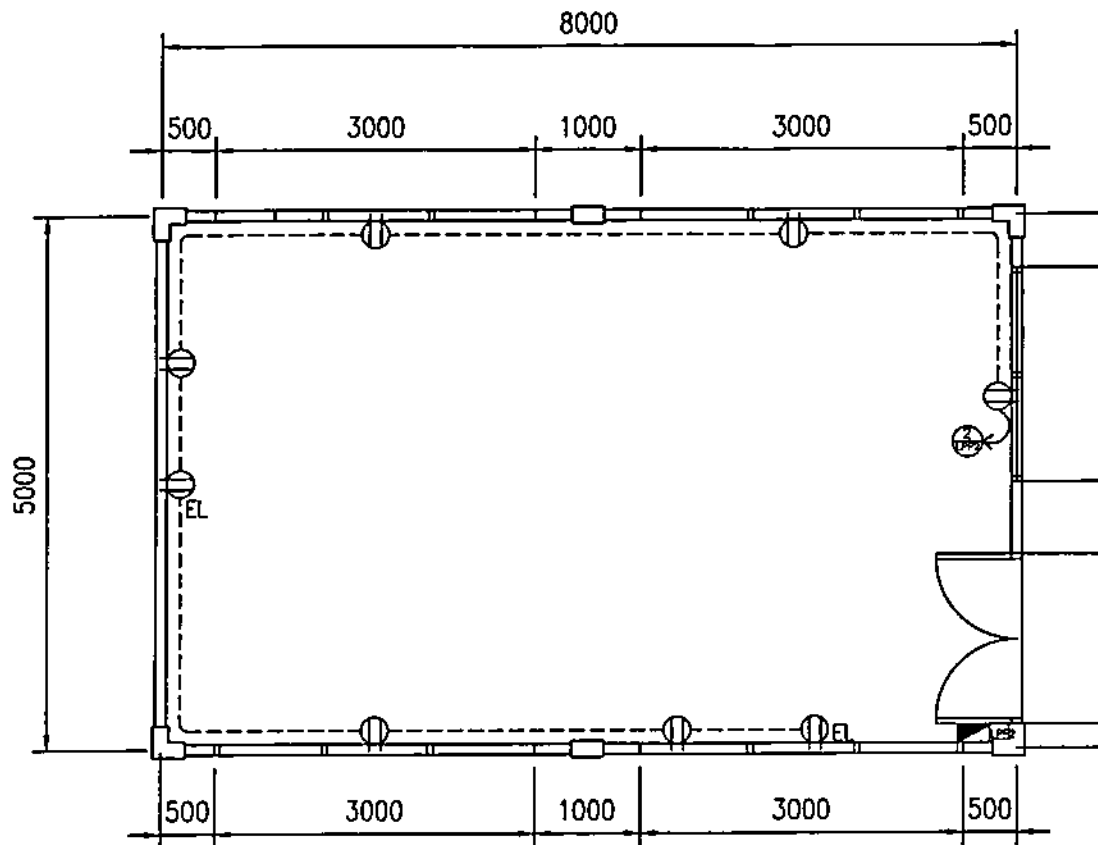
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. THIS DRAWING SHALL BE WORKED WITH CIVIL AND MECHANICAL BID DRAWINGS.

**LIGHTING LAYOUT
(WAREHOUSE)**

SCALE 1:50

OWNER		NATIONAL POWER CORPORATION AGHAM ROAD, DILMAN, QUEZON CITY	
PROJECT CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BROY I POBLACION, BALABAC PALAYAN			
TITLE		LIGHTING LAYOUT (WAREHOUSE)	
DESIGNED	BY	CHKD	DATE
DRAWN	BY		
REVIEWED	PRINCIPAL ENGR. / MCHT.		RECOMMENDED
CIVIL ARCHT.			
ELEC.			APPROVED
MCHL			
DWG. NO. VFBD-BDE-17.005		SPEC. NO. LuzP21Z1326Sc	
SCALE: AS SHOWN		BID DRAWING	
		REV. 6	

REV.	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPR



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. THIS DRAWING SHALL BE WORKED WITH CIVIL AND MECHANICAL BID DRAWINGS.

**POWER LAYOUT
(WAREHOUSE)**

SCALE 1:50


NATIONAL POWER CORPORATION AGHAM ROAD, DILMAN, QUEZON CITY																																		
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, FOST AND OTHER FACILITIES IN SALABAC DPP LOCATION: BRGY 1, POBLACION, BALABAC PALAMAN																																		
TITLE: POWER LAYOUT (WAREHOUSE)																																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">DESIGNED</td> <td style="width: 10%;">R/D</td> <td style="width: 10%;">BY</td> <td style="width: 10%;">CHKD</td> <td style="width: 10%;">DATE</td> <td rowspan="5" style="width: 10%; vertical-align: top;"> SUBMITTED: B. M. AGUIA ENGINEER </td> </tr> <tr> <td>DRAWN</td> <td>R/D</td> <td></td> <td></td> <td></td> </tr> <tr> <td>REVIEWED</td> <td>PRINCIPAL ENGR./I. ARCHT.</td> <td></td> <td></td> <td></td> <td rowspan="2" style="vertical-align: top;"> RECOMMENDED: C. LUGOD, JR. ENGINEER </td> </tr> <tr> <td>ENLIGHTENED</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>ELEC.</td> <td></td> <td></td> <td></td> <td></td> <td rowspan="2" style="vertical-align: top;"> APPROVED: N. C. S. SORIANO ENGINEER </td> </tr> <tr> <td>MECH.</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	DESIGNED	R/D	BY	CHKD	DATE	SUBMITTED: B. M. AGUIA ENGINEER	DRAWN	R/D				REVIEWED	PRINCIPAL ENGR./I. ARCHT.				RECOMMENDED: C. LUGOD, JR. ENGINEER	ENLIGHTENED					ELEC.					APPROVED: N. C. S. SORIANO ENGINEER	MECH.					
DESIGNED	R/D	BY	CHKD	DATE	SUBMITTED: B. M. AGUIA ENGINEER																													
DRAWN	R/D																																	
REVIEWED	PRINCIPAL ENGR./I. ARCHT.						RECOMMENDED: C. LUGOD, JR. ENGINEER																											
ENLIGHTENED																																		
ELEC.						APPROVED: N. C. S. SORIANO ENGINEER																												
MECH.																																		
DWG NO VFBD-BDE-17.006 SPEC NO LuzP21Z1326Sc																																		
SCALE: AS SHOWN BID DRAWING REV. 1																																		

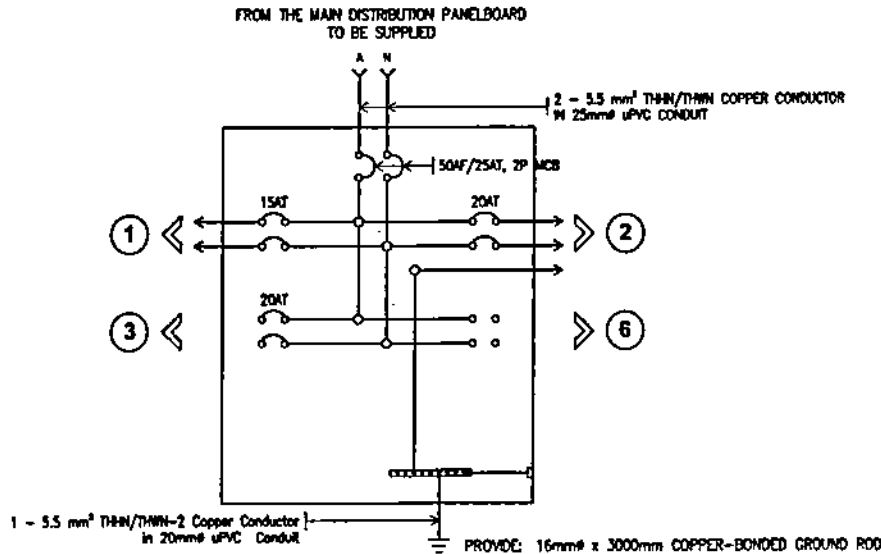
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

SCHEDULE OF LOADS							
CKT NO.	DESCRIPTION	VA	V	A	SIZES		
					BREAKER	WIRE	CONDUIT
1	8 - 2 X 10W FUTURE TYPE D	360	230	1.57	50AF / 15AT	2 - 3.5mm ² THHN/THWN-2	20mm ^ø uPVC
2	6 - 200MA COMMERCE OUTLET	1210	230	5.28	50AF / 20AT	2 - 3.5mm ² THHN/THWN-2 1 - 3.5mm ² THHN/THWN-2	20mm ^ø uPVC
	2 - 2 X 2W ENERGY LIGHT OUTLET						
3	SPARE	1500	230	6.52	50AF / 20AT		
4	SPACE						
	TOTAL	3070	230	13.35			





PROVIDE: 50 AF / 25 AT, 2P MCB
WITH BRANCH CIRCUITS OF:
2 - 50AF/20AT, 2P, MCB
1 - 50AF/15AT, 2P, MCB

PROVIDE: 2 - 5.5 mm² THHN/THWN-2 Copper Conductor &
1 - 5.5 mm² THHN/THWN-2 Copper Conductor
In 25mm^ø uPVC Conduit

 **SCHEDULE OF LOADS**
(LIGHTING AND POWER PANEL 2)

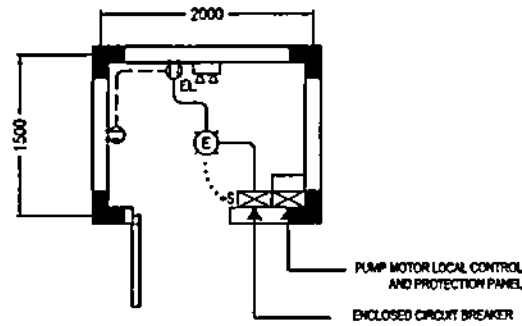


 **RISER DIAGRAM**
(LIGHTING AND POWER PANEL 2)

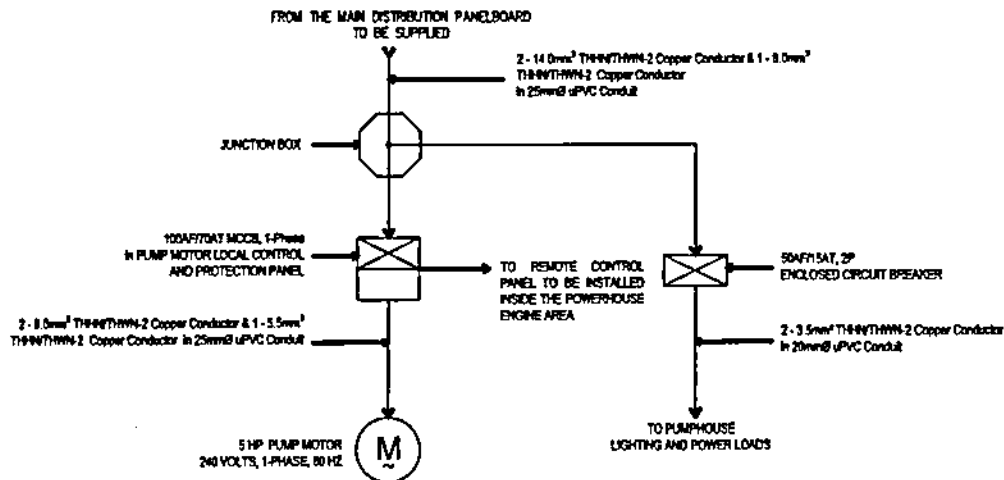
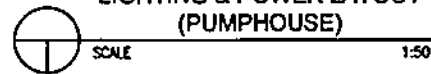
OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRNY I, POBLACION, BALABAC PALAWAN			
TITLE: SCHEDULE OF LOADS & RISER DIAGRAM (LIGHTING AND POWER PANELBOARD 2)			
DESIGNED	RLD	DATE	SUBMITTED:  E. M. AGUIA
DRAWN	RLD		RECOMMENDED:  R. C. GUGOD, JR.
REVIEWED	PRINCIPAL ENGR. / ARCHT.		APPROVED:  N. O. SCH... Manager, DPP
CHECKED	ELEC.		
MECH.			
DWG. NO. VFBD-BDE-17.007		SPEC. NO. LuzP21Z1326Sc	
SCALE: N.T.S.		BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY
			CHKD
			RECD
			APPD

NOTES:

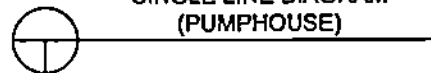
1. THE CONTRACTOR SHALL SUPPLY, INSTALL, AND TEST A NEW 5 HP PUMP MOTOR.
2. THE CONTRACTOR SHALL PROVIDE LOCAL CONTROL & PROTECTION PANEL AND REMOTE PANEL, COMPLETE WITH NECESSARY MONITORING PARAMETERS, RELAYS, CONTACTORS AND OVERCURRENT PROTECTIVE DEVICES FOR THE NEW PUMP MOTOR.
3. THE CONTRACTOR SHALL SUPPLY, INSTALL, AND TEST A NEW LIGHTING FIXTURE, EMERGENCY LIGHTING AND POWER OUTLET.
4. THE PUMP MOTOR AND ITS PANELS SHALL BE PROPERLY GROUND.



LIGHTING & POWER LAYOUT (PUMPHOUSE)



SINGLE LINE DIAGRAM (PUMPHOUSE)

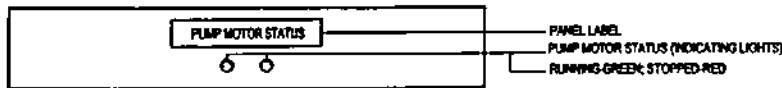


OWNER:		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY			
PROJECT CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN SALABAC DPP					
LOCATION BRGY 1 POBLACION, BALABAC PALAWAN					
TITLE: LIGHTING LAYOUT & POWER LAYOUT AND SINGLE LINE DIAGRAM (PUMPHOUSE)					
DESIGNED	RLD	CHKD	DATE	SUBMITTED	<i>[Signature]</i> E. M. SIGUNA
DRAWN	RLD			RECOMMENDED	<i>[Signature]</i> C. E. LUGOD, JR.
REVIEWED	PRINCIPAL ENGR. / ARCHT.			APPROVED	<i>[Signature]</i> H. G. SOMUSTERA Manager, DSO
CHECKED					
MECL					
DWG. NO. VFB0-BDE-17.008				SPEC. NO. LuzP21Z1326Sc	
SCALE AS SHOWN			BID DRAWING		REV. 0

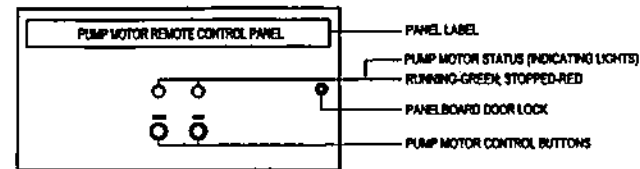
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.

NOTES:

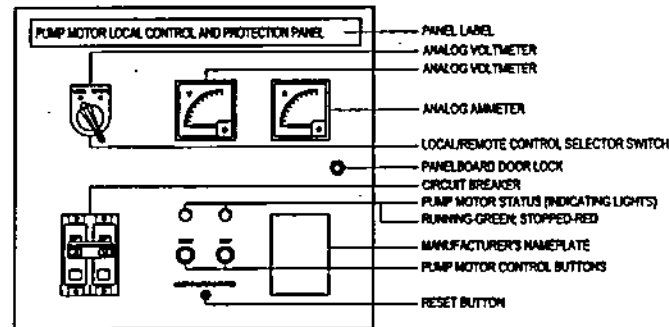
1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. PUMP MOTOR CONTROL, PROTECTION AND/OR MONITORING PANELS SHALL BE COLORED RAL 7032 AND ITS STEEL SHEET THICKNESS SHALL BE AT LEAST 2.0 MILLIMETERS.
3. THE CONTRACTOR SHALL DESIGN THE CABLE ENTRY FOR ALL THE POWER, CONTROL AND INSTRUMENTATION TO BE USED.
4. THE PUMP MOTOR MONITORING PANEL SHALL BE INSTALLED INSIDE THE CONTROL ROOM.
5. REMOTE CONTROL PANEL (RCP) SHALL BE INSTALLED AT THE POWER HOUSE ENGINE AREA.
6. THE CONTRACTOR SHALL PROVIDE THE BROCHURES/CATALOGUES OF THE PUMP MOTOR CONTROL AND MONITORING PANELS INCLUDING COMPONENTS FOR METERING, PROTECTION, CONTROL AND MONITORING PURPOSES FOR APPROVAL OF NPC.



PUMP MOTOR STATUS MONITORING PANEL



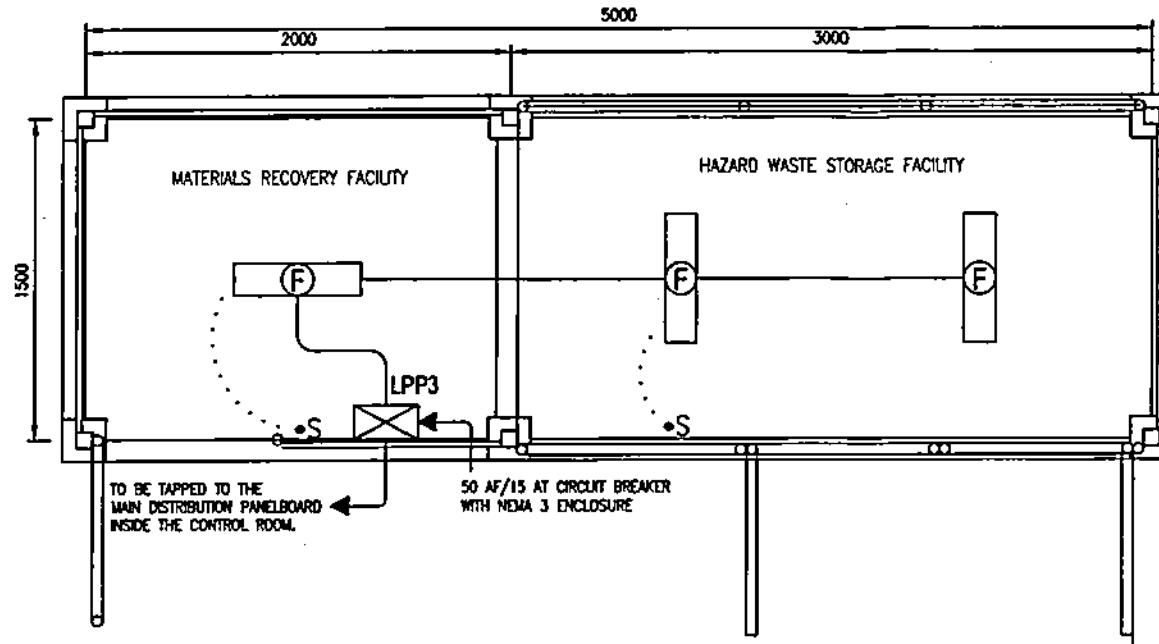
PUMP MOTOR REMOTE CONTROL PANEL (RCP)



PUMP MOTOR LOCAL CONTROL AND PROTECTION PANEL (LCPP)

		NATIONAL POWER CORPORATION ASHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY 1 POBLACION, BALABAC PALAMARI			
TITLE: PUMP MOTOR CONTROL AND PROTECTION PANEL DETAILS			
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	BY	CHKD	DATE
ENCLAROT	BY	CHKD	DATE
ELEC.	BY	CHKD	DATE
MECH.	BY	CHKD	DATE
DWG NO. VFBD-8DE-17.009		SPEC NO. L12P2121326Sc	
SCALE: N.T.S.		BID DRAWING	
REV. #		REV. #	

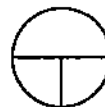
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.



NOTES:


1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. THIS DRAWING SHALL BE WORKED WITH CIVIL AND MECHANICAL BID DRAWINGS.
3. CONDUIT TO BE USED IN HAZARDOUS WASTE STORAGE AREA AND MATERIALS RECOVERY FACILITY SHALL BE RIGID STEEL CONDUIT.

**LIGHTING LAYOUT
(HAZARDOUS WASTE STORAGE FACILITY
& MATERIALS RECOVERY FACILITY)**



SCALE

1:25

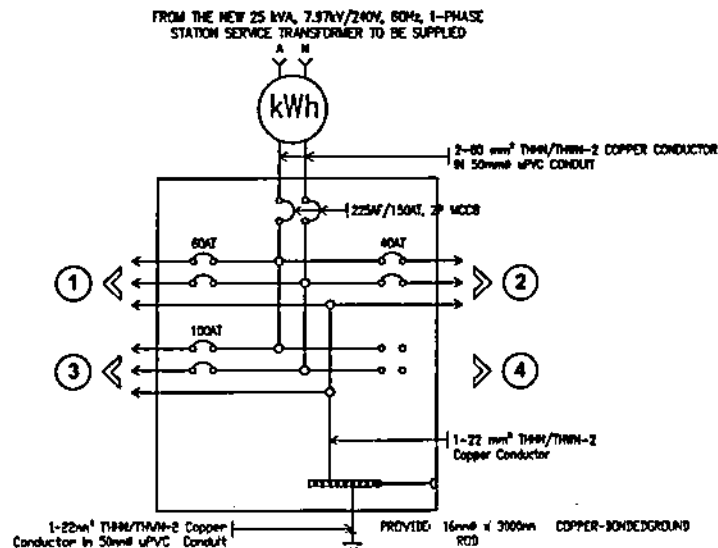
OWNER		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN BALABAC DPP			
LOCATION: BRGY L POBLACION, BALABAC PALAMAN			
TITLE: LIGHTING LAYOUT (HAZARDOUS WASTE STORAGE FACILITY & MATERIALS RECOVERY FACILITY)			
DESIGNED	RLD	DATE	SUBMITTED
DRAWN	RLD		<i>B. M. AGUIA</i>
REVIEWED	PRINCIPAL ENGR./ARCHT.		RECOMMENDED
CHIEF ARCHT.			<i>F. Z. C. LOGOD, JR.</i>
ELEC.			APPROVED
MECH.			<i>H. G. ...</i>
DWG. NO. VFBD-BDE-17.010		SPEC. NO. LuzP21Z1326Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. DATE		NATURE OF REVISION	
BY	CHKD.	RECD.	APPR.

SCHEDULE OF LOADS							
CKT NO.	DESCRIPTION	VA	V	A	SIZES		
					BREAKER	WIRE	CONDUIT
1	LPP1 (STAFFHOUSE)	4148.89	230	18.03	100AF / 30AT	2 - 14mm ² THHN/THWN-2 1 - 8.0mm ² THHN/THWN-2	25mm ^Ø uPVC
2	LPP2 (WAREHOUSE)	3079	230	13.39	50AF / 25AT	2 - 5.5mm ² THHN/THWN-2 1 - 3.5mm ² THHN/THWN-2	25mm ^Ø uPVC
3	LPP3 (HAZARDOUS WASTE FACILITY AND MATERIALS RECOVERY FACILITY)	39	230	0.13	50AF / 15AT	2 - 3.5mm ² THHN/THWN-2	25mm ^Ø uPVC
4	LPP4 (PUMPHOUSE)	657	230	28.51	100AF / 70AT	2 - 14mm ² THHN/THWN-2 1 - 8.0mm ² THHN/THWN-2	25mm ^Ø uPVC
5	LPP5 (EXISTING PANELBOARD INSIDE THE CONTROL ROOM)	5000	230	21.74	225AF / 100AT	2 - 22mm ² THHN/THWN-2 1 - 8.0mm ² THHN/THWN-2	20mm ^Ø uPVC
6	SPACE						
	TOTAL	18803.89	230	81.75			

PROVIDE: 225 AF / 125 AT, 2P MCCB
 WITH BRANCH CIRCUITS OF:
 1 - 100AF/30AT, 2P, MCB
 1 - 50AF/25AT, 2P, MCB
 1 - 50AF/15AT, 2P, MCB
 1 - 100AF/70AT, 2P, MCCB
 1 - 225AF/100AT, 2P, MCCB

PROVIDE: 2 - 60 mm² THHN/THWN-2 Copper Conductor &
 1 - 22 mm² THHN/THWN-2 Copper Conductor
 in 50mm^Ø uPVC Conduit

SCHEDULE OF LOADS
MAIN DISTRIBUTION PANELBOARD



RISER DIAGRAM
MAIN DISTRIBUTION PANELBOARD

NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF STAFFHOUSE, WAREHOUSE, POST AND OTHER FACILITIES IN SALABAC OPP	
LOCATION: BRGY L POBLADOR, SALABAC PALAWAN	
TITLE: SCHEDULE OF LOADS & RISER DIAGRAM (MAIN DISTRIBUTION PANELBOARD)	
DESIGNED	BY: <i>[Signature]</i> S. M. AGUILA Principal Engineer I
DRAWN	RD: <i>[Signature]</i>
REVIEWED	PRINCIPAL ENGR. / ARCHT. <i>[Signature]</i>
ENLARGED	
ELEC.	APPROVED: <i>[Signature]</i> H. G. DOMESTICA Engr., DDO
MECH.	
DWG. NO. VFB-D-17.011	SPEC. NO. LuzP21Z1326Sc
SCALE: N.T.S.	BID DRAWING
REV.	DATE
NATURE OF REVISION	BY
CHD	RECD
APPD	
REV. 9	