



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

## TERMS OF REFERENCE

- Name of Project** : CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BURDEOS QUEZON AND BUTAWANAN SIRUMA, CAMARINES SUR
- Location** : CALUTCOT BURDEOS, QUEZON AND BUTAWANAN, SIRUMA, CAMARINES SUR
- Specs. No** : LuzP22Z1457Sc
- Contents** :
- SECTION I - Instruction to Bidders
  - SECTION II - General Conditions of Contract
  - SECTION III - Technical Specifications
    - PH – Project Highlights*
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Design and Development Department





# National Power Corporation

## NEGOTIATED PROCUREMENT

### NP 2022-0018

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-Nego Conference	Bid Submission / Opening	ABC
HO-PIB21-016 / PB220118-HG00516 (NP)  Construction of Power Facilities for the Four (4) Units Modular Diesel Generating Sets including Hauling, Installation, Test and Commissioning of Balance of Plant in Calutcot, Burdeos Quezon and Butawanan Siruma, Camarines Sur  • PCAB License: License Category of at least <b>“Category D – General Building”</b> and registration classification of at least <b>“Small B – Building &amp; Industrial Plant”</b> or <b>“Small B – Mechanical Works”</b>	Construction / Transfer of Power Facilities of Diesel Generating Sets or Erection, Installation, Test and Commissioning of Diesel Power Plant or Construction of Multi-Storey Commercial or Industrial Building	01 December 2022 9:30 A.M	13 December 2022 9:30 A.M	₱ 24,512,000.00
<b>Venue: Kañao Function Room, NPC Bldg. Diliman, Quezon City</b>				

2. The NPC now invites Bids for Items listed above. Delivery of the items is required within **(see table below)** in the Technical Specifications in the Terms of Reference. Bidders should have completed from the date of submission and receipt of bids, a contract similar to the Project., must be at least equivalent to an amount as stated in the Terms of Reference.

PR Nos./PB Ref Nos.	Delivery Period / Contract Duration	Relevant Period of SLCC reckoned from the date of submission & receipt of bids
HO-PIB21-16	Two hundred Ten (210) Calendar Days	-

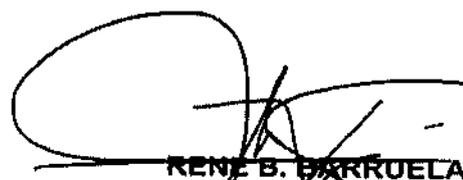
3. Bidding will be conducted through Negotiated Procurement procedures using a non-discretionary “pass/fail” criterion as specified in the Implementing Rules and Regulations (IRR) of Republic Act (RA) 9184, otherwise known as the “Government Procurement Reform Act”.
4. Interested bidders may obtain further information from BAC Secretariat at the address given below during office hours.
5. A complete set of TOR will be provided to the interested Bidders from the address below. It may also be downloaded from the websites of the Philippine Government Electronic Procurement System (PhilGEPS) <http://www.philgeps.gov.ph> and National Power Corporation <http://www.napocor.gov.ph>,

NPC will hold a Pre-Negotiation Conference on the date, time and venue stated above.

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
  - 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 delivered to the address below on the date stated above. Late bids shall not be accepted.
  8. NPC reserves the right to accept or reject any bid, to annul the bidding process, and to reject all bids at any time prior to contract award, without thereby incurring any liability to the affected bidder or bidders.
  9. 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 5564  
Fax No.: 8922-1622  
Email: [bcsd@napocor.gov.ph](mailto:bcsd@napocor.gov.ph)



**RENE B. BARRUELA**  
Vice President, Corporate Affairs Group and  
Chairman, Bids and Awards Committee

## SECTION I

# INSTRUCTION TO BIDDERS

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## SECTION I - INSTRUCTIONS TO BIDDERS

### A. General

#### 1. Scope of Bid

1.1. The National Power Corporation (NPC), with office address stated below, wishes to conduct the negotiated procurement for the **CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BURDEOS QUEZON AND BUTAWANAN, SIRUMA, CAMARINES SUR (LuzP22Z1457Sc)** as described in Section III – Technical Specifications, to selected Bidders in accordance with the revised IRR of R.A. 9184.

1.2. NPC's address is:

Office : **Bids and Contracts Services Division (BCSD)  
Logistics Department**  
Address : Ground Floor, Building No. 1  
National Power Corporation  
BIR Road corner Quezon Avenue  
Diliman, Quezon City, Metro Manila 1100  
Tel Nos. : 8924-5211 and 8921-3541 Loc. 5564  
Tel/Fax No. : 8922-1622  
Email : [bcsd@napocor.gov.ph](mailto:bcsd@napocor.gov.ph)  
Website : [www.napocor.gov.ph](http://www.napocor.gov.ph)

1.3. Contract scope shall be as specified in the Technical Specifications and Bill of Quantities. All appurtenances and associated supplies/works required to complete the works shall be deemed included in the scope of the contract. The successful bidder will be expected to complete the Works within the contract duration specified in the Technical Specifications, reckoned from the contract effectivity date.

1.4. Partial bid is not allowed. The infrastructure project is packaged in a single lot and the lot shall not be divided into sub-lots for the purpose of bidding, evaluation, and contract award.

#### 2. Source of Funds

2.1 The Government of the Philippines (GOP) through the corporate funds of NPC for CY 2022 in the amount of **TWENTY FOUR MILLION FIVE HUNDRED TWELVE THOUSAND PESOS (P 24,512,000.00)** shall be used to finance the cost of this procurement.

2.2 Payments will be made by NPC upon approval of the claims in accordance with the provisions, terms and conditions of the contract and existing and applicable law.

### 3. Corrupt, Fraudulent, Collusive, Coercive, and Obstructive Practices

3.1. NPC, as well as bidders and contractors, shall observe the highest standard of ethics during the procurement and execution of the contract. In pursuance of this policy, NPC:

(a) defines, for purposes of this provision, the terms set forth below as follows:

- (i) "corrupt practice" means behavior on the part of officials in the public or private sectors by which they improperly and unlawfully enrich themselves, others, or induce others to do so, by misusing the position in which they are placed, and includes the offering, giving, receiving, or soliciting of anything of value to influence the action of any such official in the procurement process or in contract execution; entering, on behalf of NPC, into any contract or transaction manifestly and grossly disadvantageous to the same, whether or not the public officer profited or will profit thereby, and similar acts as provided in Republic Act 3019;
- (ii) "fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of NPC, and includes collusive practices among Bidders (prior to or after Bid submission) designed to establish bid prices at artificial, non-competitive levels and to deprive NPC of the benefits of free and open competition;
- (iii) "collusive practices" means a scheme or arrangement between two or more Bidders, with or without the knowledge of NPC, designed to establish bid prices at artificial, non-competitive levels; and
- (iv) "coercive practices" means harming or threatening to harm, directly or indirectly, persons, or their property to influence their participation in a procurement process, or affect the execution of a contract;
- (v) "obstructive practice" is
  - (aa) deliberately destroying, falsifying, altering or concealing of evidence material to an administrative proceedings or investigation or making false statements to investigators in order to materially impede an administrative proceedings or investigation of NPC or any foreign government/foreign or international financing institution into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the administrative proceedings or investigation or from pursuing such proceedings or investigation; or

- (bb) acts intended to materially impede the exercise of the inspection and audit rights of NPC or any foreign government/foreign or international financing institution herein.
    - (b) will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the Contract; and
    - (c) will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded Contract funded by the Funding Source if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing or, or in executing, a Contract funded by the Funding Source.
  - 3.2. Further, NPC will seek to impose the maximum civil, administrative, and/or criminal penalties available under the applicable laws on individuals and organizations deemed to be involved in any of the practices mentioned in ITB Clause 3.1(a).
  - 3.3. Furthermore, NPC reserve the right to inspect and audit records and accounts of a contractor in the bidding for and performance of a contract themselves or through independent auditors as reflected in the GCC Clause 32.
- 4. Conflict of Interest**
- 4.1. All Bidders found to have conflicting interests shall be disqualified to participate in the procurement at hand, without prejudice to the imposition of appropriate administrative, civil, and criminal sanctions. A Bidder may be considered to have conflicting interests with another Bidder in any of the events described in paragraphs (a) through (c) and a general conflict of interest in any of the circumstances set out in paragraphs (d) through (g) below:
    - (a) A Bidder has controlling shareholders in common with another Bidder;
    - (b) A Bidder receives or has received any direct or indirect subsidy from any other Bidder;
    - (c) A Bidder has the same legal representative as that of another Bidder for purposes of this Bid;
    - (d) A Bidder has a relationship, directly or through third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder or influence the decisions of NPC regarding this bidding process;
    - (e) A Bidder submits more than one bid in this bidding process. However, this does not limit the participation of subcontractors in more than one bid;
    - (f) A Bidder who participated as a consultant in the preparation of the design or technical specifications of the goods and related services that are the subject of the bid; or

- (g) A Bidder who lends, or temporarily seconds, its personnel to firms or organizations which are engaged in consulting services for the preparation related to procurement for or implementation of the project, if the personnel would be involved in any capacity on the same project.
- 4.2. In accordance with Section 47 of the IRR of RA 9184, all Bidding Documents shall be accompanied by a sworn affidavit of the Bidder that it is not related to the Head of NPC, members of the Bids and Awards Committee (BAC), members of the Technical Working Group (TWG), members of the BAC Secretariat, the head of the Project Management Office (PMO) or the end-user unit, and the project consultants, by consanguinity or affinity up to the third civil degree. On the part of the Bidder, this Clause shall apply to the following persons:
- (a) If the Bidder is an individual or a sole proprietorship, to the Bidder himself;
  - (b) If the Bidder is a partnership, to all its officers and members;
  - (c) If the Bidder is a corporation, to all its officers, directors, and controlling stockholders;
  - (d) If the Bidder is a cooperative, to all its officers, directors, and controlling shareholders or members; and
  - (e) If the Bidder is a joint venture (JV), the provisions of items (a), (b), (c) or (d) of this Clause shall correspondingly apply to each of the members of the said JV, as may be appropriate.

Relationship of the nature described above or failure to comply with this Clause will result in the automatic disqualification of a Bidder.

## 5. Eligible Bidders

- 5.1. The following persons shall be eligible to participate in this Bidding:
- (a) Duly licensed Filipino citizens/sole proprietorships;
  - (b) Partnerships duly organized under the laws of the Philippines and of which at least Sixty Percent (60%) of the interest belongs to citizens of the Philippines;
  - (c) Corporations duly organized under the laws of the Philippines, and of which at least Sixty Percent (60%) of the outstanding capital stock belongs to citizens of the Philippines;
  - (d) Cooperatives duly organized under the laws of the Philippines.
  - (e) Persons/entities forming themselves into a JV, i.e., a group of two (2) or more persons/entities that intend to be jointly and severally responsible or liable for a particular contract: *Provided, however,* that, in accordance with Executive Order No. 65 (EO 65) s. 2018, Filipino ownership or interest of the joint venture concerned shall be at least

Sixty Percent (60%): *Provided, further*, that joint ventures in which Filipino ownership or interest is less than Sixty Percent (60%) may be eligible where the structures to be built require the application of techniques and/or technologies which are not adequately possessed by a person/entity meeting the Sixty Percent (60%) Filipino ownership requirement: *Provided, finally*, that in the latter case, Filipino ownership or interest shall not be less than twenty five percent (25%). For this purpose, Filipino ownership or interest shall be based on the contributions of each of the members of the joint venture as specified in their JVA.

- 5.2. Government owned or controlled corporations (GOCCs) may be eligible to participate only if they can establish that they (a) are legally and financially autonomous, (b) operate under commercial law, and (c) are not attached agencies of NPC.
- 5.3. The prospective bidder must have completed a Single Largest Completed Contract (SLCC) that is similar to the contract to be bid, and whose value, adjusted to current prices using the Philippine Statistics Authority (PSA) consumer price indices, must be at least fifty percent (50%) of the ABC to be bid: *Provided, however*, That contractors under Small A and Small B categories without similar experience on the contract to be bid may be allowed to bid if the cost of such contract is not more than the Allowable Range of Contract Cost (ARCC) of their registration based on the guidelines as prescribed by the PCAB.

For this purpose, similar contracts shall refer to projects involving construction/transfer of power facilities of Diesel Generating Sets or erection, installation, test and commissioning of Diesel Power Plant or construction of multi-storey commercial or industrial building.

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 for reasons attributable to the Bidder.

- 5.4. The Bidder must submit a computation of its Net Financial Contracting Capacity (NFCC), which must be at least equal to the ABC to be bid, calculated as follows:

$$\text{NFCC} = [(\text{Current assets minus current liabilities}) (15)] \text{ minus the value of all outstanding or uncompleted portions of the projects under ongoing contracts, including awarded contracts yet to be started coinciding with the contract for this Project.}$$

The values of the domestic bidder's current assets and current liabilities shall be based on the latest Audited Financial Statements (AFS) submitted to the BIR.

For purposes of computing the foreign bidders' NFCC, the value of the current assets and current liabilities shall be based on their audited financial

statements prepared in accordance with international financial reporting standards.

## 6. Bidder's Responsibilities

- 6.1. The Bidder or its duly authorized representative shall submit an Omnibus sworn statement in the form prescribed in **Section V – Bidding Forms** as required in **ITB Clause 12.1(b)(ii)**.
- 6.2. The Bidder is responsible for the following:
  - (a) Having taken steps to carefully examine all of the Bidding Documents;
  - (b) Having acknowledged all conditions, local or otherwise, affecting the implementation of the contract;
  - (c) Having made an estimate of the facilities available and needed for the contract to be bid, if any;
  - (d) Having complied with its responsibility to inquire or secure Supplemental/Bid Bulletin/s as provided under **ITB Clause 10.3**.
  - (e) Ensuring that it is not "blacklisted" or barred from bidding by the GoP or any of its agencies, offices, corporations, or LGUs, including foreign government/foreign or international financing institution whose blacklisting rules have been recognized by the GPPB;
  - (f) Ensuring that 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;
  - (g) Authorizing the Head of the NPC or its duly authorized representative/s to verify all the documents submitted;
  - (h) Ensuring that the signatory 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, accompanied by the duly notarized Special Power of Attorney, Board/Partnership Resolution, or Secretary's Certificate, whichever is applicable;
  - (i) Complying with the disclosure provision under Section 47 of RA 9184 and its IRR in relation to other provisions of RA 3019;
  - (j) Complying with existing labor laws and standards, in the case of procurement of services. Moreover, bidder undertakes to:
    - (i) Ensure the entitlement of workers to wages, hours of work, safety and health and other prevailing conditions of work as established by national laws, rules and regulations; or collective bargaining agreement; or arbitration award, if and when applicable.

In case there is a finding by NPC or the DOLE of underpayment or non-payment of workers' wage and wage-related benefits, bidder agrees that the performance security or portion of the contract amount shall be withheld in favor of the complaining workers pursuant to appropriate provisions of Republic Act No. 9184 without prejudice to the institution of appropriate actions under the Labor Code, as amended, and other social legislations.

- (ii) Comply with occupational safety and health standards and to correct deficiencies, if any.

In case of imminent danger, injury or death of the worker, bidder undertakes to suspend contract implementation pending clearance to proceed from the DOLE Regional Office and to comply with Work Stoppage Order; and

- (iii) Inform the workers of their conditions of work, labor clauses under the contract specifying wages, hours of work and other benefits under prevailing national laws, rules and regulations; or collective bargaining agreement; or arbitration award, if and when applicable, through posting in two (2) conspicuous places in the establishment's premises; and

- (k) Ensuring that it 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;

Failure to observe any of the above responsibilities shall be at the risk of the Bidder concerned.

- 6.3. The Bidder, by the act of submitting its bid, shall be deemed to have inspected the site, determined the general characteristics of the contract works and the conditions for this Project and examine all instructions, forms, terms, and project requirements in the Bidding Documents.
- 6.4. It shall be the sole responsibility of the prospective bidder to determine and to satisfy itself by such means as it considers necessary or desirable as to all matters pertaining to this Project, including: (a) the location and the nature of the contract, project, or 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.
- 6.5. NPC shall not assume any responsibility regarding erroneous interpretations or conclusions by the prospective or eligible bidder out of the data furnished by NPC. However, NPC shall ensure that all information in the Bidding Documents, including supplemental/bid bulletins issued are correct and consistent.

- 6.6. Before submitting their bids, the Bidders are deemed to have become familiar with all existing laws, decrees, ordinances, acts and regulations of the Philippines which may affect the contract in any way.
- 6.7. The Bidder shall bear all costs associated with the preparation and submission of his bid, and NPC will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.
- 6.8. The Bidder should note that NPC will accept bids only from those that have paid the applicable fee for the Bidding Documents at the office indicated in the Invitation to Bid.

## 7. Origin of Goods and Services

There is no restriction on the origin of Goods, or Contracting of Works or Services other than those prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations.

## 8. Subcontracts

- 8.1. Only a maximum of fifty percent (50%) of the Works may be subcontracted. All Subcontractors must be approved by NPC. Subcontracting of any portion shall not relieve the Bidder from any liability or obligation that may arise from the contract for this Project.
- 8.2. Subcontractors must submit the documentary requirements under **ITB** Clause 12 and comply with the eligibility criteria. In the event that any subcontractor is found by NPC to be ineligible, the subcontracting of such portion of the Works shall be disallowed.
- 8.3. The Bidder may identify the subcontractor to whom a portion of the Works will be subcontracted at any stage of the bidding process or during contract implementation. If the Bidder opts to disclose the name of the subcontractor during bid submission, the Bidder shall include the required documents as part of the technical component of its bid.

## 9. Negotiation

- 9.1. Negotiation shall be held at the venue and on the date indicated in the invitation, to clarify concerns on the technical and financial components of this procurement.
- 9.2. Bidders are encouraged to attend the negotiation to ensure that they fully understand NPC's requirements. Non-attendance of the Bidder will in no way prejudice its bid; however, the Bidder is expected to know the changes and/or amendments to the TOR discussed during the negotiation.
- 9.3. Any statement made at the negotiation shall not modify the Terms of Reference unless such statement is specifically identified in writing as an amendment thereto and issued as a Supplemental/Bid Bulletin.

- 9.4. Following completion of the negotiations, NPC shall request all Bidders remaining in the proceedings to submit, on a specified date, a best and final offer with respect to all aspects of their bid proposals.

## **10. Clarification and Amendment of Bidding Documents**

- 10.1. Bidders may request for clarifications on any part of the documents for an interpretation during the negotiation meeting.

For such purpose, the BAC may send its official letters/correspondences/notices through email. Upon securing the bidding documents, Bidders shall be required to indicate their official email and alternate email addresses. All letters/correspondences/notices sent by the BAC through the designated/official email shall be considered officially received by all bidders on the date indicated in National Power Corporation's sent folder.

- 10.2. Supplemental/Bid Bulletins may also be issued upon NPC's initiative for purposes of clarifying or modifying any provision of the Bidding Documents not later than seven (7) calendar days before the deadline for the submission and receipt of Bids. Any modification to the Bidding Documents shall be identified as an amendment.

- 10.3. Any Supplemental/Bid Bulletin issued by the BAC shall also be posted in the PhilGEPS and the website of NPC, if available, and at any conspicuous place in the premises of NPC. It shall be the responsibility of all Bidders who have properly secured the Bidding Documents to inquire and secure Supplemental/Bid Bulletins that may be issued by the BAC. However, Bidders who have submitted bids before the issuance of the Supplemental/Bid Bulletin must be informed and allowed to modify or withdraw their bids.

### **B. Preparation of Bids**

## **11. Language of Bids**

The eligibility requirements or statements, the bids, and all other documents to be submitted to the BAC must be in English. If the eligibility requirements or statements, the bids, and all other documents submitted to the BAC are in foreign language other than English, it must be accompanied by a translation of the documents in English. The documents shall be translated by the relevant foreign government agency, the foreign government agency authorized to translate documents, or a registered translator in the foreign bidder's country; and 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. The English translation shall govern, for purposes of interpretation of the bid.

## **12. Documents Comprising the Bid: Eligibility and Technical Components**

- 12.1. The first envelope shall contain the following eligibility and technical documents:

- (a) Eligibility Documents –

**Class "A" Documents**

- (i) (a) PhilGEPS Certificate of Registration and Membership under Platinum Category in accordance with Section 8.5.2 of the IRR;

**OR:**

- (b) The following updated and valid Class "A" eligibility documents enumerated under "Annex A" of the Platinum Membership:

1. 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;
2. 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;

3. 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;
4. Tax clearance per Executive Order 398, Series of 2005, as finally reviewed and approved by the BIR;
5. 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:**

- (c) A combination thereof (i.a and i.b)

In case the bidder opted to submit their Class "A" eligibility documents, the Certificate of PhilGEPS Registration (Platinum Membership) shall remain as a post-qualification requirement to be submitted in accordance with Section 34.2 of the 2016 Revised IRR of RA 9184 (GPPB Circular 07-2017);

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

Statement of the Bidder's SLCC similar to the contract to be bid, in accordance with ITB Clause 5.4.

The two statements required shall indicate for each contract the following:

- (ii.1) name of the contract;
- (ii.2) date of the contract;
- (ii.3) contract duration;
- (ii.4) owner's name and address;
- (ii.5) nature of work;
- (ii.6) contractor's role (whether sole contractor, subcontractor, or partner in a JV) and percentage of participation;
- (ii.7) total contract value at award;
- (ii.8) date of completion or estimated completion time;
- (ii.9) total contract value at completion, if applicable;
- (ii.10) percentages of planned and actual accomplishments, if applicable; and
- (ii.11) value of outstanding works, if applicable.

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:

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.

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.

Further, 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:

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.
- (iii) Valid Philippine Contractors Accreditation Board (PCAB) license or Special PCAB License in case of Joint Ventures, and registration for the type and cost of the contract for this Project as follows:
- License Category of at least **"CATEGORY D – GENERAL BUILDING"** and registration classification of at least **"SMALL B – BUILDING & INDUSTRIAL PLANT"** or **"SMALL B – MECHANICAL WORKS"**
- (iv) NFCC computation in accordance with ITB Clause 5.5.

Class "B" Documents

- (v) If applicable, Joint Venture Agreement (JVA) in accordance with RA 4566.

Each partner of the Joint Venture shall submit their respective PhilGEPS Certificates of Registration in accordance with Section 8.5.2 of the revised IRR of RA 9184. The submission of technical and financial eligibility documents by any of the joint venture partners constitutes compliance: *Provided*, That the partner responsible to submit the NFCC shall likewise submit the Statement of all of its ongoing contracts and Audited Financial Statements.

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.

- (b) Technical Documents –
- (i) Project Requirements, which shall include the following:
    - (i.1) Organizational chart for the contract to be bid;

- (i.2) List of contractor's personnel to be assigned to the contract to be bid, with their complete qualification and experience data. These personnel must meet the required minimum years of experience, as follows:

**a. One (1) Project Engineer**

Registered Civil Engineer or Registered Mechanical Engineer or Registered Electrical Engineer who had supervised at least a project similar in nature as to the type of the proposed project within the last 10 years.

**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) Safety Officer I**

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.

- (i.3) 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, which must meet the minimum requirements for the contract, as follows:

- |                                 |          |
|---------------------------------|----------|
| a. Welding Machine (300 A min)  | - 1 unit |
| b. Oxy-acetylene cutting outfit | - 1 unit |

- |   |          |
|---|----------|
| c. Portable Generator (at least 300kVA) | - 1 unit |
| d. Bar Cutter (25 mm $\phi$ capable)    | - 1 unit |
| e. Concrete Vibrator (3.5HP)            | - 1 unit |
| f. Concrete Mixer (1 bagger)            | - 1 unit |
| g. Service Vehicle (4x4 pickup)         | - 1 unit |
- (ii) Omnibus Sworn statement in accordance with Section 25.3 of the IRR of RA 9184 and using the form prescribed in Section V – Bidding Forms.
- (iii) Completely Filled out and duly signed Technical Data Sheets Mechanical Works (MW) and Electrical Works (EW) – Part II, Section III - Technical Specifications
- 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
- 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 meritorious reasons subject to validation and prior approval by NPC
- (iv) Complete eligibility documents of the proposed sub-contractor, if any.

#### 24. Documents Comprising the Bid: Financial Component

- 24.1. The bidder shall submit the following requirements in their second envelope, financial component of their bid:
- (a) Duly signed Bid Letter indicating the total bid amount in accordance with the prescribed form (*Section V – Bidding Forms, NPCSF-INFR-13*);
  - (b) Duly signed and completely filled-out Bill of Quantities (*Section V – Bill of Quantities*) indicating the unit and total prices per item and the total amount in the prescribed Bill of Quantities form;
  - (c) 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 (*Section V – Bidding Forms, NPCSF-INFR-14*);

- (d) Summary sheets indicating the direct unit prices of construction materials, labor rates and equipment rental rates used in coming up with the bid (*Section V – Bidding Forms, NPCSF-INFR-15*).

24.2. Price proposals that exceed the ABC shall be rejected.

## 25. Alternative Bids

- 25.1. Alternative Bids shall be rejected. For this purpose, alternative bid is an offer made by a Bidder in addition or as a substitute to its original bid which may be included as part of its original bid or submitted separately therewith for purposes of bidding. A bid with options is considered an alternative bid regardless of whether said bid proposal is contained in a single envelope or submitted in two (2) or more separate bid envelopes.
- 25.2. 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.
- 25.3. Each Bidder shall submit only one Bid, either individually or as a partner in a JV. A Bidder who submits or participates in more than one bid (other than as a subcontractor if a subcontractor is permitted to participate in more than one bid) will cause all the proposals with the Bidder's participation to be disqualified. This shall be without prejudice to any applicable criminal, civil and administrative penalties that may be imposed upon the persons and entities concerned.

## 26. Bid Prices

- 26.1. The contract shall be for the whole Works, as described in **ITB** Clause 1.4 based on the priced Bill of Quantities submitted by the Bidder.
- 26.2. The Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Bids not addressing or providing all of the required items in the Bidding Documents including, where applicable, Bill of Quantities, shall be considered non-responsive and, thus, automatically disqualified. In this regard, where a required item is provided, but no price is indicated, the same shall be considered as non-responsive, but specifying a zero (0) or a dash (-) for the said item would mean that it is being offered for free to the Government, except those required by law or regulations to be provided for.
- 26.3. All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, prior to the deadline for submission of bids, shall be included in the rates, prices, and total bid price submitted by the Bidder.
- 26.4. All bid prices for the given scope of work in the contract as awarded shall be considered as fixed prices, and therefore not subject to price escalation during contract implementation, except under extraordinary circumstances as specified in GCC Clause 46. Upon the recommendation of NPC, price escalation may be allowed in extraordinary circumstances as may be determined by the National Economic and Development Authority in accordance with the Civil Code of the Philippines, and upon approval by the

GPPB. Furthermore, in cases where the cost of the awarded contract is affected by any applicable new laws, ordinances, regulations, or other acts of the GoP, promulgated after the date of bid opening, a contract price adjustment shall be made or appropriate relief shall be applied on a no loss-no gain basis.

## 27. Bid Currencies

All bid prices shall be quoted in Philippine Pesos. Payment of the contract price shall also be made in Philippine Pesos.

## 28. Bid Validity

28.1. Bids shall remain valid for the period of **ONE HUNDRED TWENTY (120) CALENDAR DAYS** from the date of the opening of bids.

28.2. In exceptional circumstances, prior to the expiration of the bid validity period, NPC may request Bidders to extend the period of validity of their bids. The request and the responses shall be made in writing. A Bidder may refuse the request, but his bid shall no longer be considered for further evaluation and award. A Bidder granting the request shall not be required or permitted to modify its bid.

## 29. Format and Signing of Bids

29.1. Bidders shall submit their bids through their duly authorized representative using the appropriate forms provided in **Section V – Bidding Forms** on or before the deadline specified in the **ITB Clause 31** in two (2) separate sealed bid envelopes, and which shall be submitted simultaneously. The first shall contain the technical component of the bid, including the eligibility requirements under **ITB Clause 12.1**, and the second shall contain the financial component of the bid. This shall also be observed for each lot in the case of lot procurement.

29.2. Forms as mentioned in **ITB Clause 29.1** must be completed without any alterations to their format, and no substitute form shall be accepted. All blank spaces shall be filled in with the information requested.

29.3. The Bidder shall prepare and submit an original of the first and second envelopes as described in **ITB Clauses 12 and 24**. In addition, the Bidder shall submit copies of the first and second envelopes. In the event of any discrepancy between the original and the copies, the original shall prevail.

29.4. Each and every page of the original bid and copies must be authenticated with original signatures (preferably in blue or red ink) by the bidder or his duly authorized representative/s. Failure to do so shall be a ground for the rejection of the bid.

29.5. Any interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the duly authorized representative/s of the Bidder.

**30. Sealing and Marking of Bids**

- 30.1. Bidders shall enclose their original eligibility and technical documents described in ITB Clause 12, in one sealed envelope marked "ORIGINAL - TECHNICAL COMPONENT," and the original of their financial component in another sealed envelope marked "ORIGINAL - FINANCIAL COMPONENT," sealing them all in an outer envelope marked "ORIGINAL BID."
- 30.2. Each copy of the first and second envelopes shall be similarly sealed duly marking the inner envelopes as "COPY NO. \_\_\_ - TECHNICAL COMPONENT" and "COPY NO. \_\_\_ – FINANCIAL COMPONENT" and the outer envelope as "COPY NO. \_\_\_," respectively. These envelopes containing the original and the copies shall then be enclosed in one single envelope.
- 30.3. Bidders shall **submit two (2) set of documents**. One (1) set containing either the originals or certified true copies of the first and second components of its bid and the other set which are photocopies of the 1<sup>st</sup> set of documents (original or certified true copies). **EACH AND EVERY PAGE OF ALL SETS** (original and the other sets) **must be authenticated with original signatures** (preferably in blue or red ink) by the bidder or his duly authorized representative. *Non compliance shall be ground for disqualification.*

If there is any discrepancy between the 1<sup>st</sup> set of original/certified true copy documents and the other set of photocopied documents of the same project, the documents in the 1<sup>st</sup> set of original/certified true copy documents shall prevail and shall be the basis for rating and evaluation of bids during bid opening.

Further, should there be any lacking documents in the second set of documents, the reference for completeness for rating purposes shall be the set of original/certified true copy documents.

- 30.4. All envelopes shall:
- (a) contain the name of the contract to be bid in capital letters;
  - (b) bear the name and address of the Bidder in capital letters;
  - (c) be addressed to NPC's BAC in accordance with ITB Clause 1.2;
  - (d) bear the specific identification of this bidding process; and
  - (e) bear a warning "DO NOT OPEN BEFORE..." the date and time for the opening of bids, in accordance with ITB Clause 31.
- 30.5. Unsealed or unmarked bid envelopes shall be rejected. However, bid envelopes that are not properly sealed and marked, as required in the bidding documents, shall not be rejected, but the Bidder or its duly authorized representative shall acknowledge such condition of the bid as submitted. The BAC or NPC shall assume no responsibility for the misplacement of the contents of the improperly sealed or marked bid, or for its premature opening.

### C. Submission and Opening of Bids

#### 31. Deadline for Submission of Bids

- 31.1. Proposals must be received by the BAC on the date and time agreed upon during negotiation meeting.
- 31.2. Any proposal submitted after the deadline for submission and receipt of proposals shall be declared "Late" and shall not be accepted by NPC.

#### 32. Opening and Preliminary Examination of Bids

- 32.1. The BAC shall open the Bids in public, immediately after the deadline for the submission and receipt of bids. In case the Bids cannot be opened as scheduled due to justifiable reasons, the BAC shall take custody of the Bids submitted and reschedule the opening of Bids on the next working day or at the soonest possible time through the issuance of a Notice of Postponement to be posted in the PhilGEPS website and the website of NPC.
- 32.2. The BAC shall open the first bid envelopes and determine each Bidder's compliance with the documents prescribed in ITB Clause 12, using a non-discretionary "pass/fail" criterion. If a Bidder submits the required document, it shall be rated "passed" for that particular requirement. In this regard, bids that fail to include any requirement or are incomplete or patently insufficient shall be considered as "failed". Otherwise, the BAC shall rate the said first bid envelope as "passed".
- 32.3. Immediately after determining compliance with the requirements in the first envelope, the BAC shall forthwith open the second bid envelope of each remaining eligible Bidder whose first bid envelope was rated "passed." The second envelope of each complying Bidder shall be opened within the same day. In case one or more of the requirements in the second envelope of a particular bid is missing, incomplete or patently insufficient, and/or if the submitted total bid price exceeds the ABC, the BAC shall rate the bid concerned as "failed." Only bids that are determined to contain all the bid requirements for both components shall be rated "passed" and shall immediately be considered for evaluation and comparison.
- 32.4. Letters of Withdrawal shall be read out and recorded during bid opening, and the envelope containing the corresponding withdrawn bid shall be returned to the Bidder unopened.
- 32.5. All members of the BAC who are present during bid opening shall initial every page of the original copies of all bids received and opened.
- 32.6. Each partner of a joint venture agreement shall likewise submit the document required in ITB Clause 12.1(a)(i). Submission of other documents required under ITB Clause 12.1 by any of the joint venture partners constitutes compliance.
- 32.7. NPC shall prepare the minutes of the proceedings of the bid opening that shall include, as a minimum: (a) names of Bidders, their bid price (per lot, if

applicable, and/or including discount, if any), bid security, findings of preliminary examination, and whether there is a withdrawal or modification; and (b) attendance sheet. The BAC members shall sign the abstract of bids as read.

32.8. The Bidders or their duly authorized representatives may attend the opening of bids. The BAC shall ensure the integrity, security, and confidentiality of all submitted bids. The Abstract of Bids as read and the minutes of the Bid Opening shall be made available to the public upon written request and payment of a specified fee to recover cost of materials.

32.9. To ensure transparency and accurate representation of the bid submission, the BAC Secretariat shall notify in writing all Bidders whose bids it has received through its PhilGEPS-registered physical address or official e-mail address. The notice shall be issued within seven (7) calendar days from the date of the bid opening.

#### **D. Evaluation and Comparison of Bids**

##### **33. Process to be Confidential**

33.1. Members of the BAC, including its staff and personnel, as well as its Secretariat and TWG, are prohibited from making or accepting any kind of communication with any Bidder regarding the evaluation of their bids until the issuance of the Notice of Award, unless otherwise allowed in the case of ITB Clause 26.

33.2. Any effort by a Bidder to influence NPC in its decision in respect of bid evaluation, bid comparison or contract award will result in the rejection of the Bidder's bid.

##### **34. Clarification of Bids**

To assist in the evaluation, comparison and post-qualification of the bids, NPC may ask in writing any Bidder for a clarification of its bid. All responses to requests for clarification shall be in writing. Any clarification submitted by a Bidder in respect to its bid and that is not in response to a request by NPC shall not be considered.

##### **35. Detailed Evaluation and Comparison of Bids**

35.1. NPC will undertake the detailed evaluation and comparison of Bids which have passed the opening and preliminary examination of Bids, pursuant to ITB Clause 24, in order to determine the Lowest Calculated Bid.

35.2. The Lowest Calculated Bid shall be determined in two steps:

- (a) The detailed evaluation of the financial component of the bids, to establish the correct calculated prices of the bids; and
- (b) The ranking of the total bid prices as so calculated from the lowest to highest. The bid with the lowest price shall be identified as the Lowest Calculated Bid.

- 35.3. NPC's BAC shall immediately conduct a detailed evaluation of all bids rated "passed," using non-discretionary "pass/fail" criterion. The BAC shall consider the following in the evaluation of bids:
- (a) Completeness of the bid. Bids not addressing or providing all of the required items in the Schedule of Requirements including, where applicable, bill of quantities, shall be considered non-responsive and, thus, automatically disqualified. In this regard, where a required item is provided, but no price is indicated, the same shall be considered as non-responsive, but specifying a zero (0) or a dash (-) for the said item would mean that it is being offered for free to NPC, except those required by law or regulations to be provided for; and
  - (b) Arithmetical corrections. Consider computational errors and omissions to enable proper comparison of all eligible bids. It may also consider bid modifications. Any adjustment shall be calculated in monetary terms to determine the calculated prices.
- In case of discrepancies between:
1. bid prices in figures and in words, the latter shall prevail;
  2. total price per item and unit price for the item as extended or multiplied by the quantity of that item, the latter shall prevail;
  3. the total Bid amount and the sum of total costs per item, the sum of the total costs per item shall prevail and the total Bid amount will be corrected;
  4. unit cost in the detailed estimate and unit cost in the Bid Price Schedule, the latter shall prevail;
- 35.4. Based on the detailed evaluation of bids, those that comply with the above-mentioned requirements shall be ranked in the ascending order of their total calculated bid prices, as evaluated and corrected for computational errors, discounts and other modifications, to identify the Lowest Calculated Bid. Total calculated bid prices, as evaluated and corrected for computational errors, discounts and other modifications, which exceed the ABC shall not be considered.
- 35.5. NPC's evaluation of bids shall be based on the bid price quoted in the Bid Letter, which includes the Bill of Quantities.
- 35.6. Bids shall be evaluated on an equal footing to ensure fair competition. For this purpose, all Bidders shall be required to include in their bids the cost of all taxes, such as, but not limited to, value added tax (VAT), income tax, local taxes, and other fiscal levies and duties which shall be itemized in the bid form and reflected in the detailed estimates. Such bids, including said taxes, shall be the basis for bid evaluation and comparison.

- 35.7. Partial bid is not allowed. The infrastructure project is packaged in a single lot and the lot shall not be divided into sub-lots for the purpose of bidding, evaluation, and contract award.

### 36. Post Qualification

- 36.1. The BAC shall determine to its satisfaction whether the Bidder that is evaluated as having submitted the Lowest Calculated Bid complies with and is responsive to all the requirements and conditions specified in ITB Clauses 5, 12, and 24.
- 36.2. 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 documents and appropriate licenses and permits required by law, as follows:
- a. Latest Income Tax Returns filed and paid through the BIR Electronic Filing and Payment System (eFPS);
  - b. Business Tax/VAT Returns within the last six (6) months preceding the date of the bid submission, filed and paid through the BIR (eFPS);
  - c. PhilGEPS Registration (Platinum Membership), if not yet submitted with the bid;
  - d. Valid and current Mayor's/Business, if under renewal during bidding;
  - e. 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);
  - f. 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;
  - g. The licenses and permits relevant to the Project and the corresponding law requiring it as specified in the Technical Specifications, if any.

Failure to submit any of the post-qualification requirements on time, or a finding against the veracity thereof, shall disqualify the Bidder for award.

- 36.3. The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted pursuant to ITB Clauses 12 and 24, as well as other information as NPC deems necessary and appropriate, using a non-discretionary "pass/fail" criterion, which shall be completed within a period of twelve (12) calendar days.
- 36.4. The post-qualification shall verify, validate, and ascertain all statements made and documents submitted by the bidder with the Lowest Calculated Bid/Highest Rated Bid, using non-discretionary criteria, as stated in the Bidding documents. These criteria shall consider, but shall not be limited to, the following:

- a) **Legal Requirements.** To verify, validate, and ascertain licenses, certificates, permits, and agreements submitted by the bidder, and the fact that it is not included in any "blacklist" as provided in Section 25.3 of IRR-A of R.A. 9184.
- b) **Technical Requirements.** To determine compliance of the infrastructure projects offered with the requirements specified in the Bidding Documents, including, where applicable:
- i) Verification and validation of the bidder's stated competence and experience, and the competence and experience of the bidder's key personnel to be assigned to the project.
  - ii) Verification of availability and commitment, and/or inspection and testing for the required capacities and operating conditions, of equipment units to be owned/leased/under purchase by the bidder for use in the contract under bidding, as well as checking the performance of the bidder in its ongoing government and private contracts, if any of these ongoing contracts shows:
    - a. Negative slippage of at least fifteen percent (15%) in any one project or a negative slippage of at least ten percent (10%) in each of two (2) or more contracts;
    - b. Failure of the contractor to commence repair works on ongoing contracts within seven (7) calendar days and to complete them within thirty (30) calendar days after receipt of NPC's notice of defects and deficiencies;
    - c. Failure of the contractor to commence repair works on contracts with pending certificates of acceptance within thirty (30) calendar days and complete them within ninety (90) days after receipt of NPC's notice of defects and failures; or
    - d. Substandard quality of work as per contract plans and specifications, or unsatisfactory performance of the contractor's obligations as per contract terms and conditions, at the time of inspection.
  - iii) Verification and/or inspection and testing of the goods/product, after-sales and/or maintenance capabilities, in applicable cases, as well as checking the following:
    - a. Delay in the partial delivery of goods amounting to ten percent (10%) of the contract price in its ongoing government and private contracts;
    - b. If any of these contracts shows the bidder's failure to deliver or perform any or all of the goods or services within the period(s) specified in the contract or within any extension thereof granted by NPC pursuant to a request made by the supplier prior to the

delay, and such failure amounts to at least ten percent (10%) of the contract price; or

- c. Unsatisfactory performance of the supplier's obligations as per contract terms and conditions at the time of inspection

If the BAC verifies any of these deficiencies to be due to the contractor's fault or negligence, the agency shall disqualify the contractor from the award.

- iv) Ascertainment of the authenticity of the bid security and its correctness as to type, amount, form and wording, and validity period, as required in the Bidding Documents.

- c) Financial Requirements. To verify, validate and ascertain the bid price proposal of the bidder and the bidder's NFCC to ensure that the bidder can sustain the operating cash flow of the transaction.

36.5. If the BAC determines that the Bidder with the Lowest Calculated Bid passes all the criteria for post-qualification, it shall declare the said bid as the LCRB, and recommend to the Head of NPC the award of contract to the said Bidder at its submitted price or its calculated bid price, whichever is lower, subject to ITB Clause 38.3.

36.6. A negative determination shall result in rejection of the Bidder's bid, in which event NPC shall proceed to the next Lowest Calculated Bid, with a fresh period to make a similar determination of that Bidder's capabilities to perform satisfactorily. If the second Bidder, however, fails the post qualification, the procedure for post qualification shall be repeated for the Bidder with the next Lowest Calculated Bid, and so on until the LCRB is determined for recommendation of contract award.

36.7. Within a period not exceeding fifteen (15) calendar days from the determination by the BAC of the LCRB and the recommendation to award the contract, the Head of NPC or his duly authorized representative shall approve or disapprove the said recommendation.

36.8. In the event of disapproval, which shall be based on valid, reasonable, and justifiable grounds as provided for under Section 41 of the IRR of RA 9184, the Head of NPC shall notify the BAC and the Bidder in writing of such decision and the grounds for it. When applicable, the BAC shall conduct a post-qualification of the Bidder with the next Lowest Calculated Bid. A request for reconsideration may be filed by the Bidder with the Head of NPC in accordance with Section 37.1.3 of the IRR of RA 9184.

### 37. Reservation Clause

37.1. Notwithstanding the eligibility or post-qualification of a Bidder, NPC reserves the right to review its qualifications at any stage of the procurement process if it has reasonable grounds to believe that a misrepresentation has been made by the said Bidder, or that there has been a change in the Bidder's capability to undertake the project from the time it submitted its eligibility requirements.

Should such review uncover any misrepresentation made in the eligibility and bidding requirements, statements or documents, or any changes in the situation of the Bidder which will affect its capability to undertake the project so that it fails the preset eligibility or bid evaluation criteria, NPC shall consider the said Bidder as ineligible and shall disqualify it from submitting a bid or from obtaining an award or contract.

- 37.2. Based on the following grounds, NPC reserves the right to reject any and all Bids, declare a Failure of Bidding at any time prior to the contract award, or not to award the contract, without thereby incurring any liability, and make no assurance that a contract shall be entered into as a result of the bidding:
- (a) If there is *prima facie* evidence of collusion between appropriate public officers or employees of NPC, or between the BAC and any of the Bidders, or if the collusion is between or among the Bidders themselves, or between a Bidder and a third party, including any act which restricts, suppresses or nullifies or tends to restrict, suppress or nullify competition;
  - (b) If NPC's BAC is found to have failed in following the prescribed bidding procedures; or
  - (c) For any justifiable and reasonable ground where the award of the contract will not redound to the benefit of the GOP as follows:
    - (i) If the physical and economic conditions have significantly changed so as to render the project no longer economically, financially or technically feasible as determined by the head of NPC;
    - (ii) If the project is no longer necessary as determined by head of NPC; and
    - (iii) If the source of funds for the project has been withheld or reduced through no fault of NPC.
- 37.3. In addition, NPC may likewise declare a failure of bidding when:
- (a) No bids are received;
  - (b) All prospective Bidders are declared ineligible;
  - (c) All bids fail to comply with all the bid requirements, fail post-qualification; or
  - (d) The Bidder with the LCRB refuses, without justifiable cause, to accept the award of contract, and no award is made in accordance with Section 40 of the IRR of RA 9184.

## E. Award of Contract

### 38. Contract Award

- 38.1. Subject to ITB Clause 36, the head of NPC or its duly authorized representative shall award the contract to the Bidder whose bid has been determined to be the LCRB, at its submitted price or its calculated bid price, whichever is lower.
- 38.2. Prior to the expiration of the period of bid validity, NPC shall notify the successful Bidder in writing that its bid has been accepted, through a Notice of Award duly received by the Bidder or its representative personally or by registered mail or electronically, receipt of which must be confirmed in writing within two (2) days by the Bidder with the LCRB and submitted personally or sent by registered mail or electronically to NPC.
- 38.3. Notwithstanding the issuance of the Notice of Award, award of contract shall be subject to the following conditions:
  - (a) Submission of the following documents within ten (10) calendar days from receipt of the Notice of Award:
    - (i) In the case of procurement by a Philippine Foreign Service Office or Post, the PhilGEPS Registration Number of the winning foreign Bidder; or
    - (ii) Valid PCAB license and registration for the type and cost of the contract to be bid for foreign bidders when the Treaty or International or Executive Agreement expressly allows submission of the PCAB license and registration for the type and cost of the contract to be bid as a pre-condition to the Award;
  - (b) Posting of the performance security in accordance with ITB Clause 40;
  - (c) Signing of the contract as provided in ITB Clause 39; and
  - (d) Approval by higher authority, if required, as provided in Section 37.3 of the IRR of RA 9184.

### 39. Signing of the Contract

- 39.1. At the same time as NPC notifies the successful Bidder that its bid has been accepted, NPC shall send the Contract Form to the Bidder, which Contract has been provided in the Bidding Documents, incorporating therein all agreements between the parties.
- 39.2. Within ten (10) calendar days from receipt of the Notice of Award, the successful Bidder shall post the required performance security, sign and date the contract and return it to NPC.
- 39.3. NPC shall enter into contract with the successful Bidder within the same ten (10) calendar day period provided that all the documentary requirements are complied with.

39.4. The following documents shall form part of the contract:

- (a) Contract Agreement;
- (b) Bidding Documents;
- (c) Winning Bidder's bid, including the Technical and Financial Proposals, and all other documents/statements submitted (e.g., Bidder's response to request for clarifications on the bid), including corrections to the bid, if any, resulting from NPC's bid evaluation;
- (d) Performance Security;
- (e) Notice of Award of Contract;
- (f) Notice to Proceed;
- (g) Construction schedule and S-curve;
- (h) Manpower Schedule;
- (i) Construction Methods;
- (j) Equipment Utilization Schedule;
- (k) 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 ;
- (l) PERT/CPM;
- (m) Other contract documents that may be required by existing laws and/or NPC under these Bidding Documents

#### 40. Performance Security

40.1. To guarantee the faithful performance by the winning Bidder of its obligations under the contract, it shall post a performance security within a maximum period of ten (10) calendar days from the receipt of the Notice of Award from NPC and in no case later than the signing of the contract.

40.2. The Performance Security shall be denominated in Philippine Pesos and posted in favor of NPC in an amount not less than the percentage of the total contract price in accordance with the following schedule:

Form of Performance Security	Amount of Performance Security (Not less than the Percentage of the Total Contract Price)
(b) Cash or cashier's/manager's check issued by a Universal or Commercial Bank.	Ten percent (10%)

(c) Bank draft/guarantee or irrevocable letter of credit issued by a Universal or Commercial Bank: Provided, however, that it shall be confirmed or authenticated by a Universal or Commercial Bank, if issued by a foreign bank.	
(d) Surety bond callable upon demand issued by a surety or insurance company duly certified by the Insurance Commission as authorized to issue such security.	Thirty percent (30%)

- 40.3. Failure of the successful Bidder to comply with the above-mentioned requirement shall constitute sufficient ground for the annulment of the award and forfeiture of the bid security, in which event NPC shall have a fresh period to initiate and complete the post qualification of the second Lowest Calculated Bid. The procedure shall be repeated until LCRB is identified and selected for recommendation of contract award. However if no Bidder passed post-qualification, the BAC shall declare the bidding a failure and conduct a re-bidding with re-advertisement, if necessary.
- 40.4. The performance bond to be posted by the Contractor must also comply with the following additional requirements:
1. The following must be indicated in the performance bond to be posted by the Contractor:
    - 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 (Contract/Purchase Order Description) in accordance with the terms and conditions of (Contract No. & Schedule/Purchase Order No.) entered into by the parties.”
  2. The bond shall remain valid and effective until the duration of the contract (should be specific date reckoned from the contract effectivity) plus sixty (60) days after NPC’s acceptance of the last delivery/final acceptance of the project.
  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 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.

4. Other required conditions in addition to the standard policy terms issued by the Bonding Company:
  - a) 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;
  - b) 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;
  - c) 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.

#### **41. Notice to Proceed**

Within seven (7) calendar days from the date of approval of the Contract by the appropriate government approving authority, NPC shall issue the Notice to Proceed (NTP) together with a copy or copies of the approved contract to the successful Bidder. All notices called for by the terms of the contract shall be effective only at the time of receipt thereof by the successful Bidder.

#### **42. Protest Mechanism**

Decision of NPC at any stage of the procurement process may be questioned in accordance with Sections 55 of the IRR of RA 9184.

## SECTION II

# GENERAL CONDITIONS OF CONTRACT



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## SECTION II – GENERAL CONDITIONS OF CONTRACT

### 1. Definitions

For purposes of this Clause, boldface type is used to identify defined terms.

- 1.1. The **Arbiter** is the person appointed jointly by NPC and the Contractor to resolve disputes in the first instance, as provided for in **GCC Clause 20**.
- 1.2. **Bill of Quantities** refers to a list of the specific items of the Work and their corresponding unit prices, lump sums, and/or provisional sums.
- 1.3. The **Completion Date** is the date of completion of the Works as certified by NPC's Representative, in accordance with **GCC Clause 47**.
- 1.4. The **Contract** is the contract between NPC and the Contractor to execute, complete, and maintain the Works.
- 1.5. The **Contract Effectivity Date** is the date of signing of the Contract. However, the contractor shall commence execution of the Works on the Start Date as defined in **GCC Clause 1.28**.
- 1.6. The **Contract Price** is the price stated in the Notice of Award and thereafter to be paid by NPC to the Contractor for the execution of the Works in accordance with this Contract
- 1.7. **Contract Time Extension** is the allowable period for the Contractor to complete the Works in addition to the original Completion Date stated in this Contract.
- 1.8. The **Contractor** is the juridical entity whose proposal has been accepted by NPC and to whom the Contract to execute the Work was awarded.
- 1.9. The **Contractor's Bid** is the signed offer or proposal submitted by the Contractor to NPC in response to the Bidding Documents.
- 1.10. **Days** are calendar days; months are calendar months.
- 1.11. **Dayworks** are varied work inputs subject to payment on a time basis for the Contractor's employees and Equipment, in addition to payments for associated Materials and Plant.
- 1.12. A **Defect** is any part of the Works not completed in accordance with the Contract.
- 1.13. The **Defects Liability Certificate** is the certificate issued by NPC's Representative upon correction of defects by the Contractor.
- 1.14. The **Defects Liability Period** is the one year period between contract completion and final acceptance within which the Contractor assumes the responsibility to undertake the repair of any damage to the Works at his own expense.

- 1.15 **Drawings** are graphical presentations of the Works. They include all supplementary details, shop drawings, calculations, and other information provided or approved for the execution of this Contract.
- 1.16 **Equipment** refers to all facilities, supplies, appliances, materials or things required for the execution and completion of the Work provided by the Contractor and which shall not form or are not intended to form part of the Permanent Works.
- 1.17 The **Intended Completion Date** refers to the period specified in Clause PH – 4.0 of Section III – Technical Specifications (PH – Project Highlights) when the Contractor is expected to have completed the Works. The Intended Completion Date may be revised only by NPC's Representative by issuing an extension of time or an acceleration order.
- 1.18 **Materials** are all supplies, including consumables, used by the Contractor for incorporation in the Works.
- 1.19 The **Notice to Proceed** is a written notice issued by NPC or NPC's Representative to the Contractor requiring the latter to begin the commencement of the work not later than a specified or determinable date.
- 1.20 **Permanent Works** are all permanent structures and all other project features and facilities required to be constructed and completed in accordance with this Contract which shall be delivered to NPC and which shall remain at the Site after the removal of all Temporary Works.
- 1.21 **Plant** refers to the machinery, apparatus, and the like intended to form an integral part of the Permanent Works.
- 1.22 NPC is the **National Power Corporation (NPC or NAPOCOR)** with office address at BIR Road cor. Quezon Avenue, Diliman, Quezon City.
- 1.23 NPC's **Representative** refers to the Head of NPC or his duly authorized representative, who shall be responsible for supervising the execution of the Works and administering this Contract.

NPC's **Representative** is:

**ATTY. MELCHOR P. RIDULME**  
OIC, President and CEO  
National Power Corporation  
BIR Road corner Quezon Avenue  
Diliman, Quezon City 1100

- 1.24 The **Site** is the place provided by NPC, which is specified in Clause PH – 2.0 of Section III – Technical Specifications (PH – Project Highlights) where the Works shall be executed and any other place or places which may be designated or notified to the Contractor by NPC's Representative as forming part of the Site.

- 1.25 **Site Investigation Reports** are those that were included in the Bidding Documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.
- 1.26 **Slippage** is a delay in work execution occurring when actual accomplishment falls below the target as measured by the difference between the scheduled and actual accomplishment of the Work by the Contractor as established from the work schedule. This is actually described as a percentage of the whole Works.
- 1.27 **Specifications** means the description of Works to be done and the qualities of materials to be used, the equipment to be installed and the mode of construction.
- 1.28 The **Start Date**, as specified in the Notice to Proceed (NTP), is the date when the Contractor is obliged to commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.
- 1.29 A **Subcontractor** is any person or organization to whom a part of the Works has been subcontracted by the Contractor, as allowed by NPC, but not any assignee of such person.
- 1.30 **Temporary Works** are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Permanent Works.
- 1.31 **Work(s)** refer to the Permanent Works and Temporary Works to be executed by the Contractor in accordance with this Contract, including (i) the furnishing of all labor, materials, equipment and others incidental, necessary or convenient to the complete execution of the Works; (ii) the passing of any tests before acceptance by NPC's Representative; (iii) and the carrying out of all duties and obligations of the Contractor imposed by this Contract as described in Clause PH – 3.0 of Section III – Technical Specifications (PH – Project Highlights).
- 2. Interpretation**
- 2.1. In interpreting the Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of this Contract unless specifically defined. NPC's Representative will provide instructions clarifying queries about the Conditions of Contract.
- 2.2. The documents forming this Contract shall be interpreted in the following order of priority:
- a) Contract Agreement;
  - b) Bid Data Sheet;
  - c) Instructions to Bidders;
  - d) Addenda to the Bidding Documents;



- e) Special Conditions of Contract;
- f) General Conditions of Contract;
- g) Specifications;
- h) Bill of Quantities; and
- i) Drawings.

### 3. Governing Language and Law

- 3.1. This Contract has been executed in the English language, which shall be the binding and controlling language for all matters relating to the meaning or interpretation of this Contract. All correspondence and other documents pertaining to this Contract which are exchanged by the parties shall be written in English.
- 3.2. This Contract shall be interpreted in accordance with the laws of the Republic of the Philippines.

### 4. Communications

Communications between parties that are referred to in the Conditions shall be effective only when in writing. A notice shall be effective only when it is received by the concerned party.

### 5. Possession of Site

- 5.1. NPC shall grant the Contractor possession of so much of the Site as may be required to enable it to proceed with the execution of the Works. If the Contractor suffers delay or incurs cost from failure on the part of NPC to give possession in accordance with the terms of this clause, NPC'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 NPC.
- 5.2. If possession of a portion is not given by the date stated, NPC will be deemed to have delayed the start of the relevant activities. The resulting adjustments in contract time to address such delay shall be in accordance with GCC Clause 45.
- 5.3. The Contractor shall bear all costs and charges for special or temporary right-of-way required by it in connection with access to the Site. The Contractor shall also provide at his own cost any additional facilities outside the Site required by it for purposes of the Works.
- 5.4. The Contractor shall allow NPC's Representative and any person authorized by NPC's Representative access to the Site and to any place where work in connection with this Contract is being carried out or is intended to be carried out.

## **6. The Contractor's Obligations**

- 6.1. The Contractor shall carry out the Works properly and in accordance with this Contract. The Contractor shall provide all supervision, labor, Materials, Plant and Contractor's Equipment, which may be required. All Materials and Plant on Site shall be deemed to be the property of NPC.
- 6.2. The Contractor shall commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program of Work submitted by the Contractor, as updated with the approval of NPC's Representative, and complete them by the Intended Completion Date.
- 6.3. The Contractor shall be responsible for the safety of all activities on the Site.
- 6.4. The Contractor shall carry out all instructions of NPC's Representative that comply with the applicable laws where the Site is located.
- 6.5. The Contractor shall employ the key personnel named in the Schedule of Key Personnel, as referred to in ITB 12.1(b)(i.2), to carry out the supervision of the Works. NPC 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.
- 6.6. If NPC's Representative asks the Contractor to remove a member of the Contractor's staff or work force, for justifiable cause, the Contractor shall ensure that the person leaves the Site within seven (7) days and has no further connection with the Work in this Contract.
- 6.7. During Contract implementation, the Contractor and his subcontractors shall abide at all times by all labor laws, including child labor related enactments, and other relevant rules.
- 6.8. The Contractor shall submit to NPC for consent the name and particulars of the person authorized to receive instructions on behalf of the Contractor.
- 6.9. The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and NPC between the dates given in the schedule of other contractors particularly when they shall require access to the Site. The Contractor shall also provide facilities and services for them during this period. NPC may modify the schedule of other contractors, and shall notify the Contractor of any such modification thereto.
- 6.10. Should anything of historical or other interest or of significant value be unexpectedly discovered on the Site, it shall be the property of NPC. The Contractor shall notify NPC's Representative of such discoveries and carry out NPC's Representative's instructions in dealing with them.
- 6.11. 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:



- 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.

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:

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 3<sup>rd</sup> 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.
- 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.
- 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.
- 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.
- 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

- 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.
- 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.
- 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.

## 7. Performance Security

- 7.1. Within ten (10) calendar days from receipt of the Notice of Award from NPC but in no case later than the signing of the contract by both parties, the Contractor shall furnish the performance security in any of the forms prescribed in ITB Clause 40.2.
- 7.2. The performance security posted in favor of NPC shall be forfeited in the event it is established that the Contractor is in default in any of its obligations under the Contract.
- 7.3. The performance security shall remain valid until issuance by NPC of the Certificate of Final Acceptance.
- 7.4. The performance security may be released by NPC and returned to the Contractor after the issuance of the Certificate of Final Acceptance subject to the following conditions:
  - (a) There are no pending claims against the Contractor or the surety company filed by NPC;
  - (b) The Contractor has no pending claims for labor and materials filed against it;
- 7.5. The Contractor shall post an additional performance security following the amount and form specified in ITB Clause 40.2 to cover any cumulative increase of more than ten percent (10%) over the original value of the contract as a result of amendments to order or change orders, extra work orders and supplemental agreements, as the case may be. The Contractor shall cause the extension of the validity of the performance security to cover approved contract time extensions.

- 7.6. In case of a reduction in the contract value or for partially completed Works under the contract which are usable and accepted by NPC the use of which, in the judgment of the implementing agency or NPC, will not affect the structural integrity of the entire project, NPC shall allow a proportional reduction in the original performance security, provided that any such reduction is more than ten percent (10%) and that the aggregate of such reductions is not more than fifty percent (50%) of the original performance security.
- 7.7. The Contractor, by entering into the Contract with NPC, acknowledges the right of NPC to institute action pursuant to Act 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.

## 8. Subcontracting

- 8.1. The Contractor cannot subcontract Works more than the percentage specified in ITB Clause 8.1.
- 8.2. Subcontracting of any portion of the Works does not relieve the Contractor of any liability or obligation under this Contract. The Contractor 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.
- 8.3. If subcontracting is allowed, the contractor may identify its subcontractor during contract implementation stage. Subcontractors disclosed and identified during the bidding may be changed during the implementation of this Contract. In either case, subcontractors must submit the documentary requirements under ITB Clause 12 and comply with the eligibility criteria specified in the ITB. In the event that any subcontractor is found by any NPC to be ineligible, the subcontracting of such portion of the Works shall be disallowed.

## 9. Liquidated Damages

- 9.1. The Contractor shall pay liquidated damages to NPC for each day that the Completion Date is later than the Intended Completion Date. The applicable liquidated damages is at least one-tenth (1/10) of a percent of the cost of the unperformed portion for every day of delay. NPC shall deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's liabilities. Once the cumulative amount of liquidated damages reaches ten percent (10%) of the amount of this Contract, NPC may rescind or terminate this Contract, without prejudice to other courses of action and remedies available under the circumstances.
- 9.2. If the Intended Completion Date is extended after liquidated damages have been paid, NPC shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate.

**10. NPC, Licenses and Permits**

NPC shall, if requested by the Contractor, assist him in applying for permits, licenses or approvals, which are required for the Works.

**11. Contractor's Risk and Warranty Security**

- 11.1. The Contractor shall assume full responsibility for the Works from the time project construction commenced up to final acceptance by NPC and shall be held responsible for any damage or destruction of the Works except those occasioned by *force majeure*. The Contractor shall be fully responsible for the safety, protection, security, and convenience of his personnel, third parties, and the public at large, as well as the Works, Equipment, installation, and the like to be affected by his construction work.
- 11.2. The defects liability period for infrastructure projects shall be one year from contract completion up to final acceptance by NPC. During this period, the Contractor shall undertake the repair works, at his own expense, of any damage to the Works on account of the use of materials of inferior quality within ninety (90) days from the time the Head of 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.
- 11.3. In case the Contractor fails to comply with the preceding paragraph, NPC 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.
- 11.4. After final acceptance of the Works by NPC, the Contractor shall be held responsible for "Structural Defects," *i.e.*, major faults/flaws/deficiencies in one or more key structural elements of the project which may lead to structural failure of the completed elements or structure, or "Structural Failures," *i.e.*, where one or more key structural elements in an infrastructure facility fails or collapses, thereby rendering the facility or part thereof incapable of withstanding the design loads, and/or endangering the safety of the users or the general public:
- (a) Contractor – Where Structural Defects/Failures arise due to faults attributable to improper construction, use of inferior quality/substandard materials, and any violation of the contract plans and specifications, the contractor shall be held liable;
  - (b) Consultants – Where Structural Defects/Failures arise due to faulty and/or inadequate design and specifications as well as construction supervision, then the consultant who prepared the design or undertook construction supervision for the project shall be held liable;
  - (c) NPC's Representatives/Project Manager/Construction Managers and Supervisors – The project owner's representative(s), project manager, construction manager, and supervisor(s) shall be held liable in cases

where the Structural Defects/Failures are due to his/their willful intervention in altering the designs and other specifications; negligence or omission in not approving or acting on proposed changes to noted defects or deficiencies in the design and/or specifications; and the use of substandard construction materials in the project;

- (d) **Third Parties** - Third Parties shall be held liable in cases where Structural Defects/Failures are caused by work undertaken by them such as leaking pipes, diggings or excavations, underground cables and electrical wires, underground tunnel, mining shaft and the like, in which case the applicable warranty to such structure should be levied to third parties for their construction or restoration works.
- (e) **Users** - In cases where Structural Defects/Failures are due to abuse/misuse by the end user of the constructed facility and/or non-compliance by a user with the technical design limits and/or intended purpose of the same, then the user concerned shall be held liable.

- 11.5. The warranty against Structural Defects/Failures, except those occasioned on force majeure, shall cover the period specified below, reckoned from the date of issuance of the Certificate of Final Acceptance by NPC.

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.

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.

In case of other structures, such as Bailey and wooden bridges, shallow wells, spring developments, and other similar structures: Two (2) years.

- 11.6. The Contractor shall be required to put up a warranty security in the form of cash, bank guarantee, letter of credit, GSIS or surety bond callable on demand, in accordance with the following schedule:

Form of Warranty	Amount of Warranty Security Not less than the Percentage (%) of Total Contract Price
(a) Cash or letter of credit issued by Universal or Commercial bank: provided, however, that the letter of credit shall be confirmed or	Five Percent (5%)

authenticated by a Universal or Commercial bank, if issued by a foreign bank	
(b) Bank guarantee confirmed by Universal or Commercial bank: provided, however, that the letter of credit shall be confirmed or authenticated by a Universal or Commercial bank, if issued by a foreign bank	Ten Percent (10%)
(c) Surety bond callable upon demand issued by GSIS or any surety or insurance company duly certified by the Insurance Commission	Thirty Percent (30%)

11.7. The warranty security shall be stated in Philippine Pesos and shall remain effective for one year from the date of issuance of the Certificate of Final Acceptance by NPC, and returned only after the lapse of said one year period.

11.8. In case of structural defects/failure occurring during the applicable warranty period provided in **GCC** Clause 11.5, NPC shall undertake the necessary restoration or reconstruction works and shall be entitled to full reimbursement by the parties found to be liable for expenses incurred therein upon demand, without prejudice to the filing of appropriate administrative, civil, and/or criminal charges against the responsible persons as well as the forfeiture of the warranty security posted in favor of NPC.

## 12. Liability of the Contractor

The Contractor's liability under this Contract shall be as provided by the laws of the Republic of the Philippines. In case of Joint Venture, all partners to the joint venture shall be jointly and severally liable to NPC.

## 13. NPC's Risk

13.1. From the Start Date until the Certificate of Final Acceptance has been issued, the following are risks of NPC:

- (a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and Equipment), which are due to:
  - (i) any type of use or occupation of the Site authorized by NPC after the official acceptance of the works; or
  - (ii) negligence, breach of statutory duty, or interference with any legal right by NPC or by any person employed by or contracted to him except the Contractor.
- (b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of NPC or in NPC's design, or due to war or

radioactive contamination directly affecting the country where the Works are to be executed.

#### 14. Insurance

- 14.1. The Contractor shall, under his name and at his own expense, obtain and maintain, for the duration of this Contract, the following insurance coverage:
- (a) Contractor's All Risk Insurance;
  - (b) Transportation to the project Site of Equipment, Machinery, and Supplies owned by the Contractor;
  - (c) Personal injury or death of Contractor's employees; and
  - (d) Comprehensive insurance for third party liability to Contractor's direct or indirect act or omission causing damage to third persons.
- 14.2. The Contractor shall provide evidence to NPC's Representative that the insurances required under this Contract have been effected and shall, within a reasonable time, provide copies of the insurance policies to NPC's Representative. Such evidence and such policies shall be provided to NPC's through NPC's Representative.
- 14.3. The Contractor shall notify the insurers of changes in the nature, extent, or program for the execution of the Works and ensure the adequacy of the insurances at all times in accordance with the terms of this Contract and shall produce to NPC's Representative the insurance policies in force including the receipts for payment of the current premiums.
- The above insurance policies shall be obtained from any reputable insurance company approved by NPC's Representative.
- 14.4. If the Contractor fails to obtain and keep in force the insurances referred to herein or any other insurance which he may be required to obtain under the terms of this Contract, NPC may obtain and keep in force any such insurances and pay such premiums as may be necessary for the purpose. From time to time, NPC may deduct the amount it shall pay for said premiums including twenty five percent (25%) therein from any monies due, or which may become due, to the Contractor, without prejudice to NPC exercising its right to impose other sanctions against the Contractor pursuant to the provisions of this Contract.
- 14.5. In the event the Contractor fails to observe the above safeguards, NPC may, at the Contractor's expense, take whatever measure is deemed necessary for its protection and that of the Contractor's personnel and third parties, and/or order the interruption of dangerous Works. In addition, NPC may refuse to make the payments under GCC Clause 38 until the Contractor complies with this Clause.
- 14.6. The Contractor shall immediately replace the insurance policy obtained as required in this Contract, without need of NPC's demand, with a new policy

issued by a new insurance company acceptable to NPC for any of the following grounds:

- (a) The issuer of the insurance policy to be replaced has:
  - (i) become bankrupt;
  - (ii) been placed under receivership or under a management committee;
  - (iii) been sued for suspension of payment; or
  - (iv) been suspended by the Insurance Commission and its license to engage in business or its authority to issue insurance policies cancelled; or
  - (v) Where reasonable grounds exist that the insurer may not be able, fully and promptly, to fulfill its obligation under the insurance policy.

- 14.7. The Contractor shall fully insure the equipment/s to be transported to their full declared value during loading, unloading and transport from the point of origin at SPUG Luzon Operations Department (LOD) Warehouse at Minuyan, San Jose Del Monte, Bulacan to the delivery points/SPUG Power Plants specified in the Technical Specifications.

The Contractor shall provide NPC a comprehensive Marine Insurance Policy or a Voyage Policy applicable to the said transfer. The Marine Policy shall include but not limited to the following:

- a) Assured Property – A schedule of equipment, accessories, description, quantity and declared value. The list of equipment, accessories shall form part of the voyage policy.
- b) Period – The period of transfer shall not be more than Sixty (60) Calendar Days.
- c) Limit of Liability equivalent to the total declared amount of the diesel gensets and accessories.
- d) Voyage Clause – At and from SPUG Luzon Operations Department (LOD) Warehouse at Minuyan, San Jose Del Monte, Bulacan to port and/or places in the Philippines including inter-island and inland shipment to the delivery point specified in the Technical Specifications.
- e) Conveyance Clause – By vessels of Institute Classification Standards and connecting conveyances and/or road and inter-island and inland including hi-jacking.

The Contractor shall be the named insured under the Policy. The Loss Payable Clause shall form part of the policy which states that loss, if any, is payable to the National Power Corporation (NPC) or creditor, as its respective interest may

appear. The insurance premium and other related costs shall be to the account of the Contractor.

## 15. Termination for Default of Contractor

15.1. NPC shall terminate this Contract for default when any of the following conditions attend its implementation:

- (i) Due to the Contractor's fault and while the project is on-going, it has incurred negative slippage of fifteen percent (15%) or more in accordance with Presidential Decree 1870, regardless of whether or not previous warnings and notices have been issued for the Contractor to improve his performance;
- (ii) Due to its own fault and after this Contract time has expired, the Contractor incurs delay in the completion of the Work after this Contract has expired; or
- (iii) The Contractor:
  - (i) abandons the contract Works, refuses or fails to comply with a valid instruction of NPC or fails to proceed expeditiously and without delay despite a written notice by NPC;
  - (ii) does not actually have on the project Site the minimum essential equipment listed on the bid necessary to prosecute the Works in accordance with the approved Program of Work and equipment deployment schedule as required for the project;
  - (iii) does not execute the Works in accordance with this Contract or persistently or flagrantly neglects to carry out its obligations under this Contract;
  - (iv) neglects or refuses to remove materials or to perform a new Work that has been rejected as defective or unsuitable; or
  - (v) sub-lets any part of this Contract without approval by NPC.

15.2. All materials on the Site, Plant, Works, including Equipment purchased and funded under the Contract shall be deemed to be the property of NPC if this Contract is rescinded because of the Contractor's default.

## 16. Termination for Default of NPC

The Contractor may terminate this Contract with NPC if the works are completely stopped for a continuous period of at least sixty (60) calendar days through no fault of its own, due to any of the following reasons:

- (a) Failure of NPC to deliver, within a reasonable time, supplies, materials, right-of-way, or other items it is obligated to furnish under the terms of this Contract; or

- (b) The prosecution of the Work is disrupted by the adverse peace and order situation, as certified by the Armed Forces of the Philippines Provincial Commander and approved by the Secretary of National Defense.

## 17. Termination for Other Causes

- 17.1. NPC may terminate this Contract, in whole or in part, at any time for its convenience. The Head of NPC may terminate this Contract for the convenience of NPC if he has determined the existence of conditions that make Project Implementation economically, financially or technically impractical and/or unnecessary, such as, but not limited to, fortuitous event(s) or changes in law and National Government policies.
- 17.2. NPC or the Contractor may terminate this Contract if the other party causes a fundamental breach of this Contract.
- 17.3. Fundamental breaches of Contract shall include, but shall not be limited to, the following:
- (a) The Contractor stops work for twenty eight (28) days when no stoppage of work is shown on the current Program of Work and the stoppage has not been authorized by NPC's Representative;
  - (b) NPC's Representative instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within twenty eight (28) days;
  - (c) NPC shall terminate this Contract if the Contractor is declared bankrupt or insolvent as determined with finality by a court of competent jurisdiction. In this event, termination will be without compensation to the Contractor, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to NPC and/or the Contractor. In the case of the Contractor's insolvency, any Contractor's Equipment which NPC instructs in the notice is to be used until the completion of the Works;
  - (d) A payment certified by NPC's Representative is not paid by NPC to the Contractor within eighty four (84) days from the date of NPC's Representative's certificate;
  - (e) NPC's Representative gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by NPC's Representative;
  - (f) The Contractor does not maintain a Security, which is required;
  - (g) The Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as defined in the **GCC** Clause 9; and

- (h) In case it is determined prima facie by NPC 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, the following:
- (i) corrupt, fraudulent, collusive, coercive, and obstructive practices as defined in ITB Clause 3.1(a);
  - (ii) drawing up or using forged documents;
  - (iii) using adulterated materials, means or methods, or engaging in production contrary to rules of science or the trade; and
  - (iv) any other act analogous to the foregoing.
- 17.4. The Funding Source or NPC, as appropriate, will seek to impose the maximum civil, administrative and/or criminal penalties available under the applicable law on individuals and organizations deemed to be involved with corrupt, fraudulent, or coercive practices.
- 17.5. When persons from either party to this Contract gives notice of a fundamental breach to NPC's Representative in order to terminate the existing contract for a cause other than those listed under **GCC** Clause 17.3, NPC's Representative shall decide whether the breach is fundamental or not.
- 17.6. If this Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.
- 18. Procedures for Termination of Contracts**
- 18.1. The following provisions shall govern the procedures for the termination of this Contract:
- (a) Upon receipt of a written report of acts or causes which may constitute ground(s) for termination as aforementioned, or upon its own initiative, NPC shall, within a period of seven (7) calendar days, verify the existence of such ground(s) and cause the execution of a Verified Report, with all relevant evidence attached;
  - (b) Upon recommendation by Head of NPC, NPC shall terminate this Contract only by a written notice to the Contractor conveying the termination of this Contract. The notice shall state:
    - (i) that this Contract is being terminated for any of the ground(s) afore-mentioned, and a statement of the acts that constitute the ground(s) constituting the same;
    - (ii) the extent of termination, whether in whole or in part;
    - (iii) an instruction to the Contractor to show cause as to why this Contract should not be terminated; and

- (iv) special instructions of NPC, if any.

The Notice to Terminate shall be accompanied by a copy of the Verified Report;

- (c) Within a period of seven (7) calendar days from receipt of the Notice of Termination, the Contractor shall submit to the Head of NPC a verified position paper stating why the contract should not be terminated. If the Contractor fails to show cause after the lapse of the seven (7) day period, either by inaction or by default, the Head of NPC shall issue an order terminating the contract;
- (d) NPC may, at anytime before receipt of the Contractor's verified position paper described in item (c) above withdraw the Notice to Terminate if it is determined that certain items or works subject of the notice had been completed, delivered, or performed before the Contractor's receipt of the notice;
- (e) Within a non-extendible period of ten (10) calendar days from receipt of the verified position paper, the Head of NPC shall decide whether or not to terminate this Contract. It shall serve a written notice to the Contractor of its decision and, unless otherwise provided in the said notice, this Contract is deemed terminated from receipt of the Contractor of the notice of decision. The termination shall only be based on the ground(s) stated in the Notice to Terminate; and
- (f) The Head of NPC may create a Contract Termination Review Committee (CTRC) to assist him in the discharge of this function. All decisions recommended by the CTRC shall be subject to the approval of the Head of NPC.

18.2. Pursuant to Section 69(f) of RA 9184 and without prejudice to the imposition of additional administrative sanctions as the internal rules of the agency may provide and/or further criminal prosecution as provided by applicable laws, NPC shall impose on contractors after the termination of the contract the penalty of suspension for one (1) year for the first offense, suspension for two (2) years for the second offense from participating in the public bidding process, for violations committed during the contract implementation stage, which include but not limited to the following:

- (a) Failure of the contractor, due solely to his fault or negligence, to mobilize and start work or performance within the specified period in the Notice to Proceed ("NTP");
- (b) Failure by the contractor to fully and faithfully comply with its contractual obligations without valid cause, or failure by the contractor to comply with any written lawful instruction of NPC or its representative(s) pursuant to the implementation of the contract. For the procurement of infrastructure projects or consultancy contracts, lawful instructions include but are not limited to the following:

- (i) Employment of competent technical personnel, competent engineers and/or work supervisors;
  - (ii) Provision of warning signs and barricades in accordance with approved plans and specifications and contract provisions;
  - (iii) Stockpiling in proper places of all materials and removal from the project site of waste and excess materials, including broken pavement and excavated debris in accordance with approved plans and specifications and contract provisions;
  - (iv) Deployment of committed equipment, facilities, support staff and manpower; and
  - (v) Renewal of the effectivity dates of the performance security after its expiration during the course of contract implementation.
- (c) Assignment and subcontracting of the contract or any part thereof or substitution of key personnel named in the proposal without prior written approval by NPC.
- (d) Poor performance by the contractor or unsatisfactory quality and/or progress of work arising from his fault or negligence as reflected in the Constructor's Performance Evaluation System ("CPES") rating sheet. In the absence of the CPES rating sheet, the existing performance monitoring system of NPC shall be applied. Any of the following acts by the Contractor shall be construed as poor performance:
- (i) Negative slippage of 15% and above within the critical path of the project due entirely to the fault or negligence of the contractor; and
  - (ii) Quality of materials and workmanship not complying with the approved specifications arising from the contractor's fault or negligence.
- (e) Willful or deliberate abandonment or non-performance of the project or contract by the contractor resulting to substantial breach thereof without lawful and/or just cause.

In addition to the penalty of suspension, the performance security posted by the contractor shall also be forfeited.

## 19. Force Majeure, Release From Performance

- 19.1. For purposes of this Contract the terms "*force majeure*" and "fortuitous event" may be used interchangeably. In this regard, a fortuitous event or *force majeure* shall be interpreted to mean an event which the Contractor could not have foreseen, or which though foreseen, was inevitable. It shall not include ordinary unfavorable weather conditions; and any other cause the effects of which could have been avoided with the exercise of reasonable diligence by the Contractor.

- 19.2. If this Contract is discontinued by an outbreak of war or by any other event entirely outside the control of either NPC or the Contractor, NPC's Representative shall certify that this Contract has been discontinued. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all works carried out before receiving it and for any Work carried out afterwards to which a commitment was made.
- 19.3. If the event continues for a period of eighty four (84) days, either party may then give notice of termination, which shall take effect twenty eight (28) days after the giving of the notice.
- 19.4. After termination, the Contractor shall be entitled to payment of the unpaid balance of the value of the Works executed and of the materials and Plant reasonably delivered to the Site, adjusted by the following:
- (a) any sum to which the Contractor is entitled under **GCC Clause 27**;
  - (b) the cost of his suspension and demobilization;
  - (c) any sum to which NPC is entitled.
- 19.5. The net balance due shall be paid or repaid within a reasonable time period from the time of the notice of termination.
- 20. Resolution of Disputes**
- 20.1. If any dispute or difference of any kind whatsoever shall arise between the parties in connection with the implementation of the contract covered by the Act and this IRR, the parties shall make every effort to resolve amicably such dispute or difference by mutual consultation.
- 20.2. If the Contractor believes that a decision taken by NPC's Representative was either outside the authority given to NPC's Representative by this Contract or that the decision was wrongly taken, the decision shall be referred to the Construction Industry Arbitration Commission (CIAC) - Construction Industry Authority of the Philippines (CIAP), within fourteen (14) days of the notification of NPC's Representative's decision.
- 20.3. Any and all disputes arising from the implementation of this Contract covered by the R.A. 9184 and its IRR shall be submitted to arbitration in the Philippines according to the provisions of Republic Act No. 876, otherwise known as the "Arbitration Law" and Republic Act 9285, otherwise known as the "Alternative Dispute Resolution Act of 2004": *Provided, however*, That, disputes that are within the competence of the Construction Industry Arbitration Commission to resolve shall be referred thereto. The process of arbitration shall be incorporated as a provision in this Contract that will be executed pursuant to the provisions of the Act and its IRR: *Provided, further*, That, by mutual agreement, the parties may agree in writing to resort to other alternative modes of dispute resolution.

**21. Suspension of Loan, Credit, Grant, or Appropriation**

In the event that the Funding Source suspends the Loan, Credit, Grant, or Appropriation to NPC, from which part of the payments to the Contractor are being made:

- (a) NPC is obligated to notify the Contractor of such suspension within seven (7) days of having received the suspension notice.
- (b) If the Contractor has not received sums due it for work already done within forty five (45) days from the time the Contractor's claim for payment has been certified by NPC's Representative, the Contractor may immediately issue a suspension of work notice in accordance with GCC Clause 43.2.

**22. NPC's Representative's Decisions**

- 22.1. Except where otherwise specifically stated, NPC's Representative will decide contractual matters between NPC and the Contractor in the role representing NPC.
- 22.2. NPC's Representative may delegate any of his duties and responsibilities to other people, except to the Arbiter, after notifying the Contractor, and may cancel any delegation after notifying the Contractor.

**23. Approval of Drawings and Temporary Works by NPC's Representative**

- 23.1. All Drawings prepared by the Contractor for the execution of the Temporary Works, are subject to prior approval by NPC's Representative before its use.
- 23.2. The Contractor shall be responsible for design of Temporary Works.
- 23.3. NPC's Representative's approval shall not alter the Contractor's responsibility for design of the Temporary Works.
- 23.4. The Contractor shall obtain approval of third parties to the design of the Temporary Works, when required by NPC.

**24. Acceleration and Delays Ordered by NPC's Representative**

- 24.1. When NPC wants the Contractor to finish before the Intended Completion Date, NPC's Representative will obtain priced proposals for achieving the necessary acceleration from the Contractor. If NPC accepts these proposals, the Intended Completion Date will be adjusted accordingly and confirmed by both NPC and the Contractor.
- 24.2. If the Contractor's Financial Proposals for an acceleration are accepted by NPC, they are incorporated in the Contract Price and treated as a Variation.

**25. Extension of the Intended Completion Date**

- 25.1. NPC's Representative shall extend the Intended Completion Date if a Variation is issued which makes it impossible for the Intended Completion Date to be achieved by the Contractor without taking steps to accelerate the remaining

work, which would cause the Contractor to incur additional costs. No payment shall be made for any event which may warrant the extension of the Intended Completion Date.

- 25.2. NPC's Representative shall decide whether and by how much to extend the Intended Completion Date within twenty one (21) days of the Contractor asking NPC's Representative for a decision thereto after fully submitting all supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

## 26. Right to Vary

- 26.1. NPC's Representative with the prior approval of NPC may instruct Variations, up to a maximum cumulative amount of ten percent (10%) of the original contract cost.
- 26.2. Variations shall be valued as follows:
- (a) At a lump sum price agreed between the parties;
  - (b) where appropriate, at rates in this Contract;
  - (c) in the absence of appropriate rates, the rates in this Contract shall be used as the basis for valuation; or failing which
  - (d) at appropriate new rates, equal to or lower than current industry rates and to be agreed upon by both parties and approved by the Head of NPC.

## 27. Contractor's Right to Claim

If the Contractor incurs cost as a result of any of the events under GCC Clause 12, the Contractor shall be entitled to the amount of such cost. If as a result of any of the said events, it is necessary to change the Works, this shall be dealt with as a Variation.

## 28. Early Warning

- 28.1. The Contractor shall warn NPC's Representative at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price, or delay the execution of the Works. NPC's Representative may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.
- 28.2. The Contractor shall cooperate with NPC's Representative in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of NPC's Representative.

**29. Program of Work**

- 29.1. Within Ten (10) calendar days from receipt of the Notice of Award/Letter of Acceptance, the Contractor shall submit to NPC's Representative for approval a Program of Work showing the general methods, arrangements, order, and timing for all the activities in the Works.
- 29.2. An update of the Program of Work shall show the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.
- 29.3. The Contractor shall submit to NPC's Representative for approval an updated Program of Work at intervals no longer than Thirty (30) Calendar Days. If the Contractor does not submit an updated Program of Work within this period, NPC's Representative may withhold One Percent (1%) of contract amount 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.
- 29.4. NPC's Representative's approval of the Program of Work shall not alter the Contractor's obligations. The Contractor may revise the Program of Work and submit it to NPC's Representative again at any time. A revised Program of Work shall show the effect of any approved Variations.
- 29.5. When the Program of Work is updated, the Contractor shall provide NPC's Representative with an updated cash flow forecast. The cash flow forecast shall include different currencies, as defined in the Contract, converted as necessary using the Contract exchange rates.
- 29.6. All Variations shall be included in updated Program of Work produced by the Contractor.

**30. Management Conferences**

- 30.1. Either NPC's Representative or the Contractor may require the other to attend a Management Conference. The Management Conference shall review the plans for remaining work and deal with matters raised in accordance with the early warning procedure.
- 30.2. NPC's Representative shall record the business of Management Conferences and provide copies of the record to those attending the Conference and to NPC. The responsibility of the parties for actions to be taken shall be decided by NPC's Representative either at the Management Conference or after the Management Conference and stated in writing to all who attended the Conference.

**31. Bill of Quantities**

- 31.1. The Bill of Quantities shall contain items of work for the construction, installation, testing, and commissioning of work to be done by the Contractor.

- 31.2. The Bill of Quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item.
- 31.3. If the final quantity of any work done differs from the quantity in the Bill of Quantities for the particular item and is not more than twenty five percent (25%) of the original quantity, provided the aggregate changes for all items do not exceed ten percent (10%) of the Contract price, NPC's Representative shall make the necessary adjustments to allow for the changes subject to applicable laws, rules, and regulations.
- 31.4. If requested by NPC's Representative, the Contractor shall provide NPC's Representative with a detailed cost breakdown of any rate in the Bill of Quantities.

## **32. Instructions, Inspections and Audits**

- 32.1. NPC's personnel shall at all reasonable times during construction of the Work be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of the construction.
- 32.2. If NPC's Representative instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no defect, the test shall be a Compensation Event.
- 32.3. The Contractor shall permit NPC to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by NPC, if so required by NPC.
- 32.4. During contract implementation, NPC 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.

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.

Qualified Constructors Performance Evaluators (CPE) shall conduct project evaluation as follows:

- (a) 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.

- (b) 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.

### **33. Identifying Defects**

NPC's Representative shall check the Contractor's work and notify the Contractor of any defects that are found. Such checking shall not affect the Contractor's responsibilities. NPC's Representative may instruct the Contractor to search uncover defects and test any work that NPC's Representative considers below standards and defective.

### **34. Cost of Repairs**

Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Liability Periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

### **35. Correction of Defects**

- 35.1. NPC's Representative shall give notice to the Contractor of any defects before the end of the Defects Liability Period, which is One (1) year from project completion up to final acceptance by NPC's Representative.
- 35.2. Every time notice of a defect is given, the Contractor shall correct the notified defect within the length of time specified in NPC's Representative's notice.
- 35.3. The Contractor shall correct the defects which he notices himself before the end of the Defects Liability Period.
- 35.4. NPC shall certify that all defects have been corrected. If NPC considers that correction of a defect is not essential, he can request the Contractor to submit a quotation for the corresponding reduction in the Contract Price. If NPC accepts the quotation, the corresponding change in the SCC is a Variation.

### **36. Uncorrected Defects**

- 36.1. NPC shall give the Contractor at least fourteen (14) days notice of his intention to use a third party to correct a Defect. If the Contractor does not correct the Defect himself within the period, NPC may have the Defect corrected by the third party. The cost of the correction will be deducted from the Contract Price.
- 36.2. The use of a third party to correct defects that are uncorrected by the Contractor will in no way relieve the Contractor of its liabilities and warranties under the Contract.

**37. Advance Payment**

- 37.1. NPC 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.
- 37.2. The advance payment shall be made only upon the submission to and acceptance by NPC of an irrevocable standby letter of credit of equivalent value from a commercial bank, a bank guarantee or a surety bond callable upon demand, issued by a surety or insurance company duly licensed by the Insurance Commission and confirmed by NPC.
- 37.3. The advance payment shall be repaid by the Contractor by an amount equal to the percentage of the total contract price used for the advance payment.
- 37.4. The contractor may reduce his standby letter of credit or guarantee instrument by the amounts refunded by the Monthly Certificates in the advance payment.
- 37.5. NPC will provide an Advance Payment on the Contract Price as stipulated in the Conditions of Contract, subject to the maximum amount stated in GCC Clause 37.1.

**38. Progress Payments**

- 38.1. The Contractor may submit a request for payment for Work accomplished. Such request for payment shall be verified and certified by NPC's Representative/Project Engineer. Materials and equipment delivered on the site but not completely put in place shall not be included for payment.
- 38.2. NPC shall deduct the following from the certified gross amounts to be paid to the contractor as progress payment:
  - (a) Cumulative value of the work previously certified and paid for.
  - (b) Portion of the advance payment to be recouped for the month.
  - (c) Retention money in accordance with the condition of contract.
  - (d) Amount to cover third party liabilities.
  - (e) Amount to cover uncorrected discovered defects in the works.
- 38.3. Payments shall be adjusted by deducting therefrom the amounts for advance payments and retention. NPC shall pay the Contractor the amounts certified by NPC's Representative within twenty eight (28) days from the date each certificate was issued. No payment of interest for delayed payments and adjustments shall be made by NPC.
- 38.4. The first progress payment may be paid by NPC to the Contractor provided that at least twenty percent (20%) of the work has been accomplished as certified by NPC's Representative.

- 38.5. Items of the Works for which a price of "0" (zero) has been entered will not be paid for by NPC and shall be deemed covered by other rates and prices in the Contract.

### 39. Payment Certificates

- 39.1. The Contractor shall submit to NPC's Representative monthly statements of the estimated value of the work executed less the cumulative amount certified previously.
- 39.2. NPC's Representative shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor.
- 39.3. The value of Work executed shall:
- (a) be determined by NPC's Representative;
  - (b) comprise the value of the quantities of the items in the Bill of Quantities completed; and
  - (c) include the valuations of approved variations.
- 39.4. NPC's Representative may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

### 40. Retention

- 40.1. NPC shall retain from each payment due to the Contractor an amount equal to a percentage thereof using the rate as specified in GCC Sub-Clause 40.2.
- 40.2. Progress payments are subject to retention of ten percent (10%), referred to as the "retention money." Such retention shall be based on the total amount due to the Contractor prior to any deduction and shall be retained from every progress payment until fifty percent (50%) of the value of Works, as determined by NPC, are completed. If, after fifty percent (50%) completion, the Work is satisfactorily done and on schedule, no additional retention shall be made; otherwise, the ten percent (10%) retention shall again be imposed using the rate specified therefor.
- 40.3. The total "retention money" shall be due for release upon final acceptance of the Works. The Contractor may, however, request the substitution of the retention money for each progress billing with irrevocable standby letters of credit from a commercial bank, bank guarantees or surety bonds callable on demand, of amounts equivalent to the retention money substituted for and acceptable to NPC, provided that the project is on schedule and is satisfactorily undertaken. Otherwise, the ten (10%) percent retention shall be made. Said irrevocable standby letters of credit, bank guarantees and/or surety bonds, to be posted in favor of the Government shall be valid for a duration to be determined by the concerned implementing office/agency or NPC and will answer for the purpose for which the ten (10%) percent retention is intended, *i.e.*, to cover uncorrected discovered defects and third party liabilities.

- 40.4. On completion of the whole Works, the Contractor may substitute retention money with an "on demand" Bank guarantee in a form acceptable to NPC.

#### 41. Variation Orders

- 41.1. Variation Orders may be issued by NPC to cover any increase/decrease in quantities, including the introduction of new work items that are not included in the original contract or reclassification of work items that are either due to change of plans, design or alignment to suit actual field conditions resulting in disparity between the preconstruction plans used for purposes of bidding and the "as staked plans" or construction drawings prepared after a joint survey by the Contractor and NPC after award of the contract, provided that the cumulative amount of the Variation Order does not exceed ten percent (10%) of the original project cost. The addition/deletion of Works should be within the general scope of the project as bid and awarded. The scope of works shall not be reduced so as to accommodate a positive Variation Order. A Variation Order may either be in the form of a Change Order or Extra Work Order.
- 41.2. A Change Order may be issued by NPC to cover any increase/decrease in quantities of original Work items in the contract.
- 41.3. An Extra Work Order may be issued by NPC to cover the introduction of new work necessary for the completion, improvement or protection of the project which were not included as items of Work in the original contract, such as, where there are subsurface or latent physical conditions at the site differing materially from those indicated in the contract, or where there are duly unknown physical conditions at the site of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in the Work or character provided for in the contract.
- 41.4. Any cumulative Variation Order beyond ten percent (10%) shall be subject of another contract to be bid out if the works are separable from the original contract. In exceptional cases where it is urgently necessary to complete the original scope of work, the Head of NPC may authorize a positive Variation Order go beyond ten percent (10%) but not more than twenty percent (20%) of the original contract price, subject to the guidelines to be determined by the GPPB: *Provided, however,* That appropriate sanctions shall be imposed on the designer, consultant or official responsible for the original detailed engineering design which failed to consider the Variation Order beyond ten percent (10%).
- 41.5. In claiming for any Variation Order, the Contractor shall, within seven (7) calendar days after such work has been commenced or after the circumstances leading to such condition(s) leading to the extra cost, and within twenty-eight (28) calendar days deliver a written communication giving full and detailed particulars of any extra cost in order that it may be investigated at that time. Failure to provide either of such notices in the time stipulated shall constitute a waiver by the contractor for any claim. The preparation and submission of Variation Orders are as follows:
- (a) If NPC's representative/Project Engineer believes that a Change Order or Extra Work Order should be issued, he shall prepare the proposed

Order accompanied with the notices submitted by the Contractor, the plans therefore, his computations as to the quantities of the additional works involved per item indicating the specific stations where such works are needed, the date of his inspections and investigations thereon, and the log book thereof, and a detailed estimate of the unit cost of such items of work, together with his justifications for the need of such Change Order or Extra Work Order, and shall submit the same to the Head of NPC for approval.

- (b) The Head of NPC or his duly authorized representative, upon receipt of the proposed Change Order or Extra Work Order shall immediately instruct the appropriate technical staff or office of NPC to conduct an on-the-spot investigation to verify the need for the Work to be prosecuted and to review the proposed plan, and prices of the work involved.
- (c) The technical staff or appropriate office of NPC shall submit a report of their findings and recommendations, together with the supporting documents, to the Head of NPC or his duly authorized representative for consideration.
- (d) The Head of NPC or his duly authorized representative, acting upon the recommendation of the technical staff or appropriate office, shall approve the Change Order or Extra Work Order after being satisfied that the same is justified, necessary, and in order.
- (e) The timeframe for the processing of Variation Orders from the preparation up to the approval by NPC concerned shall not exceed thirty (30) calendar days.

#### **42. Contract Completion**

Once the project reaches an accomplishment of ninety five (95%) of the total contract amount, NPC may create an inspectorate team to make preliminary inspection and submit a punch-list to the Contractor in preparation for the final turnover of the project. Said punch-list will contain, among others, the remaining Works, Work deficiencies for necessary corrections, and the specific duration/time to fully complete the project considering the approved remaining contract time. This, however, shall not preclude the claim of NPC for liquidated damages.

#### **43. Suspension of Work**

43.1. NPC shall have the authority to suspend the work wholly or partly by written order for such period as may be deemed necessary, due to *force majeure* or any fortuitous events or for failure on the part of the Contractor to correct bad conditions which are unsafe for workers or for the general public, to carry out valid orders given by NPC or to perform any provisions of the contract, or due to adjustment of plans to suit field conditions as found necessary during construction. The Contractor shall immediately comply with such order to suspend the work wholly or partly.

- 43.2. The Contractor or its duly authorized representative shall have the right to suspend work operation on any or all projects/activities along the critical path of activities after fifteen (15) calendar days from date of receipt of written notice from the Contractor to the district engineer/regional director/consultant or equivalent official, as the case may be, due to the following:
- (a) There exist right-of-way problems which prohibit the Contractor from performing work in accordance with the approved construction schedule.
  - (b) Requisite construction plans which must be owner-furnished are not issued to the contractor precluding any work called for by such plans.
  - (c) Peace and order conditions make it extremely dangerous, if not possible, to work. However, this condition must be certified in writing by the Philippine National Police (PNP) station which has responsibility over the affected area and confirmed by the Department of Interior and Local Government (DILG) Regional Director.
  - (d) There is failure on the part of NPC to deliver government-furnished materials and equipment as stipulated in the contract.
  - (e) Delay in the payment of Contractor's claim for progress billing beyond forty-five (45) calendar days from the time the Contractor's claim has been certified to by NPC's authorized representative that the documents are complete unless there are justifiable reasons thereof which shall be communicated in writing to the Contractor.
- 43.3. In case of total suspension, or suspension of activities along the critical path, which is not due to any fault of the Contractor, the elapsed time between the effectivity of the order suspending operation and the order to resume work shall be allowed the Contractor by adjusting the contract time accordingly.

#### **44. Payment on Termination**

- 44.1. If the Contract is terminated because of a fundamental breach of Contract by the Contractor, NPC's Representative shall issue a certificate for the value of the work done and Materials ordered less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as indicated in the SCC. Additional Liquidated Damages shall not apply. If the total amount due to NPC exceeds any payment due to the Contractor, the difference shall be a debt payable to NPC.
- 44.2. If the Contract is terminated for NPC's convenience or because of a fundamental breach of Contract by NPC, NPC's Representative shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received up to the date of the certificate.

- 44.3. The net balance due shall be paid or repaid within twenty eight (28) days from the notice of termination.
- 44.4. If the Contractor has terminated the Contract under **GCC** Clauses 16 or 17, NPC shall promptly return the Performance Security to the Contractor.
- 45. Extension of Contract Time**
- 45.1. Should the amount of additional work of any kind or other special circumstances of any kind whatsoever occur such as to fairly entitle the contractor to an extension of contract time, NPC shall determine the amount of such extension; provided that NPC is not bound to take into account any claim for an extension of time unless the Contractor has, prior to the expiration of the contract time and within thirty (30) calendar days after such work has been commenced or after the circumstances leading to such claim have arisen, delivered to NPC notices in order that it could have investigated them at that time. Failure to provide such notice shall constitute a waiver by the Contractor of any claim. Upon receipt of full and detailed particulars, NPC shall examine the facts and extent of the delay and shall extend the contract time completing the contract work when, in NPC's opinion, the findings of facts justify an extension.
- 45.2. No extension of contract time shall be granted the Contractor due to (a) ordinary unfavorable weather conditions and (b) inexcusable failure or negligence of Contractor to provide the required equipment, supplies or materials.
- 45.3. Extension of contract time may be granted only when the affected activities fall within the critical path of the PERT/CPM network.
- 45.4. No extension of contract time shall be granted when the reason given to support the request for extension was already considered in the determination of the original contract time during the conduct of detailed engineering and in the preparation of the contract documents as agreed upon by the parties before contract perfection.
- 45.5. Extension of contract time shall be granted for rainy/unworkable days considered unfavorable for the prosecution of the works at the site, based on the actual conditions obtained at the site, in excess of the number of rainy/unworkable days pre-determined by NPC in relation to the original contract time during the conduct of detailed engineering and in the preparation of the contract documents as agreed upon by the parties before contract perfection, and/or for equivalent period of delay due to major calamities such as exceptionally destructive typhoons, floods and earthquakes, and epidemics, and for causes such as non-delivery on time of materials, working drawings, or written information to be furnished by NPC, non-acquisition of permit to enter private properties or non-execution of deed of sale or donation within the right-of-way resulting in complete paralyzation of construction activities, and other meritorious causes as determined by NPC's Representative and approved by the Head of NPC. Shortage of construction materials, general labor strikes, and peace and order problems that disrupt construction operations through no fault

of the Contractor may be considered as additional grounds for extension of contract time provided they are publicly felt and certified by appropriate government agencies such as DTI, DOLE, DILG, and DND, among others. The written consent of bondsmen must be attached to any request of the Contractor for extension of contract time and submitted to NPC for consideration and the validity of the Performance Security shall be correspondingly extended.

#### **46. Price Adjustment**

Except for extraordinary circumstances as determined by NEDA and approved by the GPPB, no price escalation shall be allowed. Nevertheless, in cases where the cost of the awarded contract is affected by any applicable new laws, ordinances, regulations, or other acts of the GoP, promulgated after the date of bid opening, a contract price adjustment shall be made or appropriate relief shall be applied on a no loss-no gain basis.

#### **47. Completion**

The Contractor shall request NPC's Representative to issue a certificate of Completion of the Works, and NPC's Representative will do so upon deciding that the work is completed.

#### **48. Taking Over**

NPC shall take over the Site and the Works within seven (7) days from the date NPC's Representative issues a certificate of Completion.

#### **49. Operating and Maintenance Manuals**

- 49.1. If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them within Thirty (30) Calendar Days after completion of contract.
- 49.2. If the Contractor does not supply the Drawings and/or manuals by the dates stated, or they do not receive NPC's Representative's approval, NPC's Representative shall withhold the Five Percent (5%) of contract amount from payments due to the Contractor.

## SECTION III

# TECHNICAL SPECIFICATIONS



**SECTION III – TECHNICAL SPECIFICATIONS**

**PROJECT HIGHLIGHTS**

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## PROJECT HIGHLIGHTS

### PH – 1.0 GENERAL

The Supply, Delivery, Installation, Test and Commissioning of Eight (8) Units Modular Diesel Generating Sets Including Balance of Plant for the Electrification of New Areas in Occidental Mindoro, Schedule II has been cancelled. The Generating Sets and equipment/ materials intended for these areas that were already purchased by the Contractor are delivered at NPC Minuyan, San Jose Del Monte Bulacan. The NPC Management has decided to pursue and implement the electrification projects in this Tender Documents for Calutcot, Burdeos Quezon, and Butawan, Siruma, Camarines Sur utilizing the Gensets and equipment that are to be delivered at NPC Minuyan.

### PH – 2.0 PROJECT LOCATION

The project is located in two (2) separate new plant sites, Brgy. Calutcot, Calutcot Is., Burdeos, Province of Quezon and Brgy. Butawan, Butawan Is., Siruma, Province of Camarines Sur.

### PH – 3.0 SCOPE OF WORK

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

a. Civil/Architectural Works:

1. Moving-in including furnishing, construction, operation and maintenance of general construction facilities and moving-out thereof after completion and acceptance.
2. Clearing and Grubbing;
3. Structural excavation and backfill for equipment foundations of diesel generating sets and its auxiliaries, transformers, and for all miscellaneous Balance-of-Plant (BOP) structures required;
4. Concreting works for equipment foundations of diesel generating sets and its auxiliaries, transformers and for all miscellaneous Balance-of-Plant (BOP) structures required;
5. Furnishing and installation of drainage systems and appurtenance structures, septic tank, oil water separator, open rc canal, drain pit and catch basin;
6. Fabrication and erection of structural steel supports for water storage tank and fuel oil day tank supports;

7. Complete construction of prefab container house, hazardous waste storage and lube/fuel oil receiving area and guard post;
8. Complete construction of flagpole and perimeter lighting support foundation;
9. Complete construction/installation of perimeter fence and seclusion fence including entrance gates;
10. Furnishing and erection and install for steel pole and steel cross arms braces;
11. Laying surface gravel at the switchyard area and genset area; and
12. Supply and delivery of 4 x 30 ft. and 2 x 25 ft. Steel Pole and its associated steel crossarms, braces, etc. including excavation and backfill.
13. All other works and services required to complete the project.

b. All Mechanical Works:

The scope of work shall cover the on-site hauling, installation/erection, assistance to test and commissioning of the diesel engine-generator set and its auxiliaries including supply, installation and test of balance-of-plant, but not limited to the following:

1. Packing/crating, Transportation, Hauling, Assembling, Installation, and Assistance to Testing of all Mechanical Equipment and Systems' Auxiliaries and other accessories to be transferred including but not limited to:
  - 1.1. Two (2) sets of 50 kW Modular Diesel Gensets and its systems' auxiliaries – FOR CALUTCOT DPP;
  - 1.2. One (1) set of 50 kW and one (1) set of 30 kW Modular Diesel Gensets and its systems' auxiliaries – FOR BUTAWANAN DPP;
  - 1.3. Spare Parts for Four (4) Genset as listed in Clause MW-2.0, Item a.3 of the Mechanical Works Specifications;
2. Assistance during the conduct of test and commissioning of the diesel generating sets by NPC.
3. One (1) set of 1,000-liter fuel oil day tank per genset complete with manhole, inlet and outlet nozzles, nozzles for

vent, overflow, drain and level guage/switch, and structural supports;

4. One (1) lot Fuel Oil Piping System complete with valves, strainers, pipe and fittings, gaskets, flanges, bolts and nuts, pipe supports and other required accessories to complete the piping systems for the fuel oil unloading, transfer of fuel oil to day tanks, day tanks to and from diesel gensets including flowmeters (supply and return), waste water/oil from powerhouse drain pit to oil water separator including necessary excavation, backfilling and asphalt jute application to embedded pipes;
5. One (1) lot of Well Drilling Works consisting of casing installation, well development, pumping test and disinfection;
6. Two (2) sets of Fuel Oil Hand Pump per plant complete with accessories;
7. One (1) set of Elevated Water Storage Tank (polyethylene) 600 liters capacity per plant complete with accessories;
8. One (1) lot of Domestic Water Supply Piping System, including valves, pipe fittings, pipe supports, excavation and backfilling of embedded pipes and other pipe accessories including disinfection of the system;
9. One (1) unit of Inverter/Window type Air Conditioner, 16,000 kJ/h minimum cooling capacity for control house and One (1) unit of Wall mounted Exhaust Fan for toilet, 100 m<sup>3</sup>/h minimum capacity, propeller type, direct motor driven, 220V, 60 hz, 1-phase power supply for all air conditioning and ventilation units **per plant site**, all complete with mounting accessories and controls;
10. Two (2) sets of Portable Type Fire Extinguishers, Clean Agent (HCFC or Halotron I Type), 7.1 kg. (15.5 lbs), non-expiry, multi shots, wall-hung and UL/FM approved- **per Plant Site**;
11. One (1) lot of various Miscellaneous Equipment and Materials as listed in Clause MW-2.0, Item b.7 and MW-10.0 of the Mechanical Works Specifications;
12. Hydrostatic testing of field-installed piping systems under the presence of NPC;
13. One (1) lot of Painting Materials to be applied to all equipment, pipes, steel structures, tanks, pipe supports and other incidentals;

14. Provide Labels or Standard Plant Identification Number (SPIN) for all equipment, valves, piping and instruments supplied;
15. All other works and services including those that are not specifically detailed herein but are required to fully complete the project;

**NOTE:** Refer to Mechanical Works Technical Specifications for detailed scope of works.

c. Electrical Works:

1. Hauling, Installation and **assistance to NPC during the conduct of test and commissioning** of 2 x 50 kW (for Calutcot DPP) and 1 x 30 kW & 1 x 50 kW (for Butawananan DPP), 480V, 3-phase, 60Hz AC Generator and associated auxiliary electrical equipment including grounding material that will be transferred from NPC-Minuyan, SJDM, Bulacan;
2. Hauling, Installation and **assistance to NPC during the conduct of test and commissioning** of Generator Control and Protection Panel (GCPP) for 2 x 50 kW D/G sets (for Calutcot DPP) and 1 x 30 kW & 1 x 50 kW D/G sets (for Butawananan DPP) equipped with monitoring, metering, control, protection and synchronizing equipment/devices;
3. Supply of One (1) Spare Circuit Breaker for 50 kW D/G set (for Calutcot DPP) and for 1 x 30 kW & 1 x 50 kW D/G sets (for Butawananan DPP);
4. Hauling, Installation and **assistance to NPC during the conduct of test and commissioning** of 2 x 75 kVA (for Calutcot DPP) and 1 x 75 kVA & 1 x 37.5 kVA (for Calutcot DPP), 480V/13.8kV, 3-Phase, 60Hz Generator Transformer that will be transferred from NPC-Minuyan, SJDM, Bulacan;
5. Hauling, Installation and **assistance to NPC during the conduct of test and commissioning** of 15 kVA, 7.97kV/240V, 1-Phase, 60 Hz Station Service Transformer that will be transferred from NPC-Minuyan, SJDM, Bulacan;
6. Supply, Installation and Test of 800A, 60 Hz, 15kV, 12kA, Automatic Circuit Recloser;
7. Supply, Installation and Test of 15 kV Fuse Disconnect Switches with Lightning Arrester Combination;

8. Supply, Installation and Test of Kilowatt-hour Demand Meter and associated Instrument Transformers and Accessories;
9. Supply, Installation and Test of Bus Conductor and Line Materials and Hardware;
10. Supply, Laying and Test of Power, Control and Instrumentation Cables including ground conductors and other appurtenances required for the interfacing of supplied equipment;
11. Supply, Installation and Test of Grounding System;
12. Supply, Installation and Test of Lightning Protection System;
13. Supply, Installation and Test of Lighting & Power System and its Accessories;
14. Supply and Installation of Conduit System;
15. Supply and Delivery of Special Tools;
16. Supply, Delivery and Test of two (2) sets of Job Site Cameras to be installed before the start of construction and/or installation of equipment; and
17. All other works and services including those not specifically detailed herein but are required to fully complete the project.

#### PH – 4.0 CONTRACT PERIOD

The contractor shall complete the works as specified within **Two Hundred Ten (210)** calendar days. The contract duration is inclusive of Fifteen (15) unworkable days considered unfavorable for the prosecution of works at the site. The total contract duration shall be reckoned from the date of contract effectivity as specified in the **Notice to Proceed**.

#### PH – 5.0 CONTRACTOR'S CLASSIFICATION

The Contractor must have a valid Philippine Contractors Accreditation Board (PCAB) license or Special PCAB License in case of Joint Ventures, and registration for the type and cost of the contract for this Project as follows: License Category of at least "**CATEGORY D – GENERAL BUILDING**" and registration classification of at least "**SMALL B – BUILDING & INDUSTRIAL PLANT**" or "**SMALL B – MECHANICAL WORKS**"

For this purpose, similar contracts shall refer to refer to projects involving construction/transfer of power facilities of Diesel Generating



Sets or erection, installation, test and commissioning of Diesel Power Plant.

#### PH – 6.0 MINIMUM REQUIRED KEY PESONNEL

1. **One (1) Project Engineer** - Registered Civil Engineer or Registered Mechanical Engineer or Registered Electrical Engineer who had supervised at least a project similar in nature as to the type of the proposed project within the last 10 years.
2. **One (1) Materials Engineer** - Registered Civil Engineer with valid accreditation from the Department of Public Works and Highways (DPWH) as Materials Engineer I.
3. **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.

#### PH – 7.0 MINIMUM REQUIRED CONSTRUCTION EQUIPMENT (Owned or leased)

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

- |                                     |          |
|-------------------------------------|----------|
| a. Welding Machine (300 Amp)        | - 1 unit |
| b. Oxyacetylene cutting outfit      | - 1 unit |
| c. Portable Generator (300 kVA)     | - 1 unit |
| d. Bar cutter (25mm $\Phi$ capable) | - 1 unit |
| e. Concrete Vibrator (3.5HP)        | - 1 unit |
| f. Concrete Mixer (2-bagger)        | - 1 unit |
| g. Service Vehicle (4x4 pick up)    | - 1 unit |

## SECTION III

# TECHNICAL SPECIFICATIONS (ARCHITECTURAL WORKS)



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## **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 with high-quality workmanship, in accordance with generally accepted modern 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 a 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 a request shall indicate the reasons for substitution. No substitute material shall be used without written authorization from the NPC Representative.

The Contractor shall submit a written request for substitution at least one (1) month before such materials are actually needed. Such a 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 the manufacturer or sole distributor of equipment and materials to be furnished and installed by the Contractor/Contactor, 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 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 the 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 PREFABRICATED CONTAINER HOUSE****AW-2.1 General**

The specification covers the features and technical requirements for the supply, delivery and erection/installation of one (1) unit, 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 Contractor 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-2.2 Work Scope**

The works and services to be performed by the successful bidder shall cover the supply, delivery, and complete erection/installation of one (1) unit, 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 one (1) unit twenty (20) feet Prefabricated Container House with the following specifications and fixtures:

Dimensions	6.0 meters length by 3.0 meters width by 2.7 meters height.
Steel Frame	Galvanized with painting
Walls	50 mm polystyrene insulation with double-sided 0.45mm pre-painted GI sheet.
Roof	Glasswool insulation with pre-painted GI sheet roof and interior ceiling.
Flooring	Magnesium board with linoleum finish.
Windows (4 sets – 1.0m x 1.0m)	4 sets aluminum frame sliding windows and 1 set PVC awning window.
Doors (1 set – 0.8m x 2.1m)	1 set steel door and 1 set PVC door.
Toilet & Bath	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-2.3 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-2.4 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 Bill of Quantities.

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-3.0 PLUMBING FIXTURES AND FITTINGS****AW-3.1 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-3.2 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-3.3 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-3.4 Fixtures**

Water Closet – as shown in the drawings or as specified in the Bill of Quantities

- 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-3.5 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-3.6 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-3.7 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 Bill of Quantities.

Payment shall constitute full compensation for all labor, materials, 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 shall be 0.5mm base metal thickness pre-painted long span corrugated G.I. roofing or approved equal. Including its accessories such as 0.5mm thick barge cap flashing, ridge rolls, capping, moldings and gutter must be 0.6mm thick etc.

Material for sidings shall be wire mesh enclosure sidings and 0.5mm base metal thickness pre-painted long span corrugated G.I sheet.

**AW-4.3 Workmanship**

Installation of the roofing shall be done by the manufacturer or his authorized installer in strict accordance with the specification of the manufacturer.

**AW-4.4 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.

**AW-5.0 DOWNSPOUTS AND ROOF DRAINS****AW-5.1 Scope of Works**

## a) Downspouts

Downspouts shall be 150 mm diameter unplasticised PVC, or as indicated in the drawings complete with fittings and accessories down to the catch basin and water storage tank.

## b) Roof Drain

Roof drain shall be of high grade, strong, stainless. Casting shall be free from blowholes, porosity hard spots, excessive shrinkage, cracks, or other injurious defects shall be smooth and well cleaned both inside and outside and all fin sand roughness removed. Roof drains shall conform to the diameter of downspouts. Roof drains shall be provided at the upper end of all downspouts.



**AW-5.2 Measurement and Payment**

- a) Downspouts  
Measurement for payment will be based on the length installed and accepted.
- b) Roof Drains  
Measurement for payment for Roof Drain will be based on the number of set installed and accepted.

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



## SECTION III

# **TECHNICAL SPECIFICATIONS (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 CAMPSECURITY**

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 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-1.11 MEASUREMENT AND PAYMENT**

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

#### **CW-2.0 CARE OF WATER DURING CONSTRUCTION**

##### **CW-2.1 SCOPE**

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.

##### **CW-2.2 DRAINAGE AND DEWATERING**

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-2.3 MEASUREMENT AND PAYMENT**

No separate measurement and payment will be made for the Care of Water During Construction operations. 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-3.0 ENVIRONMENTAL REQUIREMENTS FOR CIVIL WORKS**

##### **CW-3.1 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-3.2 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-3.3 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-4.0 SITE GRADING**

#### **CW-4.1 SCOPE**

In accordance with the specifications contained herein and in conformance with the lines, slopes, grades and extent shown on the plans or otherwise directed by the NPC, the Contractor shall furnish all equipment, labor and materials and shall perform the required grading work.

#### **CW-4.2 CLEARING, GRUBBING AND MISCELLANEOUS WORK**

##### **CW-4.2.1 CLEARING AND GRUBBING**

The Contractor shall perform clearing and grubbing on the project site. The site shall be cleared and grubbed of all trees and brush except particular trees, which may be retained by the NPC for preservation. Particular trees to be left in place shall be protected from scarring and/or other injuries during clearing and grubbing work and other construction operations.

All stumps, roots and brush shall be removed to a depth of thirty (30) cm below original ground surface and disposed of in a place designated by the NPC. Downed timber, which may be ordered saved by the NPC for future use, shall be cut into logs as directed and neatly piled in a place designated by the NPC, otherwise they shall be disposed of same as above.

**CW-4.2 MISCELLANEOUS WORK**

Where shown on the drawings or if not shown but directed by the NPC, the Contractor shall perform miscellaneous work like demolition, removal, chipping, replacement or transfer of existing structures and other miscellaneous work. All demolished structures shall be disposed of as directed by NPC.

**CW-4.3 GRADING****CW-4.3.1 GENERAL**

The word "grading" as defined herein means bringing to required grades all areas in accordance with the lines, slopes, elevations and grades shown on the drawings or as directed by the NPC.

**CW-4.3.2 CLASSIFICATION OF MATERIALS**

All materials in grading work shall be unclassified regardless of the nature of materials encountered during grading excavation and of materials used in grading fill. It is on the basis of unclassified material that Contractor shall determine his unit bid price for grading excavation and grading fill.

**CW-4.3.3 STRIPPING**

Fill areas to be brought to grade shall first be stripped of their top soil as directed but in no case less than twenty (20) centimeters in depth and disposed of properly in spoil areas designated by the NPC. Only materials from grading excavation and intended to be used for filling or backfilling purposes shall be stripped of top soil in the same manner as above.

**CW-4.3.4 EXCAVATION AND FILL**

Areas required to be brought to grade shall be excavated or filled as the case may be. Grading work shall be carried out in such a manner that the free drainage is maintained at all times and nowhere shall pondage be found in any part of the work.

The NPC may require the modification of slopes and grades according to the conditions actually encountered during excavation, but such change or modification shall not be construed to mean by the Contractor as a basis for additional compensation over and above the contract unit prices.

Any over-excavation performed by the Contractor for any purpose or reason, except as may be ordered by the NPC, shall be at the Contractor's expense and any excess of excavation shall be refilled, where required, with approved materials that shall be furnished, placed and properly compacted at the expense of the Contractor.

Unsuitable materials, as determined by the NPC, which may be encountered below established grade, shall be removed to a depth as directed and accordingly replaced with suitable materials approved by the

NPC. The removal and proper disposal of such unsuitable materials shall be paid for at the contract unit price for the item, Grading Excavation, and payment for placing and compacting suitable material be made at the contract unit price for the item, Grading Fill, in the Bill of Quantities.

Fill work shall not be started until the area has been inspected and approved by the NPC after stripping. Grading fill shall be spread and compacted in layers of 15 cm. loose volume and compacted with approved roller weighing not less than 10 tons. Each layer shall be moistened or dried as directed for maximum compaction. No succeeding layer shall be placed thereon unless the preceding layer has been tested for compaction and approved by the NPC.

In the event that construction of concrete footing or other concrete foundations is on fill, the fill shall be compacted efficiently and thoroughly so that when the fill is tested for compaction at the required foundation elevation for the structure, the required bearing capacity is attained but in no case less than 144kpa. In no case shall filling and compaction work to be done without the presence of NPC's inspectors. The Contractor shall be held liable for any structural instability or damage that might result in consequence to non-compliance of this requirement. The Contractor shall institute corrective measures to bring the foundation base to a condition or state that will conform to the required bearing capacity; and also to repair and make good any damage on the structure to the satisfaction and at no cost to NPC.

#### **CW-4.3.5 SLIDES**

In the event that slides occur along excavated slopes during grading operations or after completion of grading but prior to acceptance of the work, the Contractor shall removed and dispose the slide materials and also to trim the slopes as directed to leave the slopes in a safe and neat condition all at no additional cost to NPC, unless occurrence of such slides is occasioned by causes beyond control of the Contractor. In such event, payment for the satisfactory removal and proper disposal of slide material and finishing and rounding of slopes will be paid for at the equivalent of thirty percent (30%) of the contract unit price per cubic meter for the item Grading Excavation.

#### **CW-4.3.6 SLIP-OUTS**

In the event of slip-outs in any part of the grading fill prior to final acceptance of the work, the Contractor shall rebuild such portion of the fill. In the case it is determined that the slip-outs was caused through the fault of the Contractor, the rebuilding of the fill shall be performed by the Contractor at no extra cost to NPC; otherwise, the reconstruction of the fill will be paid for thirty percent (30%) of the contract unit for the item, Grading Fill.

#### **CW-4.4 DISPOSAL**

All excess materials from grading work (including excess materials in structural excavation and miscellaneous work) shall be disposed of the by the Contractor. The acquisition of the right-of-way for the area of disposal including the access thereto, permits, and other requirements,

shall be the responsibility of the Contractor at no cost to NPC. The Contractor shall be held solely liable for any claim by third parties that may arise from improper transport and disposal of excess materials. The cost of acquisition of the above-mentioned right-of-way shall be included in the unit bid price for excavation.

#### **CW-4.5 SOURCES OF FILL MATERIALS**

When suitable materials from grading excavation are deficient to meet the quantity required for grading fill, additional fill materials shall be obtained from other sources proposed by the Contractor and approved by the NPC. Cost of excavating, hauling, placing and compacting additional materials from borrow sources shall be included in the unit price bid for the item, Grading Fill. Acquisition of right-of-way to these sources shall be the responsibility and account of the Contractor.

#### **CW-4.6 ENVIRONMENTAL REQUIREMENTS**

All construction activities to be performed by the Contractor shall be in accordance with the restrictions stated in the approved Environmental Clearance Certificate (ECC) and the conditions set forth in Clause 3.0 – Environmental Requirements for Civil Works.

#### **CW-4.7 MEASUREMENT AND PAYMENT**

##### **CW-4.7.1 CLEARING AND GRUBBING**

Unless otherwise specified in the bill of quantities, no separate measurement and payment will be made for Clearing and Grubbing. Corresponding cost hereof shall be included in the unit bid price of relevant item(s) in the bill of quantities.

##### **CW-4.7.2 MISCELLANEOUS WORKS**

Measurement for payment for miscellaneous work such as demolition, restoration, etc., shall be made on a lot basis unless otherwise specified in the bill of quantities. Payment will be made at the contract unit price for the item Miscellaneous Works, which payment shall cover all cost for furnishing labor, equipment and incidentals necessary for demolition and restoration, disposal, and other related works required to complete the item.

##### **CW-4.7.3 STRIPPING**

Unless otherwise specified in the bill of quantities, no separate measurement and payment will be made for Stripping. Corresponding cost hereof shall be included in the unit bid price of relevant item(s) in the bill of quantities.

##### **CW-4.7.4 GRADING EXCAVATION**

Measurement for payment for Grading Excavation shall be based on the number of cubic meters excavated and properly disposed. Volume shall be computed by the average end area method which shall be the volume

between the original ground (as determined by survey to be made by representatives of both NPC and the Contractor) and graded surface on the drawings or as established by NPC. To this volume shall be added, for purpose of payment, all authorized excavations below grade.

Payment will be made at the contract unit price for the item Grading Excavation in the Bill of Quantities, which payment shall constitute full compensation for furnishing of all labor, construction equipment and incidentals necessary excavate, dispose and other related work required to complete the work item.

#### **CW-4.7.5 GRADING FILL**

Measurement for payment for Grading Fill shall be based on the number of cubic meters of the materials placed, graded, compacted and accepted. Volume shall be computed by the average end area method which shall be the volume between the ground surface after stripping and the finished grade surfaces on the drawings or as established by NPC.

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

#### **CW-5.0 STRUCTURAL EXCAVATION, FILL AND BACKFILL**

##### **CW-5.1 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-5.2 MATERIALS**

##### **CW-5.2.1 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-5.2.2 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:

<b>Sieve Designation (Square Mesh Sieves)</b>	<b>Percentage by Weight Passing</b>
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-5.2.3 SPECIAL FOUNDATION, IF ANY**

The NPC shall have the option to use one or both of the following materials for special foundations, whether or not shown on the drawings:

a. Lean Concrete

The strength of lean concrete shall be 13.79MPa or as designated by the NPC.

b. Selected Materials

Selected materials shall consist of compactable material which, when compacted, shall attain the required bearing capacity. The material could be a combination of earth and rock particles not greater than 8 cm including sandy clay, gravelly clay, or shale, all approved by the NPC.

Bed materials for water pipes and/or drainage culverts shall use sand fills,

**CW-5.2.4 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-5.3 CONSTRUCTION****CW-5.3.1 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.

**c. Drainage and Sewerage Pipes and Cable Trench**

The width of trench excavation for drainage and sewerage pipes and cable trench shall be as indicated on the drawings. All trench bottoms shall be excavated to the foundation grade indicated, regardless of the foundation material classification.

**d. Water Supply Pipes**

Trenches for main or feeder lines shall be excavated to the depth of no less than 0.25 meter on open ground and 0.60 meter under roadways and parking areas, both depths measured from the finished grade surface.

Service pipes shall be buried to a depth of at least 0.15 meter below grade line.

**CW-5.3.2 STRUCTURAL FOUNDATION FILL**

No fill materials shall be placed in any part of the fill foundation unless the foundations have been inspected and approved by the NPC. Fill materials shall be placed and spread in layer covering the entire length and breadth of the section under construction, each layer not to exceed 15 cm. in loose volume thickness and compacted thoroughly to the desired compaction as determined by the NPC. No succeeding layer shall be placed until the previous layer has been tested and approved, as to compaction, by the NPC.

**CW-5.3.3 SPECIAL FOUNDATIONS**

If unsuitable material is encountered or if the foundation material is unsuitable such that the required bearing capacity of the foundation cannot be attained at the required elevation, further excavation shall be performed by the Contractor as stated in CW-5.3.1b.

Excavated materials below foundation grade shall be replaced at the direction of the NPC, either by lean concrete or by selected materials as mentioned in CW-5.2.3.

Selected materials shall be placed in 15-cm layers and compacted until the required bearing capacity is attained.

**CW-5.3.4 BACKFILL****1. Structures, Other Than Pipes**

Excavated areas around structures for backfilling shall be backfilled with approved materials in horizontal layers, each not exceeding 15cm. (6") in loose volume thickness. Each layer shall either be moistened or dried as directed and thoroughly tamped with tampers having no less than 160 cm<sup>2</sup> of tamping area and weighing not less than 20 kg. The last layer shall be neatly brought up to the level of the adjoining finished grade surface.

In no case shall backfill be placed around concrete structures until after fourteen (14) days from placement of the concrete.

**2. Drainage and Sewerage Pipes**

After the pipes have been installed and grouted joints sufficiently cured, but in no case less than seven (7) days allowed for curing as specified in NSCP and the whole pipeline inspected, backfill materials specified

herein shall be placed in layers as directed, each layer either dried or moistened as directed and thoroughly tamped. The backfill shall be brought up evenly on both sides of the pipe up to the top of the pipe and finally up to the finished grade surface.

### 3. Water Supply Pipes

After the pipeline has been installed and tested it shall be backfilled in layers as directed and compacted to the satisfaction of the NPC.

## **CW-5.4 MEASUREMENT AND PAYMENT**

### **CW-5.4.1 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-5.4.2 STRUCTURAL FOUNDATION FILL**

Measurement for payment for Structural Foundation 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-5.4.3 SPECIAL FOUNDATIONS**

Measurement for payment for lean concrete and/or selected materials placed within the pay lines for excavation will be based on the number of cubic meters in-place and accepted.

Payment will be made at the contract unit price for the corresponding item shown in the Bill of Quantities, which payment shall cover all costs for furnishing all labor, materials, equipment and tools necessary to complete the item.

### **CW-5.4.4 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-5.4.5 TRENCH EXCAVATION AND BACKFILL FOR SEWERAGE, DRAINAGE AND WATER SUPPLY PIPES AND CABLE TRENCH**

No separate measurement and payment will be made for trench excavation and backfill for all sewerage, drainage and water supply pipes. Payment for trench excavation and backfill for pipes shall be included in the payment pertaining to pipes as shown in the Bill of Quantities.

**CW-6.0 CONCRETE**

**CW-6.1 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-6.2 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-6.3 MATERIALS**

**CW-6.3.1 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 (ASTM C150).

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 and Type II for concrete in contact with soil or ground water.

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-6.3.2 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-6.3.3 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-6.3.4 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-6.4 STORAGE OF MATERIALS****CW-6.4.1 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-6.4.2 REINFORCING STEEL**

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

**CW-6.5 CONCRETING****CW-6.5.1 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-6.5.2 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-6.5.3 MIXING CONCRETE**

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

**CW-6.5.4 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-6.5.5 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-6.5.6 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.

**CW-6.5.7 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-6.5.8 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.

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.

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.

#### **CW-6.5.9 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-6.5.10 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-6.6 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.

#### **CW-7.0 REINFORCING STEEL**

##### **CW-7.1 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-7.2 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-7.2.1 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-7.2.2 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-7.3 CONSTRUCTION REQUIREMENT****CW-7.3.1 ORDER LIST FOR BENT BARS**

Before materials are ordered, the Contractor shall furnish all order lists and bending diagrams for the approval of the NPC. The approval of order lists and bending diagrams by the NPC shall in no way relieve the Contractor of responsibility for the correctness of such lists and such lists and diagrams. Any expenses incident to the revisions of materials furnished in accordance with such lists and diagrams to make them comply with the drawings shall be borne by the Contractor.

Shop Drawings for Reinforcing Steel (ACI 315): Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions and details of bar reinforcing, accessories and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing steel.

**CW-7.3.2 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 $\Phi$ to 20mm $\Phi$ inclusive	D=6d
Bars 25mm $\Phi$ and 28mm $\Phi$	D=8d
Bars 32mm $\Phi$ 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-7.3.3 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-7.3.4 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-7.3.5 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-7.4 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-8.0 STRUCTURAL STEEL**

### **CW-8.1 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-8.1.1 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-8.1.2 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-8.2 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-8.2.1 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-8.2.2 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-8.2.3 ACCESSORIES:**

Welding electrodes and steel structural members shall use:

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

**CW-8.3 EXECUTION****CW-8.3.1 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-8.3.2 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-8.3.3 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-8.3.4 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-8.3.5 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 Testing<sup>1</sup>: 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

<sup>1</sup> Not applicable on non-critical structures/joints and as directed/required by NPC Design Engineer.

areas inaccessible to either radiographic or ultrasonic testing. Retest defective areas after repair.

#### **CW-8.4 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.

#### **CW-9.0 REINFORCED CONCRETE FOUNDATION AND ASSOCIATED STRUCTURES FOR EQUIPMENT AND OTHER COMPONENT (DESIGNED/CONSTRUCTED BY CONTRACTOR)**

##### **CW-9.1 Scope**

In accordance with the specification contained in this section, the Contractor shall design and furnish all materials, labor, equipment and tools to construct all reinforced concreting and relevant works based on the approved drawings or as directed by NPC.

##### **CW-9.2 Design and Construction**

The design and construction of reinforced concrete foundations and other elements for equipment and related component to be furnished by the Contractor shall be the responsibility of the Contractor. Reinforced concrete foundations shall be designed based on the actual weights, dimensions and relevant design parameters of the equipment and structures subject to NPC's evaluation and approval. No foundation and structural elements shall be constructed unless its design is duly approved in writing by NPC.

The minimum design parameters to be considered by the Contractor are as follows:

1. Compressive strength of concrete shall be 20.7 MPa at 28 days
2. Reinforcing steel shall conform to Philippine National Standards grade DSB 275
3. Compacted sand and gravel bedding shall be 150 mm thick
4. Soil bearing capacity shall be subject to the Contractor's determination and verification at the site
5. Wind velocity: 270 kph
6. Concrete pad or pedestal shall extend 150 mm beyond the equipment skid/base on all sides or at least 50 mm beyond the base plate of equipment supports
7. Top of foundations/pedestals shall be 300 mm above the finished ground elevation
8. Anchor bolt materials shall be A325 with nuts and washers. Sizes and number of anchor bolts shall be designed to safely withstand all forces acting on the equipment/structures Anchor bolts and

other embedded items shall be properly and securely installed prior to the placing/pouring of concrete.

All works and materials shall be constructed, installed and/or erected to conform with the relevant sections of this Specifications and in accordance with the generally accepted engineering techniques and methodologies.

### **CW-9.3 Measurement and Payment**

Unless otherwise indicated in the Bill of Quantities, no separate measurement and payment will be made for the design and construction of reinforced concrete foundation and/or other structural elements of the equipment and their related components. The entire cost of furnishing of all materials, labor, equipment and tools for the entire works shall be included in the supply and installation of associated mechanical and/or electrical equipment/works where they are required.

## **CW-10.0 DRAINAGE SYSTEM AND APPURTENANT STRUCTURES**

### **CW-10.1 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 canals 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, septic tank, drainage outlets, etc. as well as joints and connections as may be required to complete the system.

### **CW-10.2 Materials**

#### **CW-10.2.1 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-10.2.2 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-10.2.3 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-10.2.4 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-6.0 – Concrete. Foundation base material for concrete canal shall be sand and gravel as described in Section CW-5.0.

#### **CW-10.2.5 Bedding Material**

##### **A. For Stable Soil and Rock Foundation**

Bedding material for sewerage and drainage pipes in stable soil and rock foundation, as determined by NPC, shall consist of sand or natural sandy soil in which all the materials passes 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 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-10.3 Construction**

##### **CW-10.3.1 Trench Excavation and Backfill**

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

##### **CW-10.3.2 Concrete Canal**

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

**CW-10.3.3 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-10.4 Pipe Installation****CW-10.4.1 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 given. Succeeding pipe shall be jointed 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 Contractor at his expense.

**CW-10.4.2 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. 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 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-10.5 Measurement and Payment****CW-10.5.1 Concrete Rectangular Ditch**

Measurement for payment for 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 Bill of Quantities. 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-10.5.2 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 Bill of Quantities. 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-10.5.3 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 Contractor will be paid at the contract unit price for the pertinent item for each appurtenant structure shown in the Bill of Quantities. 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-10.5.4 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 Bill of Quantities, which payment shall constitute full compensation for furnishing all labor, materials, equipment and tools necessary to complete the items.

**CW-11.0 PERIMETER AND SECLUSION FENCE(S)****CW-11.1 SCOPE**

In accordance with the specifications contained herein, the Contractor shall furnish all labor, materials, equipment and tools for the construction of perimeter and seclusion fences, including the fabrication and installation of vehicular and pedestrian gates, to the length or extent shown on the drawing or as established in the field.

**CW-11.2 MATERIALS****CW-11.2.1 CEMENT AND REINFORCING STEEL**

Cement and reinforcing steel shall conform to the requirements set forth in CW-6.0 – Concrete. Class of concrete shall be 20.7 MPa or as shown on the drawings.

**CW-11.2.2 CONCRETE HOLLOW BLOCKS (CHB)**

Concrete hollow blocks shall be 150 mm x 200 mm x 400 mm (6"x 8"x 16") non-load bearing with a compressive strength of 3.10MPa. CHB units shall be free of chips, splits or other defects, which in the opinion of the NPC, might impair their strength and durability. At the option of the NPC, CHB units delivered to the site shall be tested to check on their specified strength. One specimen taken at random representing 500 units shall be tested. Sampling shall be done by the NPC. The group represented by a specimen that fails the compression test shall not be used in the work.

**CW-11.2.3 FINE AND COARSE AGGREGATES AND WATER**

Fine and coarse aggregates and water shall conform to the requirements stated in CW-6.0 – Concrete.

**CW-11.2.4 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.

**CW-11.2.5 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.

**CW-11.3 CONSTRUCTION****CW-11.3.1 GENERAL**

Excavation, backfilling and concreting work shall be in accordance with the applicable provisions of CW-5.0 – Structural Excavation, Fill and Backfill, CW-6.0 – Concrete and CW-7.0 – Reinforcing Steel and as prescribed hereunder.

**CW-11.3.2 CHB CONSTRUCTION****a) Laying**

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 it is laid. Any horizontal and vertical CHB wall reinforcements shall be anchored to concrete works by means of 10 mm (3/8") round by 609 mm (24") long dowels. Embedding of anchor bolts, expansion shields, conduits, etc. shall be done as the erection progresses.

**b) Cutting and Patching**

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

**c) Finishing**

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

**d) Mortar Proportions**

Cement mortar for laying concrete hollow blocks shall consist of one (1) part Portland cement, one-fourth (1/4) part lime and three (3) part sand. Only sufficient water to make a workable mix will be permitted.

Masonry grout for filling cells of concrete hollow blocks shall consist of one (1) Portland cement, one-fourth (1/4) part lime, three (3) parts sand to which three (3) parts 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 less than two minutes.

**e) Reinforcement**

All horizontal reinforcement shall be tied to vertical reinforcement.

**CW-11.3.3 VEHICULAR/PEDESTRIAN GATES**

Fabrication and installation of vehicular and pedestrian gates shall conform to the requirements of the drawings or as directed by the NPC.

**Welding Works**

All welding work shall conform to the Specifications for Welded Highway and Railway Bridges of the American Welding Society (AWS).

Galvanized surfaces to be painted, in addition to being cleaned with mineral spirits or other solvents, will require surface treatment to which paint will adhere. The galvanized surfaces, therefore, shall be coated with a solution of 7.5 grams of copper sulfate to a liter of water, allowing the coating to remain on the surface of at least twelve (12) hours, and dusting off with stiff brushes.

Surfaces to be painted shall be clean, dry, smooth and free from dust, rust, grease or oil. Sufficient time shall be allowed between coats of paints to insure complete drying but in no case less than 24 hours. No painting shall take place during the presence of rain, fog, dew or where the surfaces may otherwise be damp. All work shall be done in a workmanlike manner, leaving finished surfaces free from runs and sags.

**CW-11.3.4 CYCLONE AND BARBED WIRES**

Fabrication and installation of the heavy galvanized cyclone wire seclusion fence and gate, including barbed and razor (line, single coil or cross coil) wires, shall be in accordance with the drawings or as directed by the NPC.

**CW-11.4 MEASUREMENT AND PAYMENT****CW-11.4.1 PERIMETER FENCE**

Measurement for payment for perimeter fence will be based on the number of linear meters of fence constructed and accepted or as indicated in the Bill of Quantities.

**CW-11.4.3 CYCLONE AND BARBED WIRE FENCE(S)**

Measurement for payment for cyclone and/or barbed wire fences will be based on the length of fence in linear meters furnished, installed and accepted including wire anchorage as indicated in the Bill of Quantities.

**CW-11.4.4 VEHICULAR/PEDESTRIAN GATE**

Unless otherwise indicated in the Bill of Quantities, no separate measurement and payment will be made for the fabrication and installation of vehicular and/or pedestrian gates. All costs hereof shall be included in the payment for perimeter or seclusion fences, as applicable, or as indicated in the Bill of Quantities.

**CW-12.0 STEEL POLE WITH CROSS-ARMS AND BRACES****CW-12.1 Description**

This specification covers the technical and associated requirements for the supply and erection of steel pole complete with cross arms and braces.

**CW-12.2 Pole Requirements**

The poles shall be manufactured and supplied with the required holes, rigging accessories, insulator attachment plates, lugs for bolted steps, guying attachments, ground clamps complete with bolts, nuts, washers and miscellaneous fittings, whenever necessary, and shall have the following properties of steel poles:

Description	40' (12.20 m)	35' (10.65 m)	30' (9.15 m)	25' (7.62 m)
Steel Material	ASTM A572	ASTM A572	ASTM A572	ASTM A572
Tip Diameter	200 mm	200 mm	200 mm	150 mm
Butt Diameter	320 mm	300 mm	260 mm	240 mm
Thickness	4 mm	4 mm	4 mm	4 mm
Shape	Octagonal	Octagonal	Octagonal	Octagonal
Minimum Yield Strength	345 MPa	345 MPa	345 MPa	345 MPa

The tip and butt shall be covered with plate similar to body thickness.

Cross arm and brace members, if required in the Bid Drawings, shall be of the same material as pole body and shall conform to NPC's general arrangement drawings. The strength of the attachment of cross arms to the body shall be sufficient to develop the full capability of the cross arm.

Hole location and diameters for steel poles and cross-arms/braces shall be referred to EEICD drawings.

All structural steel, bolts, nuts and washers shall be hot-dip galvanized after fabrication in accordance with ASTM A123 with minimum zinc thickness of 85 microns. Exposed welds shall be mechanically cleaned.

**CW-12.3 Pole Erection**

The Contractor shall use standard and accepted practice and method of erecting the poles depending on their location. The Contractor shall excavate holes for poles setting to a depth indicated below:

Length of Poles		Depth of Pole Setting			
		In Earth		In Rock	
Meter	Feet	Meter	Feet	Meter	Feet
12.20	40	1.80	5.9	1.22	4.0
10.67	35	1.65	5.4	1.22	4.0
9.15	30	1.52	5.0	1.22	4.0
7.62	25	1.40	4.6	1.22	4.0

All holes shall be dug in the correct locations and shall be large enough to provide for the use of tamping bars all around the poles to the full depth of the holes.

All poles shall be set truly vertical and exact in alignment. After the poles have been set and aligned properly, the holes shall be backfilled with materials consisting of 20% sand AND 80% gravel. The gravel and sand material shall be filled around the holes and compacted thoroughly at 30 cm (12 inches) layer by tamping tools before placing the next 30 cm layer of gravel and sand, until the backfill material reaches the ground surface level. Materials from the excavated holes shall be placed and tamped around the poles to a height of 30 cm. (12 inches) above ground line and shall be spread sloping radially outward until it intersects with the ground surface.

The cross-arms and hardware shall be assembled and installed properly in accordance with the drawings. All nuts and locknuts shall be adequately tightened.

Braces such as flat and x-braces, shall be attached where required. The braces shall be attached by the Contractor in accordance with the drawings. All nuts shall be tightened adequately.

#### **CW-12.4 Measurement and Payment**

Measurement for payment for steel pole shall be based on the total quantity of steel pole supplied, erected and accepted by NPC.

Measurement for payment for cross-arms and braces shall be on lot basis of cross-arms and braces supplied, installed to the respective poles and accepted by NPC.

Payment will be made at the contract unit price for the items, Steel Pole and; Steel Cross-arms and Braces in the Bill of Quantities, which payment shall constitute full compensation for furnishing of all materials, labor and hardware and accessories necessary to complete the items.

## SECTION III

# TECHNICAL SPECIFICATIONS (ELECTRICAL WORKS)



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## SECTION EW - ELECTRICAL WORKS

### EW-1.0 GENERAL

This section covers the technical and associated requirements for the Construction of Power Facilities for the Four (4) Units Modular Diesel Generating Sets Including Hauling, Installation, and assistance to NPC during the conduct of Test and Commissioning of Balance of Plant in Calutcot, Burdeos Quezon and Butawan, Siruma, Camarines Sur.

It is not NPC's intent to specify all technical requirements nor to set forth those requirements adequately covered by applicable codes and standards. The Contractor shall furnish high quality diesel generating set and its associated electrical equipment meeting the requirements of this specification and industry standards.

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 workmanlike 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 for each project site which shall essentially consist of all electrical equipment and materials enumerated herein:

#### CALUTCOT DIESEL POWERPLANT

1. Hauling, Installation and assistance to NPC during the conduct of Test and Commissioning of 2 x 50 kW, 480V, 3-phase, 60Hz AC Generator and associated auxiliary electrical equipment including grounding materials;
2. Hauling, Installation and assistance to NPC during the conduct of Test and Commissioning of Generator Control and Protection Panel (GCPP) for 2 x 50 kW D/G sets equipped with monitoring, metering, control, protection and synchronizing equipment/devices;
3. Supply of One (1) Spare Circuit Breaker for 50 kW D/G set;
4. Hauling, Installation and assistance to NPC during the conduct of Test and Commissioning of 2 x 75 kVA, 480V/13.8kV, 3-Phase, 60Hz Generator Transformer;
5. Hauling, Installation and assistance to NPC during the conduct of Test and Commissioning of 15 kVA, 7.97kV/240V, 1-Phase, 60 Hz Station Service Transformer;

## TERMS OF REFERENCE

CONSTRUCTION OF POWER FACILITIES FOR THE FOUR  
(4) UNITS MODULAR DIESEL GENERATING SETS  
INCLUDING HAULING, INSTALLATION, TEST AND  
COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT,  
BURDEOS QUEZON AND BUTAWANAN, SIRUMA,  
CAMARINES SUR

### SECTION III – TECHNICAL SPECIFICATIONS

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6. Supply, Installation and Test of 800A, 60 Hz, 15kV, 12kA, Automatic Circuit Recloser;
7. Supply, Installation and Test of 15 kV Fuse Disconnect Switches with Lightning Arrester Combination;
8. Supply, Installation and Test of Kilowatt-hour Demand Meter and associated Instrument Transformers and Accessories;
9. Supply, Installation and Test of Bus Conductor and Line Materials and Hardware;
10. Supply, Laying and Test of Power, Control and Instrumentation Cables including ground conductors and other appurtenances required for the interfacing of supplied equipment;
11. Supply, Installation and Test of Grounding System;
12. Supply, Installation and Test of Lightning Protection System;
13. Supply, Installation and Test of Lighting & Power System and its Accessories;
14. Supply and Installation of Conduit System;
15. Supply and Delivery of Special Tools;
16. Supply, Delivery and Test of two (2) sets of Job Site Cameras to be installed before the start of construction and/or installation of equipment; and
17. All other works and services including those not specifically detailed herein but are required to fully complete the project.

### BUTAWANAN DIESEL POWERPLANT

1. Hauling, Installation and assistance to NPC during the conduct of **Test and Commissioning** of 1 x 30 kW & 1 x 50 kW , 480V, 3-phase, 60Hz AC Generator and associated auxiliary electrical equipment including grounding materials;
2. Hauling, Installation and assistance to NPC during the conduct of **Test and Commissioning** of Generator Control and Protection Panel (GCPP) for 1 x 30 kW & 1 x 50 kW D/G sets equipped with monitoring, metering, control, protection and synchronizing equipment/devices;
3. Supply of One (1) Spare Circuit Breaker for each D/G set rating;
4. Hauling, Installation and assistance to NPC during the conduct of **Test and Commissioning** of 1 x 37.5 kVA & 1 x 75 kVA, 480V/13.8kV, 3-Phase, 60Hz Generator Transformer;
5. Hauling, Installation and assistance to NPC during the conduct of **Test and Commissioning** of 15 kVA, 7.97kV/240V, 1-Phase, 60 Hz Station Service Transformer;

## TERMS OF REFERENCE

CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BURDEOS QUEZON AND BUTAWANAN, SIRUMA, CAMARINES SUR

### SECTION III – TECHNICAL SPECIFICATIONS

LuzP22Z1457Sc

6. Supply, Installation and Test of 800A, 60 Hz, 15kV, 12kA, Automatic Circuit Recloser;
7. Supply, Installation and Test of 15 kV Fuse Disconnect Switches with Lightning Arrester Combination;
8. Supply, Installation and Test of Kilowatt-hour Demand Meter and associated Instrument Transformers and Accessories;
9. Supply, Installation and Test of Bus Conductor and Line Materials and Hardware;
10. Supply, Laying and Test of Power, Control and Instrumentation Cables including ground conductors and other appurtenances required for the interfacing of supplied equipment;
11. Supply, Installation and Test of Grounding System;
12. Supply, Installation and Test of Lightning Protection System;
13. Supply, Installation and Test of Lighting & Power System and its Accessories;
14. Supply and Installation of Conduit System;
15. Supply and Delivery of Special Tools;
16. Supply, Delivery and Test of two (2) sets of Job Site Cameras to be installed before the start of construction and/or installation of equipment; and
17. 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 highly qualified and competent engineers for the direct supervision during the installation test and commissioning of supplied equipment (applies only for the equipment supplied by contractor).
2. Submission of drawings and documents i.e., Equipment Manufacturer's drawings, Operation and Maintenance Manuals, etc. (applies only for the equipment supplied by contractor).
3. Conduct 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 equipment has 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.

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 Specification but are necessary for the complete and proper operation of the diesel generator shall be furnished by the Contractor at no additional cost to NPC.

### EW-3.0 CODES AND STANDARD

The equipment furnished shall be in accordance with, but not limited to, the latest issues of the following codes and standards, including all addenda, in effect at time of purchase order unless otherwise stated in this specification:

ANSI/IEEE	American National Standards Institute and/or Institute of Electrical & Electronic Engineers
C37.60	Requirements for Overhead, Pad-mounted, Dry Vault and Submersible Automatic Circuit Reclosers and Fault Interrupters for AC Systems
C57.12.20	Standard for Overhead-Type Distribution Transformer 500kVA and Smaller; High Voltage 34500V and Below; Low Voltage, 7970/13800Y V and below
NEMA	National Electrical Manufacturers Association
MG 1	Standard for Motors and Generators
WC-5	Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
AB 1	Molded Case Circuit Breaker
ICS2	Industrial Controls and Systems: Controllers, Contactors and Overload Relays rated 600Volts
ICS	General Standards for Industrial Control and Systems
MG-1	Motors and Generators
MG-2	Safety Standard for Construction & Guide for Selection, Installation and Use of Electric Motors and Generators
UL	Underwriters Laboratories, Inc. (all parts apply)
44	Rubber-Insulated Wires and Cables
83	Thermoplastic Insulated Wires and Cables
508A	Industrial Control Equipment
1063	Machine Tool Wire (MTW) for Stranded Conductor Only
IEC	International Electro-Technical Commission
60255	Electrical Relays
60044	Instrument Transformer
60071	Insulation Coordination

60076	Power Transformers, Parts 1-5
60060	High Voltage Test Technique
62271	High Voltage Switchgear and Control Gear
60502	Power cables with extruded insulation and their accessories for rated voltages
60694	Common Specification for High Voltage Switchgear and Control Gear Standards
NFPA	National Fire Protection Association
272	Standard Method of Test for Fire and Smoke Characteristics of Wires and Cables
ASTM	American Society for Testing and Materials
ISO	International Standards Organization
9001	Quality System Model for Quality Assurance in Design/Development, Manufacture and Testing
9002	Quality System Model for Quality Assurance in Production, Installation & Servicing
PEC	Philippine Electrical Code

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

In addition to the above codes and standards mentioned, the Contractor shall comply with all National and local laws, codes, regulations, statutes and ordinances.

Equipment or materials meeting other internationally accepted standards, which ensure an equal or higher quality than the standards mentioned, will also be accepted.

In the event of any apparent conflict among standards, codes or this specification, the Contractor shall refer the conflict to NPC for written resolution before start of fabrication. Final decision regarding the acceptance of proposed standards is the prerogative of NPC.

Standards listed in the equipment specification are used mainly for NPC's references. Other internationally known standards however, shall also apply, provided such standards are equivalent in all respect to the standard prescribed and to the specific requirements described in the individual equipment specification. The Contractor shall submit copies of such standards for NPC's review and approval.

#### EW-4.0

#### SWITCHYARD EQUIPMENT AND APPURTENANCES

The switchyard equipment and appurtenances shall be installed as shown on the bid drawing. The equipment shall be securely fastened (as applicable) to the structure to avoid movement during transient fault and manual operation.

The required clearance in between equipment during installation shall be observed. All equipment and materials not specifically mentioned herein but are necessary for proper erection, assembly and safe operation of the switchyard shall be identified and furnished by the Contractor at no additional cost to NPC.

#### **EW-4.1 Automatic Circuit Recloser**

##### **EW-4.1.1 General**

The Automatic Circuit Recloser shall have rated characteristics as specified in the Technical Data Sheets (Part II of the Technical Specification).

The Automatic Circuit Recloser shall be mechanically and electrically trip free. Any applied close signal, either mechanically or electrically, shall not inhibit the recloser from tripping on the programmed time-current curve.

A manual operating handle shall be provided including an indicator flag for contact position indication.

Close and trip capacitors shall be used to store the necessary energy for operating the recloser. Only the close capacitor energy shall be used for closing while both capacitors are available for opening. Trip energy shall be available following any electrical close.

##### **EW-4.1.2 Interrupting Medium**

The interrupting medium shall be vacuum type.

##### **EW-4.1.3 Insulation Medium**

Environmentally friendly cycloaliphatic epoxy or equivalent shall be used as dielectric medium. SF6 gas shall not be used.

##### **EW-4.1.4 Housing Materials**

The tank shall be manufactured from a hot-dipped galvanized steel, 316 stainless or cast aluminum. Control cubicles shall be manufactured from 316 stainless steel. All support structures and associated bolts and nuts shall be hot dipped galvanized.

##### **EW-4.1.5 Mounting**

The Automatic Circuit Recloser shall be suitable for single and double pole/H-frame mounting.

All recloser tanks are to be supplied with standard pole mounting brackets fixed to the rear of the tank. The bracket shall be designed to ensure that the recloser live parts have statutory clearances from the pole and the earthed metal equipment.

The brackets and tank wall are to be of adequate strength to limit distortion, when mounted. Both the top and bottom bracket shall be suitable to carry the total weight of the tank.

A detailed drawing of the Auto-recloser mounting arrangement shall be submitted together with the proposal. The minimum phase-to-earth clearance including clearance to the structure shall be indicated on the drawing.

#### **EW-4.1.6 Control Cabinet**

The control cabinet shall be designed for the service condition specified, and fitted with substantial door securing devices.

The control shall be housed in a weatherproof steel cabinet (IP 65) with a padlockable internally hinged door and shall include a thermostatically controlled heater.

The control cabinet shall be mounted below the tank and shall be connected by a minimum of 20m long multi-core control cable. The multi-core cable shall be ultra violet stabilized and adequately screened against electrostatic and electromagnetic interference, which can cause malfunctioning of the protection or control equipment. This cable shall connect into both the recloser and the control cabinet by means of plug and socket arrangement.

#### **EW-4.1.7 Earthing**

Earthing terminals shall be fitted to equipment. An earthing strap shall be provided between the lid and the tank.

#### **EW-4.1.8 Surge Arrester Bracket**

Surge arrester bracket shall be provided for the arrester mounting which will serve as the connection point for the arrester earth. The brackets shall have an unpainted corrosion resistant metal connecting zone which has the capability to conduct surge arrester current

#### **EW-4.1.9 Marking and Nameplates**

Phase identification marking shall be provided on each bushing of the Auto circuit recloser.

A nameplate shall be provided using a non-ferrous material or stainless steel, with the following information:

1. Manufacturer's Name
2. Serial No.
3. Rated Maximum Voltage
4. Rated Continuous Current
5. Rated Interrupting Current
6. Rated Impulse Withstand Voltage

**EW-4.1.10 Operating Mechanism**

A low voltage system supplied from a battery or voltage transformer may be used to operate a closing mechanism. Tripping energy shall be supplied from a spring mechanism automatically tensioned when the recloser is closed.

Internal batteries used to operate closing mechanism shall not dependent on recloser load current to maintain its state of charge.

The recloser shall incorporate provision to be manually operated using a standard operating stick in the event of failure in the electrical control system.

**EW-4.1.11 Bushing**

The HV bushing shall be of high-quality glazed porcelain, or cycloaliphatic epoxy resin having a creepage length as specified in the Technical Data Sheet.

The Contractor shall provide bird guards for insulation protection between the load side and line side bushings.

**EW-4.1.12 Current Transformer**

A sensing multi-ratio bushing current transformer for use with the recloser control and protection functions shall be an integral part of the recloser.

They shall be of class and ratio adequate to ensure they do not saturate under fault conditions up to the full rated interrupting current.

Current transformers shall be thermally rated to the recloser current rating regardless of the ratio selected.

**EW-4.1.13 Auxiliary Supply**

The operating power shall be supplied from an external 240 VAC. A 12Vdc battery with sufficient ampere hour shall be provided for back up control operation in the event of loss of primary supply. The battery shall be capable of operating the control for a minimum of 48 hours. If the primary supply has not been restored within the allowable discharge time of the battery, the control shall automatically shut down. The cable for the external auxiliary supply of approx. 20 m long shall be included in the contract.

**EW-4.1.14 Control Design Features**

The design of the control shall include the following:

- a. Relay Module
- b. CPU Module
- c. Power Supply Module
- d. Communication Interface Module
- e. Front Operating & Display Module
- f. Ethernet/USB/Wi-fi/Fiber Optic/RS 232 Communication Module

The panel includes an LCD that shall allow customizable display for viewing operational data of the control. The LCD shall include complete metering information including all current, voltage and power values along with trip values for all profiles. All modules should be replaceable on site without removing the recloser controller unit.

#### **Local Control and Indication**

The recloser shall be equipped with the following local operation features through push-buttons operation:

1. Trip (with no reclosing)
2. Close (Single Shot)
3. Auto reclose ON/OFF
4. Local remote operation
5. View trip Sequences and status information

#### **SCADA Operation and Indication**

The recloser is required to be controlled and operated using a remote compatible PC with phone modem and applicable software via DNP 3.0 communication protocol.

As a minimum requirement, the following controls and indications shall be provided to the Remote SCADA system using the above protocol:

#### **Control and Indication**

- a. Tripping and closing
- b. Enable and disable automatic sequences (reclosing)
- c. Enable and disable protection
- d. Change protection setting
- e. Reset fault flags and currents
- f. Read and display metering data including a summary page
- g. Read the operation counter
- h. Read the event recorder and display at least 5000 events in time sequence complete with feeder current at the time of the event
- i. Display a summary page which shows the number of fault trips since it was last reset
- j. Examine recloser/control system malfunction alarms
- k. Read all existing recloser settings
- l. Switch status (open/close) indications
- l. Trip sequences and status information i.e., Protective device and sequence which initiated the trip, date and time, Interrupted current, etc.
- m. Buzzer Alarm Trip, Open/Close and Trip Alarm Indications
- n. Hotline Tag should be configurable in the control panel for safety and protection of personnel during off-line maintenance work.

**EW-4.1.15 Sequence of Operation**

In the event of fault on the line controlled by the recloser, the recloser shall automatically open, and after a minimum dead time, it shall automatically reclose and remain closed should the fault along the line is cleared.

In case the fault persists, the recloser shall again disconnect the line being controlled. The recloser shall be capable of not less than three automatic reclose operations at rated short circuit current should the fault persist and then lock out in the open position until reset by hand or remote control.

If the fault is of a transient in nature, the equipment shall remain closed, and the operating mechanism shall automatically reset.

The number of operations to lockout shall be adjustable in any combination of instantaneous and time-delayed trips up to a minimum of four with a minimum dead time of 0.5 seconds for the first operations.

The Automatic Circuit Recloser shall be mechanically and electrically trip free. Any applied close signal, either mechanically or electrically, shall not inhibit the recloser from tripping on the programmed time-current curve.

Close and trip capacitors shall be used to store the necessary energy for operating the recloser. Only the close capacitor energy shall be used for closing while both capacitors are available for opening. Trip energy shall be available following any electrical close operation.

**EW-4.1.16 Protection**

The Automatic Circuit Recloser to be supplied shall be equipped with but not limited with the following protections:

1. Directional Overcurrent and Earth Fault Protection
2. Instantaneous and AC Time Overcurrent Protection
3. Under/Over Voltage
4. Under/Over Frequency
5. Harmonics Protection
6. Negative Phase Sequence Protection
7. Auto Change Over Protection

All and other protections specified in the Technical Data Sheets (TDS).

The controller shall include a sensitive ground/earth fault trip feature that will provide tripping of the recloser after a programmable, definite time for ground currents below normal ground minimum trip levels. The feature shall have a programmable operation to lockout and reclose intervals independent of the ground settings. This feature shall be independently selectable for each protection profile.

A sequence coordination feature shall be included to allow the control to step through selected operation in the operating sequence without tripping.

The control shall include a cold load pick up feature to prevent the control from tripping while energizing non fault system loads.

The Cold Load Pick up feature shall be able to be programmed IN or OUT of service.

#### **EW-4.1.17 Safety Features**

The control software shall have a programmable security code to limit access of control programming functions to authorized personnel.

#### **EW-4.1.18 Metering**

The control shall provide instantaneous and demand metering with programmable integration intervals for the following minimum functions:

1. Real, Reactive and Apparent Power for each phase and total
2. Power Factor for each phase and total
3. Voltage magnitude for each phase
4. Current Magnitude for each phase and neutral
5. Positive and Negative Sequence Voltages (magnitude and phase)
6. Positive, Negative and Zero Sequence Currents (magnitude and phase)
7. Power Quality Monitoring (TDD up 15th Harmonics, HDD Up to 15th Harmonics, Voltage Sags & Swells,)

#### **EW-4.1.19 Event Recorder/Histogram**

Event recorder shall be provided to record and store events in a non-volatile memory. The recorder shall include time and date of event and histogram features displays statistical information including tagged min/max values.

#### **EW-4.1.20 Spares**

The Contractor shall furnish a detailed list of required spares for two (2) years operations (if there's any) i.e., protection cards/boards, etc. with equivalent cost.

The list shall include relevant information on the availability and delivery of spare parts.

#### **EW-4.1.21 Other Technical Requirements**

##### **Operating and Configuration Editor Software Program**

Laptop and all software and configuration editor software program including licenses shall be supplied and included in the cost of the equipment in Section IV – Bill of Quantities of the Terms of Reference. A set of each type of software including licenses plus instruction manuals shall be provided by the Contractor.

All Recloser shall be properly configured, calibrated, and set at factory prior to delivery based on the desired initial pick up current trip setting requirement of each site at present and/or forecasted load data to be provided by SPUG.

#### **EW-4.1.22 Test and Inspection**

The Contractor shall provide a test specification covering all tests on the Contractor's premises, successful completion, as deemed by NPC, of Inspection and Tests on Contractor's premises shall be a prerequisite to shipment of all materials, equipment, software or system(s). following successful completion of inspection and tests on his premises, the Contractor shall obtain the approval to proceed with the delivery of the equipment, materials, software or system(s) from NPC in accordance with the Technical Specification for the equipment.

##### **Type Test**

The test to be performed shall be in accordance with the design test set out in Section 6 of ANSI/IEEE C37.60 and Section 5 of ANSI/IEEE C37.63. In addition, the electronic protection /control unit shall have been subject to the relevant impulse, and high frequency noise immunity tests specified in IEC 60255 or equivalent standard.

The recloser complete with control/protection component (including earths) as a composite unit shall have been tested for the rated impulse withstand level and for immunity against the effects of EMI and RFI.

##### **Routine Test**

Routine test shall be carried out and shall be in accordance with the production test set out in Section 7 of ANSI/IEEE C37.60.

#### **EW-4.1.23 Packaging and Marking**

##### **Packaging**

The reclosers shall be put in crate individually complete with components i.e. control cubicle, cables, accessories, etc. The equipment must be securely fastened to prevent movement during transport and handling.

The crates must be sufficiently sturdy for another shipping/transportation to SPUG-Palawan various plant sites.

A copy of instruction, operation and maintenance manual for the equipment shall be provided in a weatherproof bag inside each crate.

##### **Marking**

The following shall be legibly and indelibly marked on two (2) sides of the crate:

- a. Manufacturer:
- b. Contract No./Schedule/Site Delivery
- c. Purchase Items Identification Number
- d. Description of Contents and Gross Mass
- e. Handling or Lifting Instructions

#### **EW-4.1.24 Data and Information to be Submitted After Award of Contract**

The following documents shall be submitted after award of contract for NPC's review and approval prior to procurement and installation of the supplied equipment and materials:

1. Brochure/Catalogues of the Automatic Circuit Recloser;
2. Manufacturer's Technical Data Sheets of the Automatic Circuit Recloser in accordance with EW-12.1;
3. Outline drawings of Automatic Circuit Recloser and accessories;
4. Schematic and Wiring Diagram;
5. Description and instructions manual covering the installation, operation and maintenance of the transformer and accessories;

The instruction manual to be provided shall include the following:

- A schematic diagram and component layout of all printed circuit boards
  - A detailed list of all component and parts including manufacturers part numbers
  - A detailed description of the circuit operation including block diagrams
  - A comprehensive trouble-shooting guide to assist in fault-finding
6. Duly signed Routine Test Results; and
  7. Field Test to be performed and Certified Test and Inspection Reports duly signed and witnessed by NPC representative.

#### **EW-4.2 Fuse Disconnect Switch with Lightning Arrester Combination**

This specification covers the supply and delivery of fuse disconnect switch with lightning arrester combination for use in various diesel power plants.

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-4.2.1 Technical Characteristics and Requirements**

The fuse disconnect switch to be supplied shall be suitable for high voltage transformer acting as an overload protector and a device for opening and closing load current. All the metal parts of the fuse disconnect switch shall be free from erosion and rust.

**Fuse Cut-Out**

Fuse cutouts shall be satisfactory use in a tropical climate with high relative humidity. The cutouts will be mounted by means of steel brackets on steel poles cross arms.

The cutouts 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 cutouts 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 with tin fuse element suitable for 15 kV open type distribution cut-out to be used in the overcurrent protection of circuits. It is characterized by perfect time current characteristics, high mechanical strength and reliable arc extinguishing performance, etc. 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 jacket, which shall have a high creep age distance and a high dielectric strength.

The primary terminals shall be suitable for the connection of the type and size of conductors specified in the Technical Data Sheets which can be either copper or aluminum conductors without use of bimetal inserts.

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 shall be provided with 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.

The Contractor shall submit for approval the brochures and/or catalogues with complete technical specification of the fuse cut out with lightning arrester combination including mounting brackets and accessories.

#### **EW-4.3 Kilowatt-Hour Demand 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-4.3.1 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-4.4 Bus Conductor and Hardware**

This specification covers the technical and associated requirements for stranded aluminum bus conductors and line hardware for use in various diesel power plant switchyards.

All line hardware/materials shall meet the performance requirements application criteria and manufacturing tolerances passed ANSI CB5. 1-1979 - America National Standard for Galvanized Steel Bolts and nuts for overhead line construction

#### **EW-4.4.1 Technical Characteristics and Requirements**

Describe herein is the general specification of the Bus conductor, line materials and equipment to be supplied for this project.

##### **Stranded Conductor**

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.

##### **Clamps**

Aluminum strain clamps and suspension clamps for aluminum conductor, if required in the Technical Data Sheets, shall have its clamp bodies and keeper pieces, made of high strength and heat treated cast aluminum alloy. Cotter bolts, U-bolts, nuts, and lock washers shall be hot dip galvanized steel. Cotter pins shall be made of stainless steel. Slip strength of the strain clamp shall be not less than 85% of the rated ultimate strength of the conductor.

##### **Cross Arms**

The cross arms to be supplied for this project shall be in accordance to ASCE manual 72 "Design of Steel Transmission Pole Structures". The materials shall meet ASTM A-570 specification (36 KSI min. steel strength) while the galvanizing shall be in accordance with ASTM A-123 specification.

**Insulators**

Insulators to be utilized in the project shall be in accordance to ANSI Class 55-3 for pin, Class 52-1 for suspension, Class 53-2 and Class 53-4 for spool standard as to material, ultimate tensile strength, leakage, distance, etc.

**Line Hardware**

Line hardware shall be made either of aluminum alloy, malleable iron or ductile iron with tensile strength in accordance with ANSI standard.

**Bolts**

All bolts such as carriage, double arming, oval, machine, etc. shall be hot dip galvanized as per ASTM A-153.

**EW-4.5 Maintenance Tools**

The following lineman's tools shall be provided by the Contractor for the maintenance in the switchyard area:

Item No.	Description	Qty.	Unit
1	Telescopic Hot Stick with Tip Lock Features, Material: Epoxy glass Minimum Length: 35 ft. No. of Sections: 8	1	set
2	Lineman's Rubber Gloves Size: 14" Maximum Usage: 17,000 Volts	2	pairs
3	Lineman's Belt Maximum Length: 42" Minimum Length: 34" D-to-D distance: 56 cm Center Hole: 38"	1	set
4	Positioning Strap, Nylon Maximum Length: 2.0m Minimum Length: 1.3m Adjustable Range: 0.7m	1	set
5	Heavy Duty Hard Hat with strap & NPC (Passed Safety Standard)	3	pcs

**EW-5.0 POWER, CONTROL AND INSTRUMENTATION CABLES**

This specification covers the technical and associated requirements of power, control and instrumentation cables, and medium voltage power cable for use in switchyards.

All cables shall be designed to withstand the short-circuit condition and voltage drop of 3% (max.).

**EW-5.1 Technical Characteristics and Requirements**

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.

**EW-5.1.1 Insulation**

Insulation shall be of the type specified in the Technical Data Sheets.

**EW-5.1.2 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.

**EW-5.1.3 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.

**EW-5.1.4 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-6.0 GROUNDING SYSTEM**

This specification covers the technical and associated requirements for the entire grounding system of the electric generating plants and/or switchyards, required to protect persons and equipment, to reduce electromagnetic interference (EMI) and to allow safe service and maintenance of the installations. The grounding system includes all major and minor equipment such as generator, transformer, generator control and protection panel, ground rods, motors, pumps, etc. and connections.

All materials and parts which are not specifically mentioned herein but are necessary for the safety of operating personnel and safe operation of the plant shall be furnished and determined by the Contractor at no additional cost to NPC.

**EW-6.1 Technical Characteristics and Design Requirements****EW-6.1.1 General**

The ruling criteria in the design of the grounding grid shall be the safety of personnel and the proper operation of the electrical equipment during normal operation and during transient disturbances such as short circuits in the electric power system and during lightning discharges.

The Contractor shall carry out earth resistivity measurement for the plant site. Based on the result of this measurement and the system parameter, the appropriate design and the calculation will be determined whether impermissible touch and step voltages occur at any place inside plant area and at any place 10 m. outside of the plant boundary line which may be endangered. These calculations will decide on the provisions for grounding to be made with the relevant part of the civil works related to foundations. If the calculations proved after the application of all engineering possibility that touch and step voltages are still higher than permitted and consequently the Contractor managed to design the earthing and grounding grid in such a way to obtain the lowest touch and step voltage value, all documents including limitation and justification shall be provided to the NPC for approval.

If in case the actual measured resistance of the Contractor-designed and installed ground grid is higher than specified in the Technical Data Sheets, the Contractor shall install, at no extra cost to the NPC, additional grounding rods, mats, grounding electrodes, etc., until the field-measured resistance is equal to or less than the specified value.

The ground grid shall be composed of a system of copper conductors buried approximately 60 cm. beneath the surface of the earth, excluding crushed rock surfacing. Driven ground rods shall be installed at regular intervals and connected to the grounding conductor at grid nodes. A minimum of four (4) of the specified ground rods must be installed (one at each corner of the ground grid). The Contractor shall determine the spacing of ground grid conductors and the total number and location of ground rods and their lengths (single or two or more coupled sections).

**EW-6.2 Equipment and Materials Requirements****EW-6.2.1 Grounding Cables**

Grounding cables shall be copper conductor of soft drawn or hard drawn concentric stranding bare copper conductor in accordance with the latest revision of ASTM B3 and manufactured in accordance with ASTM Specification B8 (class B). The copper conductor shall have the characteristics specified in the Technical Data Sheets.

**EW-6.2.2 Ground Rods**

The ground rod shall be copper-covered steel of circular cross section, with a nominal diameter of 19 mm and a nominal length of 3 meters.

Each ground rod shall have a conical swaged point at one end and shall have a continuous smooth copper covering of at least 0.254 mm thickness molten-welded or copper bonded (electro-deposit) to a steel core. The copper clad or pressed type will not be accepted

### **EW-6.2.3 Exothermic Welding Materials**

The Contractor shall supply exothermic welding materials for cable-to-cable, cable-to-ground rod and cable-to-steel structure grounding connections. The Contractor should submit detailed information describing the proposed process.

### **EW-6.2.4 Grounding Hardware**

#### **Terminal Lugs**

Terminal lugs shall be one hole, socket type, rounded edge lug, cast of high strength corrosion resistant copper alloy. Machine screws, nuts, and washers used with the lugs shall be bronze.

### **EW-6.2.5 Steel Structure Grounding**

All generating plant metal parts such as structures, equipment, cable trays, fence, etc. shall be connected to the ground grid by suitable ground connections.

If there is any possibility for a conductor to fall down on a steel structure, this structure must be connected to the grid with a connection able to sustain the earth fault current.

### **EW-6.2.6 Equipment Earthing**

#### **Transformer Earthing**

The transformer shall be earthed at two points diagonally opposite each other. These connections shall be made from two different points of the earthing grid.

#### **Lightning Arrester**

Lightning arresters shall be connected to the earthing grid with 50 mm<sup>2</sup> tin-annealed copper conductor.

#### **Power Cables**

The lead sheath or armor (shield) of the MV power cables, if to be provided, shall be earthed by connecting a flexible braid to the shield. This shall be done at both ends of each cable. Cable end boxes shall be earthed with copper cable connection on one of the mounting bolts.

**Lighting Poles**

Poles for lighting shall be connected to the earthing grid with 22 mm<sup>2</sup> tin-annealed copper conductor (one connection for each pole).

**Other Metallic Structures**

Other types of metal structures within the diesel plant area, not mentioned thereto, shall be connected to the earthing grid.

Major equipment shall be equipped with at least two (2) terminals or suitable grounding pads of adequate size to accommodate at least two fixing screws for proper connection to the earthing system.

**EW-6.2.7 Powerhouse / Building Earthing**

Generally, each electrical device inside the control building/room must be equipped with an earthing screw of sufficient diameter for connection to the earthing system. The same applies to all metallic parts such as panels, etc. which are effectively connected by earth conductors.

Control panels and desks, switchboards, etc. consisting of several individual sections or compartments shall each be connected to a common tinned copper earth bar unless all panels are solidly welded together, or other approved means are applied ensuring solid earthing connections. In such a case, provisions for earthing must be made at one end at least.

**EW-6.2.8 Fence Earthing**

Steel fences around the switchyard or station shall be connected to the earthing system at appropriate connection point along the fence and at all corners and gate posts.

**EW-6.2.9 Pipe Earthing**

All piping shall be earthed at all service points in an approved manner.

The conceptual design of the grounding system based on the specified conditions shall be referred to the bid drawing.

The supply shall include special tools, kits and expandable materials necessary to weld the grid joints and ground rod connections by exothermic process, including reasonable waste to be expected during installations. Standard grounding connectors shall be fixed to metal frames by means of bolted clamps.

**EW-6.2.10 Ground Rods**

Ground rods shall be driven to a depth such that the top of each rod is at the same elevation as the ground grid and shall be bonded to the ground grid conductors by suitable exothermic connections.

**EW-7.0 LIGHTNING PROTECTION SYSTEM**

This specification covers the technical and associated requirements for the supply and installation of Lightning Protection System of 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 in this specification.

**EW-7.1 Technical Characteristics and Requirements****EW-7.2.1 Air Terminal and Support**

The air termination shall respond dynamically to the appearance of lightning. The materials of the air terminal shall be non-corroding in hostile environment. It shall be located at the highest point of the facility to capture the lightning strike to a preferred point, so that the discharge current can be safely directed via the down conductor to the grounding system.

The air terminal support shall consist of a minimum of 3 meters of galvanized iron piping mast. The conductor shall pass through the center of the mast, with the high voltage termination contained to the upper 1m of the mast. It shall be provided with adequate support to be determined by the Contractor to withstand maximum locally recorded wind velocity in the area. The Contractor shall give technical details of the protection including mounting and installation details for approval.

**EW-7.2.2 Down Conductor**

The down conductor will provide a low impedance path from the air termination to the ground system so that the lightning current can be safely conducted to earth, without the development of excessively large voltages.

The main copper conductor shall be made of electrical grade copper, with a minimum cross sectional equivalent to 50 mm<sup>2</sup>. The main conductor shall consist of copper strands helically bound by a copper tape conductor designed to evenly distribute the lightning currents concentrically along the conductor length.

In order to reduce the possibility of dangerous sparking (side-flashing), the down conductor route(s) should be as direct as possible with no sharp bends or stress points where the inductance, and hence impedance, is increased under impulse conditions. The down conductor should not be subject to bends of less than 0.5meter radius and shall be secured to the structure by approved metallic fastening at least every 2.0 meters.

**EW-8.0 LIGHTING 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.

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 Design Requirements

### EW-8.1.1 Technical Characteristics and Requirements

#### Contamination and Aging Factor

a. Indoor	:	1.25
b. Outdoor	:	1.67

#### Illumination Level Requirement, lux

a. Control room	:	400
b. Conference room	:	300
c. Loading Ramp, Staircase	:	100
d. Lavatory, Kitchen	:	100
e. Battery Room	:	200
f. Hallway, Corridor, Foyer	:	50
g. Pump house	:	100
h. Warehouse	:	200
i. Roads	:	50
j. Switchyard area	:	30
k. Guard house	:	100
l. Office	:	500
m. Perimeter fence	:	50
n. Safety lighting	:	10
o. Control building eaves	:	100
p. Control Building Façade Lighting	:	As Recommended by Contractor

#### Administration Building

a. Engineering/ Technical Room	:	500
b. Administrative Room	:	500
c. Manager's Office	:	400
d. Disbursing Room	:	400
e. Hallway, Corridor, Foyer	:	50
f. Toilet/Utility Rooms	:	100
g. Eaves	:	100
h. Façade Lighting	:	As Recommended by Contractor

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 (inside control house only);
- 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.

Circuits shall be separated between normal lighting, emergency lighting, single-phase outlets.

The plant lighting switching shall be designed as follows:

- a. Lighting not normally required during daylight hours shall be controlled by photocells and by separate switches from the station lighting/small power outlet distribution board.
- b. Lighting branch circuits shall be switched locally at each room door or close to the lighting areas.

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 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:

1. Fixture Type A

IP20 Rating, 1 x 9 Watts, Cool White Classic Globe Shape Frosted Finish E27 Base with holder, Compact LED Lamp.

When used in damp and wet locations, it shall have an explosion and corrosion proof body and sealed.

2. Fixture Type B

IP65, Weatherproof Surface mounted type Lighting Fixture with 1200mm long Polycarbonate Housing and 2 X 16 Watts LED Linear Tube.

3. Fixture Type C

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.

4. Street/Perimeter Light

Street/Perimeter Compact LED Lamp shall be used for illuminating roads, parking spaces, perimeter fence area and outdoor equipment areas.

Support for street/perimeter lighting luminaries shall consist of a pole and a bracket arm, giving a mounting height of approximately 6m and the arm shall overhang by 1.8m. Pole and brackets shall be fabricated from galvanized steel or aluminum. Suitably enclosed terminals mounted 600mm above finished ground level shall be provided in each pole, for connection of the luminaires and looping of the power supply cable.

**5. Flood Light**

Light Emitting Diode (LED) Flood Light shall be forged with high quality aluminum alloy with clear tempered glass and built-in cooling fins.

Under normal supply, the charging system shall ensure and maintain the batteries in a fully charged state ready to supply power and shall be equipped with a reliable protective device to protect the batteries against overload and short circuit.

**6. Fixture Type G**

IP65 Water and Dust Proof Lighting Fixture with Polycarbonate Housing and 2 X 16 Watts, 600mm, High Output, LED Tube.

**EW-8.3 Switches and Single Phase Outlets****EW-8.3.1 General**

Switches and single phase outlets shall comply with NEMA Standard. The ratings of switches and single phase outlets with one conductor earthed shall be as specific herein. All switches and single phase outlets shall be flush mounted, impact resistant and splash proof type.

**EW-8.3.2 Switches**

Switches for lighting fixtures shall be of the toggle quiet and flush mounted and fixed to the wall 1.37 m above the finished floor level. The rating of the switches shall be 10A, 240VAC, single-phase.

**EW-8.3.3 Single Phase Outlets**

All outlets shall be provided with separate earthing pins connected to the yellow/green part in the feeder cable. Outlets with rated voltage not exceeding 250 Volts shall be in accordance with PEC for 2-pole three-wire (indoor and outdoor).

**EW-8.4 Outlet Boxes and Pull Boxes****EW-8.4.1 Outlet Boxes**

All outlet boxes for concealed work shall be of hot-dipped galvanized steel. Outlet 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.

All wall boxes on exposed work shall be of aluminum blasted cast iron.

**EW-8.4.2 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 pulling boxes shall be made of galvanized sheet steel not less than 2mm. Where pulling boxes are used in connection with exposed conduits, plain covers attached to the pulling box with a suitable number of countersunk flathead machine screws may be used.

**EW-8.5 Lighting and Power Panelboard**

The Panelboards for Lighting and Power system shall be manufactured to NEMA standards and shall be totally enclosed, recess or surface-mounted.

**EW-8.5.1 Circuit Breaker**

AC three phase and single phase circuit breakers shall be rated 600V, 60Hz. DC circuit breaker, if to be provided, shall be rated 250 VDC.

Circuit breakers shall be quick-make, quick-break with thermal magnetic trip. The circuit breakers shall have interrupting rating of not less than 10,000 RMS Amps.

The circuit breakers shall be installed so as to permit the removal and re-installation or replacement of an individual circuit breaker without requiring the removal of any other circuit breaker or the disconnection of main or branch circuit connectors.

**EW-8.5.2 Kilowatt-hour Meters**

Kilowatt-hour demand meters shall be transformer-connected, single phase, 2-wire, 240VAC, 60 Hz and shall be of the type specified in the Technical Data Sheets.

**EW-8.5.3 Grounding Electrode**

Lighting and Power Panelboard shall be effectively grounded. LPP shall be provided with one copper bonded grounding electrode connected through cable conductor with rating equivalent to the ampacity of the panel.

**EW-8.5.4 Cables**

Cables shall be stranded annealed copper conductor suitable for continuous temperature of 90°C. The minimum size of line conductor to be used shall be 3.5 mm<sup>2</sup>.

Insulation shall be suitable for wet and dry locations, fungi resistant and ultraviolet stable. All cables shall be moisture and heat resistant thermoplastic or cross-linked synthetic polymer unless otherwise specified by NPC.

**EW-8.5.5 Cable Installation**

The Contractor shall furnish the following miscellaneous materials required for proper cable installation:

- a. Cable ties, clamps and markers.
- b. Connectors, tapes and other splicing and terminating materials.
- c. Fire barriers, duct and conduit sealant, sand and planks.
- d. Pulling lubricants.

The cable entries into buildings, panels and other equipment shall be sealed off by an approved type of sealant suitable for the purpose.

Cables pulled through conduits shall be supported in an approved manner so as to avoid damaged to the insulation. Grease or oily substance shall not be used to facilitate the passage of the cable in conduits.

The pull shall be applied to cables only by means of approved grips and the end portion of the cable, 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 cables, conduits shall be thoroughly cleaned to prevent damage to cables during installation. After cables have been installed, cables shall be tested for continuity and insulation, and shall be tagged with respective cable number.

**EW-8.5.6 Nameplates**

A unit identification nameplate shall be furnished at the top front of each panelboard. All nameplates shall be black satin finish with white core engraved to show white lettering. Nameplate engraving shall be in accordance with the nameplate designations shown on the accompanying drawings.

**EW-9.0 CONDUIT SYSTEM**

This specification covers the technical and associated requirements for the supply, laying and installation of conduits as required within the plant complex, including associated fittings, accessories (elbows, tees, steps, crossings etc.), supporting racks and brackets and all hardware.

All materials and parts which are not specifically mentioned herein but are necessary for the proper laying and installation of conduits shall be furnished at no additional cost to NPC.

**EW-9.1 Technical Requirements and Characteristics**

The conduit system shall conform to the material and fabrication requirements of the specification. All miscellaneous materials required for proper installation shall include but are not limited to, the following:

1. Plug and fillers, coupling and bends;
2. Spacers, inserts and ties for conduits;
3. Conduit splicing solvent and connector material for uPVC conduit, if uPVC conduits are used; and
4. Fire barriers, duct and conduit sealant;

Conduit edges shall be reamed and smoothen to avoid damage to cable outer sheath during cable installation. The conduits shall have the following characteristics:

1. High mechanical strength
2. Corrosion resistant
3. Heat resistant

**Conduits**

All embedded and concealed in ceiling conduits, boxes and fitting required for the power and control cables 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 checked to be free from obstructions by pulling a wooden mandrel of appropriate size through the conduit.

Conduits running in floors and terminating at motors or other 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 0.457 m.

**Metallic Conduits (If specified)**

Rigid metallic 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.

#### **Non-Metallic Conduits**

Where non-metallic conduits are allowed to be used by NPC, it shall be made of unplasticized polyvinyl chloride (uPVC) smooth walled inside and outside, coloured 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.

### **EW-10.0 FACTORY ASSEMBLY AND TESTS**

#### **EW-10.1 General**

The Contractor shall carry out at his own expenses all tests necessary to ensure the satisfactory design and manufacture of all equipment is in accordance with relevant ANSI and IEC standard.

All parts shall be properly marked for ease of assembly in the field. Test report on design and routine tests performed in accordance with ANSI or IEC standard shall be submitted to NPC for evaluation and approval.

The test equipment, test method, measurements and computations shall be in accordance with the latest applicable requirements of ANSI and IEC standard.

#### **EW-10.2 Shop Test**

Routine, design, quality and conformance test and other necessary tests shall be performed in accordance with ANSI Standard or equivalent IEC Standard. Design tests is required if the equipment is manufacturer's new design or previous design with significant design changes. In this case, certified test report of duplicated production type is acceptable.

The test methods, measurements and computation shall be in accordance with the latest applicable requirements of ANSI and IEC standard and shall be submitted for NPC's approval.

#### **EW-10.3 Other Requirements**

The Contractor shall submit the following Factory Test Results:

**Automatic Circuit Recloser**

1. Duly Certified Factory Type Test Results
2. Duly Certified Factory Routine Test Results

**Power, Control and Instrumentation Cable**

For Power, Control and Instrumentation Cable to be supplied other than those type specified in the PEC, the Contractor shall submit the following:

1. Routine Test Results per IEC or equivalent UL standard
2. Manufacturer's Track Record
3. Brochure with cable ampacity rating including correction factor at 40°C.

**EW-11.0 OTHER SITE REQUIREMENTS****EW-11.1 Job Site Cameras**

This specification covers the supply, delivery and installation of job site cameras for the use in the monitoring and documentation of construction of diesel power plants.

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-11.2 Technical Characteristics**

The job site cameras to be supplied shall be DC supply operated and battery-operated cameras. It shall be designed to monitor the construction of diesel power plants and access areas for a routine documentation.

At least two (2) sets of job site cameras must be installed first before works shall be done in the sites.

The Contractor shall define the focusing ranges and allowable minimum distance in accordance with the layout at site.

In normal operation, the job site camera provides monitoring of the construction sites. For full coverage of the cameras, the job site cameras shall be installed in an elevated area within the site while is out of reach of the construction equipment. It shall include mounting supports for the ease of the installation.

The job site cameras must have the functionality and adaptability in the construction site. It shall have a 100% reliability without affecting the implementation.

The Contractor shall ensure that the job site cameras they supply, functions correctly and safely. In principle, the installation shall follow that latest modern engineering practice, ensure optimum functionality of supply and ensure the safety of the construction staff.

Job site cameras shall be subject to the approval of NPC.

All job site cameras shall meet the technical requirements specified in the specifications. It shall have a dust proof and weather resistant protective enclosure complying with the technical requirements.

**Technical Requirements:**

a. Type	:	Time-Lapse Camera
b. Quantity	:	At least Two (2) Cameras per Site
c. Screen	:	Thin-Film-Transistor (TFT) Liquid Crystal Display (LCD)
d. Screen Resolution	:	At least 1.3 Megapixel CMOS
e. View Angle	:	At least 110 degrees
f. Video/Image Resolution	:	1280 x 720
g. Time Lapse Interval	:	15 minutes
h. Battery Type	:	Four (4) Rechargeable AA Size Batteries
i. Additional Battery (Spare)	:	At least Eight (8) Rechargeable AA Size Batteries
j. Battery Charger	:	Included
k. Input Voltage	:	5VDC (Micro USB)
l. Enclosure	:	IP64 compliant
m. Storage Memory	:	SDHC
n. Storage Capacity	:	32 GB
o. Additional Storage (Spare)	:	At least Two (2) 32GB SDHC

When the installation of the job site cameras is completed, the operation and safekeeping shall be turnover to NPC.

**EW-12.0**

**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.

**EW-12.1 Data and Information to be Submitted During Post Qualification**

Contractor shall furnish during the post qualification the filled-in Section E-1.0 to E-8.0 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-12.2 Data and Information to be Submitted During Implementation**

The following shall be the full technical data requirement of equipment indicated in Section E-1.0 to E-8.0 of the Technical Data Sheets which shall be submitted by the Contractor together with Manufacturer's brochure/drawings during the Implementation stage.

**1.0 POWER, CONTROL & INSTRUMENTATION CABLE**

Item	Description	NPC Requirements	Contractor's Data
<b>15kV Power Cable</b>			
E-1.1	Manufacturer	By Contractor	
E-1.2	Continuous current carrying capacity of conductor at 90°C Operating Temperature	Manufacturer's Data	
E-1.3	Conductor Cross-Section, mm <sup>2</sup>	Refer to Single Line Diagram	
E-1.4	Type of cable	Single Core	
E-1.5	Conductor Material	Annealed Copper	
E-1.6	Max. Outside Diameter, mm	Manufacturer's Data	
E-1.7	Conductor Shape	Circular Stranded Wire	
E-1.8	Conductor Material	Annealed Copper	
E-1.9	Insulation		
	a. Material	Cross-linked polyethylene (XLPE)	
	b. Thickness, mm	≥ 4.0	
E-1.10	Outer covering/Jacket		
	a. Material	PVC Sheath Jacketing	
	b. Thickness, mm	Manufacturer's Data	
	c. Termite Protection Required	Yes	

Item	Description	NPC Requirements	Contractor's Data
E-1.11	Shielded (yes, no)	Yes	
	a. Type of Shielding	Copper Tape Screen	
E-1.12	Provided with Filler and Binder Tape	Yes	
<b>600V Power, Instrumentation and Control Cable</b>			
E-1.13	Manufacturer	By Contractor	
E-1.14	Type		
	a. Power	THHN/THWN-2	
	b. Control & Instrumentation	Royal Cord	
E-1.15	Continuous current carrying capacity of conductor at 75°C Operating Temperature		
	a. THHN/THWN-2	Refer to Single Line Diagram	
	b. Royal Cord	By Contractor	
E-1.16	Conductor Material	Annealed Copper	
E-1.17	Conductor Shape	Circular Stranded Conductors	
E-1.18	Type of Insulation	Lead Free, UL-listed PVC	
E-1.19	Outer covering/Jacket	Oil, Chemical and Abrasion Resistant Tough Polyamide (Nylon)	
E-1.20	Meets ASTM, UL 83 & 1063, and PNS 35 Specifications and requirements of PEC	Yes	

**2.0 BUS CONDUCTOR AND HARDWARE**

Item	Description	NPC Requirements	Contractor's Data
<b>Stranded Conductor Requirements</b>			
E-2.1	Manufacturer	By Contractor	
E-2.2	Type designation	Aluminum Conductor Steel Reinforced (ACSR)	

Item	Description	NPC Requirements	Contractor's Data
E-2.3	Code Name	By Contractor	
E-2.4	Conductor size	Refer to Single Line Diagram	
E-2.5	Voltage Rating. kV	15	
E-2.6	Ampacity, A	270	
E-2.7	Outer Layers		
	a. Material	Aluminum	
	b. Stranding No.	6	
	c. Calculated Cross-sectional Area, mm <sup>2</sup>	Manufacturer's Data	
	d. Coefficient of Elongation (/°C)	Manufacturer's Data	
E-2.8	Core		
	a. Material	Galvanized Steel	
	b. Stranding No.	1	
	c. Calculated Cross-sectional Area, mm <sup>2</sup>	Manufacturer's Data	
	d. Coefficient of Elongation (/°C)	Manufacturer's Data	
E-2.9	Conductor Coefficient of Linear Expansion (/°C)	Manufacturer's Data	
<b>Conductor Hardware</b>			
E-2.10	Tension Clamp		
	a. Type	Bolted, U-Bolt	
	b. Material of Body	Aluminum Alloy	
E-2.11	Connectors		
	a. Type	Wedge pressure clamp for stranded conductor connection	
	b. Angle and T-connectors type	Wedge pressure clamp for stranded conductor connection	

**3.0 GROUNDING SYSTEM**

Item	Description	NPC Requirements	Contractor's Data
<b>Grounding Grid Design Criteria</b>			
E-3.1	Fault duration, sec.	3	
E-3.2	Total fault level (line to ground), kA	8	
E-3.3	Ground mat design resistance	5 Ohms (max.)	
E-3.4	Grounding connection	Exothermic	
E-3.5	Permissible temperature rise of grid copper conductor, °C	300	
E-3.6	Grid conductor		
	a. Manufacturer	By Contractor	
	b. Minimum Size, mm <sup>2</sup>	100	
	c. Material	tin-annealed copper stranded conductor (bare)	
E-3.7	Burial depth of grid conductor below finished grade, m	0.6	
<b>Equipment Grounding</b>			
E-3.8	Bonding Conductor (riser)		
	a. Manufacturer	By Contractor	
	b. Size, mm <sup>2</sup>	100, 50 & 22	
	c. Material	Tin-annealed copper stranded conductor with 1.2kV PVC insulation	
E-3.9	Ground Rod		
	a. Manufacturer	By Contractor	
	b. Type	Copper Rod	
	c. Diameter, mm	≥ 19 mm	
	d. Length/section, m	≥ 3 m	

**4.0 LIGHTNING PROTECTION SYSTEM**

Item	Description	NPC Requirements	Contractor's Data
<b>Lightning Protection</b>			
E-4.1	Manufacturer	By Contractor	
<b>Lightning Rod</b>			
E-4.2	Material	Copper	
E-4.3	Length, mm	2000	
E-4.4	Minimum Diameter, mm	19	
<b>Down Conductor</b>			
E-4.5	Type	Insulated Copper Conductor	
E-4.6	Minimum Cross-Section Area	55 mm <sup>2</sup>	
E-4.7	Overall Diameter, mm	Manufacturer's Data	
E-4.8	Insulation Material	PVC	
E-4.9	Weight (kg/meter)	Manufacturer's Data	
<b>Accessories</b>			
E-4.10	Support Pipe, Download Clamp, Terminal Lug, Guy Wire, PVC conduit, etc.	Yes	

**5.0 AUTOMATIC CIRCUIT RECLOSER**

Item	Description	NPC Requirements	Contractor's Data
E-5.1	Manufacturer	By Contractor	
E-5.2	Place of Manufacture	By Contractor	
E-5.3	Type	Solid Dielectric Vacuum Interrupter	
E-5.4	Phase	3	
E-5.5	Rated Frequency, Hz	60	
E-5.6	Nominal Rated Voltage, kV	13.8	
E-5.7	Maximum Rated Voltage, kV	By Contractor	
E-5.8	Rated Normal Current (Min.)	800 A	
E-5.9	Rated Symmetrical Interrupting Current at rated Voltage	≥2 kA	
E-5.10	Rated Short Time Current for 3 secs.	≥2 kA	
E-5.11	Rated Making Current (RMS)	≥2 kA	

Item	Description	NPC Requirements	Contractor's Data
E-5.12	Rated 1 min. power frequency withstand between phase and earth (min.)	50 kV	
E-5.13	Interrupting Medium	Vacuum	
E-5.14	Insulation Medium	Cycloaliphatic epoxy or equivalent	
E-5.15	Rated Operating Sequence (total number of trips/counts to lock out)	4	
E-5.16	Current Sensing	By Contractor	
E-5.17	Voltage Sensing	By Contractor	
E-5.18	Mechanical Life – minimum number of close/open operations – without inspection	≥ 30000	
E-5.19	HV Bushing Creepage Distance (min.)	≥ 465mm	
E-5.20	Min. length of umbilical (multi-core) cable to be provided	At least 20 m	
E-5.21	AC Supply	230 Volts	
E-5.22	DC Supply		
	a. Voltage	By Contractor	
	b. Make of Batteries	By Contractor	
	c. Type	Re-chargeable sealed lead-acid battery	
	d. Capacity	By Contractor	
	e. Battery Operating Time after Loss of AC supply	At least 48 hours	
	f. No. of reclose sequences possible within 48 hours after the loss of ac supply	To be Provided	
E-5.23	Spare Battery	Re-chargeable sealed lead-acid battery	
E-5.24	Manual "Open-Close" Functionality with Operator Hook Stick	To be Provided	
	Capacity : 26Ah Voltage : 12Vdc Dimensions (LxWxH) : same as original	To be provided	
E-5.25	Controller		
E-5.26	a. Type	Electronic type equipped with advance protection, metering, control and communication in an individual module arranged within the compartment	
	Protection Features		
	Directional Overcurrent and Earth Fault Protection	Yes	

Item	Description	NPC Requirements	Contractor's Data
	Instantaneous/Time Overcurrent	Yes	
	Sensitive Earth Fault (Current Setting Range 1 – 80 Ampere)	Yes	
	Under and Over Voltage	Yes	
	Under and Over Frequency (pick-up setting range of 45 – 65 Hz)	Yes	
	Cold Load Pick-up Element	Yes	
	Inrush Restraint Element	Yes	
	Auto Reclosing Element	Yes	
	Harmonics Protection Element (up to 15 <sup>th</sup> Harmonics)	Yes	
	Negative Phase Sequence Element	Yes	
	Auto Change Over Protection Scheme	Yes	
	Four (4) Independent Protection Groups - Each Group must contain independent protection settings for each direction	Yes	
E-5.27	Remote control communication of existing Recloser Controller with integrated free software application and can be installed in a desktop, laptop and cellular phone devices. Effective WIFI signal range minimum of 100ft line of sight	Yes	
E-5.28	Monitoring/Metering Functions	Yes	
E-5.29	Data Records		
	a. Sequence of Event (Up to 5000 events can be stored)	Yes	
	b. Fault and Disturbance Records	Yes	
	c. Load Profile	Yes	
E-5.30	Communication Interface	RS 232/ RS 485	
E-5.31	Rated Duty Cycle	0-0.1s CO-1s-CO-1s-CO	
E-5.32	Controller Cubicle Degree of protection	At least IP 65	
E-5.33	Fault Indicator Type FLA3.1 for overhead lines to be integrated with the control cubicle	To be provided	
E-5.34	Buzzer Alarm Trip, Open/Close Alarm Indications	To be provided	
E-5.35	Bird Guard for insulation protection between the load side and line side, Units	6	
E-5.36	Total Weight, kg	By Contractor	

Item	Description	NPC Requirements	Contractor's Data
<b>Other Technical Requirements</b>			
E-5.37	Programming (Configuration) and Maintenance Human-Machine Interface equipped w/ Operating and Configuration Editor Software Program to be provided	Yes	
	a. Type	PC Compatible Notebook Computer/ Laptop	
	1. No. of Units to be supplied	1/plant	
	b. Hardware		
	1. Processor	Latest available model on the time of award	
	2. Clock Frequency, GHz	2.0 (min)	
	3. RAM Capacity, GB	16	
	4. Hard Disk Capacity, TB	1	
	5. Video Card Capacity	Dedicated 256 Mbytes min.	
	6. Optical Drive	DVD ± RW	
	7. Display	15" LCD Color Monitor	
	8. Audio System	Built-in Stereo Speakers	
	c. Software		
	1. Operating System	Licensed Windows, pre-installed with back-up CDROM bundled with latest version of MS Office and reference manuals	
	2. Communication Stack	OSI-TCP / IP	
	3. Configuration Tools	Provided with back-up copy	
	4. Testing, Maintenance and Diagnostic Software	Provided with back-up copy	
	d. Peripheral Connectivity		
	1. Communication Interface (I/O)	1x9-pin RS232 & 1x25-pin ECP/EPP parallel ports, 1xUSB, keyboard & Mouse port, VGA port, phone line-in, microphone-in ports and DC jack for power adapter	
	e. Keyboard	84/85 key with embedded numeric key pad	
	f. Mouse	Built-in touch pad pointing device	
	g. Power Adaptor	100 - 240V full range 50 – 60Hz	

Item	Description	NPC Requirements	Contractor's Data
	h. Battery	Li-ion battery pack 4-5hrs rundown battery life with APM	
E-5.38	Operating and Configuration Editor Software Program		
	a. All system software and configuration editor software program including licenses and instruction manuals	To be provided	
E-5.39	Test Requirement		
	1. Design and Routine Tests Reports required	Yes	

#### 6.0 FUSE DISCONNECT SWITCH WITH LIGHTNING ARRESTER COMBINATION

Item	Description	NPC Requirements	Contractor's Data
E-6.1	Manufacturer	By Contractor	
E-6.2	Class (indoor, outdoor)	Outdoor	
E-6.3	Rated voltage, kV	15	
E-6.4	Nominal system voltage, kV	13.8	
E-6.5	Frequency, Hz	60	
E-6.6	BIL, kV	110	
E-6.7	Ampere Frame	100	
E-6.8	Interrupting Capacity, kA	10	
E-6.9	Fuse Link		
	a. Type	Universal button head design	
	b. Current Rating, A	Refer to Single Line Diagram	
E-6.10	Lightning Arrester		
	a. Type	Metal Oxide Varistor (MOV), Gapless	
	b. Rated frequency, Hz	60	
	c. Nominal system voltage, kV	13.8	
	d. Duty cycle voltage (rating), kVrms	12	

Item	Description	NPC Requirements	Contractor's Data
	e. Maximum Continuous Operating Voltage (MCOV), for the arresters having the following duty cycle voltage, kVrms	10.2	
	f. Nominal discharge current, kA	10	
	g. Creepage distance, mm	465	
	h. Supporting brackets, bolts, nuts, etc.	Yes	

**7.0 KILOWATT-HOUR DEMAND METER**

Item	Description	NPC Requirements	Contractor's Data
<b>240V Single Phase Kilowatt-Hour Demand Meter</b>			
E-7.1	Manufacturer	By Contractor	
E-7.2	Accuracy Class	Class 0.5 or Better	
E-7.3	Number of Phase	1	
E-7.4	Wire	2	
E-7.5	Voltage, V	240	
E-7.6	Current Range	Class 200	
E-7.7	Frequency, Hz	60	
E-7.8	Register Type	LCD	
E-7.9	TOU (Time of Use)	Programmable Ready	
E-7.10	Soft Switches	Available	
E-7.11	LCD Display	Programmable	
E-7.12	Power Consumption	By Contractor	
E-7.13	The Kilowatt-hour meter to be provided is certified and approved by ERC	Yes	
<b>13.8kV Three Phase Kilowatt-Hour Demand Meter</b>			
E-7.14	Manufacturer	By Contractor	
E-7.15	Accuracy Class	Class 0.2 or Better	
E-7.16	Number of Phase	3	

Item	Description	NPC Requirements	Contractor's Data
E-7.17	Wire	4	
E-7.18	Voltage, V	120 - 480	
E-7.19	Current Range	Class 20	
E-7.20	Frequency, Hz	60	
E-7.21	Register Type	LCD	
E-7.22	TOU (Time of Use)	Programmable Ready	
E-7.23	Soft Switches	Available	
E-7.24	LCD Display	Programmable	
E-7.25	Power Consumption	Manufacturer's Data	
E-7.26	The Kilowatt-hour meter to be provided is certified and approved by ERC	Yes	
E-7.27	Metering Current Transformer		
	a. Class (indoor, outdoor)	Outdoor	
	b. Insulation type	Full cast epoxy resin	
	c. Secondary rated current for all windings, A	5	
	d. CT ratio	To be based on protection and metering requirements	
	e. Accuracy class	Class 0.2 or better	
	f. Burden	Manufacturer's Data	
	g. BIL, kV	110	
E-7.28	Metering Voltage Transformer		
	a. Class (indoor, indoor)	Outdoor	
	b. Highest continuous operating voltage of VTs, kV	15	
	c. Nominal voltage of VT, kV	13.2	
	d. Rated secondary voltage, V	120	
	e. Insulation type	Full cast epoxy resin	

Item	Description	NPC Requirements	Contractor's Data
	f. Accuracy class	Class 0.2 or Better	
	g. Burden	Manufacturer's Data	
	h. BIL, kV	110	

**8.0 JOB SITE CAMERAS**

Item	Description	NPC Requirements	Contractor's Data
E-8.1	Manufacturer	By Contractor	
E-8.2	Type	Time-Lapse Camera	
E-8.3	Quantity	As specified in the SOR/BOQ	
E-8.4	Control Display	Thin-Film-Transistor (TFT) Liquid Crystal Display (LCD)	
E-8.5	Image Sensor Resolution	At least 1.3 Megapixel CMOS	
E-8.6	View Angle	At least 110 degrees viewing angle	
E-8.7	Still Image Resolution	1280 x 720	
E-8.8	Time Lapse Interval	Every 15 minutes/ User-programmable	
E-8.9	Battery Type	Standard AA or AAA Size Alkaline Batteries	
E-8.10	Battery Life	At least 120 days of image recording	
E-8.11	Additional Battery (Spare)	Required	
E-8.12	Enclosure	IP64 compliant	
E-8.13	Storage Memory	SDHC	
E-8.14	Storage Capacity	32GB	
E-8.15	Additional Storage (Spare)	At least Two (2) 32GB SDHC Storage	

**9.0 SPARE PARTS AND TOOLS**

Item	Description <sup>3</sup>	Qty. <sup>1</sup>	Unit Price	Total Price <sup>2</sup>
E-9.1	Generator Circuit Breaker for Generator Control & Protection Panel	1 set per D/G set rating		
E-9.2	Telescopic Hot Stick with Tip Lock Features, Material: Epoxy glass Minimum Length: 35 ft. No. of Sections: 8	1 set		

Item	Description <sup>3</sup>	Qty. <sup>1</sup>	Unit Price	Total Price <sup>2</sup>
E-9.3	Lineman's Rubber Gloves Size: 14" Maximum Usage: 17,000 Volts	2 pairs		
E-9.4	Lineman's Belt Maximum Length:42" Minimum Length: 34" D-to-D distance: 56 cm Center Hole: 38"	1 set		
E-9.5	Positioning Strap, Nylon Maximum Length: 2.0m Minimum Length: 1.3m Adjustable Range: 0.7m	1 set		
E-9.6	Heavy Duty Hard Hat with strap & NPC (Passed Safety Standard)	3 pcs		

**Note:**

1. Minimum requirements but the Contractor may increase the specified quantity if found not sufficient. Additional spares consumed and/or required for any repairs/replacement during the warranty period shall be provided by the Contractor at no cost to NPC.
2. Indicated Price shall be used for reference in future purchase orders.
3. The above list is preliminary which is subject to changes to conform with the final design and model/brand of the proposed equipment (per manufacturer's standard).

**EW-13.0 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 IV of the Tender Documents. The cost of each item shall cover all works required and described in the pertinent provisions of the specifications.

**PART II – TECHNICAL DATA SHEETS****EW- ELECTRICAL WORKS****TABLE OF CONTENTS**

<b>SECTION</b>	<b>DESCRIPTION</b>	<b>PAGE</b>
E-1.0	Power, Control and Instrumentation Cables	VI-TDS(EW)-2
E-2.0	Bus Conductor	VI-TDS(EW)-2
E-3.0	Grounding System	VI-TDS(EW)-3
E-4.0	Lightning Protection System	VI-TDS(EW)-3
E-5.0	Automatic Circuit Recloser	VI-TDS(EW)-4
E-6.0	Fuse Disconnect Switch with Lightning Arrester Combination	VI-TDS(EW)-4
E-7.0	Kilowatt-Hour Demand Meter	VI-TDS(EW)-5
E-8.0	Spare Parts and Tools	VI-TDS(EW)-6

**PART II****TECHNICAL DATA SHEETS****EW – Electrical Works****Technical Requirements**

1. The Bidder is required to provide all the information required under the column "Contractor's Data". Although not given by NPC, The Contractor's Data shall be based on the International Standard.
2. NPC's requirements are indicated below. The Contractor shall indicate their data corresponding to the said NPC requirements to facilitate evaluation of Contractor's compliance to the specifications.
3. Non-compliance with the requirements shall be ground for disqualification.

Name of Firm	Name & Signature of Representative	Designation
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**E-1.0 POWER, CONTROL & INSTRUMENTATION CABLE**

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
<b>15kV Power Cable</b>			
E-1.1	Manufacturer	By Contractor	
E-1.2	Continuous current carrying capacity of conductor at 90°C Operating Temperature	Manufacturer's Data	
E-1.3	Conductor Cross-Section, mm <sup>2</sup>	Refer to Single Line Diagram	
E-1.4	Conductor Material	Annealed Copper	
E-1.5	Insulation Material	Cross-linked polyethylene (XLPE)	
<b>600V Power, Instrumentation and Control Cable</b>			
E-1.6	Manufacturer	By Contractor	
E-1.7	Type		
	a. Power	THHN/THWN-2	
	b. Control & Instrumentation	Royal Cord	
E-1.8	Continuous current carrying capacity of conductor at 75°C Operating Temperature		
	a. THHN/THWN-2	Refer to Single Line Diagram	
	b. Royal Cord	By Contractor	
E-1.9	Conductor Material	Annealed Copper	

**E-2.0 BUS CONDUCTOR**

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-2.1	Manufacturer	By Contractor	
E-2.2	Type designation	Aluminum Conductor Steel Reinforced (ACSR)	

Name of Firm

Name &amp; Signature of Representative

Designation

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-2.3	Conductor size	Refer to Single Line Diagram	
E-2.4	Ampacity, A	By Contractor	

**E-3.0 GROUNDING SYSTEM**

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-3.1	Grounding connection	Exothermic	
E-3.2	Permissible temperature rise of grid copper conductor, °C	300	
E-3.3	Grid conductor		
	a. Manufacturer	By Contractor	
	b. Minimum Size, mm <sup>2</sup>	100	
	c. Material	tin-annealed copper stranded conductor (bare)	
E-3.4	Bonding Conductor		
	a. Manufacturer	By Contractor	
	b. Size, mm <sup>2</sup>	100, 50 & 22	
	c. Material	tin-annealed copper stranded conductor with 1.2 kV PVC Insulation	
E-3.5	Copper Ground Rod		
	a. Manufacturer	By Contractor	
	b. Diameter, mm	≥ 19 mm	
	c. Length/section, m	≥ 3 m	

**E-4.0 LIGHTNING PROTECTION SYSTEM**

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
<b>Lightning Protection</b>			
E-4.1	Manufacturer	By Contractor	

Name of Firm

Name &amp; Signature of Representative

Designation

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
<b>Lightning Rod</b>			
E-4.2	Material	Copper	
E-4.3	Length, mm	2000	
E-4.4	Minimum Diameter, mm	19	
<b>Down Conductor</b>			
E-4.5	Type	Insulated Copper Conductor	
E-4.6	Minimum Cross-Section Area	55 mm <sup>2</sup>	
E-4.7	Insulation Material	PVC	

**E-5.0 AUTOMATIC CIRCUIT RECLOSER**

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-5.1	Manufacturer	By Contractor	
E-5.2	Place of Manufacture	By Contractor	
E-5.3	Type	Solid Dielectric Vacuum Interrupter	
E-5.4	Phase	3	
E-5.5	Rated Frequency, Hz	60	
E-5.6	Nominal Rated Voltage, kV	13.8	
E-5.7	Mainly Active Breaking Capacity	800 A	

**E-6.0 FUSE DISCONNECT SWITCH WITH LIGHTNING ARRESTER COMBINATION**

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-6.1	Manufacturer	By Contractor	
E-6.2	Rated voltage, kV	15	
E-6.3	Frequency, Hz	60	
E-6.4	BIL, kV	110	
E-6.5	Ampere Frame	100	
E-6.6	Interrupting Capacity, kA	10	
E-6.7	Fuse Link		

Name of Firm

Name &amp; Signature of Representative

Designation

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
	a. Type	Universal button head design	
	b. Current Rating, A	Refer to Single Line Diagram	
E-6.8	Lightning Arrester		
	a. Type	Metal Oxide Varistor (MOV), gapless	

**E-7.0 KILOWATT-HOUR DEMAND METER**

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
<b>240V Single Phase, Digital Kilowatt-Hour Demand Meter</b>			
E-7.1	Manufacturer	By Contractor	
E-7.2	Accuracy Class	Class 0.5 or Better	
E-7.3	Wire	2	
E-7.4	Current Range	Class 200	
E-7.5	Frequency, Hz	60	
E-7.6	The Kilowatt-hour meter to be provided is certified and approved by ERC	Yes	
<b>13.8kV Three Phase, Digital Kilowatt-Hour Demand Meter</b>			
E-7.7	Manufacturer	By Contractor	
E-7.8	Accuracy Class	Class 0.2 or Better	
E-7.9	Wire	4	
E-7.10	Voltage, V	120 - 480	
E-7.11	Current Range	Class 20	
E-7.12	Frequency, Hz	60	
E-7.13	The Kilowatt-hour meter to be provided is certified and approved by ERC	Yes	
E-7.14	Metering Transformer Current		
	a. Insulation type	Full cast epoxy resin	

Name of Firm

Name &amp; Signature of Representative

Designation

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
	b. Secondary rated current for all windings, A	5	
	c. Accuracy class	Class 0.2 or Better	
	d. BIL, kV	110	
E-7.15	Metering Voltage Transformer		
	a. Nominal voltage of VT, kV	13.2	
	b. Rated secondary voltage, V	120	
	c. Insulation type	Full cast epoxy resin	
	d. Accuracy class	Class 0.2 or Better	
	e. BIL, kV	110	

**E-8.0 SPARE PARTS AND TOOLS**

ITEM	DESCRIPTION <sup>3</sup>	QTY. <sup>1</sup>	UNIT PRICE	TOTAL PRICE <sup>2</sup>
E-8.1	Generator Circuit Breaker for Generator Control & Protection Panel	One Set for each Genset Rating per site		
E-8.2	Telescopic Hot Stick with Tip Lock Features, Material: Epoxy glass Minimum Length: 35 ft. No. of Sections: 8	1 Set		
E-8.3	Lineman's Rubber Gloves Size: 14" Maximum Usage: 17,000 Volts	2 Pairs		
E-8.4	Lineman's Belt Maximum Length: 42" Minimum Length: 34" D-to-D distance: 56 cm Center Hole: 38"	1 Set		
E-8.5	Positioning Strap, Nylon Maximum Length: 2.0m Minimum Length: 1.3m Adjustable Range: 0.7m	1Set		

Name of Firm

Name &amp; Signature of Representative

Designation

ITEM	DESCRIPTION <sup>3</sup>	QTY. <sup>1</sup>	UNIT PRICE	TOTAL PRICE <sup>2</sup>
E-8.6	Heavy Duty Hard Hat with strap & NPC (Passed Safety Standard)	3 Pcs		
E-8.7				
E-8.8				
E-8.9				

## Note:

1. Minimum requirements but the Supplier may increase the specified quantity if found not sufficient. Additional spares consumed and/or required for any repairs/replacement during the warranty period shall be provided by the Supplier at no cost to NPC.
2. Indicated Price shall be used for reference in future purchase orders.
3. The above list is preliminary which is subject to changes to conform with the final design and model/brand of the proposed equipment (per manufacturer's standard).

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 Name of Firm

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 Name & Signature of Representative

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 Designation

## SECTION III

# **TECHNICAL SPECIFICATIONS (MECHANICAL WORKS)**



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**MW - MECHANICAL WORKS**

**MW-1.0 GENERAL**

The Work to be done under this section shall include the furnishing of all labor, materials, equipment, tools and other incidentals for all mechanical works enumerated hereunder or as shown on the accompanying drawings and installation manuals or as otherwise directed by NPC for the **CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BURDEOS QUEZON AND BUTAWANAN, SIRUMA, CAMARINES SUR.**

EQUIPMENT	DESTINATION
Four (4) complete sets of Prime Power Output Modular Diesel Gensets and their systems' auxiliaries; spare parts; special tools; balance of plant, consumables (lube oil, lubricants and coolants).	1. Calutcot DPP: 2 X 50 kW
	2. Butawanon DPP: 1 X 50 kW & 1 x 30 kW

The Contractor/Supplier shall accept full responsibility for its work as required, performance qualifications, specifications, documentation, reports, fabrication, corrosion protection, cleaning, shop testing, preparation for transport, reinforcement of roads and bridges as maybe deemed necessary, field testing and compliance with the applicable codes and standards and the requirements of this specification

Workmanship shall be of first class quality and in accordance with the best modern engineering practice for hauling, loading/unloading, assembly, installation and test of all equipment and materials, notwithstanding any omissions from the specifications and drawings. To have quality workmanship, only technicians skilled in their respective trades shall be employed

Correction of all deviations from the requirement of this specification or drawings and all errors in or resulting from the workmanship of the Contractor/Supplier including all costs, expenses and other damages resulting from any such deviations or errors, as well as freight charges, taxes and duties, will be solely for the account of the Contractor/Supplier.

All equipment and materials including its associated structures and necessary accessories which the Contractor/Supplier shall supply and install and which thereafter will be incorporated in the plant shall be new and unused. They shall be suitable for their intended purpose and appropriately matched to other items complying with all applicable regulations, quality and dimension standards.

The Contractor/Supplier shall strictly observe the general requirements of this specification in conjunction with the specific requirements specified in the relevant specifications (Civil, Architectural and Electrical Works).

**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. However, the Contractor/Supplier shall furnish high quality work, materials and equipment meeting the requirements of this specification and industry standards and shall be capable of performing and meeting the Contractor/Supplier's guarantees in a manner acceptable to NPC, who shall be entitled to reject any work or material which in his judgment is not in full accordance therewith.

The Contractor/Supplier shall conduct actual inspection at both sites and thoroughly investigate and familiarize himself with all the conditions at site, make assessment on the physical conditions and configurations of the existing building equipment and auxiliaries to be transferred, 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/Supplier and no additional payment thereof shall be made by NPC.

The Contractor/Supplier shall furnish all supervision, labor, materials, supplies, tools and equipment to complete all the Mechanical Works.

The Contractor/Supplier 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/Supplier deemed required or necessary to complete the works shall be included in the bid proposal.

The scope of works under this project shall generally consist of the following:

- a. Packing/crating, Transportation, Hauling, Assembling, Installation, and Assistance to Testing of all Mechanical Equipment and Systems' Auxiliaries and other accessories to be transferred including but not limited to:

- a.1 Two (2) sets of 50 kW Modular Diesel Gensets and its systems' auxiliaries – **FOR CALUTCOT DPP**

Make	: SAONON
Model	: S100EPS6(S)
Alternator	: UC1224D (Stamford)
Engine	: 1104A-44TG2 (Perkins)
Rating	: 480 V, 3Ø
Enclosure Dimension (m)	: 2.3 x 1.133 x 1.376
Weight	: 1,597 kg.

- a.2 One (1) set of 50 kW and one (1) set of 30 kW Modular Diesel Gensets and its systems' auxiliaries – **FOR BUTAWANAN DPP**

50 KW GENSET	30 KW GENSET
Make : SAONON	Make : SAONON
Model : S100EPS6(S)	Model : S60EP6 (S)
Engine : 1104A-44TG2 (Perkins)	Engine : 1104A-44TG1 (Perkins)
Alternator : UC1224D (Stamford)	Alternator : PI144G (Stamford)
Rating : 480 V, 3Ø	Rating : 480 V, 3Ø
Dimension (m): 2.3 x 1.133 x 1.376	Dimension (m): 2.3 x 1.133 x 1.376
Weight : 1,597 kg.	Weight: 1,484 kg.

- a.3 Spare Parts for Four (4) Genset

ITEM	EQUIPMENT	QTY
1	Air Filter – 26510342	24 pcs.
2	Lube Oil Filter – 2654407	120 pcs.
3	Fuel oil Filter Element – 4816636	60 pcs.
4	Water Filter Element – 4415122	24 pcs.
5	Fan Belt - 2614B655	14 pcs.
6	Fuel Injector Assembly - 2645K022	8 pcs
7	Top Overhauling Kit - U5LT0357	4 pcs
8	Jacket Water Pump Repair Kit - U5MW0206	4 sets
9	Lube Oil Pump Repair Kit - T414941	4 sets
10	Fan Adaptor and Accessories - 2485C546	8 sets
11	Exhaust Manifold Bellow - 3778E401	4 sets
12	Magnetic Pickup - 2868A006	4 sets

- b. Supply, delivery, install and test including painting of all materials and equipment but not limited to the following:
- b.1 Supply, installation and test of Fuel Oil System consisting of two (2) 1000 Liters fuel day tank complete with manhole, inlet and outlet nozzle, nozzles for vent, overflow, drain and level gauge/switch and structural supports; including two (2) 50 l/min double acting rotary type hand pumps complete with fittings connections including flexible hoses - **Per Site**;
- b.2 One (1) lot of Well Drilling Works consisting of casing installation, well development, pumping test and disinfection including supply and installation of hand pumps complete with accessories- **Per Site**;
- b.3 One (1) lot of Domestic Water Supply System consisting of 0.6 m3 Elevated Water Tank, pipes, valves, pipe fittings, gaskets, flanges, pipe supports, excavation and backfilling of embedded pipes and other pipe accessories including disinfection of the system- **Per Site**;

- b.4 One (1) unit Window Type Air Conditioner (Inverter), 16,000 kJ/hr minimum cooling capacity for control house and One (1) unit of Wall mounted Exhaust Fan for toilet, 100 m<sup>3</sup>/h minimum capacity, propeller type, direct motor driven, 220V, 60 hz, 1-phase power supply for all air conditioning and ventilation units, all complete with mounting accessories and controls- **Per Site**;
- b.5 Two (2) units Portable Type Fire Extinguishers, Clean Agent (HCFC or Halotron I Type), 7.1 kg. (15.5 lbs), non-expiry, multi shots, wall-hung and UL/FM approved- **Per Site**
- b.6 One (1) lot Fuel Oil Piping System complete with valves, strainers, pipe and fittings, gaskets, flanges, bolts and nuts, pipe supports and other required accessories to complete the piping systems for the fuel oil unloading, transfer of fuel oil from fuel source to day tanks including double acting rotary type hand pumps, day tanks to and from diesel gensets, waste water/oil from container drain pit to oil water separator including necessary excavation, backfilling and asphalt jute application to embedded pipes- **Per Site**;
- b.7 Assistance to test and commissioning;
- b.8 Painting Materials to be applied to all equipment, pipes, steel structures, tanks, pipe supports and other incidentals;
- b.9 Labels or Standard Plant Identification Number (SPIN) for all equipment, valves, piping and instruments supplied; and
- b.10 All other works and services including those are not specifically detailed herein but are required to fully complete the project.

The Contractor/Supplier shall carefully store and maintain all equipment and materials transported to designated sites, if not immediately assembled/installed, including Balance of Plant to be supplied by Contractor/Supplier until such time as they are required/installed at their designated locations. The Contractor/Supplier shall provide temporary shelter/cover such as tarpaulin or equivalent type of cover for protection of the equipment during the storage.

The Contractor/Supplier shall secure insurance against loss or damage incidental to hauling/transportation, reassembly, and erection/installation of all plant equipment to be relocated.

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

The requirements specified herein shall apply to all equipment and materials to be transferred from SPUG-LOD Minuyan-Warehouse, San Jose Del Monte, Bulacan to Calutcot, Burdeos, Quezon and Butawan, Siruma, Camarines Sur and those to be supplied by the Contractor/Supplier.

The Contractor/Supplier shall provide the services of qualified engineers who shall be responsible for the transfer; assembly; erection/installation; final alignment; and assistance to start-up, testing, and commissioning of all relocated/transferred equipment including those to be supplied by the Contractor/Supplier.

The work shall be performed and completed in a 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/Supplier, 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/Supplier 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/Supplier 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/Supplier'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/Supplier under this contract shall be submitted by the Contractor/Supplier for NPC's review and approval prior to fabrication.

From the commencement of the works until the date of Final Completion, the Contractor/Supplier will be fully responsible for the care of the works and all materials and equipment, whether supplied by the Contractor/Supplier 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/Supplier, the Contractor/Supplier 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 Inventory**

Immediately upon effectivity of the Contract, NPC and the Contractor/Supplier or their authorized representatives, shall jointly take a physical inventory of all equipment and materials including its associated structures, consumable goods, spare parts, tools and other inventory items to be repacked, transported and installed to the new locations.

The Contractor/Supplier shall prepare a checklist to record the physical inventory of the equipment and materials which shall be signed by authorized NPC and Contractor/Supplier representatives present during the inventory.

The weight and physical characteristics of the equipment to be transferred are based on the available data taken from the corresponding nameplates. It shall be the responsibility of the Contractor/Supplier to verify the specified data and make actual assessment of the equipment at the sites particularly on the quantity, physical conditions or appearance and, weight and dimensional requirements.

Completeness of the equipment's controls and accessories including sizes and dimensions and rating shall be verified during the site inspection. Any missing and/or lacking in measure or quantity of items/equipment shall be supplied by the Contractor/Supplier.

### **MW-3.2.3 Mechanical Equipment and Auxiliaries/Accessories**

All mechanical equipment/components and its associated structures which shall be hauled, transported, re-assembled, installed, assistance to testing and commissioning by the Contractor/Supplier are enumerated and described in this section.

The Contractor/Supplier shall supply all equipment and materials which are damaged, missing or lacking in required quantity.

Prior to submission of Bids, the Contractor/Supplier shall make a visual inspection of the all equipment and materials to be transferred in coordination with NPC. It shall be the responsibility of the Contractor/Supplier to verify the specified physical characteristics, make actual assessment particularly on the quantity, physical conditions or appearance and dimensional requirements.

All necessary equipment, materials, and devices, although not listed and/or described herein but are parts of the plant and required for the safe and reliable operation of the plant, shall be included in the scope of works.

The physical, dimensional characteristics and specifications of equipment to be transferred are based on the available data taken from the corresponding nameplates and actual measurements. It shall be the responsibility of the Contractor/Supplier to verify the specified data and make actual assessment of the equipment at the sites particularly on the quantity, physical conditions or appearance and dimensional requirements.

### **MW-3.2.3 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-3.4 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/Supplier 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/Supplier 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/Supplier 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/Supplier 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/Supplier 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 piping systems for the transferred generating sets and its auxiliaries shall be installed as shown on the drawings.

The Contractor/Supplier 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. Such modifications shall be reflected/incorporated in the as-built drawings which shall be submitted by the Contractor for NPC review and final approval.

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/Supplier 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/Supplier in a manner satisfactory to NPC or shall be replaced by and at the expense of the Contractor/Supplier. 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/cm<sup>2</sup>.

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/Supplier at its own expense.

The Contractor/Supplier 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/Supplier 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/Supplier 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/Supplier.

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 below 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/Supplier'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/Supplier 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/Supplier 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 above 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 above 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 below 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 or as specified in relevant sections of this specification.

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 Drives and Gears**

All moving parts of machinery including shafts, couplings, collars, projecting key heads, gear wheels, rope/belt-drives shall be completely guarded to provide full protection. All set screws on revolving shafts shall be countersunk or suitably protected. The guards shall be of approved design and shall be fitted, where necessary, with inspection doors/openings. All guards shall be arranged so that they can be removed without disturbing the parts of the gears and equipment which they protect.

Where practicable gear wheels shall be forced fit on the shaft and in addition, shall be keyed adequately to prevent any relative motion between the wheel and shaft. Where gears and couplings are secured in position by means of keys, they shall be accessible for tightening or removal. All keyways shall be machine cut. Couplings and collars shall be the shrouded or protected-type, free from projections of any kind.

All bearings shall be mounted in dustproof housings. Base of bearing supports shall be machined and shall rest on machined-surfaces.

### **MW-4.0 EQUIPMENT MARKING, LABELING AND MISCELLANEOUS REQUIREMENTS**

#### **MW-4.1 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.

**MW-4.1.1 Equipment for Relocation**

Prior to relocation, the Contractor/Supplier shall ensure and verify that all equipment, valves, piping, panels, cables, instruments and its associated structures and components still contain the original tagging or identification number that will be used as reference to facilitate re-assembly, wiring termination and erection/installation at the new site. As an alternative, proper marking shall be provided to conform with those shown on the drawings or material lists or other marking recommended by the Contractor/Supplier and approved by the NPC.

**MW-4.1.2 Equipment to be Supplied by the Contractor/Supplier**

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/Supplier 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-4.2 Nameplates**

All equipment and auxiliaries to be supplied by the Contractor/Supplier 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-4.3 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-4.4 Tag Numbers/Standard Plant Identification Number (SPIN)**

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

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/Supplier shall assign a number subject to the approval of NPC.

**MW-4.5 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-4.6 Locks**

Where locks are called for in the Specification, they shall be of the barrel type. Whenever possible, they shall be incorporated in the appropriate door handle. Padlocks will be acceptable on valves and are preferred for all outdoor equipment.

In general, all locks shall be supplied with three keys, and all locks and keys are to be non-interchangeable. However, in the case of an electric switchboard containing a number of lockable doors, all locks shall be operated by one key. In all other cases where a set of locks is provided under any section of the equipment, a group master key shall also be supplied. Where a group of locks is supplied under any part of the Contract, a key cabinet is to be supplied for the accommodation of all padlocks and/or keys while not in use. Padlocks and keys are to be engraved with a suitable identifying code or inscription and this is to be repeated in the cabinet on engraved labels.

**MW-4.7 Guards**

Guards shall be provided for coupling, drive shafts, fans, etc. These shall comply with ANSI Standard B15.1, Safety Code for Mechanical Power Transmission Apparatus.

**MW-4.8 Lifting Lugs**

Lifting lugs or points where lifting lugs supplied can be attached to each item of equipment or component which requires to be removed for servicing and which weighs more than 20 kg shall be adequately provided.

**MW-5.0 PACKING, CRATING, HAULING AND INSTALLATION****MW-5.1 General**

Generally, the equipment, materials and associated steel structures to be transported/hailed, re-assembly and installation shall come from the NPC SPUG-LOD Warehouse, Minuyan, San Jose Del Monte, Bulacan. The Contractor/Supplier shall furnish all necessary plant, equipment, tools and labor to execute the relocation works.

NPC shall make available and provide access to the site for the repacking/crating activities of the Contractor/Supplier. After contract award and prior, the Contractor/Supplier shall submit relocation schedule and methodology or work program for review and approval of the NPC. Preparation of the schedule shall be closely coordinate with NPC Plant Management in consideration to priority generating units to be relocated. The work program shall include detailed procedure for all plant equipment and its associated steel structures such as Diesel Generating Sets, tanks, piping, electrical equipment, cables, panels, transformers, etc. The dismantling procedures shall comply with safety standards, existing environmental laws, rules, and regulations.

The Contractor/Supplier shall submit after the award of contract the general procedure or overall work program covering the crating, hauling, transporting and temporary storage of all equipment and materials to be transferred including disposal works within the new locations.

All works shall be properly coordinated with other fields and with existing installations, structures, piping, and equipment so that interference shall be avoided.

Any discrepancy between the unit quantity of material inventory conducted and actual unit quantity certified received by NPC representative/s for purposes of payment under the Contract shall be considered losses and therefore charged as Materials Accountability of the Contractor/Supplier where the cost of materials damaged or lost shall be based on the current price of the latest contract award of NPC.

Defects and damages to the equipment resulting from faulty re-assembly and installation works by the Contractor/Supplier shall be repaired and corrected at no cost to NPC.

Final adjustments in the location of any other equipment, if necessary, shall be done in the field by the Contractor/Supplier during installation with prior approval of the NPC.

Special tools, devices and instruments specifically designed and manufactured for the components of transferred equipment shall be made available to the Contractor/Supplier by NPC. The Contractor/Supplier shall return the same in good condition after use who shall be responsible for their safekeeping. In case of failure to return the tools, instruments or devices and equipment, their value shall be debited to the Contractor/Supplier's account.

The Contractor/Supplier shall submit for NPC's review and approval the installation schedule and program showing all the details prior to the erection/installations in accordance with the manufacturer's procedures and standards.

#### **MW-5.2 Scope of Work**

The Contractor/Supplier's scope of work shall cover the hauling/transporting, re-assembly, installation/erection, assistance to test and commissioning of all transferred mechanical equipment, materials and associated auxiliaries as specified in Clause MW-2.0 of this specification.

The Contractor/Supplier shall furnish all equipment, materials, labor, tools, scaffoldings and other necessary appurtenances whether or not specifically mentioned in this specification or shown on the accompanying drawings but are deemed necessary to complete the work.

The layout/arrangement of transferred mechanical equipment and associated auxiliaries shall be as shown on the bid drawings. The Contractor/Supplier shall supply all the required piping materials pipe fittings, pipe supports/racks, etc. to complete the works.

The Contractor/Supplier shall supply all materials/parts that will be damaged during transfer works including those that are lacking in measure or quantity. It shall include, but not limited to replacement bolts, including anchor bolts for Diesel Gen-Sets and Auxiliary Equipment; nuts; screws; piping materials; instruments and gauges; and other necessary appurtenances to complete the work called for and to provide a safe, efficient, and reliable operation of each equipment and system.

All replacement and additional materials/parts to be supplied by the Contractor/Supplier shall match the specifications of the original ones. In case of difficulty in procuring such materials/parts, the Contractor/Supplier may supply a different specification provided that such will guarantee a quality not inferior to the original and with prior approval of the NPC.

All transferred equipment and materials shall be painted by the Contractor/Supplier.

The Contractor/Supplier shall assist NPC in conducting all the tests required for the transferred equipment during the pre-commissioning/site commissioning tests. The Contractor/Supplier shall perform any repair or adjustment resulting from faulty re-assembly and re-installation works at no cost to NPC.

The Contractor/Supplier shall provide temporary shelter/cover for all transferred equipment and materials shall be stored by the Contractor/Supplier at the temporary storage yard to be designated by NPC within the new plant site by the Contractor/Supplier.

The Contractor/Supplier shall maintain a well-guarded and secured area, as designated by the NPC, for all dismantled equipment and materials to avoid pilferage.

### **MW-5.3 Preparation**

The Contractor/Supplier shall prepare materials and equipment for shipment to protect it from damage during shipment/transport and subsequent storage.

All packaging or crating shall be suitable for long term outdoor storage on or off the ground.

All equipment, accessories and associated structures shall be properly and carefully packed/crated, as applicable, including any equipment and materials to be supplied by the Contractor/Supplier.

All openings and machined surfaces shall be provided with protection to prevent damage, corrosion and entrance of foreign matter during shipment and storage.

Flanged connections shall be protected by a ½ inch (15 mm) or thicker plywood disc, or suitable alternate, bolted to the face of the flange.

Threaded or socket weld connections shall be protected with screwed or snap on type and securely held plastic protectors. Cast-iron plugs are not acceptable for protection unless part of the permanent assembly.

Butt weld connections shall be protected by wooden disks that cover the entire weld end area and shall be secured by metal straps and fasteners. Covers, straps or fasteners shall not be welded to equipment.

Equipment shall be adequately supported for shipment. All loose parts shall be crated or boxed for shipment and appropriately identified. Where shipment is braced internally, it shall be marked conspicuously, "Remove internal braces before testing and operating".

All large and heavy shipping units shall have suitable skids for moving. Crating shall also be adequate for lifting with slings. If location of slings is critical, these locations shall be marked accordingly.

As the shipment or transported equipment/materials may be left in open temporary storage at the designated place, the Contractor/Supplier shall ensure that the delivered items have appropriate protection from water and other elements such as temporary shelter/cover/tarpauline or equivalent type of cover for protection.

All delicate electrical and mechanical parts susceptible to damage from moisture shall be packed in hermetically sealed container or other approved containers within their packing cases, with all machined surfaces coated with a rust preventive compound. All sealed packages shall include bags of silica or equally moisture absorbing chemical. When electric space heaters are provided for that purpose, these should be wired to the outside of the equipment so that energization immediately upon receipt is possible without disassembly of crates, etc. This also requires that no combustible material will be left in the inside of the equipment.

All equipment belonging to the same system/skid shall be properly marked and packed in the same crate, where practicable. The Contractor/Supplier shall not mix equipment and parts of one system with another to avoid confusion during re-assembly.

Valves including its bolts, nuts, gaskets and washers shall be segregately packed and properly marked according to plant system, size and number of pieces.

All temperature gauges, pressure gauges, switches, transmitters and other instruments shall be properly marked and carefully packed so as not to break the associated glass and undue damage to the threaded portion.

All spare parts shall be packed in a sealed container including special and standard tools in their separate sealed toolboxes.

All packages, crate boxes, drums, bags, bundles, or other containers or any loose pieces shall carry the following identification marks on the two (2) sides in black with a stencil-proof ink or paint by means of block letters not less than 30 mm high; i.e.



NATIONAL POWER CORPORATION

CONTRACT NO.	:	_____
ITEM NO.	:	_____
PORT OF DISCHARGE	:	_____
DESCRIPTION	:	_____
OF CONTENT	:	_____
NET WEIGHT	:	_____ kgs.
GROSS WEIGHT	:	_____ kgs.
DIMENSION	:	_____ m <sup>3</sup>
CRATE NO.	:	_____



All packages shall be forwarded with a copy of packing list placed inside the package and another copy thereof contained in a waterproof envelope placed outside the package. The packing list shall give all information on the package such as package no., packing appearance, net weight, gross weight, dimension, measurement, and description of the equipment including storage and handling instructions with descriptions for periodic inspection and/or storage maintenance to ascertain that no deterioration will occur during storage.

Prior to shipment/transport, the Contractor/Supplier shall furnish advance copies of all non-negotiable shipping documents, invoices, packing lists and other pertinent documents.

The Contractor/Supplier shall employ methods that will warrant safe delivery of equipment to its ultimate destination, with careful consideration given to the type of commodity, method of transportation, destination, storage time, and storage facilities at point of destination.

#### **MW-5.4 Shipment/Transport**

The Contractor/Supplier shall be responsible for the sea and land transportation of the plant equipment, materials and supplies required under this Specification and shall ensure that they are safely and timely delivered to the specified site. Contractor/Supplier shall be deemed to have visited the sites and other areas on the route of delivery, including port facilities, inter-island shipping facilities, island transport, access roads, bridges, and to have acquainted themselves with all factors that will affect the cost of shipping and freight to Site.

Any damages to the roads, bridges, railways if any, etc. arising out of neglect of Contractor/Supplier shall be the responsibility of the Contractor/Supplier. Likewise, any additional claim attributable to Contractor/Supplier's lack of knowledge or understanding on existing conditions of the site shall not be given due credence.

Upon arrival of equipment and materials at site, NPC and the Contractor/Supplier or their authorized representatives shall jointly verify the plant equipment to be stored at site following the steps below:

- a) Inspection and verification of the packing list;
- b) Visual inspection of the condition of the packing and its surfaces; and
- c) Partial opening of the crates and plastic sheet protection of the plant auxiliary equipment and diesel generating sets to verify the content and its physical condition and to check pilferage or damage during shipment and storage.

A record shall be prepared carefully noting all eventual shortage, defects or damages, signed by the Contractor/Supplier and concurred by NPC. All shortages and damages noted shall be immediately replaced by the Contractor/Supplier at his own cost and shall ensure the timely delivery of replacement without affecting the agreed overall project implementation schedule. The Contractor/Supplier shall be responsible for the care and custody of the equipment from storage until erection.

The Contractor/Supplier shall keep a proper store ledger carefully noting all movements of materials within the project site. NPC has the right of access to the ledger, which shall be kept by the Contractor/Supplier on site at all times.

The Contractor/Supplier shall ship/transport the required equipment and materials on clear commercial bill of lading and the cost of all freight, insurance, shipping, handling and road transport charges, as applicable, shall be included in the Bid Price.

#### **MW-5.5 Storage**

If the dismantled equipment and materials including those to be supplied by the Contractor/Supplier will not be immediately required for installation at the site, the materials and equipment shall be carefully stored and maintained at such place and in such a manner as NPC may direct until such time as they are ready for installation/erection. The Contractor/Supplier shall provide temporary shelter/cover such as tarpauline or equivalent type of cover for protection of the equipment during the storage.

The Contractor/Supplier shall be responsible for securing all his supplied and transferred equipment at a place designated by NPC until the completion of the erection/installation, testing and commissioning of the Plant.

Any loss and/or damage of said equipment at said storage area shall be the responsibility of the Contractor/Supplier.

If the Contractor/Supplier desires to use any storage area outside property at the respective sites, he may do so at his own expense and subject to the approval of NPC.

#### **MW-5.6 Erection and Installation Requirements**

All dismantled materials, electro-mechanical equipment and associated structures which are transported to the new site of Guintarcan DPP shall be reassembled, re-erected, installed, tested and commissioned in accordance with the manufacturer's drawings, instruction manuals, and drawings provided thereto including all equipment and materials to be supplied by the Contractor/Supplier under this Contract. In the event of conflict within these documents, the Contractor/Supplier shall inform NPC of the conflict in writing for written resolution prior to the execution of the Work.

Materials and equipment shall be handled with care at all times to prevent damage and defects during handling, hauling, packing/crating, loading, transportation, unloading, assembly/re-assembly, erection/re-erection and any such damage and defects shall be repaired, replaced or otherwise make good by the Contractor/Supplier to the satisfaction of and at no cost to NPC.

Assembly, erection and installation of all materials, equipment and its associated structures shall be carried out by skilled and qualified personnel with special training and experience in the appropriate trade.

During installation, the Contractor/Supplier shall provide adequate lifting gears and other protective devices that may be required to prevent damage to the equipment during and after erection. The Contractor/Supplier shall be responsible for the correct positioning and leveling of the equipment and auxiliaries, and any checking made by NPC during the course of the work shall not relieve the Contractor/Supplier from his responsibility. The equipment shall be carefully lifted or glided on their respective foundations by using only approved methods and devices on a manner that will prevent damage during erection/installation. They shall be positioned on locations as shown on the drawings.

The equipment shall be set level and checked true to grade and alignment before final grouting. Foundation bolts/bed plates of the number and sizes required shall be supplied and installed by the Contractor/Supplier. The cost of which shall be included in the cost for the installation of respective equipment. Transferred equipment whose foundation/anchor bolts were no longer retrieved shall be supplied and shall be installed by the Contractor/Supplier.

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

Welding works for structural steels and piping system shall be by an electric arc process. The procedure, testing and inspection shall conform generally with the relevant approved standards and to the approval of NPC. Weld joint preparations shall be in accordance with approved standard and to NPC's approval. Approval of the welding procedure, etc. shall not relieve the Contractor/Supplier of his responsibility for correct welding, electrodes and for minimizing distortion in the finished structure and piping systems.

Re-assembly, re-erection and re-installation of all transferred materials, equipment and its associated structures shall be carried out by skilled and qualified personnel and in accordance with the manufacturer's recommended instructions and standard engineering practice.

The layout/arrangement of all transferred and relocated mechanical equipment and associated auxiliaries shall be as shown on the bid drawings.

Any transferred equipment which are not indicated in the drawings shall be installed by the Contractor/Supplier as directed by NPC.

The Contractor/Supplier shall submit for NPC's review and approval the erection schedule and program showing all the details prior to the erection/installations in accordance with the manufacturer's procedures and standards.

Final adjustments in the location of any other equipment, if necessary, shall be done in the field by the Contractor/Supplier during installation with prior approval of the NPC.

Special tools, devices and instruments specifically designed and manufactured for the components of transferred equipment shall be made available to the Contractor/Supplier by NPC. The Contractor/Supplier shall return the same in good condition after use who shall be responsible for their safekeeping. In case of failure to return the tools, instruments or devices and equipment, their value shall be debited to the Contractor/Supplier's account.

#### **MW-5.7 Inspection and Field Tests**

The installation/erection works shall be inspected by NPC field inspectors and will keep a strict compliance with the specification and approved drawings. The Contractor/Supplier shall keep a daily record of the activities done and see that the position, level, limits and other reference data are kept in proper order during the implementation works. The Contractor/Supplier shall give due notice to the NPC field inspectors in advance whenever such foundations are available for placement of equipment.

After installation of all the transferred equipment and its associated auxiliaries and accessories, NPC shall conduct test and commissioning with the assistance of the Contractor/Supplier.

#### **MW-5.8 Defects and Damages**

Defects and damages to the equipment including existing equipment and structures resulting from re-assembly, transport/shipment and installation works by the Contractor/Supplier shall be repaired/corrected and/or replaced at no cost to NPC.

#### **MW-5.9 Technical Description of Transferred Equipment**

The mechanical equipment/materials and its associated structures which shall be repacked, hauled, transported, assembled, installed, assistance to testing and commissioning by the Contractor/Supplier are enumerated and described in this section.

The Contractor/Supplier shall supply all equipment and materials which are damaged, missing or lacking in required quantity and those which are not suitable for use on the new site to make the system complete upon its installation in the new sites.

Prior to submission of Bids, the Contractor/Supplier shall make a visual inspection of the plant and all equipment and materials to be transferred in coordination with NPC. It shall be the responsibility of the Contractor/Supplier to verify the specified weight and physical characteristics, make actual assessment particularly on the quantity, physical conditions or appearance and dimensional requirements.

All necessary equipment, materials, and devices, although not listed and/or described herein but are parts of the plant and required for the safe and reliable operation of the plant, shall be included in the scope of works

## **MW-6.0 FUEL OIL SUPPLY AND TRANSFER SYSTEM**

### **MW-6.1 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/Supplier under the Balance-of-Plant (BOP). The system shall comprise of fuel oil unloading and transfer facilities including its associated equipment and accessories to complete the system requirements of the new 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) Four (4) sets of Fuel Oil Day Tanks with a capacity of 1.0 m<sup>3</sup> each complete with manhole, inlet and outlet nozzles, nozzles for vent, overflow, drain and level gauge/switch, and structural supports;
- b) One (1) lot Fuel Oil Piping System complete with valves, strainers, pipe and fittings, gaskets, flanges, bolts and nuts, pipe supports and other required accessories to complete the piping systems for the fuel oil unloading, transfer of fuel oil from drums to day tanks, including four (4) double acting rotary hand pumps rated at 50 l/m and 10 m discharge head, day tanks to and from diesel gensets including fuel oil storage tank's overflow and drain to oil water separator, waste water/oil from powerhouse drain pit to oil water separator including necessary excavation, backfilling and asphalt jute application to embedded pipes.

### **MW-6.2 Fuel Oil Storage Tank (Not Included)**

### **MW-6.3 Fuel Oil Unloading Pump (Not Included)**

**MW-6.4 Fuel Day Tank**

The fuel oil day tank shall have a minimum capacity of 1,000 liters and shall be shop-fabricated, all welded construction, rectangular shape and shall be designed and constructed in accordance with the requirements of applicable standards complete with manholes, inlet and outlet nozzles, nozzles for vent, overflow, drain and level gauge/switches. Included in the supply of fuel oil day tank are its structural steel supports with sufficient height as required by the diesel engine fuel system or as recommended by the engine manufacturer. The tank material shall be of carbon steel conforming to ASTM A36 or approved equal with minimum shell thickness of 5 mm. Nozzles shall be fitted with flanges, raised face conforming to ANSI B16.5. The supply shall include all the necessary materials for fixing and installation.

The tank shall be provided with an interior and exterior coating. For internal surfaces, 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 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 DFT of intermediate chlorinated rubber shall be applied and 80 microns DFT chlorinated rubber topcoat as final coat. Refer to relevant Civil Works specifications and drawings for details of concrete foundation and supporting steel structures.

Inspection of 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.

Tank tightness shall be tested by filling the tank with water and inspected frequently during the filling operation. Filling of water shall be up to the point above the overflow nozzle. Traces of leakages shall be determined for at least one (1) day while the tank is filled with water.

Inspection of 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.

Tank tightness shall be tested by filling the tank with water and inspected frequently during the filling operation. Filling of water shall be up to the point above the overflow nozzle. Traces of leakages shall be determined for at least one (1) day while the tank is filled with water.

**MW-6.5 Double Acting Rotary Hand Pump**

The Supplier shall supply, deliver, install and test four (4) sets of double acting rotary hand (1 set to be installed per fuel day tank). The pump shall have a capacity of not less than 50 liters per minute @ 10 m discharge head and shall be used for the transfer of fuel oil to the fuel oil day tank from a fuel storage drum as necessary.

The pump shall be heavy duty cast iron construction with brass internals fitted with easy clean wire screen, easy dispensing through anti-static neoprene rubber hose, with telescopic suction tube, adjusted to fit 50 mm diameter to 210 liters drum. Necessary fitting connections including flexible hose shall be provided. Flexible hose shall be oil resistant and made of synthetic rubber tube reinforced spiral-ply synthetic fabric with wire helix.

## **MW-6.6 Piping, Valves, Fittings and Accessories**

### **MW-6.6.1 Scope of Work**

The Supplier 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 flexible hose at fuel rotary hand pump inlet, and from fuel oil day tanks to respective diesel engines.

Waste Oil/Water shall consist of piping interconnections from drain pits in the Generating sets' area to the oil-water separator as shown on the relevant works drawings.

### **MW-6.6.2 Piping**

Fuel oil piping shall be constructed from ASTM A53 Gr. B, seamless pipe, 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 or otherwise permitted or approved by NPC.

Fuel oil piping in the fuel oil day tanks' area shall generally be installed above ground. All other fuel oil piping shall be installed either above ground or underground or as directed by NPC. Fuel piping installed underground shall generally 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 other corrosion protection method as approved by NPC. 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 in conformance with manufacturer's recommendation. 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 compatible 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-6.6.3 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 below. All valves shall have flanged ends with a rating of not less than Class 150. 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-6.6.4 Strainers**

Strainers shall be of basket type with cast iron body and flanged ends or as specified in the relevant specifications. Body drain and vent connections shall be included. Drain plugs shall be threaded. Screen elements shall be of stainless steel construction with minimum 32-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-6.6.5 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-6.6.7 Testing**

The assembled piping and valves shall be hydrostatically tested at 1.5 times the design pressure for a minimum of 30 minutes. During the test, valves shall be opened and closed. Any leakage or any defect disclosed by the tests shall be corrected and repaired by the Supplier at his own expense to the satisfaction of NPC.

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.

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 Supplier at his own expense to the satisfaction of NPC.

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.

**MW-6.6.8 Painting**

All steel piping installed outdoors and indoors shall be primed 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 two (2) coats of coal tar epoxy polyamide of 170 microns DFT each coat and finally wrapped with 6mm thickness asphalt jute.

Painting for waste oil/water uPVC piping is not required unless otherwise directed by NPC.

Final color for Fuel Oil piping and associated valves installed above ground shall conform to Munsell No. 7.5R 3/12.

**MW-7.0 DOMESTIC WATER SUPPLY SYSTEM****MW-7.1 General**

This section provides the essential information for the design, supply, installation, construction, test and commissioning of the complete Domestic Water Supply System to provide the water requirement including the required excavation and backfilling of pipe trenches.

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

- a) One (1) lot of Drilling, Casing Installation, Well Development, Well Disinfection;
- b) One (1) set of Shallow Well Hand Pump complete with controls, instrumentation and necessary accessories;
- c) One (1) lot of Elevated Water Storage Tank complete with accessories; and
- d) One (1) lot of Piping, Valves, and Fittings including the required excavation and backfill.

**MW-7.2 Drilling, Developing and Testing of Deep Well****MW-7.2.1 General**

The Contractor/Supplier shall furnish labor, materials, and equipment and perform all operations in connection with the drilling, placing of casing, development and disinfection of the deep well which shall be drilled to an appropriate size and depth.

Depth of well shall be approximately 15m or at a water level suitable for drinking purposes. The Contractor/Supplier shall be responsible for the geological/ground water study as to where the well will be drilled taking into consideration the location of the Elevated Water Storage Tank shown on the drawing.

**MW-7.2.2 Drilling**

Drilling of the deep well shall be done by an appropriate method most suited to the conditions of the deep well site to be drilled. When necessary, temporary casing shall be used in sections in the hole through over burden or unstable materials to prevent casing-in of the well.

**MW-7.2.3 Well Completion and Development**

The Supplier shall develop the well by an appropriate method most suited for the conditions of the well site and placing ready for installation of the Jetmatic Hand Pump.

The Supplier shall undertake all operations pertaining to completion and development of the well which shall consist of installation of casing, installing well screen in a sand and gravel formation, developing toe water bearing, surging and back washing.

All permanent casing materials shall be new. The well casing to be installed shall be 50mm Ø GI steel pipe, while the pump's suction pipe is 32mm Ø steel pipe conforming to ASTM A 53 seamless hot dip galvanized, schedule 40 pipe. Opening of the well screens shall have dimension to avoid the sediments to pass into the well and shall be designated to prevent clogging and shall be free from jogged edges, irregularities, etc. that will accelerate clogging or corrosion.

After the completion of well construction, the well shall be thoroughly cleaned of all foreign substances including tools, timbers, rope, debris of any kind, cement, oil, grease and scum. The casing pipe shall be thoroughly sabbed using alkalis, if necessary, to remove oil and grease.

Sterilization of the well is done by pouring a solution of 0.46 kg (1 pound) of calcium hypochlorite in 38 liters (10 gals) of water.

#### **MW-7.2.4 Submittal**

The Contractor/Supplier shall submit to NPC the complete installation details prior to start of works and the complete well-drawdown test results upon completion of the drilling.

#### **MW-7.3 Pump**

The scope of work shall cover the supply, delivery, installation at the well platform and test of two (2) units of shallow well hand pump complete with brass foot valve, stainless steel screen with 5mm Ø slots, associated valves, flanges, bolts, nuts and other accessories necessary for the safe and reliable operation of the domestic water supply system.

The shallow well hand pump shall have a minimum discharge capacity of 0.455 m<sup>3</sup>/h (2 gpm) and capable of lifting water at a minimum depth of 7.6 m. The hand pump shall be reciprocating type and made of cast iron.

The pump shall be complete with necessary fittings and accessories to provide the safe and reliable operation of the pumping system.

The following documents shall be submitted by the Supplier for NPC's review and approval.

- a) Technical data, specifications and catalogues;
- b) Outline, assembly and installation drawings showing all the dimensions; and
- c) Operation and maintenance manuals

**MW-7.5 Water Storage Tank**

The Supplier shall supply, deliver, install and test two (2) sets of water storage tank. The water storage tank shall have a minimum capacity of 600 liters and shall be of triple layer polyethylene type. The water storage tank shall be complete with manhole, inlet and outlet nozzles with valves, overflow pipe, strainer, drain nozzle with valve, level switch nozzle with plug (for future use), pipe supports, access ladder and supporting steel structures.

Tank foundation and supporting steel structures shall be in accordance with requirements of relevant Civil Works specifications and drawings.

**MW-7.5 Piping, Valves and Fittings**

Domestic water supply and distribution piping shall be constructed from Unplasticized Polyvinyl Chloride (*uPVC*) pipe, schedule 80 or class 150, conforming to ASTM D-1784 or approved equivalent.

Gate valves, 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. Check valves shall be of swing type, cast bronze and with screwed ends. Valves of all sizes shall have a rating of not less Class 150.

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

**MW-7.6 Testing**

After installation of the equipment, the Supplier shall perform necessary tests at site to determine its compliance with the requirements of the specifications. All costs for testing shall be borne by the Supplier.

**MW-7.6.1 Pumps**

The pump shall be subjected to site 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.

**MW-7.6.2 Water Storage Tank**

Upon completion of the tank, it shall be filled with water at a proper pressure to fill the tank to the maximum water level. The water shall remain in the tank for at least twenty-four (24) hours after which observations for leaks and other defects shall be made.

All defects shall be corrected by the Supplier to the satisfaction of NPC before final acceptance of the work is made. Any leakage that is disclosed in the test shall be repaired by the Supplier.

All equipment and appurtenances necessary to carry out the tests and any repair, if required, shall be borne by the Supplier.

**MW-7.6.3 Domestic Water Supply Piping System**

The piping system shall be hydrostatically tested at a pressure of 1.5 times the operating pressure of the system.

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.

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.

**MW-7.7 Disinfecting of Water Storage Tank and Domestic Water Piping System**

The water storage tank and domestic water piping system shall be disinfected after testing and before being put into use. Before disinfections, the tank and piping should be drained, flushed, re-drained and refilled. In refilling, care must be taken to avoid entraining or entrapping air in the tank. 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.

**MW-8.0 AIR CONDITIONING & VENTILATION SYSTEM****MW-8.1 General**

The Contractor/Supplier shall furnish, deliver, install and test the ventilation and air conditioning system 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 240 V, single phase, 60 Hz power supply, otherwise specified.

Refrigerant to be used shall be environment-friendly.

All necessary transformers and electrical materials shall be included in the Contractor/Supplier's supply if power ratings provided are other than the one's specified above.

### MW-8.2 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) Areas to be air-conditioned shall be:

##### c.1 Control Rooms

#### d) Areas to be ventilated shall be:

d.1 Comfort Rooms	-	10 air changes per hour
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### MW-8.3 Schedule of Equipment

#### a) Air-Conditioning Units

Location	Quantity	Cooling Load/Unit	Type
Control Room	Two (2) units	16,000 kJ/hr	Inverter Window Type

#### b) Ventilation Units

Location	Quantity	Rating/Unit	Type
Comfort Room	Two (2) units	100 m <sup>3</sup> /hr	Wall Mounted Exhaust Fan

**MW-8.4 Air-conditioning System****MW-8.4.1 Scope of Work**

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 and electrical outlets shall be included and provided by the Contractor/Supplier including complete system of automatic temperature controls.

All air conditioning units 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
- Gold or blue fin condenser

The type and quantity of air conditioning equipment to be supplied shall be as specified in Clause 7.3 (Schedule of Equipment) or shown on the drawings.

**MW-8.5 Ventilation Units****MW-8.5.1 General**

The Contractor/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-8.5.2 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-8.6 Installation and Painting**

The Wall Mounted Supply & Exhaust Fan and Air Conditioning Unit 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-8.7 Spare Parts**

The Contractor/Supplier shall supply the standard spare parts for one (1) year operation or as recommended by the manufacturer. Spare parts required during the warranty period shall be supplied by the Contractor/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-8.8 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 Contractor/Supplier.

#### **MW-8.9 Submittals**

Prior to purchase and implementation of the works, the Contractor/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

## **MW-9.0 FIRE FIGHTING SYSTEM**

### **MW-9.1 Scope of Work**

The Supplier shall supply the specified number of Underwriter Laboratories/Factory Mutual approved Portable Type Fire Extinguishers complete and ready for operation and shall be installed at their corresponding place of use as specified in the particular specifications and as shown on the drawings.

- a) Two (2) 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; and

### **MW-9.2 Fire Extinguisher**

Fire extinguishers shall be Underwriter Laboratories and/or Factory Mutual approved and of rechargeable cylinder with five (5) years guarantee against leak. 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 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 Supplier at no expense to NPC.

### **MW-9.3 Submittal**

The Supplier shall submit the technical specifications/data and brochures/catalogs of the fire extinguishers for the approval of NPC prior to purchase.

**MW-10.0 MISCELLANEOUS TOOLS, EQUIPMENT AND MATERIALS TO BE SUPPLIED AND DELIVERED PER PLANT**

The Contractor/Supplier shall supply, deliver and install the following equipment, materials and appurtenances which are necessary for the safe and reliable operation of the plant. All equipment and materials to be supplied shall be new and unused. The Contractor/Supplier/Supplier shall submit brochures/technical data prior to supply for approval of NPC. The equipment and materials shall be submitted with the Bid in a form specified in the Bid Form.

The materials listed below will be allocated and delivered to the plant site:

**MW-10.1 Miscellaneous Tools (Per Plant)**

Tools	Qty.
▪ Hoist, hand chain, 2 tons capacity, 3 meters lift	1 Unit
▪ Wrench, combination, 13 pcs/set	1 Set
▪ Wrench, open, 8 pcs/set	1 Set
▪ Wrench box, 7 pcs/set	1 Set
▪ Wrench, socket, 17 pcs/set	1 Set
▪ Wrench, adjustable, chrome vanadium steel, drop forged, fine polished, heavy duty, sizes: 8, 10 & 12"	1 Set
▪ Wrench, pipe, forge steel, heavy duty, sizes: 12 & 14"	1 Set
▪ Wrench, torque, 0-500 Nm	1 Pc
▪ Plier, combination, sizes: 6, 7 & 8"	1 Set
▪ Plier, long nose, sizes: 6 & 8"	1 Set
▪ Screw driver, 6 pcs/set	1 Set
▪ Vise, size 6" swivel type, pre drilled holes for mounting	1 Pc
▪ Caliper, digimatic, measuring range: 0-150mm, accuracy: +/- 0.02mm	1 Pc
▪ Micrometer, outside deviation within: +/- 0.01 mm, heavy duty	1 Pc
▪ Drill, Electric, 13mm hammer drill, 220 V, 60 Hz, 710 W, 3.2a, reversible, with hammer, lock-on button and kit box	1 Pc
▪ Bit, drill, 70 pcs/set, includes 3 position ratcheting hand drive, brad point bits-wood, twist drill bits - metal/wood/plastic/masonry	1 Set
▪ Grinder, angle, heavy duty, 220 V, 60 Hz, 750 W, 1200 rpm, single phase, variable speed	1 Set
▪ Tester, Multi, Digital	1 Pc
▪ Meter, Clamp, Digital	1 Pc
▪ Tester, Megger (0-1000)	1 Pc
▪ Allen Wrench	1 Set
▪ Hammer - ball & claw (2 pcs each type)	1 Set

Tools	Qty.
▪ Filter Wrench	1 Pc
▪ Tongue & Grove Pliers (10")	1 Pc
▪ Precision Screwdrivers (long type)	1 Set
▪ Grease gun	1 Pc.
▪ Locker Cabinet with 6 compartment with lock keys and ball rollers	1 Set
▪ Tool box, heavy duty, 535mm x 250mm x 238 mm (or as required to contain all the standard/special and miscellaneous Tools)	1 Set

**MW-10.2 Miscellaneous Equipment and Materials**

Equipment/Material	Quantity
a. Four Wheel Drum Truck (210 liter capacity)	1 pc.
b. Clock (10" diameter)	1 set
c. Steel Cabinet locker, 90 x 45 x 140 cm galvalum materials	1 set
d. Office Table and Chairs (Standard size table, 3 drawers with lock keys and 2 chairs with roller balls)	1 set
e. Ear muff, fluid filled high attenuation	10 pcs.
f. Lube Oil requirement (for the next lube oil change)	80 liters
g. Flash Light and head light with rechargeable AA battery, halogen bulb,	1 set
h. LED light Automatic Rechargeable Emergency Light	1 set
i. Electricians First Aid Kit (Plastic case filled specifically to meet the needs of the electricians most common injuries – burns, eye irritations, cuts and insect bites) consists of the ff:	1 set
▪ Adhesive bandages, plastic 1 x 3	16 pcs
▪ Burn Ointment 1/8 oz	6 pcs.
▪ Cold Pack, Instant	4 packs
▪ Eye wash Solution, Eye pads & Strips	7 pcs.
▪ Tweezers	4 pcs.
▪ Latex Gloves, Pair	1 box
▪ PVP Iodine Wipes	10 pcs.
▪ Scissors, 4" blunt	1 pcs.
▪ Sting Kill Swabs	4 pack
▪ Triangular Bandage	4 pcs.
▪ First Aide Guide	1 set
j. Diesel Fuel including plastic drum	800 liters

Equipment/Material	Quantity
k. Hard Hat with NPC logo, white color	5 sets
l. Plastic table and 4-chair (monoblock)	1 set

**MW-11.0 GUARANTEE**

The Contractor/Supplier 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/Supplier 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-12.0 MEASUREMENT OF PAYMENT**

Measurement of payment for all works shall be based on the bid price of each item as shown 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.

## **SECTION VI**

# **(PART II - TECHNICAL DATA SHEETS)**

## **MW – MECHANICAL WORKS**

**PART II – TECHNICAL DATA SHEETS****MW – MECHANICAL WORKS****TABLE OF CONTENTS**

<b>SECTION</b>	<b>DESCRIPTION</b>	<b>PAGE</b>
M-1.0	Equipment/Gensets to be Transferred	VI-TDS(MW)-1
M-2.0	Equipment to be Supplied, Installed and Tested by the Contractor	VI-TDS(MW)-2
M-2.1	Domestic Water Supply System	VI-TDS(MW)-2
M-2.2	Fuel Oil Day tank	VI-TDS(MW)-3
M-2.3	Exhaust Fan	VI-TDS(MW)-3
M-2.4	Airconditioning Unit	VI-TDS(MW)-3
M-2.5	Fire Extinguishers	VI-TDS(MW)-3

**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 additional sheets as necessary for any other additional information following 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.

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**M-1.0 EQUIPMENT/GENSETS TO BE TRANSFERRED**

ITEM NO.	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S VERIFIED DATA
M-1.1	<b>FOR CALUTCOT DPP</b>		
M-1.1a	SAONON Modular GenSet and its Accessories	<b>50 kW GENSET (2 UNITS)</b> Model : S100EPS6(S) Engine : 1104A-44TG2 (Perkins) Alternator : UC1224D (Stamford) Rating : 480 V, 3Ø Dimension (m): 2.3 x 1.133 x 1.376 Weight : 1,597 kg.	
M-1.1b	One (1) lot of Spare Parts and Tools	500 kg	
M-1.2	<b>FOR BUTAWANAN DPP</b>		
	SAONON Modular GenSet and its Accessories	<b>50 kW GENSET (1 UNIT)</b> Model : S100EPS6(S) Engine : 1104A-44TG2 (Perkins) Alternator : UC1224D (Stamford) Rating : 480 V, 3Ø Dim (m): 2.3 x 1.133 x 1.376 Weight : 1,597 kg.  <b>30 kW GENSET (1 UNIT)</b> Model : S60EP6 (S) Engine : 1104A-44TG1 (Perkins) Alternator : PI144G (Stamford) Rating : 480 V, 3Ø Dim (m): 2.3 x 1.133 x 1.376 m Weight: 1,484 kg.	
M-1.2b	One (1) lot of Spare Parts and Tools	500 kg	

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**M-2.0 EQUIPMENT TO BE SUPPLIED, INSTALLED AND TESTED BY  
THE CONTRACTOR**

ITEM	DESCRIPTION	UNIT	NPC REQUIREMENT	CONTRACTOR'S DATA
<b>MW-2.2</b>	<b>DOMESTIC WATER SUPPLY</b>			
<b>MW-2.2.1</b>	<b>WATER STORAGE TANK</b>			
MW-2.2.1a	Manufacturer/Fabricator		By Contractor	
MW-2.2.1b	Capacity (Nominal)	liters	600	
MW-2.2.1c	Design Code		By Contractor	
MW-2.2.1d	Quantity	Sets	Two (2)	
MW-2.2.1e	Empty Weight	kg	By Contractor	
MW-2.2.1f	Operating Weight	kg	By Contractor	
MW-2.2.1g	Size (diameter x height x thickness)	m x m x m	By Contractor	
MW-2.2.1h	Materials of Construction		Triple Layer Polyethylene	
MW-2.2.1i	Paint Specifications (if applicable:		Per Specifications	
MW-2.2.1j	Structurals Supports		By Contractor	
<b>MW-2.2.2</b>	<b>JETMATIC HAND PUMP</b>			
MW-2.2.2a	Manufacturer		By Contractor	
MW-2.2.2b	Place of Manufacture		By Contractor	
MW-2.2.2c	Quantity	Sets	Two (2)	
MW-2.2.2d	Type		Reciprocating	
MW-2.2.2e	Pump Capacity	GPM	2	
MW-2.2.2g	Materials:			
	Body		By Contractor	
	Foot Valve		Brass	
	Suction Screen/Strainer		Stainless Steel	

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**M-2.0 EQUIPMENT TO BE SUPPLIED, INSTALLED AND TESTED BY  
THE CONTRACTOR (Cont'd...)**

ITEM	DESCRIPTION	UNIT	NPC REQUIREMENT	CONTRACTOR'S DATA
<b>2.3</b>	<b>FUEL OIL DAY TANK</b>			
2.3.1	Manufacturer		By Contractor	
2.3.2	Model		By Contractor	
2.3.3	Fuel Day Tank Capacity	m <sup>3</sup>	1	
2.3.4	Fuel Day Tank Type (Elevated)		Rectangular or Approved Shape	
2.3.5	Fuel Tank Dimensions (W x L x H)	m	By Supplier	
2.3.6	Fuel Tank Plate Material	ASTM	A 36	
2.3.7	Fuel Tank Shell Thickness	mm	5	
2.3.8	Structural Steel Supports		Included	
<b>2.4</b>	<b>EXHAUST FAN</b>			
2.4.1	Manufacturer		By Contractor	
2.4.2	Model		By Contractor	
	a.1) Air Flow	m <sup>3</sup> /hr	100 (minimum)	
	a.2) Quantity	set	2	
	a.3) Type		Wall Mounted	
	a.4) Dimensions (W x D x H)	mm	By Contractor	
	a.5) Power Consumption	kW	By Contractor	
	a.6) Electrical Ratings	V/Ph/Hz	220/1/60	
<b>2.5</b>	<b>AIRCONDITIONING UNIT</b>			
2.5.1	Manufacturer		By Contractor	
2.5.1	Model		By Contractor	
	a.1) Cooling Capacity	kJ/hr	16,000 minimum	
	a.2) Quantity	sets	2	
	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	
<b>2.6</b>	<b>PORTABLE FIRE EXTINGUISHER</b>			
2.6.1	Manufacturer		By Contractor	
2.6.2	Type		HCFC or Halotron I, Wall Hung	
2.6.3	Quantity	sets	4	
2.6.4	Capacity	kg	7.1	
2.6.5	Approving Authority		UL/FM	

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## SECTION IV

# BILL OF QUANTITIES

## SECTION IV

# **BILL OF QUANTITIES (ARCHITECTURAL WORKS)**

## SECTION IV - BILL OF QUANTITIES

LuzP21Z1311Sc

**ARCHITECTURAL WORKS**  
(2x50kW CALUTCOT DPP)

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
1.0	<b>PREFAB CONTAINER HOUSE (CONTROL HOUSE)</b> Prefabricated Container House including Installation Works: Dimensions: 6m length x 3m width x 2.7m height Flooring: MGO board with linoleum tiles Walls and Roofing : 50mm styrofoam Insulation with oven baked double sided galvanized iron sheet Windows: 4 pcs pvc sliding windows, 1 pc pvc awning window Door: 2pcs aluminum frame with double sided Insulated GI sheet with 50mm Polysyrene insulation Additional: toilet (1.2x1.2) including fixtures and plumbing	furnish & install	Refer to NPC TS & Drawing	lot	1.00	(P_____)	(P_____)
2.0	<b>GUARD POST</b>						
2.1	<b>Wall Finishes</b>						
	a. 150mm thick CHB wall including reinforcements	furnish & lay	Refer to NPC TS & Drawing	sq.m.	9.00	(P_____)	(P_____)
	a. Plain cement plaster finish.	furnish & apply	Refer to NPC TS & Drawing	sq.m.	15.00	(P_____)	(P_____)
2.2	<b>Floor Finishes</b>						
	a. Plain concrete floor finish	furnish & apply	Refer to NPC TS & Drawing	sq.m.	3.00	(P_____)	(P_____)
2.3	<b>Roofing and Blankets</b>						
	a. Roofings: 2.0mm thick Metallic Plastic long span corrugated roofing sheet including stainless steel fasteners, sealants, and 2.0mm thick metallic end flashing.	furnish & install	Refer to NPC TS & Drawing	sq.m.	10.00	(P_____)	(P_____)
	b. Gutter: 2.0mm thick Metallic Plastic Gutter including fasteners, sealants, hardware and accessories.	furnish & install	Refer to NPC TS & Drawing	li.m.	3.00	(P_____)	(P_____)

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SECTION IV - BILL OF QUANTITIES

LuzP2121311Sc

**ARCHITECTURAL WORKS**  
**(2x50kW CALUTCOT DPP)**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
	c. Facia Board: 1/2"x12"x12' fiber cement board including steel frame hardware and accessories.	furnish & install	Refer to NPC TS & Drawing	li.m.	13.00	_____ (P _____)	_____ (P _____)
	d. Downspout: 3" Φ uPVC pipe series 1000 downspout including joint fittings solvents and brackets	furnish & install	Refer to NPC TS & Drawing	li.m.	3.00	_____ (P _____)	_____ (P _____)
	e. Roof Drain: Removable stainless wire basket strainer.	furnish & install	Refer to NPC TS & Drawing	pc.	1.00	_____ (P _____)	_____ (P _____)
<b>2.4</b>	<b>Painting</b>						
	a. All concrete surfaces	furnish & apply	Refer to NPC TS & Drawing	sq.m.	27.00	_____ (P _____)	_____ (P _____)
	b. All wooden surfaces	furnish & apply	Refer to NPC TS & Drawing	sq.m.	10.00	_____ (P _____)	_____ (P _____)
<b>2.5</b>	<b>Ceiling</b>						
	6mm thick marine plywood on standard metal furring spaced @ 0.40 O.C.B.W. and metal hangers spaced 0.80 O.C.B.W.	furnish & install	Refer to NPC TS & Drawing	sq.m.	10.00	_____ (P _____)	_____ (P _____)
<b>3.0</b>	<b>HAZARDOUS WASTE AND SOLID WASTE FACILITY</b>						
<b>3.1</b>	<b>Roofing Sheets (Roofing and Sidings)</b>						
	0.5 mm base metal thickness pre-painted corrugated G.I. Roofing including fasteners, sealants, retouching paintshardware and accessories	furnish & install	Refer to NPC TS & Drawing	sq.m.	70.00	_____ (P _____)	_____ (P _____)

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## SECTION IV - BILL OF QUANTITIES

LuzP21Z1311Sc

**ARCHITECTURAL WORKS**  
(2x50kW CALUTCOT DPP)

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
3.2	<b>Barge Cap Flashing</b> 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	20.00	(P _____)	(P _____)
3.3	<b>Gutter:</b> 0.6 mm base metal thickness zinc-aluminum-silicon coated pre-painted including fasteners, sealants, retouching paint, hardware and accessories	furnish & install	Refer to NPC TS & Drawing	l.m	9.00	(P _____)	(P _____)
3.4	<b>Downspout</b> 3" (75 mm) 0 uPVC pipe series 1000 downspout including joint fittings, solvent and fasteners	furnish & install	Refer to NPC TS & Drawing	l.m	8.00	(P _____)	(P _____)
3.5	<b>Roof Drain</b> Removable PVC wire basket strainer	furnish & install	Refer to NPC TS & Drawing	pcs	3.00	(P _____)	(P _____)
3.6	<b>Fascia Board</b> 1/2" x 12" x 12" Fiber cement board including steel frame hardware and accessories	furnish & install	Refer to NPC TS & Drawing	l.m	29.00	(P _____)	(P _____)
3.7	<b>Wire Mesh Enclosure Sidings</b> (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	20.00	(P _____)	(P _____)

Name of Firm

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SECTION IV - BILL OF QUANTITIES

LuzP21Z13115c

**ARCHITECTURAL WORKS**  
 (2x50kW CALUTCOT DPP)

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
3.8	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 _____)
3.9	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 _____)
3.10	100MM Thick CHB	furnish & lay	Refer to NPC TS & Drawing	sq.m	17.60	_____ (P _____)	_____ (P _____)
3.11	Plaster Plain Cement Finish	furnish & spread	Refer to NPC TS & Drawing	sq.m	16.50	_____ (P _____)	_____ (P _____)
<b>SUB-TOTAL AMOUNT OF ARCHITECTURAL WORKS</b>						_____ (P _____)	_____ (P _____)

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## SECTION IV - BILL OF QUANTITIES

LuzP21Z1311Sc

**ARCHITECTURAL WORKS**  
**(1x50 & 1x30kW BUTAWANAN DPP)**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
1.0	<b>PREFAB CONTAINER HOUSE (CONTROL HOUSE)</b> Prefabricated Container House including Installation Works: Dimensions: 6m length x 3m width x 2.7m height Flooring: MGO board with linoleum tiles Walls and Roofing : 50mm styrofoam insulation with oven baked double sided galvanized iron sheet Windows: 4 pcs pvc sliding windows, 1 pc pvc awning window Door: 2pcs aluminum frame with double sided insulated GI sheet with 50mm Polysyrene insulation Additional: toilet (1.2x1.2) including fixtures and plumbing	furnish & install	Refer to NPC TS & Drawing	lot	1.00	_____ (P _____)	_____ (P _____)
2.0	<b>GUARD POST</b>						
2.1	<b>Wall Finishes</b>						
	a. 150mm thick CHB wall including reinforcements	furnish & lay	Refer to NPC TS & Drawing	sq.m.	9.00	_____ (P _____)	_____ (P _____)
	a. Plain cement plaster finish.	furnish & apply	Refer to NPC TS & Drawing	sq.m.	15.00	_____ (P _____)	_____ (P _____)
2.2	<b>Floor Finishes</b>						
	a. Plain concrete floor finish	furnish & apply	Refer to NPC TS & Drawing	sq.m.	3.00	_____ (P _____)	_____ (P _____)
2.3	<b>Roofing and Blankets</b>						
	a. Roofings: 2.0mm thick Metallic Plastic long span corrugated roofing sheet including stainless steel fasteners, sealants, and 2.0mm thick metallic end flashing.	furnish & install	Refer to NPC TS & Drawing	sq.m.	10.00	_____ (P _____)	_____ (P _____)
	b. Gutter: 2.0mm thick Metallic Plastic Gutter including fasteners, sealants, hardware and accessories.	furnish & install	Refer to NPC TS & Drawing	li.m.	3.00	_____ (P _____)	_____ (P _____)

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Name and Signature of Authorized Representative

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SECTION IV - BILL OF QUANTITIES

LuzP21Z1311Sc

**ARCHITECTURAL WORKS**  
 (1x50 & 1x30kW BUTAWANAN DPP)

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
	c. Facia Board: 1/2"x12"x12' fiber cement board including steel frame hardware and accessories.	furnish & install	Refer to NPC TS & Drawing	li.m.	13.00	_____ (P_____)	_____ (P_____)
	d. Downspout: 3" Φ uPVC pipe series 1000 downspout including joint fittings solvents and brackets	furnish & install	Refer to NPC TS & Drawing	li.m.	3.00	_____ (P_____)	_____ (P_____)
	e. Roof Drain: Removable stainless wire basket strainer.	furnish & install	Refer to NPC TS & Drawing	pc.	1.00	_____ (P_____)	_____ (P_____)
<b>2.4</b>	<b>Painting</b>						
	a. All concrete surfaces	furnish & apply	Refer to NPC TS & Drawing	sq.m.	27.00	_____ (P_____)	_____ (P_____)
	b. All wooden surfaces	furnish & apply	Refer to NPC TS & Drawing	sq.m.	10.00	_____ (P_____)	_____ (P_____)
<b>2.5</b>	<b>Ceiling</b>						
	6mm thick marine plywood on standard metal furring spaced @ 0.40 O.C.B.W. and metal hangers spaced 0.80 O.C.B.W.	furnish & install	Refer to NPC TS & Drawing	sq.m.	10.00	_____ (P_____)	_____ (P_____)
<b>3.0</b>	<b>HAZARDOUS WASTE AND SOLID WASTE FACILITY</b>						
<b>3.1</b>	<b>Roofing Sheets (Roofing and Sidings)</b>						
	0.5 mm base metal thickness pre-painted corrugated G.I. Roofing including fasteners, sealants, retouching paintshardware and accessories	furnish & install	Refer to NPC TS & Drawing	sq.m.	70.00	_____ (P_____)	_____ (P_____)

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## SECTION IV - BILL OF QUANTITIES

LuzP21Z1311Sc

**ARCHITECTURAL WORKS**  
(1x50 & 1x30kW BUTAWANAN DPP)

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
3.2	<b>Barge Cap Flashing</b> 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	20.00	_____ (P_____)	_____ (P_____)
3.3	<b>Gutter:</b> 0.6 mm base metal thickness zinc-aluminum-silicon coated pre-painted including fasteners, sealants, retouching paint, hardware and accessories	furnish & install	Refer to NPC TS & Drawing	l.m	9.00	_____ (P_____)	_____ (P_____)
3.4	<b>Downspout</b> 3" (75 mm) Ø uPVC pipe series 1000 downspout including joint fittings, solvent and fasteners	furnish & install	Refer to NPC TS & Drawing	l.m	8.00	_____ (P_____)	_____ (P_____)
3.5	<b>Roof Drain</b> Removable PVC wire basket strainer	furnish & install	Refer to NPC TS & Drawing	pcs	3.00	_____ (P_____)	_____ (P_____)
3.6	<b>Fascia Board</b> 1/2" x 12" x 12" Fiber cement board including steel frame hardware and accessories	furnish & install	Refer to NPC TS & Drawing	l.m	29.00	_____ (P_____)	_____ (P_____)
3.7	<b>Wire Mesh Enclosure Sidings</b> (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	20.00	_____ (P_____)	_____ (P_____)

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SECTION IV - BILL OF QUANTITIES

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**ARCHITECTURAL WORKS**  
 (1x50 & 1x30kW BUTAWANAN DPP)

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
3.8	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_____)
3.9	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_____)
3.10	100MM Thick CHB	furnish & lay	Refer to NPC TS & Drawing	sq.m	17.60	_____ (P_____)	_____ (P_____)
3.11	Plaster Plain Cement Finish	furnish & spread	Refer to NPC TS & Drawing	sq.m	16.50	_____ (P_____)	_____ (P_____)
<b>SUB-TOTAL AMOUNT OF ARCHITECTURAL WORKS</b>						_____ (P_____)	_____ (P_____)

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## SECTION IV

# **BILL OF QUANTITIES (CIVIL WORKS)**

## SECTION IV - BILL OF QUANTITIES

LuzP2221457Sc

**CIVIL WORKS**  
**(2x50kW CALUTCOT DPP)**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimate d	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
<b>CW-1.0 SITE DEVELOPMENT</b>							
CW-1.1	Clearing and Grubbing	clear, cut & dispose	Refer to NPC	lot	1.00	_____ (P _____)	_____ (P _____)
<b>CW-1.2 Drainage System and Appurtenant Structures</b>							
	a. Open RC Canal	furnish & construct	Refer to NPC TS & Drawing	li.m.	220.00	_____ (P _____)	_____ (P _____)
	b. Septic Tank (ST)	furnish & construct	Refer to NPC TS & Drawing	pc.	1.00	_____ (P _____)	_____ (P _____)
	c. Oil-Water Separator	furnish & construct	Refer to NPC TS & Drawing	pc.	1.00	_____ (P _____)	_____ (P _____)
	d. Drain Pit (DP)	furnish & construct	Refer to NPC TS & Drawing	pcs.	2.00	_____ (P _____)	_____ (P _____)
	e. Catch Basin (CB)	furnish & construct	Refer to NPC TS & Drawing	pcs.	1.00	_____ (P _____)	_____ (P _____)
	f. 100 mm dia. uPVC	furnish & install	Refer to NPC TS & Drawing	li.m.	14.00	_____ (P _____)	_____ (P _____)
CW-1.3	Perimeter Fence (including vehicular & pedestrian gates, wall footing, barbed wires, pedestal painting & other accessories)	furnish & construct	Refer to NPC TS & Drawing	li.m.	225.00	_____ (P _____)	_____ (P _____)
CW-1.4	Concrete Walk (including excavation & bedding)	furnish & place	Refer to NPC TS & Drawing	cu.m	6.00	_____ (P _____)	_____ (P _____)

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SECTION IV - BILL OF QUANTITIES

LuzP2221457Sc

**CIVIL WORKS**  
**(2x50kW CALUTCOT DPP)**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
<b>CW-1.5 Other Appurtenances</b>							
	a. Flag Pole (FP) (including GI Pipe, cleats, painting, foundation & accessories)	furnish & construct	Refer to NPC TS & Drawing	lot	1.00	_____ (P_____)	_____ (P_____)
	b. Perimeter Lighting Pole Foundation (PL) (inc. excavation, bedding & backfill)	furnish & construct	Refer to NPC TS & Drawing	pcs.	3.00	_____ (P_____)	_____ (P_____)
<b>CW-2.0 OTHER STRUCTURES AND FACILITIES</b>							
<b>CW-2.1 Prefabricated Container House Foundation</b>							
	a. Structural Excavation	excavate & reuse	Refer to NPC TS & Drawing	cu.m.	5.00	_____ (P_____)	_____ (P_____)
	b. Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	2.00	_____ (P_____)	_____ (P_____)
	c. Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	0.50	_____ (P_____)	_____ (P_____)
	d. Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	2.00	_____ (P_____)	_____ (P_____)
	e. Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	80.00	_____ (P_____)	_____ (P_____)
	f. Structural Steel (A36) (including base plate & anchor bolts)	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	kgs.	35.00	_____ (P_____)	_____ (P_____)
<b>CW-2.2 Hazardous &amp; Solid Waste Storage Facility</b>							
	a. Structural Excavation	excavate, stockpile & reuse	Refer to NPC TS & Drawing	cu.m.	12.00	_____ (P_____)	_____ (P_____)

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**CIVIL WORKS**  
**(2x50kW CALUTCOT DPP)**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
b.	Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	4.00	_____ (P_____)	_____ (P_____)
c.	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	2.00	_____ (P_____)	_____ (P_____)
d.	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	6.00	_____ (P_____)	_____ (P_____)
e.	Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	300.00	_____ (P_____)	_____ (P_____)
f.	Structural Steel (A36)	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	kgs.	2,100.00	_____ (P_____)	_____ (P_____)
<b>CW-2.3 Guardpost</b>							
a.	Structural Excavation	excavate & reuse	Refer to NPC TS & Drawing	cu.m.	3.00	_____ (P_____)	_____ (P_____)
b.	Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	1.00	_____ (P_____)	_____ (P_____)
c.	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	0.50	_____ (P_____)	_____ (P_____)
d.	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	1.50	_____ (P_____)	_____ (P_____)
e.	Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	180.00	_____ (P_____)	_____ (P_____)
f.	Rafter (LC120x40x20x2mm thk.)	furnish, fabricate & install	Refer to NPC TS & Drawing	li.m.	7.00	_____ (P_____)	_____ (P_____)
g.	Purlins (LC100x50x15x2.0mm thk.)	furnish, fabricate & install	Refer to NPC TS & Drawing	li.m.	11.00	_____ (P_____)	_____ (P_____)

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SECTION IV - BILL OF QUANTITIES

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**CIVIL WORKS**  
**(2x50kW CALUTCOT DPP)**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimate d	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
<b>CW-2.4</b>	<b>2x50kW Genset Foundation Pad</b>	design and construct	Refer to NPC TS & Drawing	units	<b>2.00</b>	_____ (P _____)	_____ (P _____)
<b>CW-2.5</b>	<b>Water Tank Steel Support</b>						
a.	Structural Excavation	excavate, stockpile & reuse	Refer to NPC TS & Drawing	cu.m.	<b>0.50</b>	_____ (P _____)	_____ (P _____)
b.	Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	<b>0.03</b>	_____ (P _____)	_____ (P _____)
c.	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	<b>0.07</b>	_____ (P _____)	_____ (P _____)
d.	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	<b>0.20</b>	_____ (P _____)	_____ (P _____)
e.	Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	<b>24.00</b>	_____ (P _____)	_____ (P _____)
f.	Structural Steel (A36) (Including base plate)	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	kgs.	<b>115.00</b>	_____ (P _____)	_____ (P _____)
g.	12 dia. x 75mm Dynabolt Stainless Steel	furnish & install	Refer to NPC TS & Drawing	pcs	<b>16.00</b>	_____ (P _____)	_____ (P _____)
<b>CW-2.6</b>	<b>Day Tank Steel Support (2pc)</b>						
a.	Structural Excavation	excavate, stockpile & reuse	Refer to NPC TS & Drawing	cu.m.	<b>0.60</b>	_____ (P _____)	_____ (P _____)
b.	Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	<b>0.20</b>	_____ (P _____)	_____ (P _____)
c.	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	<b>0.20</b>	_____ (P _____)	_____ (P _____)
d.	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	<b>0.40</b>	_____ (P _____)	_____ (P _____)

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**CIVIL WORKS**  
**(2x50kW CALUTCOT DPP)**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
e.	Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	46.00	_____ (P_____)	_____ (P_____)
f.	Structural Steel (A36) (Including base plate)	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	kgs.	144.00	_____ (P_____)	_____ (P_____)
g.	12 dia. x 75mm Dynabolt Stainless Steel	furnish & install	Refer to NPC TS & Drawing	pcs	32.00	_____ (P_____)	_____ (P_____)
<b>CW-2.7 Switchyard Appurtenances:</b>							
a.	Seclusion Fence including gate, concrete post, CHB wall, excavation, fill & 50mm dia. uPVC Pipe Weep Holes.	furnish & construct	Refer to NPC TS & Drawing	l.m	45.00	_____ (P_____)	_____ (P_____)
b.	Gravel Surfacing (150mm thick)	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m	13.00	_____ (P_____)	_____ (P_____)
c.	50mm dia. uPVC Pipe Weep Holes;	furnish & install	Refer to NPC TS & Drawing	l.m	13.00	_____ (P_____)	_____ (P_____)
d.	Transformer pad foundation for 2x75kVA (including excavation, bedding, gravel surfacing, and anchor bolts)	design and construct	Refer to NPC TS & Drawing	units	2.00	_____ (P_____)	_____ (P_____)
<b>CW-2.8 Take-off Structures</b>							
a.	4 - 30 Ft Steel Pole (including excavation & backfill)	furnish & erect	Refer to NPC TS & Drawing	pc.	4.00	_____ (P_____)	_____ (P_____)
b.	2 - 25 Ft Steel Pole (including excavation & backfill)	furnish & erect	Refer to NPC TS & Drawing	pc.	2.00	_____ (P_____)	_____ (P_____)
c.	Steel Crossarms, Braces etc.	furnish & install	Refer to NPC TS & Drawing	lot	1.00	_____ (P_____)	_____ (P_____)
<b>SUB-TOTAL AMOUNT OF BID (CIVIL WORKS)</b>						_____ (P_____)	_____ (P_____)

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**CIVIL WORKS**  
(1x50 & 1x30kW BUTAWANAN DPP)

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
<b>CW-1.0 SITE DEVELOPMENT</b>							
<b>CW-1.1</b>	<b>Clearing and Grubbing</b>	clear, cut & dispose	Refer to NPC	lot	<b>1.00</b>	_____ (P _____)	_____ (P _____)
<b>CW-1.2 Drainage System and Appurtenant Structures</b>							
	a. Open RC Canal	furnish & construct	Refer to NPC TS & Drawing	li.m.	<b>235.00</b>	_____ (P _____)	_____ (P _____)
	b. Septic Tank (ST)	furnish & construct	Refer to NPC TS & Drawing	pc.	<b>1.00</b>	_____ (P _____)	_____ (P _____)
	c. Oil-Water Separator	furnish & construct	Refer to NPC TS & Drawing	pc.	<b>1.00</b>	_____ (P _____)	_____ (P _____)
	d. Drain Pit (DP)	furnish & construct	Refer to NPC TS & Drawing	pcs.	<b>2.00</b>	_____ (P _____)	_____ (P _____)
	e. Catch Basin (CB)	furnish & construct	Refer to NPC TS & Drawing	pcs.	<b>1.00</b>	_____ (P _____)	_____ (P _____)
	f. 100 mm dia. uPVC	furnish & install	Refer to NPC TS & Drawing	li.m.	<b>14.00</b>	_____ (P _____)	_____ (P _____)
<b>CW-1.3</b>	<b>Perimeter Fence</b> (including vehicular & pedestrian gates, wall footing, barbed wires, pedestal painting & other accessories)	furnish & construct	Refer to NPC TS & Drawing	li.m.	<b>240.00</b>	_____ (P _____)	_____ (P _____)
<b>CW-1.4</b>	<b>Concrete Walk</b> (including excavation & bedding)	furnish & place	Refer to NPC TS & Drawing	cu.m	<b>7.00</b>	_____ (P _____)	_____ (P _____)

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SECTION IV - BILL OF QUANTITIES

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**CIVIL WORKS**  
 (1x50 & 1x30kW BUTAWANAN DPP)

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimate d	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
<b>CW-1.5 Other Appurtenances</b>							
a.	Flag Pole (FP) (including GI Pipe, cleats, painting, foundation & accessories)	furnish & construct	Refer to NPC TS & Drawing	lot	1.00	_____ (P_____)	_____ (P_____)
b.	Perimeter Lighting Pole Foundation (PL) (inc. excavation, bedding & backfill)	furnish & construct	Refer to NPC TS & Drawing	pcs.	4.00	_____ (P_____)	_____ (P_____)
<b>CW-2.0 OTHER STRUCTURES AND FACILITIES</b>							
<b>CW-2.1 Prefab Container House Foundation</b>							
a.	Structural Excavation	excavate & reuse	Refer to NPC TS & Drawing	cu.m.	5.00	_____ (P_____)	_____ (P_____)
b.	Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	2.00	_____ (P_____)	_____ (P_____)
c.	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	0.50	_____ (P_____)	_____ (P_____)
d.	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	2.00	_____ (P_____)	_____ (P_____)
e.	Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	80.00	_____ (P_____)	_____ (P_____)
f.	Structural Steel (A36) (Including base plate & anchor bolts)	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	kgs.	35.00	_____ (P_____)	_____ (P_____)
<b>CW-2.2 Hazardous &amp; Solid Waste Storage Facility</b>							
a.	Structural Excavation	excavate, stockpile & reuse	Refer to NPC TS & Drawing	cu.m.	12.00	_____ (P_____)	_____ (P_____)

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## SECTION IV - BILL OF QUANTITIES

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**CIVIL WORKS**  
**(1x50 & 1x30kW BUTAWANAN DPP)**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
b.	Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	4.00	(P_____)	(P_____)
c.	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	2.00	(P_____)	(P_____)
d.	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	6.00	(P_____)	(P_____)
e.	Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	300.00	(P_____)	(P_____)
f.	Structural Steel (A36)	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	kgs.	2,100.00	(P_____)	(P_____)
<b>CW-2.3 Guardpost</b>							
a.	Structural Excavation	excavate & reuse	Refer to NPC TS & Drawing	cu.m.	3.00	(P_____)	(P_____)
b.	Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	1.00	(P_____)	(P_____)
c.	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	0.50	(P_____)	(P_____)
d.	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	1.50	(P_____)	(P_____)
e.	Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	180.00	(P_____)	(P_____)
f.	Rafter (LC120x40x20x2mm thk.)	furnish, fabricate & install	Refer to NPC TS & Drawing	li.m.	7.00	(P_____)	(P_____)
g.	Purlins (LC100x50x15x2.0mm thk.)	furnish, fabricate & install	Refer to NPC TS & Drawing	li.m.	11.00	(P_____)	(P_____)

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## SECTION IV - BILL OF QUANTITIES

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**CIVIL WORKS**  
(1x50 & 1x30kW BUTAWANAN DPP)

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
CW-2.4	1x50 and 1x30kW Genset Foundation Pad	design and construct	Refer to NPC TS & Drawing	units	2.00	(P_____)	(P_____)
<b>CW-2.5 Water Tank Steel Support</b>							
a.	Structural Excavation	excavate, stockpile & reuse	Refer to NPC TS & Drawing	cu.m.	0.50	(P_____)	(P_____)
b.	Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	0.03	(P_____)	(P_____)
c.	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	0.07	(P_____)	(P_____)
d.	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	0.20	(P_____)	(P_____)
e.	Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	24.00	(P_____)	(P_____)
f.	Structural Steel (A36) (Including base plate)	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	kgs.	115.00	(P_____)	(P_____)
g.	12 dia. x 75mm Dynabolt Stainless Steel	furnish & install	Refer to NPC TS & Drawing	pcs	16.00	(P_____)	(P_____)
<b>CW-2.6 Day Tank Steel Support (2pc)</b>							
a.	Structural Excavation	excavate, stockpile & reuse	Refer to NPC TS & Drawing	cu.m.	0.60	(P_____)	(P_____)
b.	Structural Backfill	spread, level & compact	Refer to NPC TS & Drawing	cu.m.	0.20	(P_____)	(P_____)
c.	Sand and Gravel Bedding	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	0.20	(P_____)	(P_____)
d.	Concrete (20.7 Mpa)	furnish & place	Refer to NPC TS & Drawing	cu.m.	0.40	(P_____)	(P_____)

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**CIVIL WORKS**  
**(1x50 & 1x30kW BUTAWANAN DPP)**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
e.	Reinforcing Steel Bars (Grade 275)	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs.	46.00	_____ (P _____)	_____ (P _____)
f.	Structural Steel (A36) (Including base plate)	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	kgs.	144.00	_____ (P _____)	_____ (P _____)
g.	12 dia. x 75mm Expansionbolt Stainless Steel	furnish & install	Refer to NPC TS & Drawing	pcs	32.00	_____ (P _____)	_____ (P _____)
<b>CW-2.7 Switchyard Appurtenances:</b>							
a.	Seclusion Fence including gate, concrete post, CHB wall, excavation, fill & 50mm dia. uPVC Pipe Weep Holes.	furnish, fabricate assemble & install	Refer to NPC TS & Drawing	l.m	45.00	_____ (P _____)	_____ (P _____)
b.	Gravel Surfacing (150mm thick)	spread, level & compact	Refer to NPC TS & Drawing	cu.m	13.00	_____ (P _____)	_____ (P _____)
c.	50mm dia. uPVC Pipe Weep Holes;	furnish & install	Refer to NPC TS & Drawing	l.m	13.00	_____ (P _____)	_____ (P _____)
d.	Transformer pad foundation for 1x75kVA & 1x50kVA (including anchor bolts)	design and construct	Refer to NPC TS & Drawing	units	2.00	_____ (P _____)	_____ (P _____)
<b>CW-2.8 Take-off Structures</b>							
a.	4- 30 Ft Steel Pole (including excavation & backfill)	furnish & erect	Refer to NPC TS & Drawing	pc.	4.00	_____ (P _____)	_____ (P _____)
b.	2 - 25 Ft Steel Pole (including excavation & backfill)	furnish & erect	Refer to NPC TS & Drawing	pc.	2.00	_____ (P _____)	_____ (P _____)
c.	Steel Crossarms, Braces etc.	furnish & install	Refer to NPC TS & Drawing	lot	1.00	_____ (P _____)	_____ (P _____)
<b>SUB-TOTAL AMOUNT OF BID (CIVIL WORKS)</b>						_____ (P _____)	_____ (P _____)

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## SECTION IV

# **BILL OF QUANTITIES (ELECTRICAL WORKS)**

**ELECTRICAL WORKS**  
**CALUTCOT DIESEL POWER PLANT (2x50kW)**

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>A. EQUIPMENT &amp; MATERIALS TO BE FURNISHED BY THE CONTRACTOR</b>							
<b>1.0 Bus Conductor and Line Hardwares to wit:</b>							
a.	2/0 AWG, 15kV, ACSR	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
b.	1/0 AWG, 15kV, ACSR	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
c.	3/8"Ø High grade steel galvanized OHGW	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
d.	Lightning rod	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	pcs.	1	_____ (P _____) P _____	
e.	Line Hardwares such as tee-connectors, turnbuckle, insulators, termination kit, including sealant, ground clamp, cable/conduit support, etc.	Furnish, Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
<b>2.0 Power Control and Instrumentation Cables including Terminal Lugs, Connectors, Cable Ties, Identification Tags, Etc</b>							
a.	30 mm <sup>2</sup> , 15kV, Crosslink-Polyethylene (XLPE) Power Cable Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	

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**ELECTRICAL WORKS**  
**CALUTCOT DIESEL POWER PLANT (2x50kW)**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price In Pesos (Words and Figures)	Total Amount
a.	30 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
c.	4- 4c x 2.0 mm <sup>2</sup> , 600 V, (Royal Chord) Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
<b>3.0</b>	<b>Grounding System</b>						
<b>3.1</b>	<b>Grounding Grid Copper Conductor</b> 100 mm <sup>2</sup> , soft drawn bare copper conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
<b>3.2</b>	<b>Bonding Copper Conductor</b>						
a.	100 mm <sup>2</sup> , copper conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
b.	50 mm <sup>2</sup> , copper conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
c.	22 mm <sup>2</sup> , copper conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
<b>3.3</b>	<b>Weld Metal Powder for Powder Connection including Molder and Holder, Etc.</b>	Furnish and Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	

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**ELECTRICAL WORKS  
CALUTCOT DIESEL POWER PLANT (2x50kW)**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
3.4	Grounding Rod (3m x 19mm dia.) Copper Bonded	Furnish and Install	EW-TS, TDS & Bid Dwg.	pcs	18	_____ (P _____) P _____	
3.5	Grounding Test Pit	Furnish and Install	EW-TS, TDS & Bid Dwg.	set	1	_____ (P _____) P _____	
3.6	Grounding Accessories such as Cable Terminals, Lugs, Etc.	Furnish and Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
4.0	<b>Electrical Services and Accessories</b>						
4.1	<b>Lighting Fixtures</b>						
a.	Fixture Type A 1 x 9 W Compact LED Lamp Lighting Fixture	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	3	_____ (P _____) P _____	
b.	Fixture Type B 2 x 18 Watts cool white high output IP20 Flush mounted Type Lighting Fixture with mirror finish aluminum reflector	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	5	_____ (P _____) P _____	
c.	Fixture Type C Portable Emergency Light, 2 x 2 W LED with built in battery and Battery Charger	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	

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## SECTION IV - BILL OF QUANTITIES

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**ELECTRICAL WORKS**  
**CALUTCOT DIESEL POWER PLANT (2x50kW)**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
d.	Fixture Type D 50W LED Flood Light with clear Tempered Glass and Cooling Fins	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
e.	Fixture Type E (30W LED Perimeter Lighting Fixture with adjustable easy tilting, and built-in heat sink fixture including hot dipped galvanized tapered post )	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	3	_____ (P _____) P _____	
f.	Fixture Type F 1 x 30 W LED Flood Light with Clear Tempered Glass and Cooling Fins including lamp post	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	7	_____ (P _____) P _____	
g.	Fixture Type G 2 x 16 W 600 mm LED Tube, IP 65 Water and Dust Proof Lighting Fixture with Polycarbonate housing	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	2	_____ (P _____) P _____	
4.2	Outlets and Switches Including Plate Cover, Flush-mounted, Grounding Type						
a.	Convenience Outlet, Duplex with Cover, 16 A, 230 V, 1-phase	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	4	_____ (P _____) P _____	
b.	Convenience Outlet, Duplex, Weatherproof type with Cover, 16 A, 230 V, 1-phase	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	1	_____ (P _____) P _____	

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**ELECTRICAL WORKS  
CALUTCOT DIESEL POWER PLANT (2x50kW)**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
c.	Outlet for Emergency Lighting Fixture, Single Receptacle, 16 A, 230 V, 1-phase	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	1	_____ (P _____) P _____	_____
d.	Outlet for Exhaust Fan, Single Receptacle, 16 A, 230 V, 1-phase	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	1	_____ (P _____) P _____	_____
e.	50AF/25AT, 2 Pole, Enclosed Circuit Breaker with built-in universal outlet	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	_____
f.	Single Pole Wall Switch, 10 A, 230 V	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	2	_____ (P _____) P _____	_____
g.	Weatherproof Single Pole Wall Switch, 10 A, 230 V	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	2	_____ (P _____) P _____	_____
h.	Duplex Wall Switch, 10 A, 230 V	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	3	_____ (P _____) P _____	_____
i.	Boxes, Fittings, and Accessories	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	_____

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**ELECTRICAL WORKS  
CALUTCOT DIESEL POWER PLANT (2x50kW)**

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>4.3</b>	<b>Panelboard and Breakers</b>						
a.	Main Distribution Panelboard, 100AF/60AT, 240V, 1-Phase, 2-Pole Main MCB with branch circuits of: 1 - 50AF/25AT, 2-Pole, MCB 5 - 50AF/20AT, 2-Pole, MCB 2 - 50AF/15AT, 2-Pole, MCB	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
b.	Lighting and Power Panelboard, 50AF/20AT, 240V, 1-Phase, 2-Pole Main MCB with branch circuits of: 3 - 50AF/15AT, 2-Pole, MCB	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
<b>4.4</b>	<b>600V, Lighting and Power Cables</b>						
a.	14 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
b.	8.0 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
c.	5.5 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
d.	3.5 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	

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CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BURDEOS QUEZON AND BUTAWANAN, SIRUMA, CAMARINES SUR

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**ELECTRICAL WORKS  
CALUTCOT DIESEL POWER PLANT (2x50kW)**

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>5.0</b>	<b>Conduit System</b>						
	Electrical Conduit including Locknuts, Washer, Elbows and Other Fittings						
a.	110 mmØ uPVC	Furnish and Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
b.	40 mm dia. uPVC	Furnish and Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
c.	25 mm dia. uPVC	Furnish and Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
d.	20 mm dia. uPVC	Furnish and Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
e.	Boxes, Locknuts, Elbows, and other Fittings	Furnish and Install		lot	1	_____ (P _____) P _____	
<b>6.0</b>	<b>Tools and Spare Parts</b>						
a.	90AT, 600V Rated Molded Case Circuit Breaker, 3-Ph, 60Hz	Furnish	EW-TS, TDS & Bid Dwg.	set(s)	1	_____ (P _____) P _____ _____ _____	

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CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BURDEOS QUEZON AND BUTAWANAN, SIRUMA, CAMARINES SUR

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**ELECTRICAL WORKS  
CALUTCOT DIESEL POWER PLANT (2x50kW)**

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.	Telescopic Hot Stick with Tip Lock Features, 35 ft., 8 Sections, Epoxyglass	Furnish	EW-TS & Bid Dwg.	set	1	_____ (P _____) P _____	_____
c.	Lineman's Rubber Gloves, maximum usage: 17,000 Volts Size 14"	Furnish	EW-TS & Bid Dwg.	pairs	2	_____ (P _____) P _____	_____
d.	Lineman's Belt, Max. Length:42", Minimum Length: 34", D-to-D distance:56 cm, Center Hole:38"	Furnish	EW-TS & Bid Dwg.	set	1	_____ (P _____) P _____	_____
e.	Positioning Strap, Nylon, Maximum Length:2.0m Minimum Length: 1.3m, Adjustable Range: 0.7m	Furnish	EW-TS & Bid Dwg.	set	1	_____ (P _____) P _____	_____
f.	Heavy Duty Hard Hat with NPC Logo & strap (Safety Standard Compliant)	Furnish	EW-TS & Bid Dwg.	sets	3	_____ (P _____) P _____	_____
<b>7.0</b>	<b>Job Site Cameras</b>						
a.	Construction Cameras (2 Sets), complete with the req accessories and peripherals	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	2	_____ (P _____) P _____	_____
b.	32Gb SDHC Memory Cards	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	2	_____ (P _____) P _____	_____

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**ELECTRICAL WORKS**  
**CALUTCOT DIESEL POWER PLANT (2x50kW)**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
c.	2650mAh, 1.2mAh, AA Size Rechargeable Batteries	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	4	_____ (P _____) P _____	
d.	Spare 32GB SDHC Memory Cards	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	2	_____ (P _____) P _____	
e.	Spare 2650mAh, 1.2mAh, AA Size Rechargeable Batteries	Furnish	EW-TS, TDS & Bid Dwg.	set(s)	16	_____ (P _____) P _____	
<b>7.0</b>	<b>13.8 kV Switchyard and Appurtenances</b>						
7.1	Automatic Circuit Recloser, 800 A, 60 Hz, 15 kV 12 kA Symmetrical Fault Current	Furnish Install & Test	EW-TS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
7.2	15 kV, 100 A, 10 kA, Fuse Disconnect Switch with Lightning Arrester Combination complete with the required fuse link (10A), brackets and accessories	Furnish Install & Test	EW-TS & Bid Dwg.	set(s)	3	_____ (P _____) P _____	
7.3	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 & Test	EW-TS & Bid Dwg.	set(s)	6	_____ (P _____) P _____	

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**ELECTRICAL WORKS**  
**CALUTCOT DIESEL POWER PLANT (2x50kW)**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
7.4	15 kV, 100 A, 10 kA, Fuse Disconnect Switch with Lightning Arrester Combination complete with the required fuse link (2A), brackets and accessories	Furnish Install & Test	EW-TS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
7.5	Kilowatt-Hour Demand Meter						
a.	13.8 kV, Three-Phase Kilowatt-hour meter and associated Instrument Transformer and Accessories	Furnish Install & Test	EW-TS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
b.	240V, Single-phase Kilowatt-hour Demand Meter	Furnish Install & Test	EW-TS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
<b>B.</b>	<b>EXISTING EQUIPMENT TO BE HAUL/TRANSPORT, INSTALL AND TEST BY THE CONTRACTOR</b>						
1.0	Generator Control and Protection Panel (GCPP) for 50 kW AC Generator Set complete with the required Control, Metering, Protection, Synchronization (auto/manual), Annunciation and Alarm, Grounding Materials and all other appurtenances	Haul, Install & Test	EW-TS & Bid Dwg.	set(s)	2	_____ (P _____) P _____	

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**ELECTRICAL WORKS  
CALUTCOT DIESEL POWER PLANT (2x50kW)**

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>2.0</b>	<b>13.8 kV Switchyard and Appurtenances</b>						
2.1	75 kVA, 13.8 kV/480 V, 3-phase, 60 Hz, Generator Transformer	Haul, Install & Test	EW-TS & Bid Dwg.	set(s)	2	_____ (P _____) P _____	
2.3	15 kVA, 7.97 kV/240 V, 1-phase, 60 Hz, Station Service Transformer	Haul, Install & Test	EW-TS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	

**SUB-TOTAL AMOUNT OF BID (ELECTRICAL WORKS)**

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**ELECTRICAL WORKS  
BUTAWANAN DIESEL POWER PLANT (1X30 kW & 1x50kW)**

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>A.</b>	<b>EQUIPMENT &amp; MATERIALS TO BE FURNISHED BY THE CONTRACTOR</b>						
<b>1.0</b>	<b>Bus Conductor and Line Hardwares to wit:</b>						
a.	2/0 AWG, 15kV, ACSR	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
b.	1/0 AWG, 15kV, ACSR	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
c.	3/8"Ø High grade steel galvanized OHGW	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
d.	Lightning rod	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	pcs.	1	_____ (P _____) P _____	
e.	Line Hardwares such as tee-connectors, turnbuckle, insulators, termination kit, including sealant, ground	Furnish, Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
<b>2.0</b>	<b>Power Control and Instrumentation Cables including Terminal Lugs, Connectors, Cable Ties, Identification Tags, Etc</b>						

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**ELECTRICAL WORKS**  
**BUTAWANAN DIESEL POWER PLANT (1X30 kW & 1x50kW)**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
a.	30 mm <sup>2</sup> , 15kV, Crosslink-Polyethylene (XLPE) Power Cable Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
b.	30 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
c.	14 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
d.	4- 4c x 2.0 mm <sup>2</sup> , 600 V, (Royal Chord) Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
<b>3.0</b>	<b>Grounding System</b>						
<b>3.1</b>	Grounding Grid Copper Conductor 100 mm <sup>2</sup> , soft drawn bare copper conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
<b>3.2</b>	Bonding Copper Conductor						
a.	100 mm <sup>2</sup> , copper conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
b.	50 mm <sup>2</sup> , copper conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	

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**ELECTRICAL WORKS**  
**BUTAWANAN DIESEL POWER PLANT (1X30 kW & 1x50kW)**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
	c. 22 mm <sup>2</sup> , copper conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
3.3	Weld Metal Powder for Powder Connection including Molder and Holder, Etc.	Furnish and Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
3.4	Grounding Rod (3m x 19mm dia.) Copper Bonded	Furnish and Install	EW-TS, TDS & Bid Dwg.	pcs	18	_____ (P _____) P _____	
3.5	Grounding Test Pit	Furnish and Install	EW-TS, TDS & Bid Dwg.	set	1	_____ (P _____) P _____	
3.6	Grounding Accessories such as Cable Terminals, Lugs, Etc.	Furnish and Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
<b>4.0</b>	<b>Electrical Services and Accessories</b>						
<b>4.1</b>	<b>Lighting Fixtures</b>						
a.	Fixture Type A 1 x 9 W Compact LED Lamp Lighting Fixture	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	3	_____ (P _____) P _____	
b.	Fixture Type B 2 x 18 Watts cool white high output IP20 Flush mounted Type Lighting Fixture with mirror finish aluminum reflector	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	5	_____ (P _____) P _____	

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**ELECTRICAL WORKS**  
**BUTAWANAN DIESEL POWER PLANT (1X30 kW & 1x50kW)**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
c.	Fixture Type C Portable Emergency Light, 2 x 2 W LED with built in battery and Battery Charger	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
d.	Fixture Type D 50W LED Flood Light with clear Tempered Glass and Cooling Fins	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
e.	Fixture Type E (30W LED Perimeter Lighting Fixture with adjustable easy tilting, and built-in heat sink fixture including hot dipped galvanized tapered post )	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	4	_____ (P _____) P _____	
f.	Fixture Type F 1 x 30 W LED Flood Light with Clear Tempered Glass and Cooling Fins including lamp post	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	8	_____ (P _____) P _____	
g.	Fixture Type G 2 x 16 W 600 mm LED Tube, IP 65 Water and Dust Proof Lighting Fixture with Polycarbonate housing	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	2	_____ (P _____) P _____	
<b>4.2</b>	<b>Outlets and Switches Including Plate Cover, Flush-mounted, Grounding Type</b>						
a.	Convenience Outlet, Duplex with Cover, 16 A, 230 V, 1-phase	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	4	_____ (P _____) P _____	

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**ELECTRICAL WORKS  
BUTAWANAN DIESEL POWER PLANT (1X30 kW & 1x50kW)**

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.	Convenience Outlet, Duplex, Weatherproof type with Cover, 16 A, 230 V, 1-phase	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	1	_____ (P _____) P _____	
c.	Outlet for Emergency Lighting Fixture, Single Receptacle, 16 A, 230 V, 1-phase	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	1	_____ (P _____) P _____	
d.	Outlet for Exhaust Fan, Single Receptacle, 16 A, 230 V, 1-phase	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	1	_____ (P _____) P _____	
e.	50AF/25AT, 2 Pole, Enclosed Circuit Breaker with built-in universal outlet	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
f.	Single Pole Wall Switch, 10 A, 230 V	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	2	_____ (P _____) P _____	
g.	Weatherproof Single Pole Wall Switch, 10 A, 230 V	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	2	_____ (P _____) P _____	
h.	Duplex Wall Switch, 10 A, 230 V	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	sets	3	_____ (P _____) P _____	
i.	Boxes, Fittings, and Accessories	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	

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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>4.3</b>	<b>Panelboard and Breakers</b>						
a.	Main Distribution Panelboard, 100AF/60AT, 240V, 1-Phase, 2-Pole Main MCB with branch circuits of: 1 - 50AF/25AT, 2-Pole, MCB 5 - 50AF/20AT, 2-Pole, MCB 2 - 50AF/15AT, 2-Pole, MCB	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
b.	Lighting and Power Panelboard, 50AF/20AT, 240V, 1-Phase, 2-Pole Main MCB with branch circuits of: 3 - 50AF/15AT, 2-Pole, MCB	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
<b>4.4</b>	<b>600V, Lighting and Power Cables</b>						
a.	14 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
b.	8.0 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
c.	5.5 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
d.	3.5 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor	Furnish, Lay and Test	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	

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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>5.0</b>	<b>Conduit System</b>						
	Electrical Conduit including Locknuts, Washer, Elbows and Other Fittings						
a.	110 mmØ uPVC	Furnish and Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
b.	40 mm dia. uPVC	Furnish and Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
c.	25 mm dia. uPVC	Furnish and Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
d.	20 mm dia. uPVC	Furnish and Install	EW-TS, TDS & Bid Dwg.	lot	1	_____ (P _____) P _____	
e.	Boxes, Locknuts, Elbows, and other Fittings	Furnish and Install		lot	1	_____ (P _____) P _____	
<b>6.0</b>	<b>Tools and Spare Parts</b>						
a.	90AT, 600V Rated Molded Case Circuit Breaker, 3-Ph, 60Hz	Furnish	EW-TS, TDS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
b.	50AT, 600V Rated Molded Case Circuit Breaker, 3-Ph, 60Hz	Furnish	EW-TS, TDS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	

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Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
c.	Telescopic Hot Stick with Tip Lock Features, 35 ft., 8 Sections, Epoxyglass	Furnish	EW-TS & Bid Dwg.	set	1	_____ (P _____) P _____	
d.	Lineman's Rubber Gloves, maximum usage: 17,000 Volts Size 14"	Furnish	EW-TS & Bid Dwg.	pairs	2	_____ (P _____) P _____	
e.	Lineman's Belt, Max. Length:42", Minimum Length: 34", D-to-D distance:56 cm, Center Hole:38"	Furnish	EW-TS & Bid Dwg.	set	1	_____ (P _____) P _____	
f.	Positioning Strap, Nylon, Maximum Length:2.0m Minimum Length: 1.3m, Adjustable Range: 0.7m	Furnish	EW-TS & Bid Dwg.	set	1	_____ (P _____) P _____	
g.	Heavy Duty Hard Hat with NPC Logo & strap (Safety Standard Compliant)	Furnish	EW-TS & Bid Dwg.	sets	3	_____ (P _____) P _____	
<b>7.0</b>	<b>Job Site Cameras</b>						
a.	Construction Cameras (2 Sets), complete with the req accessories and peripherals	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	2	_____ (P _____) P _____	
b.	32Gb SDHC Memory Cards	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	2	_____ (P _____) P _____	

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Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
c.	2650mAh, 1.2mAh, AA Size Rechargeable Batteries	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	4	_____ (P _____) P _____	_____
d.	Spare 32GB SDHC Memory Cards	Furnish, Install and Test	EW-TS, TDS & Bid Dwg.	set(s)	2	_____ (P _____) P _____	_____
e.	Spare 2650mAh, 1.2mAh, AA Size Rechargeable Batteries	Furnish	EW-TS, TDS & Bid Dwg.	set(s)	16	_____ (P _____) P _____	_____
<b>7.0</b>	<b>13.8 kV Switchyard and Appurtenances</b>						
7.1	Automatic Circuit Recloser, 800 A, 60 Hz, 15 kV 12 kA Symmetrical Fault Current	Furnish Install & Test	EW-TS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	_____
7.2	15 kV, 100 A, 10 kA, Fuse Disconnect Switch with Lightning Arrester Combination complete with the required fuse link (10A), brackets and accessories	Furnish Install & Test	EW-TS & Bid Dwg.	set(s)	3	_____ (P _____) P _____	_____
7.3	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 & Test	EW-TS & Bid Dwg.	set(s)	3	_____ (P _____) P _____	_____
7.4	15 kV, 100 A, 10 kA, Fuse Disconnect Switch with Lightning Arrester Combination complete with the required fuse link (2A), brackets and accessories	Furnish Install & Test	EW-TS & Bid Dwg.	set(s)	4	_____ (P _____) P _____	_____

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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>7.5</b>	<b>Kilowatt-Hour Demand Meter</b>						
a.	13.8 kV, Three-Phase Kilowatt-hour meter and associated Instrument Transformer and Accessories	Furnish Install & Test	EW-TS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
b.	240V, Single-phase Kilowatt-hour Demand Meter	Furnish Install & Test	EW-TS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
<b>B.</b>	<b>EXISTING EQUIPMENT TO BE HAUL/TRANSPORT, INSTALL AND TEST BY THE CONTRACTOR</b>						
<b>1.0</b>	<b>Generator Control and Protection Panel (GCPP) for AC Generator Set complete with the required Control, Metering, Protection, Synchronization (auto/manual), Annunciation and Alarm, Grounding Materials and all other appurtenances</b>						
<b>1.1</b>	GCPP for 50 kW AC Generator Set	Haul, Install & Test	EW-TS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
<b>1.2</b>	GCPP for 30 kW AC Generator Set	Haul, Install & Test	EW-TS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
<b>2.0</b>	<b>13.8 kV Switchyard and Appurtenances</b>						

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BUTAWANAN DIESEL POWER PLANT (1X30 kW & 1x50kW)**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price In Pesos (Words and Figures)	Total Amount
2.1	75 kVA, 13.8 kV/480 V, 3-phase, 60 Hz, Generator Transformer	Haul, Install & Test	EW-TS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
2.2	37.5 kVA, 13.8 kV/480 V, 3-phase, 60 Hz, Generator Transformer	Haul, Install & Test	EW-TS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
2.3	15 kVA, 7.97 kV/240 V, 1-phase, 60 Hz, Station Service Transformer	Haul, Install & Test	EW-TS & Bid Dwg.	set(s)	1	_____ (P _____) P _____	
<b>SUB-TOTAL AMOUNT OF BID (ELECTRICAL WORKS)</b>						_____ (P _____) P _____	

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## SECTION IV

# **BILL OF QUANTITIES (MECHANICAL WORKS)**



**MECHANICAL WORKS**

**CALUTCOT DIESEL POWER PLANT**

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
A.	EQUIPMENT TO BE HAULED/TRANSPORTED FROM NPC-SPUG MINUYAN WAREHOUSE,SAN JOSE DELMONTE, BULACAN TO PLANT SITE		MW-2.0				
<b>MW-1.0</b>	<b>MECHANICAL EQUIPMENT AND ACCESSORIES</b>						
MW-1.1	50 kW Modular Diesel Generating sets and its Accessories (approx. 2.0 tons per set)	Hauling/Transport and Installation	MW-2.0	sets	2	_____ P _____ (P _____)	_____
MW-1.2	Spare Parts	Hauling/Transport and Installation	MW-2.0	lot	1	_____ P _____ (P _____)	_____

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**CALUTCOT DIESEL POWER PLANT**

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price In Pesos (Words and Figures)	Total Amount
<b>B. BALANCE OF PLANT AND MISCELLANEOUS TOOLS, EQUIPMENT AND MATERIALS TO BE SUPPLIED BY THE CONTRACTOR</b>							
<b>MW-2.0</b>	<b>FUEL OIL SUPPLY AND TRANSFER SYSTEM</b>						
MW-2.1.1	Rectangular Fuel Oil Day Tank, 1,000 liters capacity, 5mm thick, ASTM A 36 steel plate, complete with rotary hand pump (50 l/min., aluminum body), strainer, nozzles/manhole, level gauge glass with protector guard, level switch for high & low alarm, structural steel supports with anchor bolts on foundation, relative pipeworks and other accessories required	Supply, Installation and Test	MW 6.0	sets	2	_____ P _____ (P _____)	_____
<b>MW-3.0</b>	<b>PIPING SYSTEM</b>						
	Pipe, fittings, supports, valves and other accessories for interconnection of the supplied equipment including required excavation and backfilling works as described in the technical specifications and shown on the bid drawings: 3a) Fuel supply/filling to the separate/elevated fuel day tanks through the rotary hand pump (50 l/min., aluminum body) complete with flexible hose, accessories, etc. and interconnection piping to/from the generating sets including strainers, etc.; 3b) Interconnection of water supply to radiators from the domestic water source; and 3c) Waste oil discharge to the oil-water separator.	Supply, Excavate, Install, Backfill and Test	MW-6.0 & Drawings	lot	1	_____ P _____ (P _____)	_____

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Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
<b>MW-4.0</b>	<b>DOMESTIC WATER SYSTEM</b>						
			<b>MW-7.0</b>				
MW-4.1	Well Drilling, Well Development, Pumping Test and Disinfection, complete with 50 mm Ø (min.) casing and 32mm Ø suction pipes conforming to ASTM A53, Gr.A , welded or seamless, Sch. 40, hot dip galvanized, fitted with 32mm Ø stainless steel Screen with 5mm slots and (1) set of Brass Foot Valve, and other accessories as described in the technical specifications	Drilling, Well Development, Test and Disinfection		lm	15	_____ P _____ ____ (P _____ )	
MW-4.2	Hand pump jetmatic, 2 gpm min. flow, reciprocating type, cast iron body complete with foot valves, fittings, supports, concrete pad and other accessories as described in the technical specifications.	Supply, Installation and Test		set	1	_____ P _____ ____ (P _____ )	
MW-4.3	Water Tank, 600 liters capacity, triple layer polyethylene, complete with nozzles/manhole, inlet and outlet nozzles, supports, down spout strainer, overflow and drain nozzles with pipes, pipe structural steel supports with anchor bolts on foundation and access ladder, and other accessories as required in the technical specifications.	Supply, Installation Test and Disinfection		set	1	_____ P _____ ____ (P _____ )	
MW-4.4	Gate Valve, 25 mm Ø, cast bronze, screwed ends, rising stem, Class 150	Supply, Installation and Test		sets	1	_____ P _____ ____ (P _____ )	
MW-4.5	Gate Valve, 20 mm Ø, cast bronze, screwed ends, rising stem, Class 150	Supply, Installation and Test		sets	3	_____ P _____ ____ (P _____ )	
MW-4.6	Gate Valve, 15 mm Ø, cast bronze, screwed ends, rising stem, Class 150	Supply, Installation and Test		sets	2	_____ P _____ ____ (P _____ )	

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Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price In Pesos (Words and Figures)	Total Amount
<b>MW-4.0</b>	<b>DOMESTIC WATER SYSTEM (Cont'd...)</b>						
			<b>MW-7.0</b>				
MW-4.7	Ball Valve, 80mmØ, cast iron, flanged ends, Class 150 Class 150	Supply, Installation and Test		set	1	_____ P _____ (P _____)	_____
MW-4.8	Hose Bibb, 20 mm Ø, bronze body, screwed ends, Class 150.	Supply, Installation and Test		sets	3	_____ P _____ (P _____)	_____
MW-4.9	Water Pipe, 90 mm O.D. (80 mm N.D.), uPVC pipe, sch 80 or Class 150, and its associated fittings, pipe supports and other accessories.	Supply, Excavation, Installation, Test, Backfill & Disinfection		lm	6	_____ P _____ (P _____)	_____
MW-4.10	Water Pipe, 40 mm O.D. (32 mm N.D.), uPVC pipe, sch 80 or Class 150, and its associated fittings, pipe supports and other accessories.	Supply, Excavation, Installation, Test, Backfill & Disinfection		lm	6	_____ P _____ (P _____)	_____
MW-4.11	Water Pipe, 32 mm O.D. (25 mm N.D.), uPVC pipe, sch 80 or Class 150, and its associated fittings, pipe supports and other accessories.	Supply, Excavation, Installation, Test, Backfill & Disinfection		lm	12	_____ P _____ (P _____)	_____
MW-4.12	Water Pipe, 25 mm O.D. (20 mm N.D.), uPVC pipe, sch 80 or Class 150, and its associated fittings, pipe supports and other accessories.	Supply, Excavation, Installation, Test, Backfill & Disinfection		lm	78	_____ P _____ (P _____)	_____
MW-4.13	Water Pipe, 20mm O.D. (15 mm N.D.), uPVC pipe, sch 80 or Class 150, and its associated fittings, pipe supports and other accessories.	Supply, Excavation, Installation, Test, Backfill & Disinfection		lm	6	_____ P _____ (P _____)	_____
<b>MW-5.0</b>	<b>FIRE FIGHTING SYSTEM</b>						
			<b>MW 9.0</b>				
MW-5.1	Portable Fire Extinguishers, HCFC or Halotron I, 7.1 kg (15 lbs), non-expiry, multi shots, wall hung type with bracket and mounting accessories	Supply and Installation		sets	2	_____ P _____ (P _____)	_____

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Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
<b>MW-6.0</b>	<b>AIR CONDITIONING &amp; VENTILATION SYSTEM</b>						
			MW 8.0				
<b>MW-6.1</b>	<b>Air-Conditioning System</b>						
MW-6.1.1	Air conditioning unit for Control Room, 16,000 kJ/h 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, Installation and Test		sets	1	_____ P _____ ____ (P _____ )	
<b>MW-6.2</b>	<b>Ventilation System</b>						
MW-6.2.1	Exhaust fan for CR, 100 m <sup>3</sup> /h wall mounted, propeller type, direct driven, complete with automatic shutter, mounting accessories and controls	Supply, Installation and Test		set	1	_____ P _____ ____ (P _____ )	

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<b>MW-7.0</b>	<b>MISCELLANEOUS TOOLS, EQUIPMENT AND MATERIALS</b>		MW-10.0				
<b>MW-7.1</b>	<b>MISCELLANEOUS EQUIPMENT AND MATERIALS</b>						
MW-7.1.1	Four Wheel Drum Truck (210 Liter Capacity)	Supply and Delivery		pc	1	_____ P _____ _____ (P _____)	_____
MW-7.1.2	Clock, 10" diameter	Supply and Delivery		set	1	_____ P _____ _____ (P _____)	_____
MW-7.1.3	Steel Cabinet Locker, 90 x 45 x 140 cm, galvalum materials	Supply and Delivery		set	1	_____ P _____ _____ (P _____)	_____
MW-7.1.4	Office Tables and Chairs (Standard size table, 3 drawers with lock keys and 2 chairs with roller balls)	Supply and Delivery		set	1	_____ P _____ _____ (P _____)	_____
MW-7.1.5	Ear Muff, fluid filled high attenuation	Supply and Delivery		pcs	10	_____ P _____ _____ (P _____)	_____
MW-7.1.6	Lube Oil requirement for next oil change	Supply and Delivery		liter	80	_____ P _____ _____ (P _____)	_____
MW-7.1.7	Flash Light and Head Light with rechargeable AA battery, halogen bulb, LED light	Supply and Delivery		set	1	_____ P _____ _____ (P _____)	_____
MW-7.1.8	Automatic rechargeable emergency light (LED)	Supply and Delivery		set	1	_____ P _____ _____ (P _____)	_____

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<b>MW-7.1</b>	<b>MISCELLANEOUS EQUIPMENT AND MATERIALS (Cont'd...)</b>		MW-10.0				
MW-7.1.9	Diesel Fuel in a sealed plastic drum	Supply and Delivery		liter	800	_____ P _____ ____ (P _____ )	
MW-7.1.10	Hard hat with NPC logo, white color	Supply and Delivery		sets	5	_____ P _____ ____ (P _____ )	
MW-7.1.11	Plastic table and 4-chair (monoblock)	Supply and Delivery		set	1	_____ P _____ ____ (P _____ )	
MW-7.1.12	Electricians First Aid Kit (Refer to Item "I" Clause MW-10.2 for details of contents)	Supply and Delivery		set	1	_____ P _____ ____ (P _____ )	
<b>MW-7.2</b>	<b>MISCELLANEOUS TOOLS &amp; SPARE PARTS</b>		MW-10.1				
MW-7.2.1	Manufacturer's Special/Standard and Specified Tools as listed in Sections "MW-10.1" Part I - Technical Specifications (Mechanical Works).	Supply and Delivery		lot	1	_____ P _____ ____ (P _____ )	

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**MECHANICAL WORKS**

**CALUTCOT DIESEL POWER PLANT**

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
<b>MW-8.0</b>	<b>MISCELLANEOUS WORKS</b>						
MW-8.1	Tagging and/or Labels for Equipment, Valves, Piping, Instruments and its fixing accessories as described in the bid documents or shown on the drawings.	Supply & Install	MW-4.0	lot	1	_____ P _____ (P _____)	
MW-8.2	Painting for Fuel Oil Piping & Equipment, Water Piping, Waste Oil Piping, its associated valves, fittings, supports and other accessories including touch-up for factory painted equipment and accessories as described in the technical specifications or shown on the drawings	Supply & Apply	MW-7.0 TO MW-9.0	lot	1	_____ P _____ (P _____)	
MW-8.3	Conduct Testing & Commissioning for all Mechanical Works Systems supplied by the Contractor including its associated electrical equipment and other services as described in the technical specifications. The Contractor's scope of work shall include assistance during the test and commissioning of the generating sets supplied by NPC	Conduct/Perform		lot	1	_____ P _____ (P _____)	
<b>TOTAL MECHANICAL WORKS</b>							_____ P _____ (P _____)

\_\_\_\_\_  
Name of Firm

\_\_\_\_\_  
Name and Signature of Authorized Representative

\_\_\_\_\_  
Designation



**MECHANICAL WORKS**

**BUTAWANAN DIESEL POWER PLANT**

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
A.	<b>EQUIPMENT TO BE HAULED/TRANSPORTED FROM NPC-SPUG MINUYAN WAREHOUSE,SAN JOSE DELMONTE, BULACAN TO PLANT SITE</b>		MW-2.0				
<b>MW-1.0</b>	<b>MECHANICAL EQUIPMENT AND ACCESSORIES</b>						
MW-1.1	50 kW Modular Diesel Generating sets and its Accessories (approx. 2.0 tons per set)	Hauling/Transport and Installation	MW-2.0	set	1	_____ P _____ (P _____ )	
MW-1.2	30 kW Modular Diesel Generating sets and its Accessories (approx. 1.8 tons per set)	Hauling/Transport and Installation	MW-2.0	set	1	_____ P _____ (P _____ )	
MW-1.3	Spare Parts	Hauling/Transport and Installation	MW-2.0	lot	1	_____ P _____ (P _____ )	

\_\_\_\_\_  
Name of Firm

\_\_\_\_\_  
Name and Signature of Authorized Representative

\_\_\_\_\_  
Designation



**MECHANICAL WORKS**

**BUTAWANAN DIESEL POWER PLANT**

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
<b>B.</b>	<b>BALANCE OF PLANT AND MISCELLANEOUS TOOLS, EQUIPMENT AND MATERIALS TO BE SUPPLIED BY THE CONTRACTOR</b>						
<b>MW-2.1</b>	<b>FUEL OIL SUPPLY AND TRANSFER SYSTEM</b>		MW 6.0				
MW-2.1.1	Rectangular Fuel Oil Day Tank, 1,000 liters capacity, 5mm thick, ASTM A 36 steel plate, complete with rotary hand pump (50 l/min., aluminum body), strainer, nozzles/manhole, level gauge glass with protector guard, level switch for high & low alarm, structural steel supports with anchor bolts on foundation, relative pipeworks and other accessories required	Supply, Installation and Test		sets	2	_____ P _____ (P _____)	_____
<b>MW-3.0</b>	<b>PIPING SYSTEM</b>						
	Pipe, fittings, supports, valves and other accessories for interconnection of the supplied equipment including required excavation and backfilling works as described in the technical specifications and shown on the bid drawings:	Supply, Excavate, Install, Backfill and Test	MW-6.0 & Drawings	lot	1	_____ P _____ (P _____)	_____
	3a) Fuel supply/filling to the separate/elevated fuel day tanks through the rotary hand pump (50 l/min., aluminum body) complete with flexible hose, accessories, etc. and interconnection piping to/from the generating sets including strainers, etc.;						
	3b) Interconnection of water supply to radiators from the domestic water source; and						
	3c) Waste oil discharge to the oil-water separator.						

\_\_\_\_\_  
Name of Firm

\_\_\_\_\_  
Name and Signature of Authorized Representative

\_\_\_\_\_  
Designation



**MECHANICAL WORKS**

**BUTAWANAN DIESEL POWER PLANT**

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
<b>MW-4.0</b>	<b>DOMESTIC WATER SYSTEM</b>						
			MW-7.0				
MW-4.1	Well Drilling, Well Development, Pumping Test and Disinfection, complete with 50 mm Ø (min.) casing and 32mm Ø suction pipes conforming to ASTM A53, Gr.A , welded or seamless, Sch. 40, hot dip galvanized, fitted with 32mm Ø stainless steel Screen with 5mm slots and (1) set of Brass Foot Valve, and other accessories as described in the technical specifications	Drilling, Well Development, Test and Disinfection		lm	15	_____ P _____ (P _____ )	
MW-4.2	Hand pump jetmatic, 2 gpm min. flow, reciprocating type, cast iron body complete with foot valves, fittings, supports, concrete pad and other accessories as described in the technical specifications.	Supply, Installation and Test		set	1	_____ P _____ (P _____ )	
MW-4.3	Water Tank, 600 liters capacity, triple layer polyethylene, complete with nozzles/manhole, inlet and outlet nozzles, supports, down spout strainer, overflow and drain nozzles with pipes, pipe structural steel supports with anchor bolts on foundation and access ladder, and other accessories as required in the technical specifications.	Supply, Installation Test and Disinfection		set	1	_____ P _____ (P _____ )	
MW-4.4	Gate Valve, 25 mm Ø, cast bronze, screwed ends, rising stem, Class 150	Supply, Installation and Test		sets	1	_____ P _____ (P _____ )	
MW-4.5	Gate Valve, 20 mm Ø, cast bronze, screwed ends, rising stem, Class 150	Supply, Installation and Test		sets	3	_____ P _____ (P _____ )	
MW-4.6	Gate Valve, 15 mm Ø, cast bronze, screwed ends, rising stem, Class 150	Supply, Installation and Test		sets	2	_____ P _____ (P _____ )	

\_\_\_\_\_  
Name of Firm

\_\_\_\_\_  
Name and Signature of Authorized Representative

\_\_\_\_\_  
Designation



**MECHANICAL WORKS**

**BUTAWANAN DIESEL POWER PLANT**

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-4.0	<b>DOMESTIC WATER SYSTEM (Cont'd...)</b>		MW-7.0				
MW-4.7	Ball Valve, 80mmØ, cast iron, flanged ends, Class 150 Class 150	Supply, Installation and Test		set	1	_____ P _____ (P _____)	_____
MW-4.8	Hose Bibb, 20 mm Ø, bronze body, screwed ends, Class 150.	Supply, Installation and Test		sets	3	_____ P _____ (P _____)	_____
MW-4.9	Water Pipe, 90 mm O.D. (80 mm N.D.), uPVC pipe, sch 80 or Class 150, and its associated fittings, pipe supports and other accessories.	Supply, Excavation, Installation, Test, Backfill & Disinfection		lm	6	_____ P _____ (P _____)	_____
MW-4.10	Water Pipe, 40 mm O.D. (32 mm N.D.), uPVC pipe, sch 80 or Class 150, and its associated fittings, pipe supports and other accessories.	Supply, Excavation, Installation, Test, Backfill & Disinfection		lm	6	_____ P _____ (P _____)	_____
MW-4.11	Water Pipe, 32 mm O.D. (25 mm N.D.), uPVC pipe, sch 80 or Class 150, and its associated fittings, pipe supports and other accessories.	Supply, Excavation, Installation, Test, Backfill & Disinfection		lm	12	_____ P _____ (P _____)	_____
MW-4.12	Water Pipe, 25 mm O.D. (20 mm N.D.), uPVC pipe, sch 80 or Class 150, and its associated fittings, pipe supports and other accessories.	Supply, Excavation, Installation, Test, Backfill & Disinfection		lm	78	_____ P _____ (P _____)	_____
MW-4.13	Water Pipe, 20mm O.D. (15 mm N.D.), uPVC pipe, sch 80 or Class 150, and its associated fittings, pipe supports and other accessories.	Supply, Excavation, Installation, Test, Backfill & Disinfection		lm	6	_____ P _____ (P _____)	_____
MW-5.0	<b>FIRE FIGHTING SYSTEM</b>		MW 9.0				
MW-5.1	Portable Fire Extinguishers, HCFC or Halotron I, 7.1 kg (15 lbs), non-expiry, multi shots, wall hung type with bracket and mounting accessories	Supply and Installation		sets	2	_____ P _____ (P _____)	_____

\_\_\_\_\_  
Name of Firm

\_\_\_\_\_  
Name and Signature of Authorized Representative

\_\_\_\_\_  
Designation



**MECHANICAL WORKS**

**BUTAWANAN DIESEL POWER PLANT**

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
<b>MW-6.0</b>	<b>AIR CONDITIONING &amp; VENTILATION SYSTEM</b>		MW 8.0				
<b>MW-6.1</b>	<b>Air-Conditioning System</b>						
MW-6.1.1	Air conditioning unit for Control Room, 16,000 kJ/h 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, Installation and Test		sets	1	_____ P _____ ____ (P _____ )	
<b>MW-6.2</b>	<b>Ventilation System</b>						
MW-6.2.1	Exhaust fan for CR, 100 m <sup>3</sup> /h wall mounted, propeller type, direct driven, complete with automatic shutter, mounting accessories and controls	Supply, Installation and Test		set	1	_____ P _____ ____ (P _____ )	

\_\_\_\_\_ Name of Firm

\_\_\_\_\_ Name and Signature of Authorized Representative

\_\_\_\_\_ Designation



**MECHANICAL WORKS**

**BUTAWANAN DIESEL POWER PLANT**

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-7.0	<b>MISCELLANEOUS TOOLS, EQUIPMENT AND MATERIALS</b>		MW-10.0				
MW-7.1	<b>MISCELLANEOUS EQUIPMENT AND MATERIALS</b>						
MW-7.1.1	Four Wheel Drum Truck (210 Liter Capacity)	Supply and Delivery		pc	1	_____ P _____ _____ (P _____)	
MW-7.1.2	Clock, 10" diameter	Supply and Delivery		set	1	_____ P _____ _____ (P _____)	
MW-7.1.3	Steel Cabinet Locker, 90 x 45 x 140 cm. galvalum materials	Supply and Delivery		set	1	_____ P _____ _____ (P _____)	
MW-7.1.4	Office Tables and Chairs (Standard size table, 3 drawers with lock keys and 2 chairs with roller balls)	Supply and Delivery		set	1	_____ P _____ _____ (P _____)	
MW-7.1.5	Ear Muff, fluid filled high attenuation	Supply and Delivery		pcs	10	_____ P _____ _____ (P _____)	
MW-7.1.6	Lube Oil requirement for next oil change	Supply and Delivery		liter	80	_____ P _____ _____ (P _____)	
MW-7.1.7	Flash Light and Head Light with rechargeable AA battery, halogen bulb, LED light	Supply and Delivery		set	1	_____ P _____ _____ (P _____)	
MW-7.1.8	Automatic rechargeable emergency light (LED)	Supply and Delivery		set	1	_____ P _____ _____ (P _____)	

\_\_\_\_\_  
Name of Firm

\_\_\_\_\_  
Name and Signature of Authorized Representative

\_\_\_\_\_  
Designation



**MECHANICAL WORKS**

**BUTAWANAN DIESEL POWER PLANT**

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
<b>MW-7.1</b>	<b>MISCELLANEOUS EQUIPMENT AND MATERIALS (Cont'd...)</b>		MW-10.0				
MW-7.1.9	Diesel Fuel in a sealed plastic drum	Supply and Delivery		liter	800	_____ P _____ (P _____)	
MW-7.1.10	Hard hat with NPC logo, white color	Supply and Delivery		sets	5	_____ P _____ (P _____)	
MW-7.1.11	Plastic table and 4-chair (monoblock)	Supply and Delivery		set	1	_____ P _____ (P _____)	
MW-7.1.12	Electricians First Aid Kit (Refer to Item "I" Clause MW-10.2 for details of contents)	Supply and Delivery		set	1	_____ P _____ (P _____)	
<b>MW-7.2</b>	<b>MISCELLANEOUS TOOLS &amp; SPARE PARTS</b>		MW-10.1				
MW-7.2.1	Manufacturer's Special/Standard and Specified Tools as listed in Sections "MW-10.1" Part I - Technical Specifications (Mechanical Works).	Supply and Delivery		lot	1	_____ P _____ (P _____)	

\_\_\_\_\_  
Name of Firm

\_\_\_\_\_  
Name and Signature of Authorized Representative

\_\_\_\_\_  
Designation



**MECHANICAL WORKS**

**BUTAWANAN DIESEL POWER PLANT**

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
<b>MW-8.0</b>	<b>MISCELLANEOUS WORKS</b>						
MW-8.1	Tagging and/or Labels for Equipment, Valves, Piping, Instruments and its fixing accessories as described in the bid documents or shown on the drawings.	Supply & Install	MW-4.0	lot	1	_____ P _____ ____ (P _____ )	
MW-8.2	Painting for Fuel Oil Piping & Equipment, Water Piping, Waste Oil Piping, its associated valves, fittings, supports and other accessories including touch-up for factory painted equipment and accessories as described in the technical specifications or shown on the drawings	Supply & Apply	MW-7.0 TO MW-9.0	lot	1	_____ P _____ ____ (P _____ )	
MW-8.3	Conduct Testing & Commissioning for all Mechanical Works Systems supplied by the Contractor including its associated electrical equipment and other services as described in the technical specifications. The Contractor's scope of work shall include assistance during the test and commissioning of the generating sets supplied by NPC	Conduct/Perform		lot	1	_____ P _____ ____ (P _____ )	
<b>TOTAL MECHANICAL WORKS</b>						_____ P _____ ____ (P _____ )	

\_\_\_\_\_  
Name of Firm

\_\_\_\_\_  
Name and Signature of Authorized Representative

\_\_\_\_\_  
Designation



## SECTION V

# BIDDING FORMS



## SECTION V – BIDDING FORMS

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NPCSF-INFR-14	- Detailed Cost Estimate Form
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Standard Form No: NPCSF-INFR-01

**Checklist of Technical & Financial Envelope Requirements for Bidders**

**A. THE 1<sup>ST</sup> 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**

- 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
- 
- Complete eligibility documents of proposed sub-contractor, if applicable

**B. THE 2<sup>ND</sup> 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 IV) 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. Bidders shall submit two (2) set of documents. **One (1) set** containing either the originals or certified true copies of the first and second components of its bid and the other set which are photocopies of the 1<sup>st</sup> set of documents (original or certified true copies). **EACH AND EVERY PAGE OF ALL SETS** (original and the other set) **must be authenticated with original signatures** (preferably in blue or red ink) by the bidder or his duly authorized representative. Non compliance shall be ground for disqualification.

*If there is any discrepancy between the 1<sup>st</sup> set of original/certified true copy documents and the other sets of photocopied documents of the same project, the documents in the 1<sup>st</sup> set of original/certified true copy documents shall prevail and shall be the basis for rating and evaluation of bids during bid opening.*

*Further, should there be any lacking documents in the other set, the reference for completeness for rating purposes shall be the set of original/ certified true copy documents.*

2. For Joint Venture, each partner of a joint venture agreement shall submit the document required in ITB Clause 12.1(a)(i). Submission of other documents required under ITB Clauses 12.1 by any of the joint venture partners constitutes compliance.
3. 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		a. 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*

\_\_\_\_\_  
*Name & Signature of Authorized Representative*

\_\_\_\_\_  
*Official Designation*

\_\_\_\_\_  
*Official Designation*

\_\_\_\_\_  
*Name of Firm*

\_\_\_\_\_  
*Name of Firm*

Witnesses

1. \_\_\_\_\_

2. \_\_\_\_\_

**[Jurat]**

*[Format shall be based on the latest Rules on Notarial Practice]*

Standard Form No: NPCSF-INFR-07

**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;

*This omnibus statement is a requirement in the Technical Envelope. The following additional requirements shall also be submitted: in the case of corporation/partnership/JV, duly notarized Special Power of Attorney, Board/Partnership Resolution, or Secretary's Certificate, whichever is applicable.*

*[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:

NAME OF PROJECT	OWNER	COST	DATE COMPLETED

At present, I am supervising 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 (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.

*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-10a  
Page 2 of 2

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.

*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).*

TERMS OF REFERENCE

CONSTRUCTION OF POWER FACILITIES FOR THE FOUR  
(4) UNITS MODULAR DIESEL GENERATING SETS  
INCLUDING HAULING, INSTALLATION, TEST AND  
COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT,  
BURDIOS QUEZON AND BUTAWANAN, SIRUMA,  
CAMARINES SUR

SECTION V – BIDDING FORMS

LuzP22Z1457Sc

Standard Form Number: NPCSF-INFR-10b  
Page 2 of 2

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:

Name and Address of Employer

Length of Service

_____	_____ 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, Foreman, 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).*

TERMS OF REFERENCE

CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BURDEOS QUEZON AND BUTAWANAN, SIRUMA, CAMARINES SUR

SECTION V – BIDDING FORMS

LuzP22Z1457Sc

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
<b>A. Owned</b>							
i.							
ii.							
iii.							
iv.							
v.							
<b>B. Leased</b>							
i.							
ii.							
iii.							
iv.							
v.							
<b>C. Under Purchase Agreements</b>							
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 POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BURDEOS QUEZON AND BUTAWANAN, SIRUMA, CAMARINES SUR (LuzP22Z1457Sc)**.

(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 POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BURDEOS QUEZON AND BUTAWANAN, SIRUMA, CAMARINES SUR (LuzP22Z1457Sc)** 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 VI

**BID DRAWINGS**



SECTION VI

**BID DRAWINGS  
(CIVIL WORKS)**



## SECTION VI – BID DRAWINGS CW – CIVIL WORKS

<u>DRAWING NO.</u>	<u>TITLE</u>
ButDPP-BDC-17.001	SITE DEVELOPMENT PLAN (1x50 & 1x30kW BUTAWANAN)
CalDPP-BDC-17.001	SITE DEVELOPMENT PLAN (2x50kW CALUTCOT DPP)
CBBSDPP-BDC-17.001	TYPICAL PREFAB CONTAINER HOUSE (FOUNDATION, FOOTING AND PEDESTAL PLAN DETAILS)
CBBSDPP-BDC-17.002	TYPICAL ENTRANCE GATE AND PERIMETER FENCE (ELEVATION, SECTION AND DETAILS)
CBBSDPP-BDC-17.003	TYPICAL GENSET AND TRANSFORMER PAD (PLAN, SECTION AND DETAILS)
CBBSDPP-BDC-17.004	TYPICAL WATER TANK AND DAY TANK SUPPORT (PLAN, SECTION AND DETAILS)
CBBSDPP-BDC-17.005	TYPICAL SEPTIC TANK AND OPEN RC CANAL
CBBSDPP-BDC-17.006	TYPICAL OIL-WATER SEPARATOR (SECTION AND DETAILS)
CBBSDPP-BDC-17.007	TYPICAL FLAGPOLE AND LIGHTING POLE FOUNDATION (PLAN, SECTION AND DETAILS)
CBBSDPP-BDC-17.008	TYPICAL DIRECT BURIED STEEL POLE (DETAILS)
CBBSDPP-BDC-17.009	TYPICAL SECLUSION FENCE AND PEDESTRIAN GATE (PLAN, SECTION AND DETAILS)
CBBSDPP-BDC-17.010	TYPICAL GUARD POST (FOUNDATION PLAN, ROOF FRAMING PLAN AND DETAILS)

TERMS OF REFERENCE

CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF-PLANT IN CALUTCOT, BURDEOS QUEZON AND BUTAWANAN, SIRUMA, CAMARINES SUR

SECTION VI – BID/ REFERENCE DRAWINGS

LuzP22Z1457Sc

CBBSDPP-BDC-17.011	TYPICAL HAZARDOUS WASTE STORAGE & LUBE/FUEL OIL RECEIVING AREA (PLANS)
CBBSDPP-BDC-17.012	TYPICAL HAZARDOUS WASTE STORAGE & LUBE/FUEL OIL RECEIVING AREA (FRAME ELEVATIONS)
CBBSDPP-BDC-17.013	TYPICAL HAZARDOUS WASTE STORAGE & LUBE/FUEL OIL RECEIVING AREA (FOOTING DETAILS & CONTAINMENT WALL)



## SECTION VI – BID DRAWINGS CW – CIVIL WORKS

<u>DRAWING NO.</u>	<u>TITLE</u>
ButDPP-BDC-17.001	SITE DEVELOPMENT PLAN (1x50 & 1x30kW BUTAWANAN)
CalDPP-BDC-17.001	SITE DEVELOPMENT PLAN (2x50kW CALUTCOT DPP)
CBBSDPP-BDC-17.001	TYPICAL PREFAB CONTAINER HOUSE (FOUNDATION, FOOTING AND PEDESTAL PLAN DETAILS)
CBBSDPP-BDC-17.002	TYPICAL ENTRANCE GATE AND PERIMETER FENCE (ELEVATION, SECTION AND DETAILS)
CBBSDPP-BDC-17.003	TYPICAL GENSET AND TRANSFORMER PAD (PLAN, SECTION AND DETAILS)
CBBSDPP-BDC-17.004	TYPICAL WATER TANK AND DAY TANK SUPPORT (PLAN, SECTION AND DETAILS)
CBBSDPP-BDC-17.005	TYPICAL SEPTIC TANK AND OPEN RC CANAL
CBBSDPP-BDC-17.006	TYPICAL OIL-WATER SEPARATOR (SECTION AND DETAILS)
CBBSDPP-BDC-17.007	TYPICAL FLAGPOLE AND LIGHTING POLE FOUNDATION (PLAN, SECTION AND DETAILS)
CBBSDPP-BDC-17.008	TYPICAL DIRECT BURIED STEEL POLE (DETAILS)
CBBSDPP-BDC-17.009	TYPICAL SECLUSION FENCE AND PEDESTRIAN GATE (PLAN, SECTION AND DETAILS)
CBBSDPP-BDC-17.010	TYPICAL GUARD POST (FOUNDATION PLAN, ROOF FRAMING PLAN AND DETAILS)

TERMS OF REFERENCE

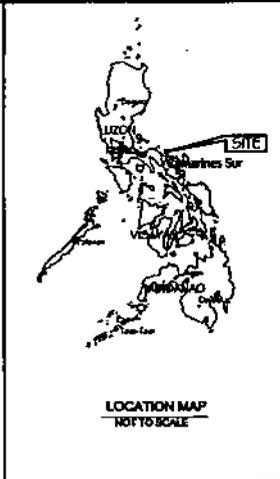
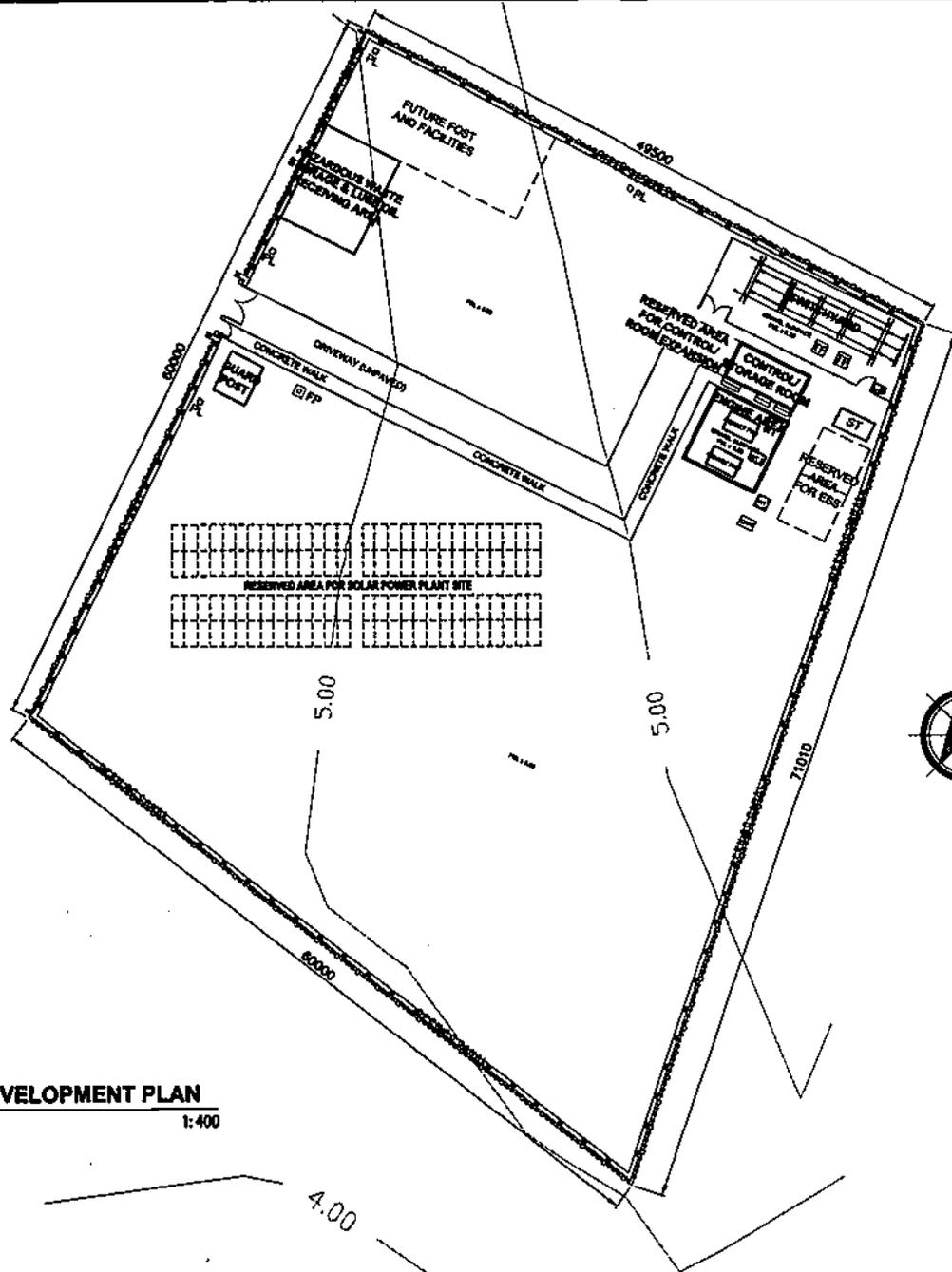
CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BURDEOS QUEZON AND BUTAWANAN, SIRUMA, CAMARINES SUR

SECTION VI – BID/ REFERENCE DRAWINGS

LuzP22Z1457Sc

CBBSDPP-BDC-17.011	TYPICAL HAZARDOUS WASTE STORAGE & LUBE/FUEL OIL RECEIVING AREA (PLANS)
CBBSDPP-BDC-17.012	TYPICAL HAZARDOUS WASTE STORAGE & LUBE/FUEL OIL RECEIVING AREA (FRAME ELEVATIONS)
CBBSDPP-BDC-17.013	TYPICAL HAZARDOUS WASTE STORAGE & LUBE/FUEL OIL RECEIVING AREA (FOOTING DETAILS & CONTAINMENT WALL)





**LEGENDS:**

- PL - PERIMETER LIGHTING
- FP - FLAG POLE
- WT - WATER TANK
- CB - CATCH BASIN
- ST - SEPTIC TANK
- TP - TRANSFORMER PAD
- OWS - OIL-WATER SEPARATOR
- \*---\*--- PERIMETER FENCE (BARBED WIRE)
- o---o--- SECLUSION FENCE

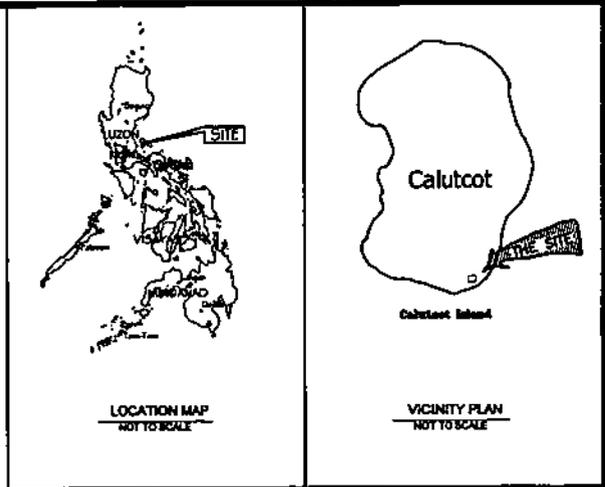
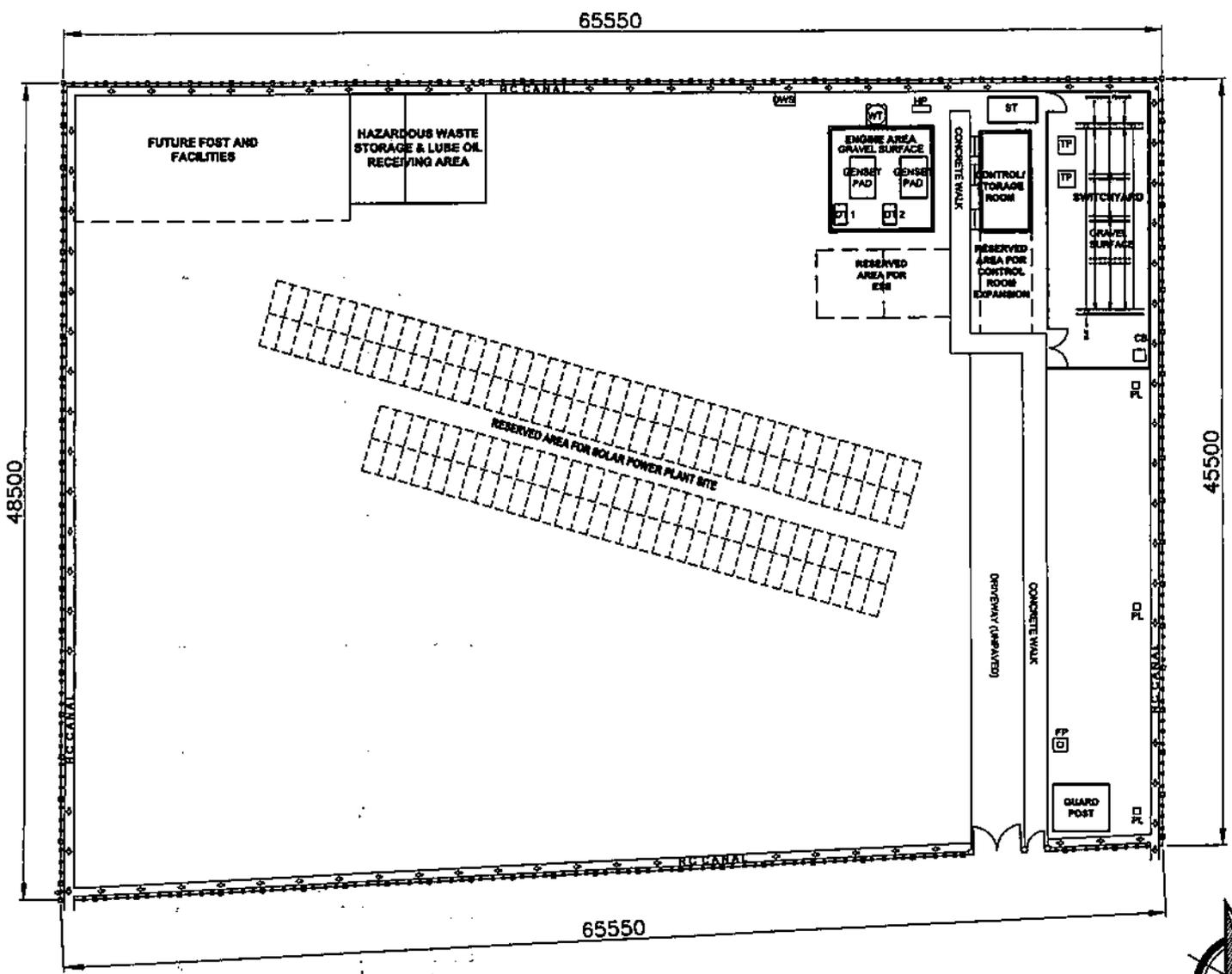


**SITE DEVELOPMENT PLAN**  
SCALE 1:400

**NOTES:**  
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.

<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY			
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALITCOT, BARDIOS QUEZON AND BUTAWANAN, SURIGAO, CAMARINES SUR LOCATION: BUTAWANAN, SURIGAO, CAMARINES SUR			
<b>TITLE:</b> <b>SITE DEVELOPMENT PLAN</b> <b>(1x50 &amp; 1x30kW BUTAWANAN DPP)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	C. Serr		
REVIEWED	PRINCIPAL ENGR./ARCHT.		RECOMMENDED:
CIVIL/ARCHT			A. C. ESPRITU Principal Engr. A. CEM
ELEC.			APPROVED:
MECH.			M. G. SERRANO Manager, DDD
DWG. NO. ButDPP-BDC-17.001		SPECS. NO. LuzP22Z1457Sc	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPD.	
SCALE: AS SHOWN		<b>BID DRAWING</b>	
		REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



- LEGENDS:**
- PL — PERMETER LIGHTING
  - FP — FLAG POLE
  - WT — WATER TANK
  - CB — CATCH BASIN
  - ST — SEPTIC TANK
  - TP — TRANSFORMER PAD
  - OWS — OIL-WATER SEPARATOR
- (dashed line with dots) — PERMETER FENCE (BARBED WIRE)
  - (solid line with dots) — SECLUSION FENCE

**NOTES:**  
 1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.

**SITE DEVELOPMENT PLAN**  
 SCALE 1:275

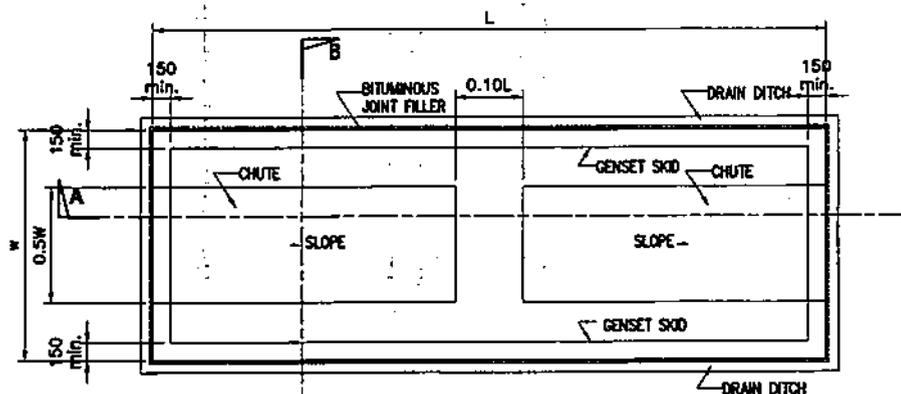


OWNER:  <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BUNDOLO QUEZON AND BUTABANAK, BIRANA, CALUTCOT, BUNDOLO, QUEZON	
TITLE: <b>SITE DEVELOPMENT PLAN</b> <b>(2x50 kW CALUTCOT DPP)</b>	
DESIGNED BY: [ ]	CHD: [ ] DATE: [ ]
DRAWN BY: [ ]	RECOMMENDED BY: <b>H. L. BENDOZA</b> Principal Engineer A, G&D
REVIEWED BY: PRINCIPAL ENGR./ARCHT.	RECOMMENDED BY: <b>A. C. ESPIRITU</b> Manager, G&D
CIVIL/ARCHT. [ ]	APPROVED BY: <b>R. C. SOMBRERA</b> Manager, G&D
ELEC. [ ]	
MECH. [ ]	
DWG. NO. <b>CaIDPP-BDC-17.001</b> SPEC. NO. <b>LuzP22Z1457Sc</b>	
SCALE: <b>AS SHOWN</b>	<b>BID DRAWING</b> REV. <b>0</b>

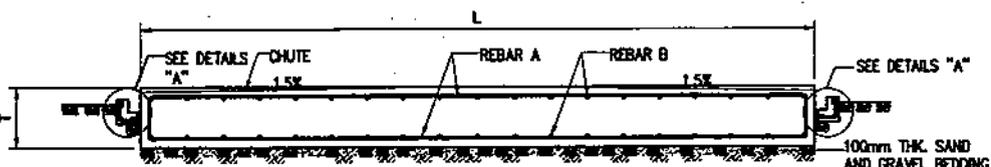
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.



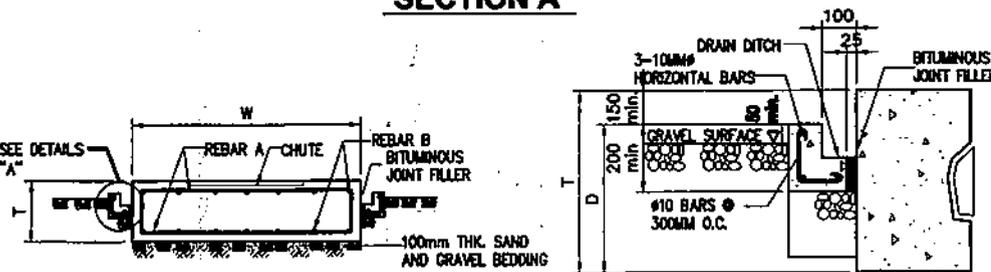




**PLAN**



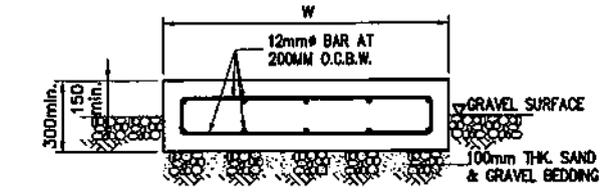
**SECTION A**



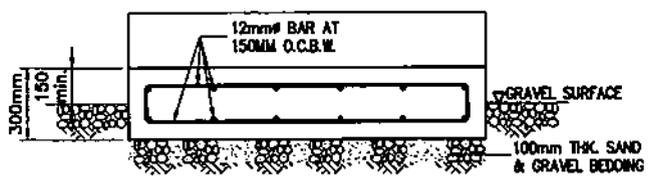
**SECTION B**

**DETAILS "A"**

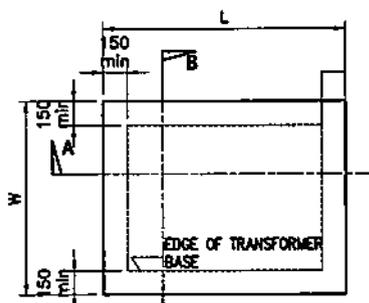
**CONCRETE GENSET PAD**  
SCALE NTS



**SECTION A**

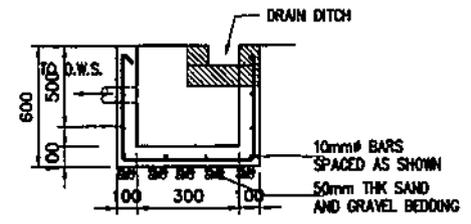


**SECTION B**

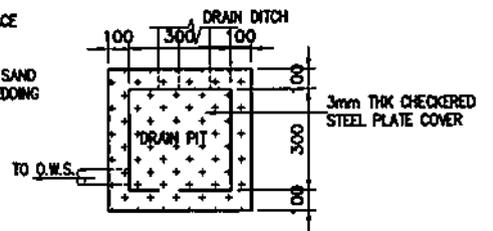


**PLAN**

**TRANSFORMER PAD**  
SCALE NTS

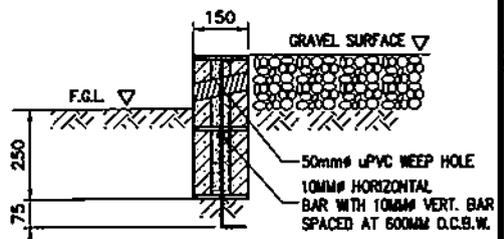


**SECTION**



**PLAN**

**DRAIN PIT (DP)**  
SCALE NTS



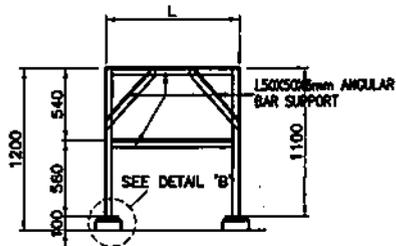
**CHB ZOCALO WALL**  
SCALE NTS

**NOTES:**

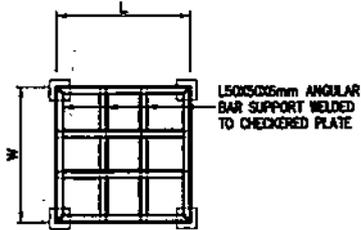
1. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE SHALL BE  $f_c = 20.7$  MPa (3000 psi) AT 28-DAY PERIOD.
2. REINFORCING STEEL BARS SHALL CONFORM TO THE REQUIREMENTS OF THE PHS FOR DEFORMED STEEL BARS GRADE 275.
3. THE DESIGN OF THE GENSET PAD FOUNDATION AND MOUNTING DETAILS SHALL BE PREPARED BY THE CONTRACTOR SUBJECT TO NPC'S REVIEW AND APPROVAL. FINAL DIMENSION SHALL BE AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER IN CONSIDERATION OF THE MINIMUM REQUIREMENTS.
4. ALLOWABLE BEARING CAPACITY OF SOIL SHALL NOT BE LESS THAN 143.9 KPa.
5. WORK THIS WITH ELECTRICAL AND MECHANICAL DRAWINGS.

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS BICOALAR DIESEL SUBSTATION SITE INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTOOT, BURDIBOS, QUEZON AND BUTAMAMAH, BRUMA, CAMARINES SUR.			
LOCATION: CALUTOOT, BURDIBOS, QUEZON AND BUTAMAMAH, BRUMA, CAMARINES SUR			
TITLE: <b>TYPICAL GENSET &amp; TRANSFORMER PAD (PLAN, SECTIONS &amp; DETAILS)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	C.B.M.		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		RECOMMENDED
ENLARGED			
ELEC.			APPROVED:
MECH.			
DWG. NO. CBBSDPP-BDC-17.003		SPEC. NO. LUZZP22Z1457Sc	

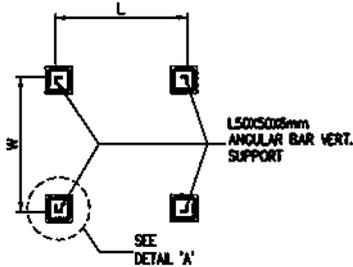
REV.	DATE	NATURE OF REVISION	BY	CHKD.	REC'D.	APPR.	SCALE AS SHOWN	<b>BID DRAWING</b>	REV. 0
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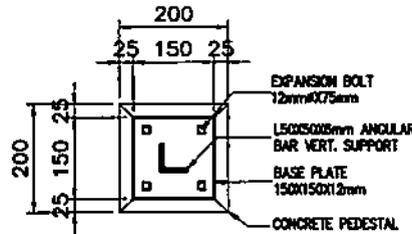
**ELEVATION**



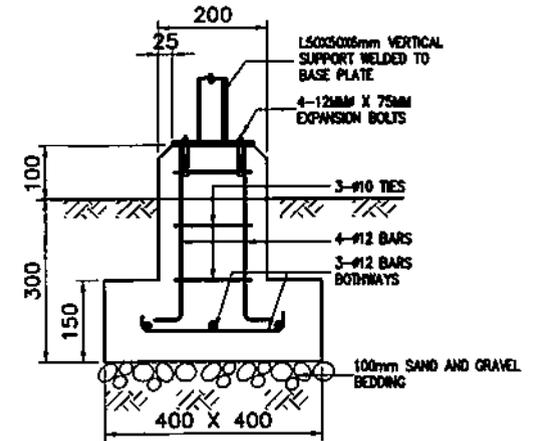
**FRAMING PLAN**



**PLAN**

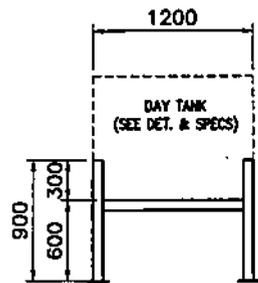


**DETAIL 'A'**

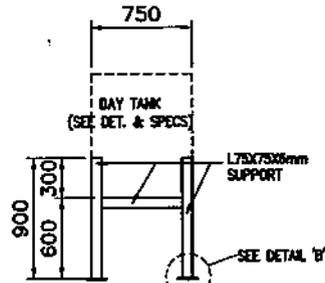


**DETAIL 'B'**

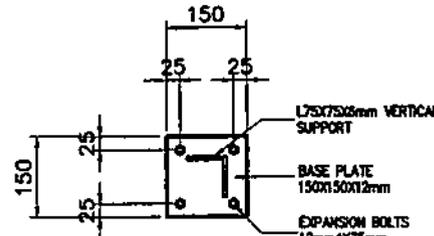
1000L WATER TANK SUPPORT  
SCALE 1:40



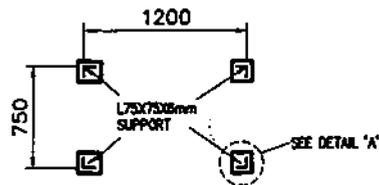
**SIDE ELEVATION**



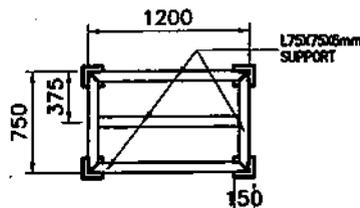
**FRONT ELEVATION**



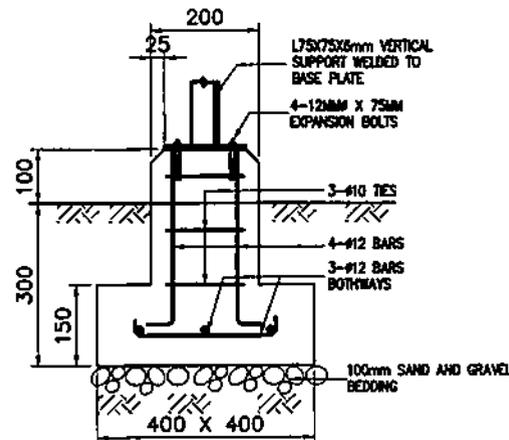
**DETAIL 'A'**



**PLAN**



**FRAMING PLAN**



**DETAIL 'B'**

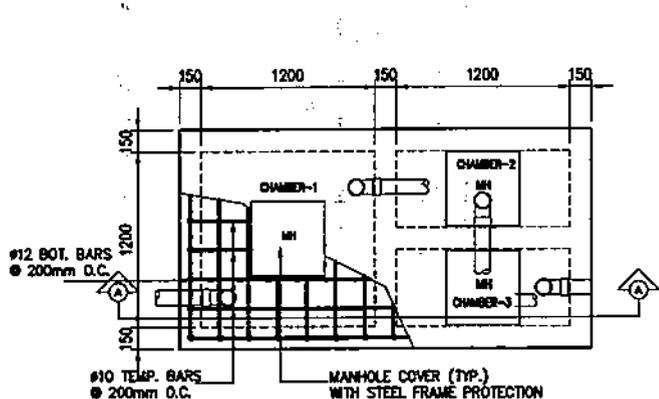
DAYTANK SUPPORT  
SCALE 1:40

**NOTES:**

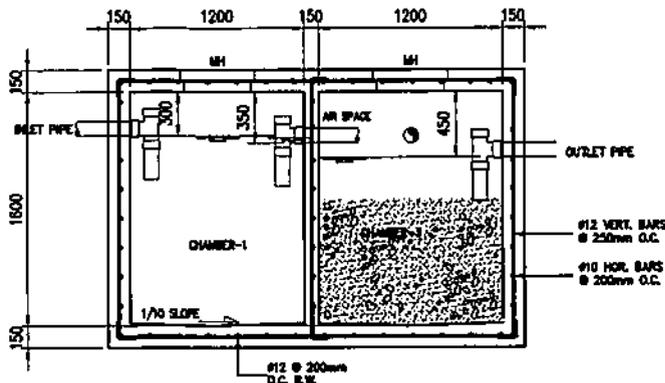
1. ALL DIMENSIONS ARE IN MILLIMETER UNLESS OTHERWISE INDICATED.
2. USE STRUCTURAL GRADE STEEL SHAPES, BARS AND PLATES CONFORMING TO ASTM A36.
3. ALL WELDING WORKS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN WELDING SOCIETY.
4. ALL STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE AISC SPECIFICATIONS AND CODE OF STANDARD PRACTICE.
5. WORK THIS WITH AND MECHANICAL DRAWINGS.
6. FINAL DIMENSION OF WATER TANK SUPPORT WILL VARY IN THE WATER TANK TO BE SUPPLIED.

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS BOKHAR GENSET GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTOG, BURGOS, QUEZON AND BUTAHANAN, BRUMA, CAMARINES SUR.			
LOCATION: CALUTOG, BURGOS, QUEZON AND BUTAHANAN, BRUMA, CAMARINES SUR			
TITLE: <b>TYPICAL WATER TANK AND DAY TANK SUPPORT</b> (PLAN, SECTION AND DETAILS)			
DESIGNED	BY	CHKD	DATE
DRAWN	C.D.arp		
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	
CHECKED/INT.		APPROVED	
ELEC.			
MECH.			
DWG. NO. <b>CBBS DPP-BDC-17.004</b>		SPEC. NO. <b>LuzP2221457Sc</b>	
SCALE: AS SHOWN		<b>BID DRAWING</b>	
REV.	DATE	NATURE OF REVISION	BY

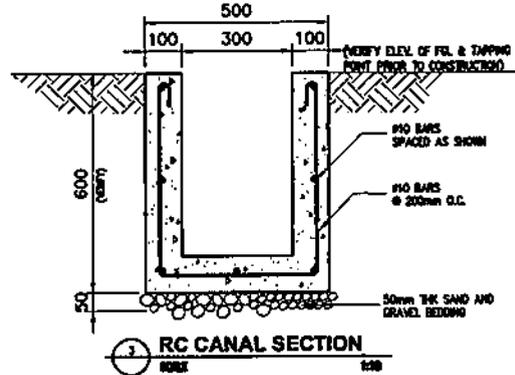
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.



**PLAN**

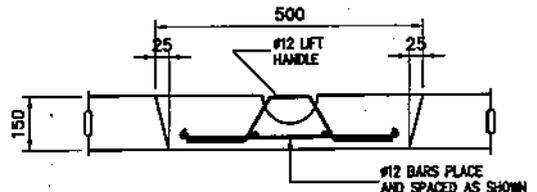


**SECTION 'A'**

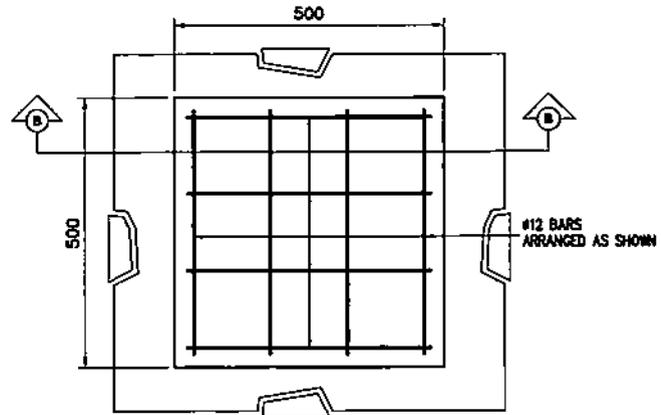


**RC CANAL SECTION**

**SEPTIC TANK**  
SCALE 1:30



**SECTION B-B**



**PLAN**

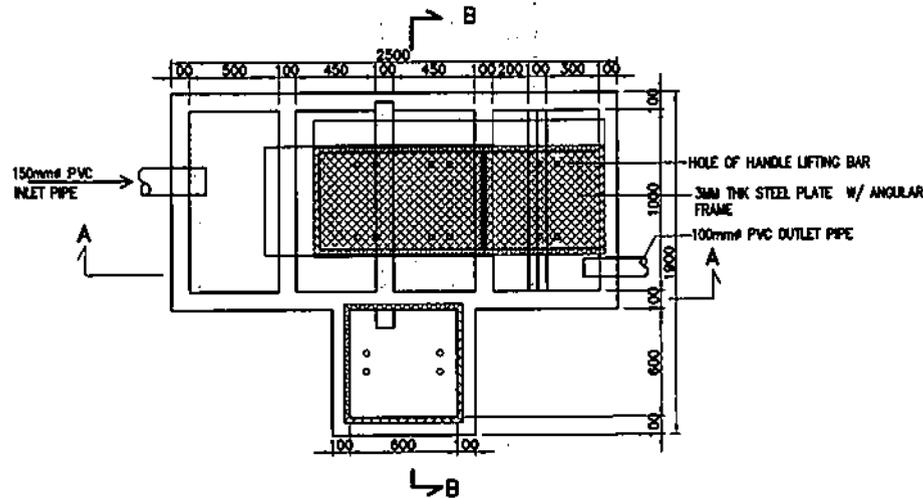
**MANHOLE COVER**  
SCALE 1:10

**NOTES:**

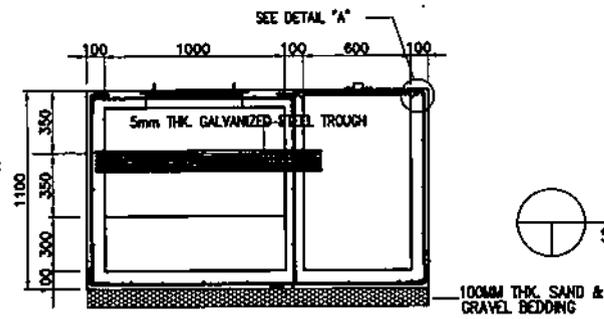
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED IN THE DRAWING.
2. USE 17.30MPa CONCRETE FOR ALL DRAINAGE APPURTENANT STRUCTURES UNLESS OTHERWISE INDICATED.
3. REINFORCING STEEL BARS SHALL CONFORM TO THE REQUIREMENTS OF THE PNS FOR DEFORMED STEEL BARS GRADE 275.
4. POLYVINYL CHLORIDE (PVC) PIPE SHALL BE UNPLASTICIZED CONFORMING TO ISO4435 OR EQUIVALENT.

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALITDOT, BUREDON, QUEZON AND BUTAYAKAAN, SIBUMA, CAMARINES SUR.			
LOCATION: CALITDOT, BUREDON, QUEZON AND BUTAYAKAAN, SIBUMA, CAMARINES SUR.			
TITLE: <b>TYPICAL SEPTIC TANK AND OPEN RC CANAL</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	C.B.M.		
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED:	 H. L. MENDOZA Principal Engineer A
CHLAINRCHT		APPROVED:	 A. C. ESPIRITU Manager, E&I
ELEC.		APPROVED:	 M. G. SISON Manager, O&D
MECH.			
DWG. NO. CBSDPP-BDC-17.005		SPEC. NO. LUZP2221457Sc	
SCALE: AS SHOWN		<b>BID DRAWING</b>	
REV.	DATE	NATURE OF REVISION	BY

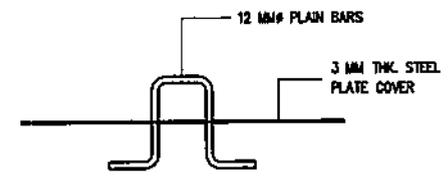
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



**PLAN**



**SECTION B-B**

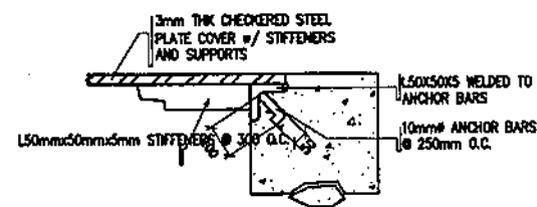


**DETAIL OF LIFTING HANDLE BAR**



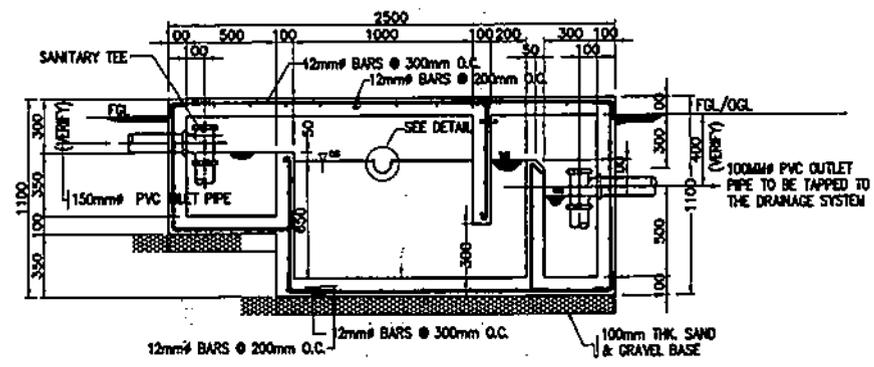
SCALE

1:10

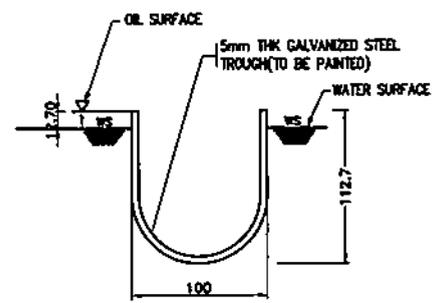


**DETAIL "A"**

NOT TO SCALE



**SECTION A-A**



**DETAIL "B"**

SCALE 1:4

**NOTES:**

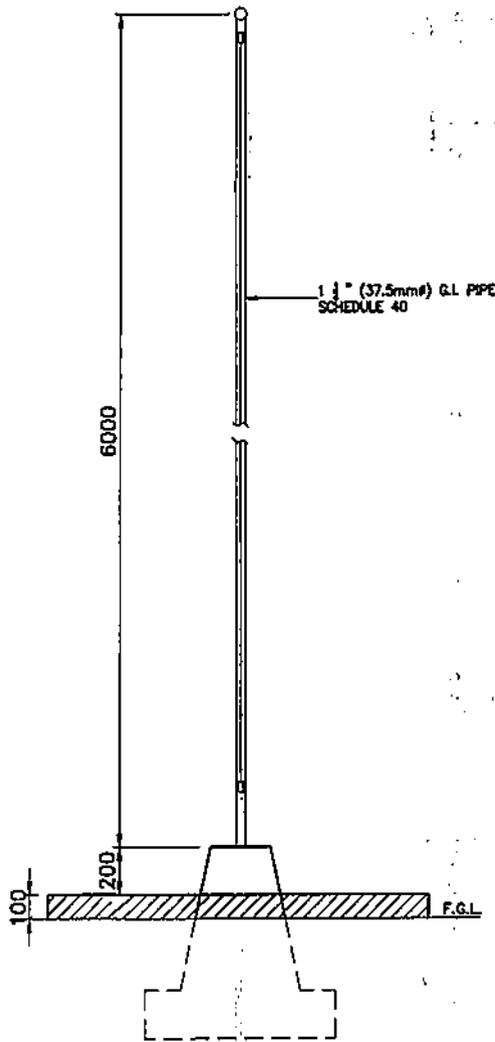
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE SHALL BE  $F'_c=20.70$  MPA AT 28 DAY PERIOD.
3. ALL REINFORCING STEEL BARS SHALL CONFORM TO THE LATEST REQUIREMENTS OF PNS FOR DEFORMED STEEL BARS, GRADE 275.
4. ALL ASPECTS OF CONSTRUCTION AND DETAILING OF REINFORCEMENTS SHALL BE IN ACCORDANCE WITH THE PROVISIONS OF ACI CODE.
5. BEFORE THE START OF THE CONSTRUCTION, VERIFY THE DRAINAGE STRUCTURES & ELEVATIONS CONNECTED TO THE OIL-WATER SEPARATOR.
6. AFTER THE COMPLETION OF THE CONSTRUCTION, THE OIL-WATER SEPARATOR MUST BE FILLED WITH WATER UP TO THE BOTTOM RIM OF THE STEEL TROUGH.
7. LOCATION OF O/W SEPARATOR IS TO SUIT ACTUAL FIELD CONDITION.

**OIL WATER SEPARATOR**

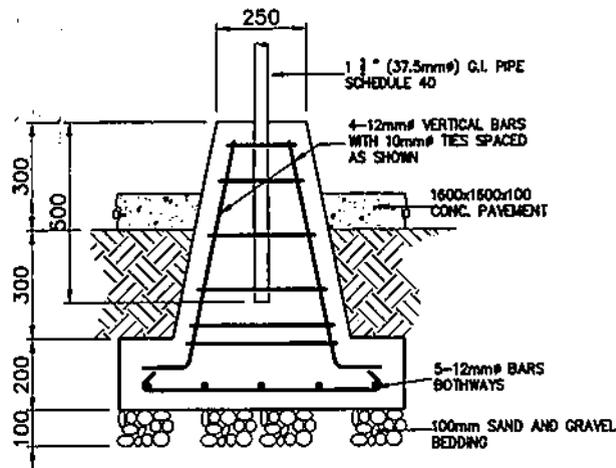
SCALE

1:30

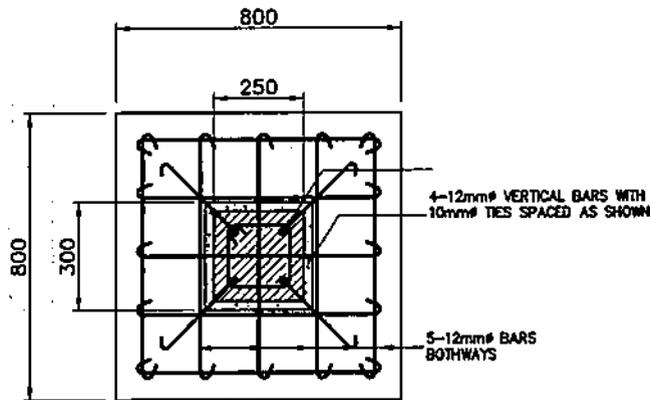
		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING MAIN PMS INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALITCUT, BUNDOON, QUEZON AND BUTAYAMAN, BRUMA, CAMARINES SUR.			
LOCATION: CALITCUT, BUNDOON, QUEZON AND BUTAYAMAN, BRUMA, CAMARINES SUR.			
TITLE: <b>TYPICAL OIL-WATER SEPARATOR (SECTION AND DETAILS)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	C.Beth		
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED:	H.L. MENDOZA Principal Engineer A, CEAD
CIVIL/ARCHT			F.A. ESPERITU Manager, CEAD
ELEC.		APPROVED:	H.L. MENDOZA Manager, CEAD
MECH.			
DWG. NO. <b>CBSDPP-BDC-17.806</b>		SPECS. NO. <b>LuzP22Z1457Sc</b>	
REV.	DATE	NATURE OF REVISION	BY
SCALE: AS SHOWN		<b>BID DRAWING</b>	
		REV. #	



FLAG POLE ELEVATION  
SCALE 1:15

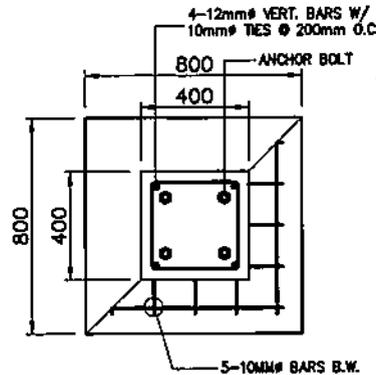


SECTION



PLAN

FLAG POLE FOUNDATION  
SCALE 1:15



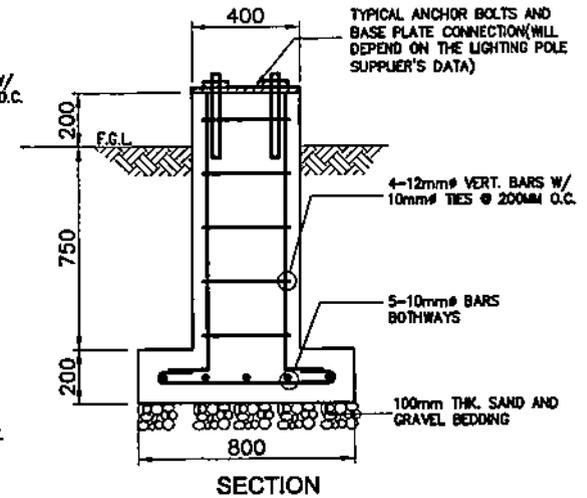
PLAN



PERIMETER LIGHTING POLE FOUNDATION

SCALE

1:20



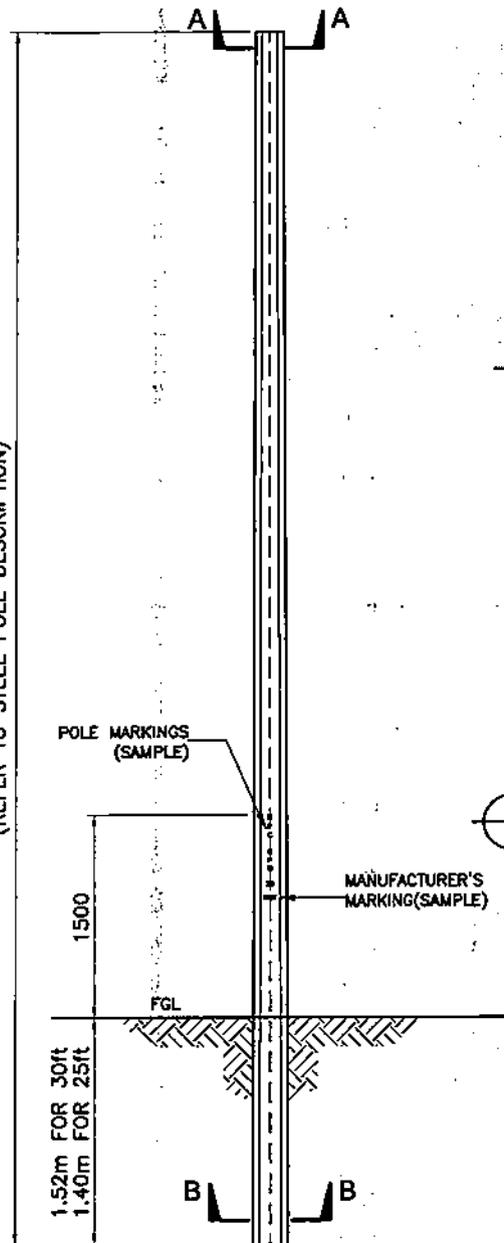
SECTION

NOTES:

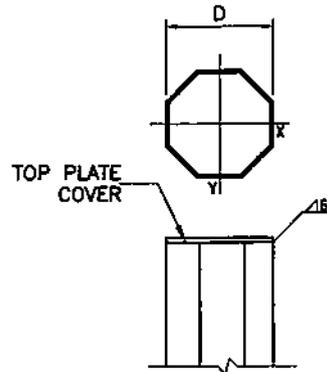
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED IN THE DRAWING.
2. USE 17.30MPa CONCRETE FOR ALL APPURTENANT STRUCTURES UNLESS OTHERWISE INDICATED.
3. REINFORCING STEEL BARS SHALL CONFORM TO THE REQUIREMENTS OF THE PNS FOR DEFORMED STEEL BARS GRADE 275.

OWNER:		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING WALKING INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTOG, BURDOR, QUEZON AND BUTAMAMAN, SURIGAO, CAMARINES SUR			
LOCATION: CALUTOG, BURDOR, QUEZON AND BUTAMAMAN, SURIGAO, CAMARINES SUR			
TITLE: TYPICAL FLAG POLE & LIGHTING POLE FOUNDATION (PLAN, SECTIONS & DETAILS)			
DESIGNED	BY	CHKD	DATE
DRAWN	C. Bado		
REVIEWED	PRINCIPAL ENGR. JARCHT.	RECOMMENDED	H. L. MENDOZA Principal Engr. in A. CAD 6/10
CHECKED		APPROVED	M. G. DOMESTICO Manager, E&C
ELEC.			
MED.			
DWG. NO. CBSDPP-SDC-17.007		SPECS. NO. LUZP2221457Sc	
REV.		DATE	
NATURE OF REVISION		BY	
		CHKD.	
		RECD.	
		APPL.	
SCALE: AS SHOWN		BID DRAWING	
		REV. 0	

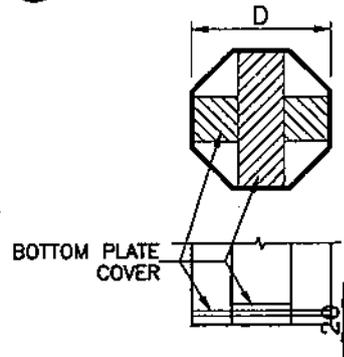
(REFER TO STEEL POLE DESCRIPTION)



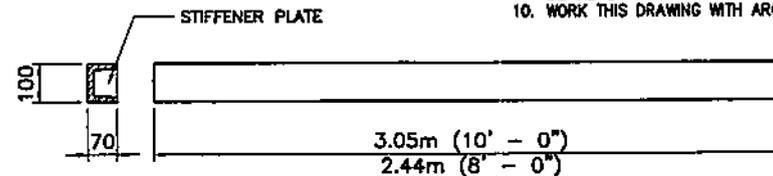
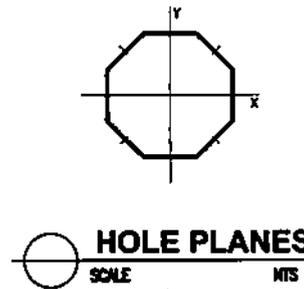
**ELEVATION OF STEEL POLE**  
SCALE 1:40



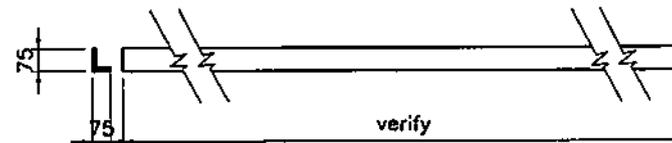
**TOP PLATE (SECTION A-A)**  
SCALE MTS



**BOTTOM PLATE (SECTION B-B)**  
SCALE MTS



**CROSS ARM DET.**  
SCALE MTS



**CROSS BRACE DET.**  
SCALE MTS

**SHAFT INFORMATION**

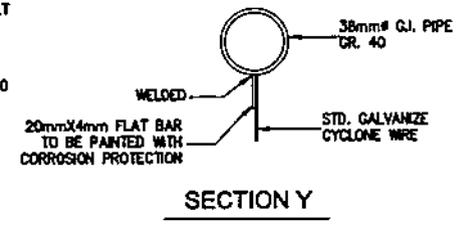
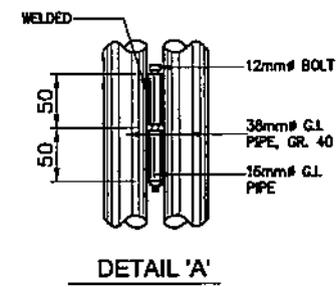
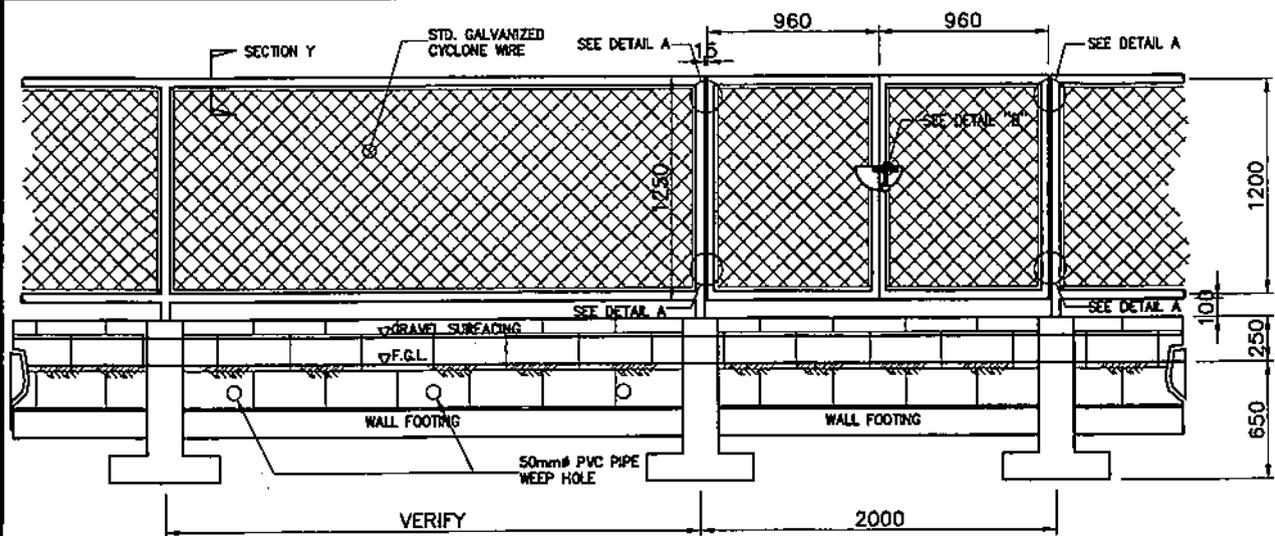
	LENGTH	30 ft.	25 ft.
DESCRIPTION			
TIP DIAMETER		200mm	150mm
BUTT DIAMETER		260mm	240mm
THICKNESS		4mm	4mm

**NOTES:**

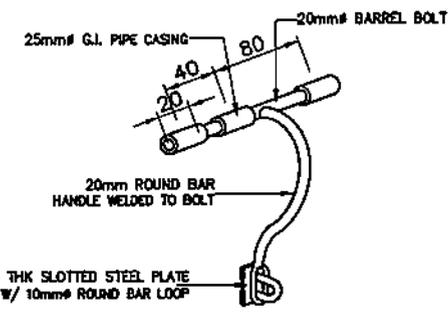
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. DRILL HOLES ON CENTERLINE OF POLE FACES.
3. HOLE LOCATION AND DIAMETER SHALL BE REFERRED TO EEICD DRAWINGS FOR DIFFERENT TYPES OF POLE.
4. POLES SHALL BE OCTAGONAL ( 8 SIDES ) AND THE DIAMETERS ARE MEASURED ON THE OUTSIDE AND ACROSS THE FLAT SURFACES.
5. THE MATERIAL FOR POLE SHALL BE 345MPa (50ksi) MINIMUM YIELD STRENGTH OF ROLLED STEEL PLATE.
6. ALL POLES ARE HOT DIP GALVANIZED IN ACCORDING WITH ASTM A123M WITH MINIMUM COATING THICKNESS OF 85 MICRONS.
7. TIP AND BUTT OF POLES SHALL BE COVERED WITH PLATE SIMILAR TO SHAFT BODY THICKNESS.
8. CROSSARMS SHALL BE 6MM THICK BENDED CHANNEL SECTION PROVIDED WITH 6MM THICK STIFFENER PLATE WELDED AT 300MM ON CENTERS.
9. CROSS BRACES SHALL BE 6MM THICK ANGULAR SECTION. LENGTHS AND HOLE LOCATIONS SHALL BE REFERRED TO EEICD DRAWINGS.
10. WORK THIS DRAWING WITH ARCHITECTURAL DRAWINGS.

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE POLE (8) UNITS REGULAR DESIG. GENERATING SETS INCLUDING MARKING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTOG, BURDOB, QUEZON AND BUTANANAN, SIRIMA, CAMARINES SUR.			
LOCATION: CALUTOG, BURDOB, QUEZON AND BUTANANAN, SIRIMA, CAMARINES SUR.			
TITLE: <b>TYPICAL DIRECT BURIED STEEL POLE</b> (DETAILS)			
DESIGNED	BY	CHKD	DATE
DRAWN	C. Bato		
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	
CIVIL/ARCHT		APPROVED	
ELEC			
MECH			
DWG. NO. <b>CBSDPP-BDC-17.008</b>		SPECS. NO. <b>Lu2P22Z1457Sc</b>	
SCALE: AS SHOWN		<b>BID DRAWING</b>	
REV.	DATE	NATURE OF REVISION	BY

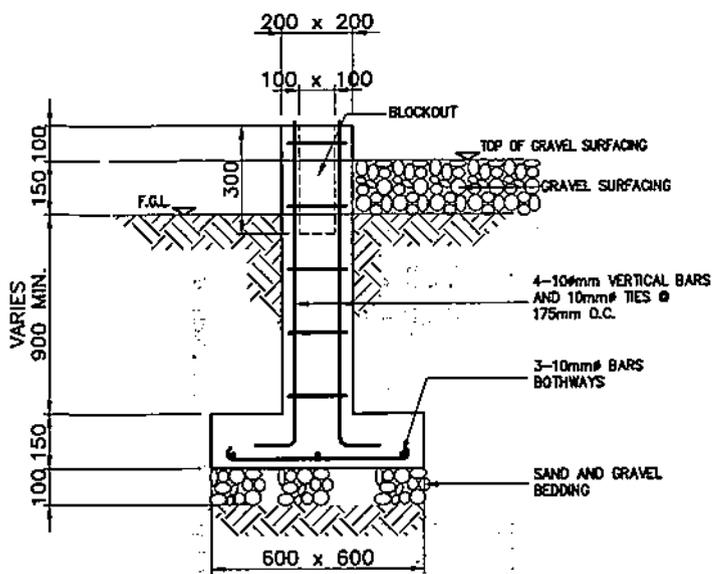
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



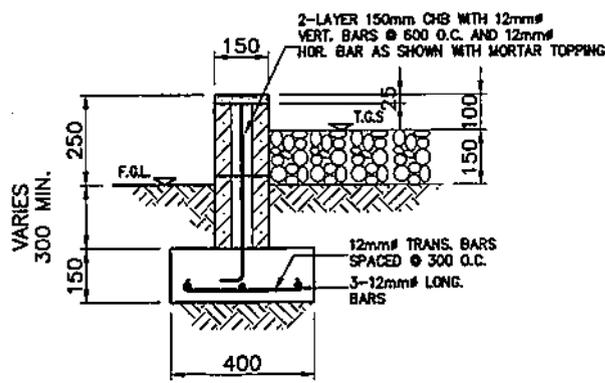
SECTION FENCE ELEVATION  
SCALE 1:30



DETAIL 'B'



PEDESTAL FOOTING  
SCALE 1:15



WALL FOOTING  
SCALE 1:15

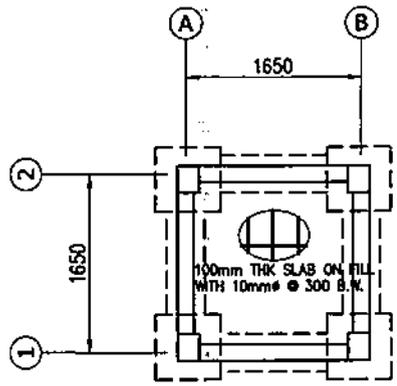
- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
  2. PLAN/LAYOUT OF SECLUSION FENCE TO BE CONSTRUCTED ARE INDICATED IN ELECTRICAL DRAWINGS.
  3. WORK THIS WITH ELECTRICAL DRAWINGS.

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALITCOT, BURENCO QUEZON AND BUTAMAHAN, BRUMA, CAMARINES SUR.			
LOCATION: CALITCOT, BURENCO, QUEZON AND BUTAMAHAN, BRUMA, CAMARINES SUR.			
TITLE: <b>TYPICAL SECLUSION FENCE &amp; PEDESTRIAN GATE (PLAN, SECTION &amp; DETAILS)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	C. Bando		
REVIEWED	PRINCIPAL ENGR./ARCHT.		RECOMMENDED:
CIVIL/ARCHT			H. L. BENDOZA Principal Engineer A, CEAS 4/10
ELEC.			A. C. ESPRITU Principal Engr. III 4/10
MECH.			APPROVED:
			H. L. BENDOZA Manager, E&C

DWG. NO. CBBSDPP-BDC-17.009 SPEC. NO. LUZP22Z1457SC

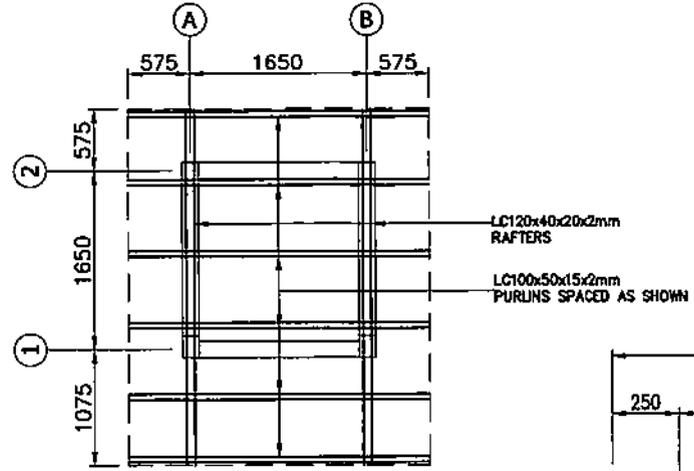
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

SCALE: AS SHOWN **BID DRAWING** REV. 0



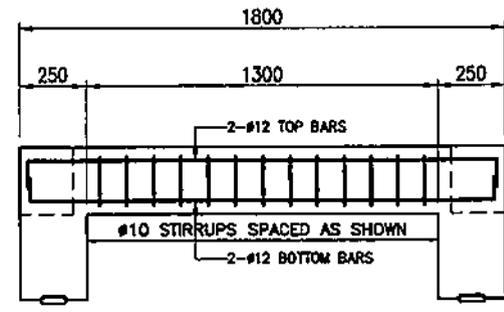
FOUNDATION PLAN

SCALE 1:50



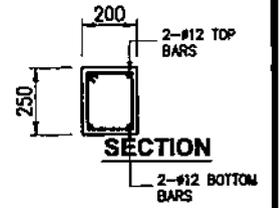
ROOF FRAMING PLAN

SCALE 1:50

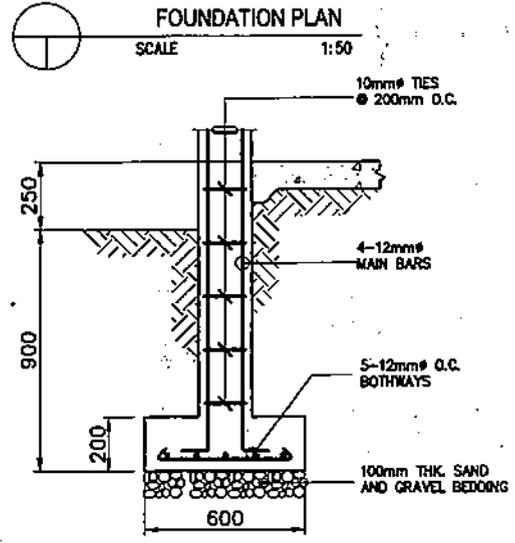


ROOF BEAM DETAIL

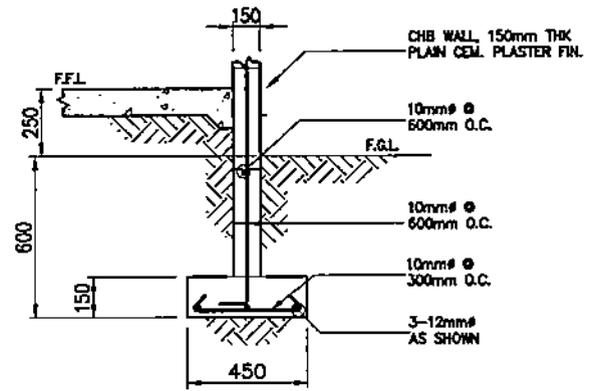
SCALE 1:50



SECTION

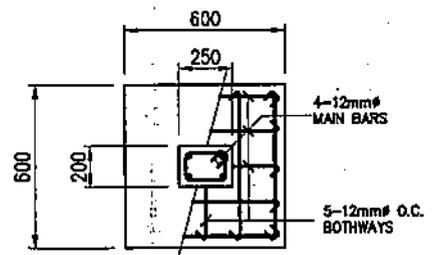


SECTION

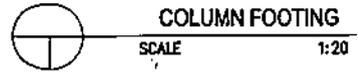


WALL FOOTING

SCALE 1:20



PLAN



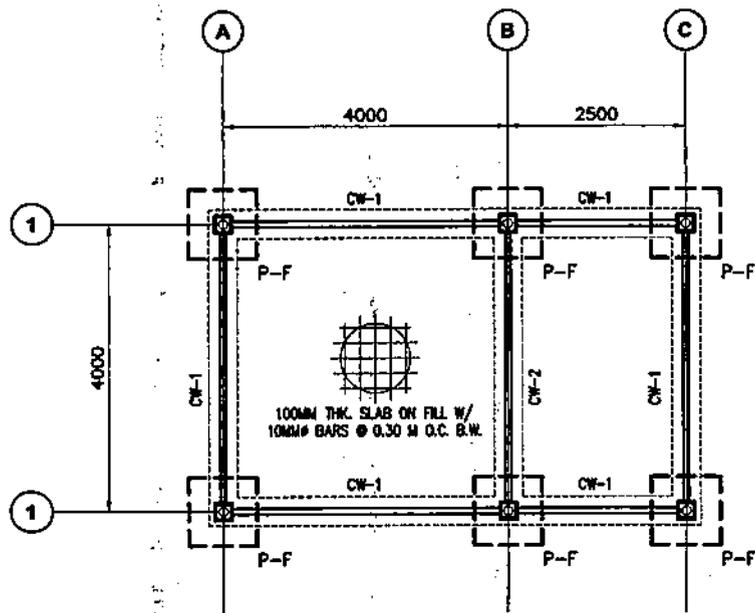
COLUMN FOOTING

SCALE 1:20

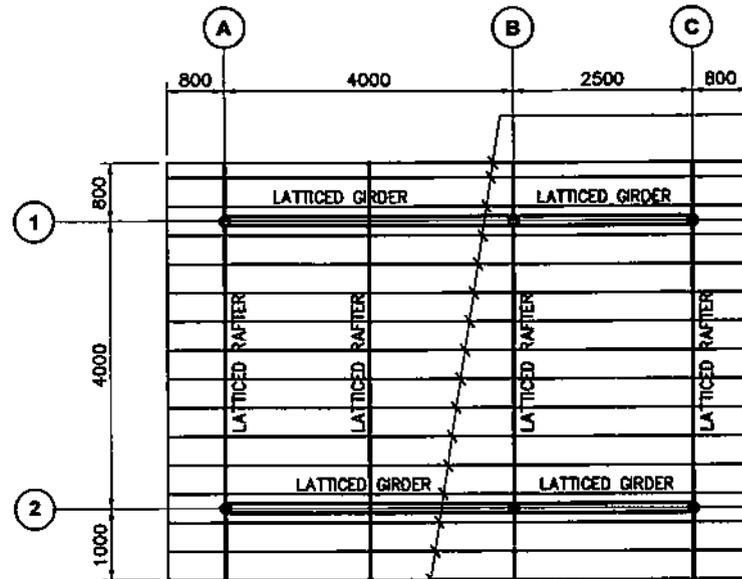
- NOTES:
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
  - WORK THIS DRAWING WITH ARCHITECTURAL DRAWINGS.

OWNER		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATOR SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUBOT, BURDEON, QUEZON AND BUTAWANAK, SURIGAO, CAGANAN SUR, CAGANAN SUR			
LOCATION: CALUBOT, BURDEON, QUEZON AND BUTAWANAK, SURIGAO, CAGANAN SUR			
TITLE: <b>TYPICAL GUARD POST</b> (FOUNDATION PLAN, ROOF FRAMING PLAN AND DETAILS)			
DESIGNED	BY	CHKD	DATE
DRAWN	C. Banks		
REVIEWED	PRINCIPAL ENGR./ARCHT.		
CIVIL/ARCHT			
ELEC			
MECH			
SUBMITTED:		H. L. MENDOZA Principal Engineer A, CEAD	
RECOMMENDED:		A. C. ESPRITU Manager, CEAD	
APPROVED:		R. C. SORIANO Manager, CEAD	
DWG. NO. CBBSDPP-BDC-17.01B		SPECS. NO. LUZP22Z1457Sc	
SCALE: AS SHOWN		<b>BID DRAWING</b> REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD	RECD.	APPD.



**FOUNDATION PLAN**  
SCALE 1:75



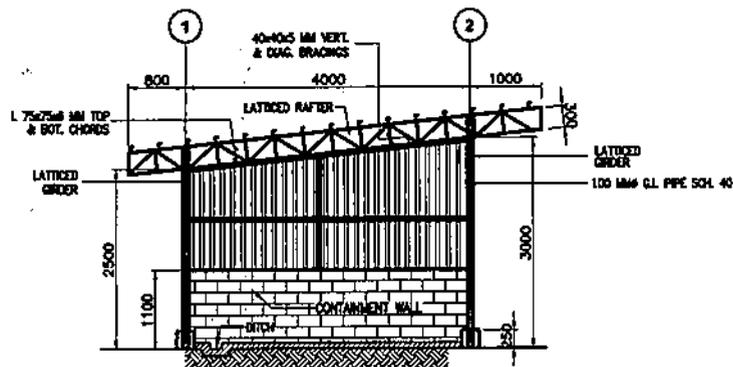
**ROOF FRAMING PLAN**  
SCALE 1:75

**NOTES:**

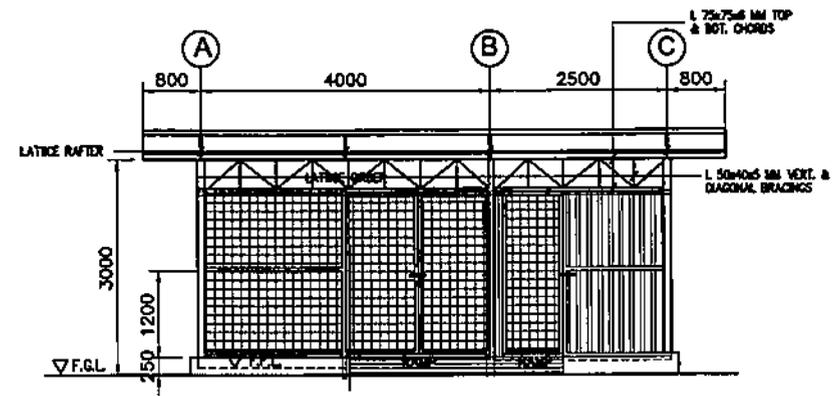
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. WORK THIS DRAWING WITH RELATED ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS.

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DELIMAN QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT MODULAR DIESEL GENERATORS WITH HOLDING BUILDING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTDOT, SORSOGON QUEZON AND BUTAHANAN, SORSOGON, CAMARINES SUR.			
LOCATION: CALUTDOT, SORSOGON, QUEZON AND BUTAHANAN, SORSOGON, CAMARINES SUR.			
TITLE: <b>TYPICAL HAZARDOUS WASTE STORAGE &amp; LUBE/FUEL OIL RECEIVING AREA (PLANS)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	C. Rom		
REVIEWED	PRINCIPAL ENGR./ARCHT.		
CHAR. ARCHT.			
ELEC.			
MECH.			
SUBMITTED:		H. L. MENDOZA Principal Engineer A, CEAD	
RECOMMENDED:		A. C. ESPRITU Manager, CEAD	
APPROVED:		N. G. SORIANO Manager, CEAD	
DWG. NO. C8BSDPP-BDC-17.011		SPEC. NO. LUZP22Z1457Sc	
SCALE: AS SHOWN		<b>BID DRAWING</b>	
REV. 0			

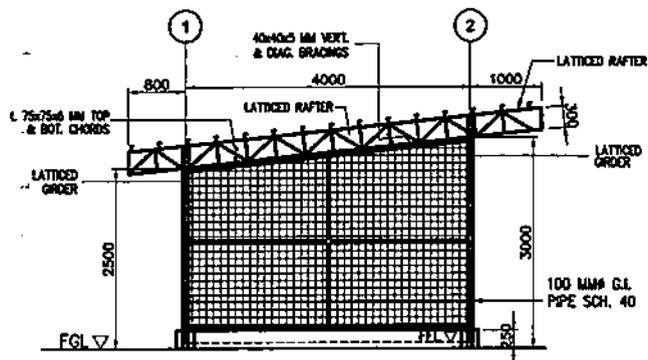
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



**ELEVATION @ GRID B**  
SCALE 1:75



**FRONT ELEVATION**  
SCALE 1:75



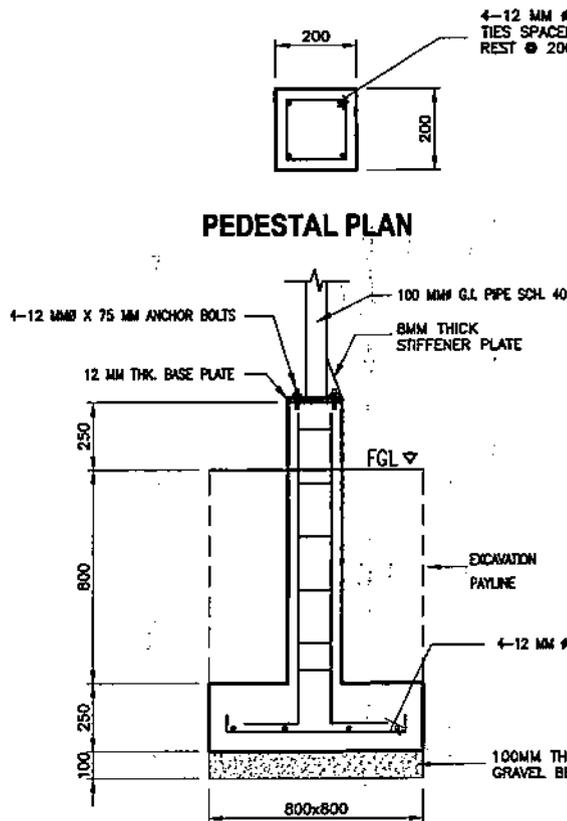
**SIDE ELEVATIONS**  
SCALE 1:75

**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. WORK THIS DRAWING WITH RELATED ARCHITECTURAL AND ELECTRICAL DRAWINGS.

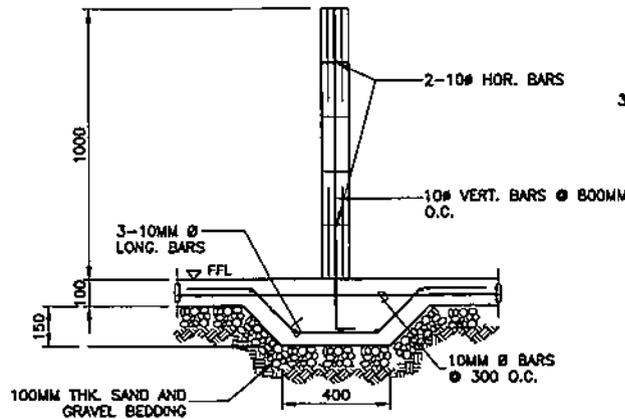
OWNER:				<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DELMAN QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALATCOOT, BURGOS QUEZON AND BUTAMAMAH, BRUMA, CAMARINES SUR					
LOCATION: CALATCOOT, BURGOS, QUEZON AND BUTAMAMAH, BRUMA, CAMARINES SUR					
TITLE: <b>TYPICAL HAZARDOUS WASTE STORAGE &amp; LUBE/FUEL OIL RECEIVING AREA (FRAME ELEVATIONS)</b>					
DESIGNED	BY	CHKD	DATE	SUBMITTED:	<i>H. C. BENDOZA</i> Principal Engineer A. CD
DRAWN	C. Bero			RECOMMENDED:	<i>A. C. ESPIRITU</i> Manager, E&I
REVIEWED	PRINCIPAL ENGR. (ARCHT.)			APPROVED:	<i>N. S. SORIANO</i> Manager, O&D
CHECKED BY					
ELEC.					
MECH.					
DWG. No. <b>CBBSDPP-BDC-17.012</b> (Specs. No. <b>LuzP22Z1457Sc</b> )					
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.
SCALE: AS SHOWN			<b>BID DRAWING</b>		REV. 0

**PEDESTAL PLAN**



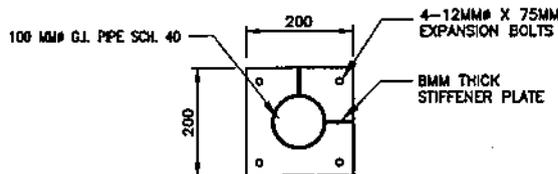
**PEDESTAL-FOOTING (P-F)**

SCALE NTS



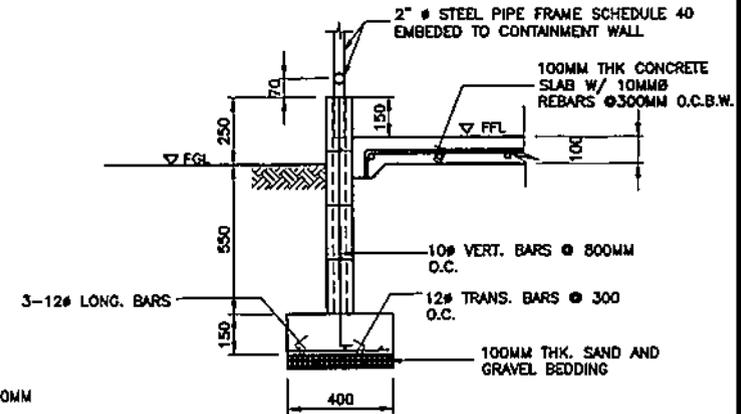
**CONTAINMENT WALL (CW-2)**

SCALE NTS



**TYPICAL BASE PLATES DETAILS**

SCALE NTS



**CONTAINMENT WALL (CW-1)**

SCALE NTS

**NOTES**

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE SHALL BE  $f_c = 20.7$  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 A36STEEL 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, DELIMAN QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT MODULAR DIESEL GENERATING SETS INCLUDING MAINT. INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALATOGOT, BURGOS QUEZON AND BUTAMAMAN, BRUMA, CAMARINES SUR.			
LOCATION: CALATOGOT, BURGOS, QUEZON AND BUTAMAMAN, BRUMA, CAMARINES SUR.			
TITLE: TYPICAL HAZARDOUS WASTE STORAGE & FUEL OIL RECEIVING AREA (FOOTING DETAILS & CONTAINMENT WALL)			
DESIGNED	BY	CHKD	DATE
DRAWN	C. Bado		
REVIEWED	PRINCIPAL ENGR./ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			
SUBMITTED:		H. U. MENDOZA Principal Engineer, A. CEAD	
RECOMMENDED:		A. C. ESPIRITU Manager, DDO	
APPROVED:		N. S. SOMBODERA Manager, DDO	
DWG. NO. CBBSDPP-BDC-17.013		SPECS. NO. LuzP2Z21457Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPD.	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

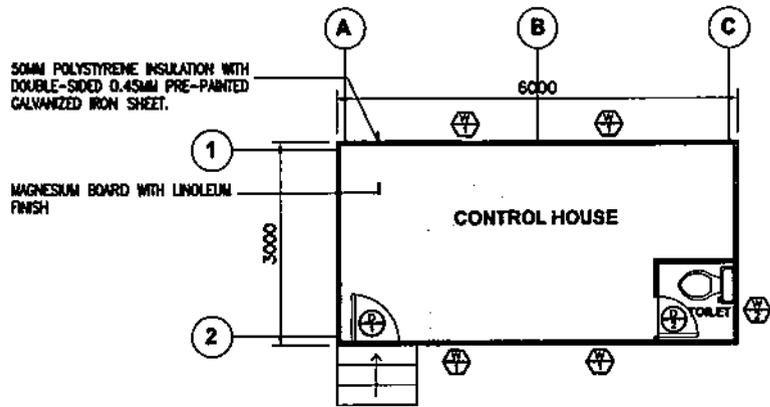
SECTION VI

**BID DRAWINGS  
(ARCHITECTURAL WORKS)**

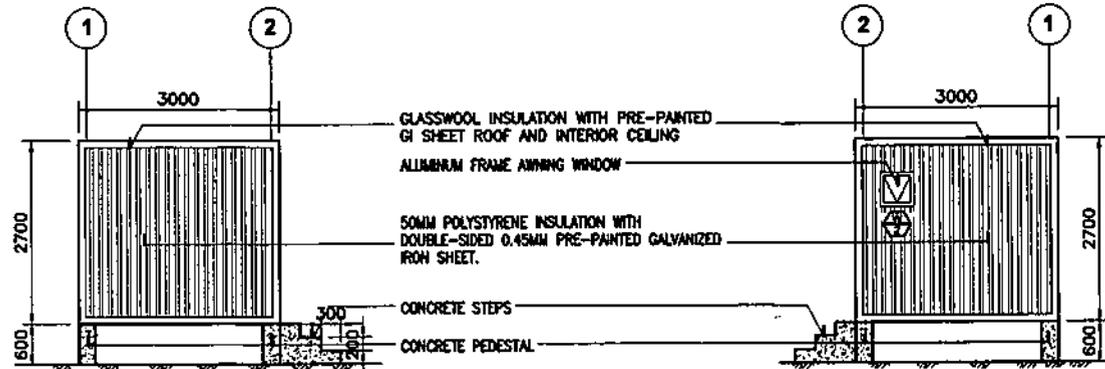


**SECTION VI – BID DRAWINGS  
AW – ARCHITECTURAL WORKS**

<b><u>DRAWING NO.</u></b>	<b><u>TITLE</u></b>
CBBSDPP-BDA-17.001	PREFABRICATED CONTAINER HOUS (FLOOR PLAN, ELEVATIONS & SCHEDULE OF DOORS & WINDOWS)
CBBSDPP-BDA-17.002	PREFABRICATED CONTAINER HOUS (PLUMBING, WATERLINE LAYOUT & SCHEDULE OF DOORS & WINDOWS)
CBBSDPP-BDA-17.003	GUARD POST (PLAN, ELEVATION & SECTIONS)
CBBSDPP-BDA-17.004	HAZARDOUS WASTE STORAGE & FUEL OIL RECEIVING AREA (PLAN)
CBBSDPP-BDA-17.004	HAZARDOUS WASTE STORAGE & FUEL OIL RECEIVING AREA (ELEVATIONS)

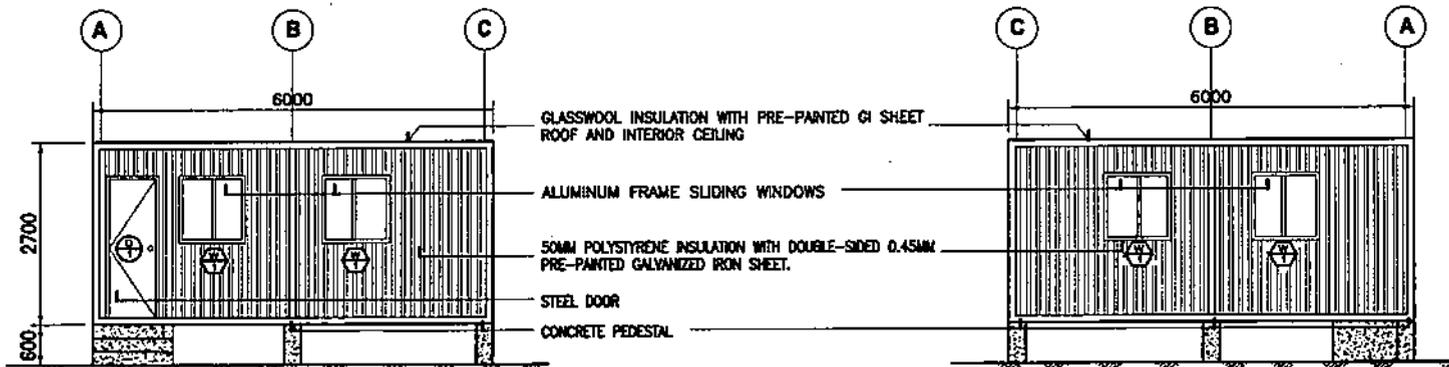


**FLOOR PLAN**  
SCALE 1:80



**LEFT SIDE ELEVATION**  
SCALE 1:80

**RIGHT SIDE ELEVATION**  
SCALE 1:80



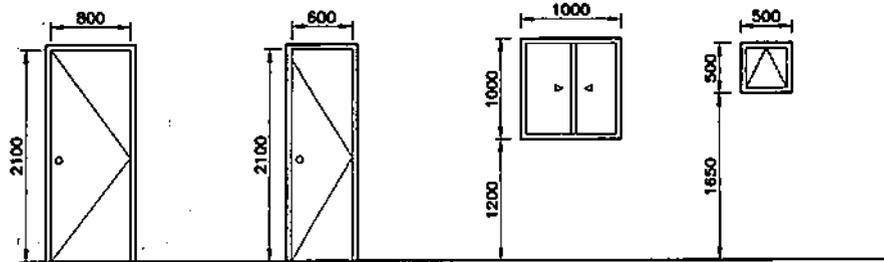
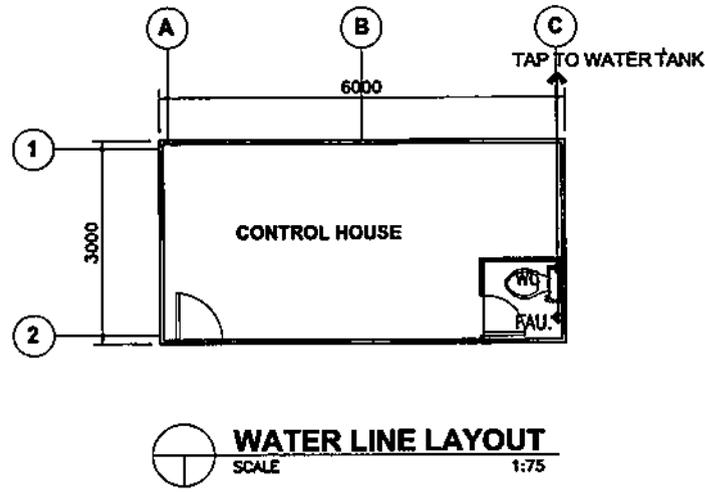
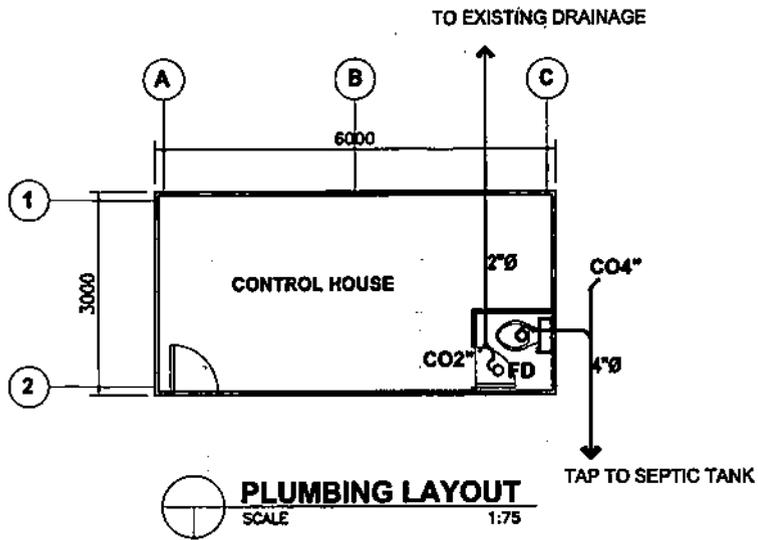
**FRONT ELEVATION**  
SCALE 1:80

**REAR ELEVATION**  
SCALE 1:80

**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. WORK THIS DRAWING WITH RELATED CIVIL, MECHANICAL AND ELECTRICAL DRAWINGS.

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALITCOT, BURDEOL, QUEZON AND BUTAWANAK, BRUNAI, CAMARINES SUR			
LOCATION: CALITCOT, BURDEOL, QUEZON AND BUTAWANAK, BRUNAI, CAMARINES SUR			
TITLE: <b>PREFABRICATED CONTAINER HOUSE</b> (FLOOR PLAN, ELEVATIONS & SCHEDULE OF DOORS AND WINDOWS)			
DESIGNED	BY	CHKD	DATE
DRAWN			
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	
CIVIL/ARCHT			
ELEC.			
MECH.			
SUBMITTED:		R.R. R. VILLANUEVA <i>Principal Architect, CEAG</i> A. C. ESPRITU <i>Manager, CEAG</i>	
APPROVED:		N. G. SORIANO <i>Manager, ECG</i>	
DWG. NO. CBBSDPP-BDA-17.001		SPEC. NO. L12P22Z1457Sc	
REV.	DATE	NATURE OF REVISION	BY
CHKD.	RECD.	APPR.	SCALE: AS SHOWN
<b>BID DRAWING</b>			REV. 0



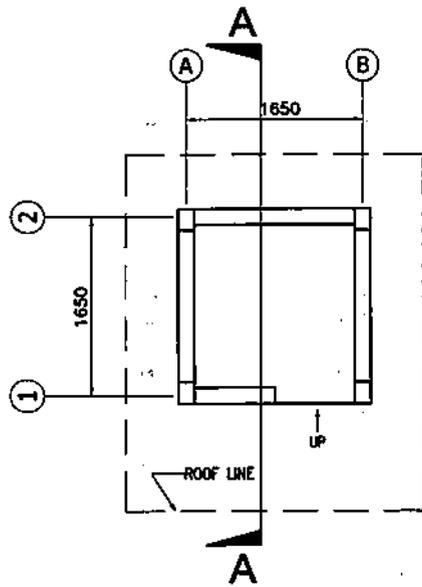
- : FLUSH TYPE STEEL DOOR  
: ONE (1) SET
- : FLUSH TYPE PVC DOOR  
: ONE (1) SET
- : GLASS AND ALUM. SLIDING WINDOW  
: 6 MM THICK CLEAR GLASS ALUMINUM FRAME  
: FOUR (4) SETS
- : GLASS AND ALUM. AWNING WINDOW  
: 6 MM THICK CLEAR GLASS ALUMINUM FRAME  
: ONE (1) SET

**SCHEDULE OF DOORS AND WINDOWS**  
SCALE 1:50

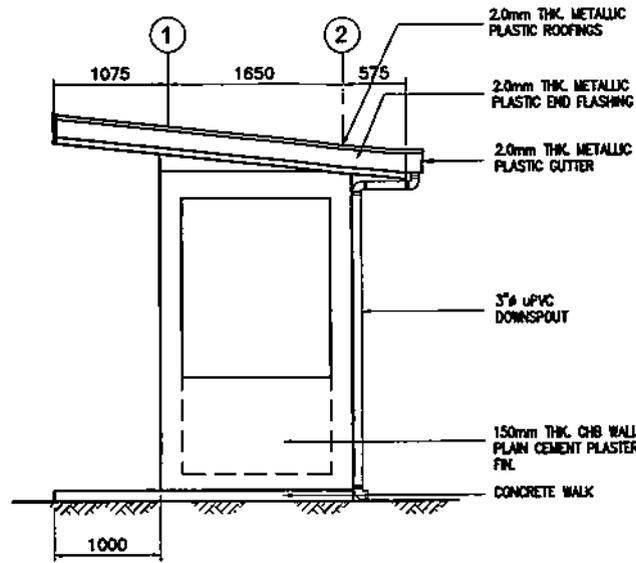
**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.

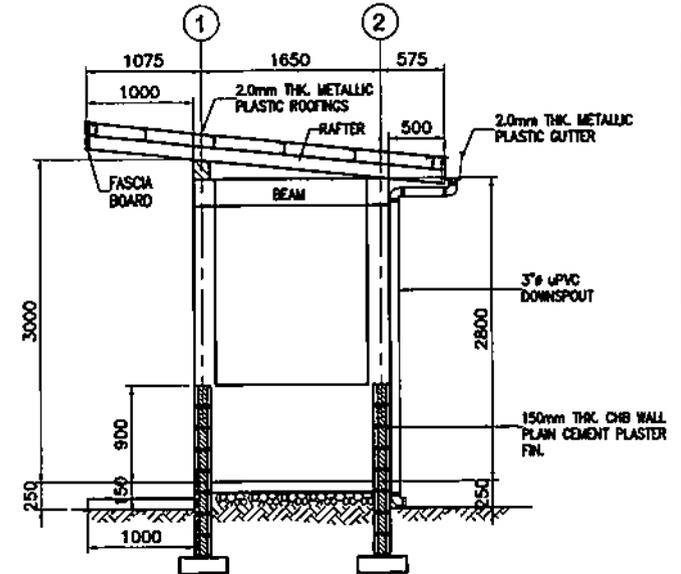
OWNER: <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT GEORGE BERNAL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALAYCOT, BUNEDOS QUEZON AND BUTANAMAN, SURIGAO, CAGAYAN DEL SUR	
LOCATION: CALAYCOT, BUNEDOS, QUEZON AND BUTANAMAN, SURIGAO, CAGAYAN DEL SUR	
TITLE: <b>PREFABRICATED CONTAINER HOUSE</b> (PLUMBING, WATERLINE LAYOUT & SCHEDULE OF DOORS & WINDOWS)	
DESIGNED	BY:  R.R. VILLANUEVA Principal Architect, CEAD
DRAWN	BY:  A.C. ESPERITU Architect
REVIEWED	PRINCIPAL ENGR. / ARCHT.
CHIEF ARCHT.	APPROVED:  N. G. SORIANO Manager, CDD
ELEC.	
MECH.	
DWG. NO. CBBSDPP-BDA-17.002 SPEC. NO. LuzP22Z1457Sc	
SCALE: AS SHOWN	<b>BID DRAWING</b>
REV.	DATE
NATURE OF REVISION	BY
CHKD.	RECD.
APPD.	REV. 0



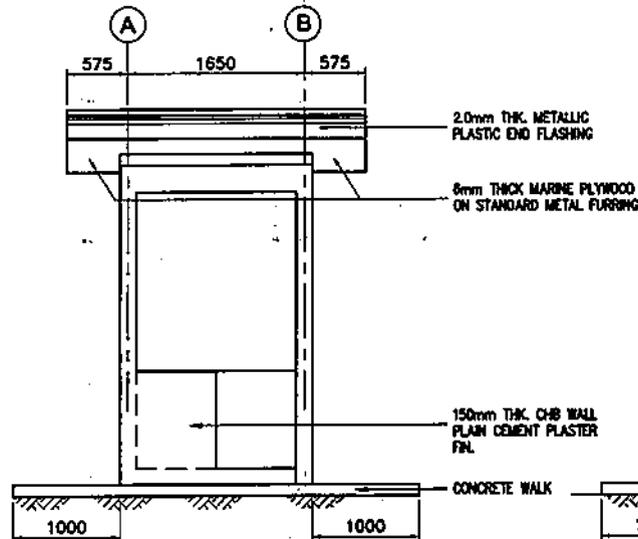
**FLOOR PLAN**  
SCALE 1:50



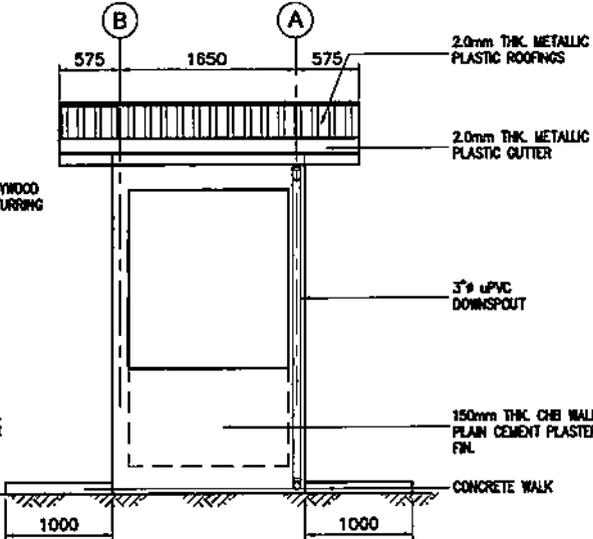
**RIGHT SIDE ELEVATION**  
SCALE 1:50



**SECTION A-A**  
SCALE 1:50



**FRONT ELEVATION**  
SCALE 1:50



**REAR ELEVATION**  
SCALE 1:50

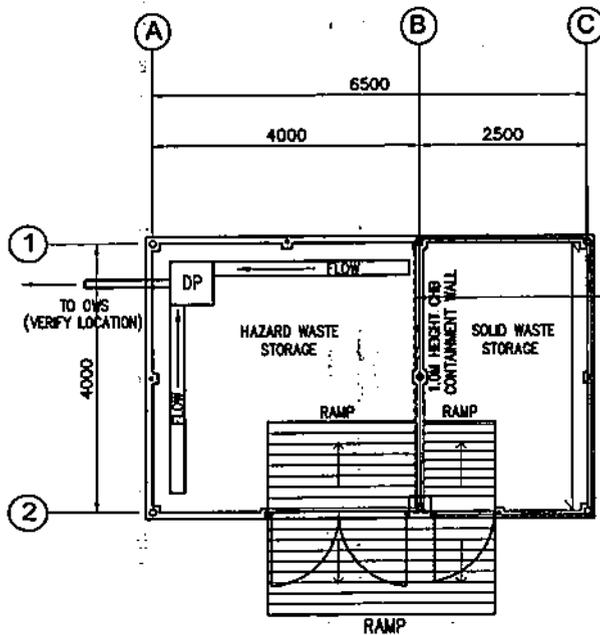
- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
  2. WORK THIS DRAWING WITH CIVIL DRAWINGS.

OWNER:  <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUYOT, BUREOS, QUEZON AND BUTAHANAN, SURIGAO, CAMARINES SUR	
LOCATION: CALUYOT, BUREOS, QUEZON AND BUTAHANAN, SURIGAO, CAMARINES SUR	
TITLE: <b>GUARD POST</b> (PLAN, ELEVATIONS & SECTION)	
DESIGNED	BY: <i>R.R. Villanueva</i> SUBMITTED: <i>R.R. VILLANUEVA</i> Principal Architect, CEAD
DRAWN	BY: <i>A.C. Espiritu</i> RECOMMENDED: <i>A.C. ESPIRITU</i> Manager, ELEC
REVIEWED	PRINCIPAL ENGR./ARCHT.
CIVIL/ARCHT	
ELEC.	APPROVED: <i>N.A. Villanueva</i> Manager, ELEC
MECH.	

DRW. NO. **CBSDPP-BDA-17.003** SPEC. NO. **LuzP22Z1457Sc**

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.

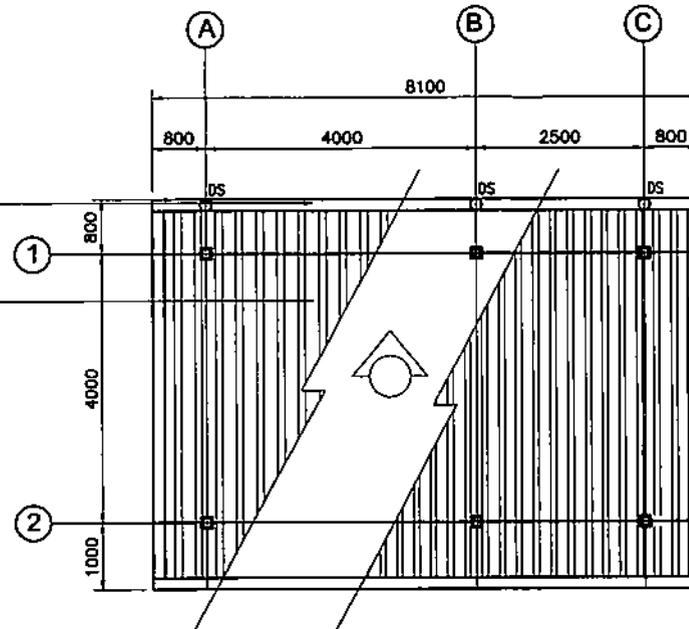
SCALE: AS SHOWN **BID DRAWING** REV. 0



**FLOOR PLAN**  
SCALE 1:75

0.6 MM THICK BASE METAL PRE-PAINTED  
ROOF GUTTER

0.5 MM THICK BASE METAL PRE-PAINTED  
CORRUGATED G.I. ROOFING SHEETS



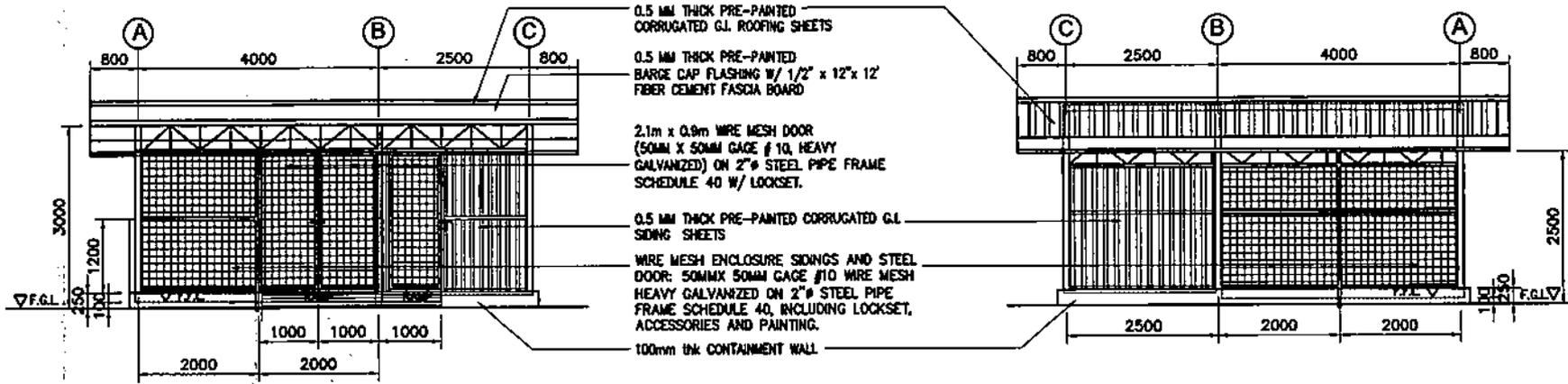
**ROOF PLAN**  
SCALE 1:75

**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. WORK THIS DRAWING WITH RELATED CIVIL, MECHANICAL AND ELECTRICAL DRAWINGS.

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT MODULAR DIESEL GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTOOT, BUREOS QUEZON AND BUTAKANAH, BURESA, CAGAYAN SUR, CAGAYAN SUR			
LOCATION: CALUTOOT, BUREOS, QUEZON AND BUTAKANAH, BURESA, CAGAYAN SUR			
TITLE: <b>HAZARDOUS WASTE STORAGE &amp; FUEL OIL RECEIVING AREA (PLAN)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN			
REVIEWED	PRINCIPAL ENGR. / ARCHT.		RECOMMENDED:
CHARAC'T			
ELEC.			APPROVED:
MECH.			
DWG. NO. <b>CBBSDPP-BDA-17.004</b>		SPEC. NO. <b>LuzP22Z1457Sc</b>	
SCALE: AS SHOWN		<b>BID DRAWING</b>	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPD.	

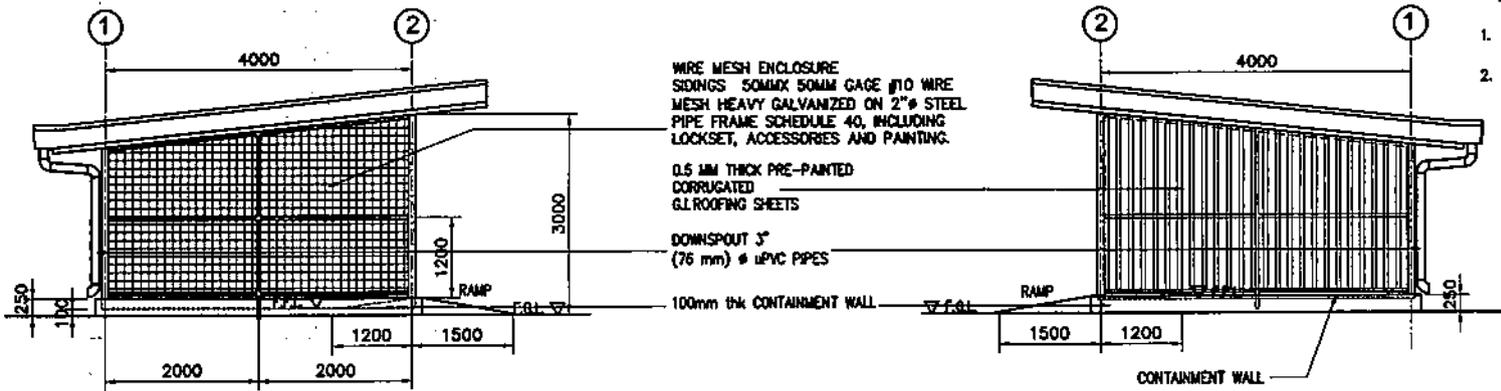
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



- 0.5 MM THICK PRE-PAINTED CORRUGATED G.I. ROOFING SHEETS
- 0.5 MM THICK PRE-PAINTED BARGE CAP FLASHING W/ 1/2" x 12" x 12' FIBER CEMENT FASCIA BOARD
- 2.1m x 0.9m WIRE MESH DOOR (50MM X 50MM GAGE #10, HEAVY GALVANIZED) ON 2" # STEEL PIPE FRAME SCHEDULE 40 W/ LOCKSET.
- 0.5 MM THICK PRE-PAINTED CORRUGATED G.I. SIDING SHEETS
- 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.
- 100mm thk CONTAINMENT WALL

**FRONT ELEVATION**  
SCALE 1:75

**REAR ELEVATION**  
SCALE 1:75



- WIRE MESH ENCLOSURE SIDINGS 50MM X 50MM GAGE #10 WIRE MESH HEAVY GALVANIZED ON 2" # STEEL PIPE FRAME SCHEDULE 40, INCLUDING LOCKSET, ACCESSORIES AND PAINTING.
- 0.5 MM THICK PRE-PAINTED CORRUGATED G.I. ROOFING SHEETS
- DOWNSPOUT 3" (76 mm) # UPVC PIPES
- 100mm thk CONTAINMENT WALL

**LEFT ELEVATION**  
SCALE 1:75

**RIGHT ELEVATION**  
SCALE 1:75

- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
  2. WORK THIS DRAWING WITH RELATED CIVIL, MECHANICAL AND ELECTRICAL DRAWINGS.

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN QUEZON CITY	
PROJECT:		CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING MAKING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALITCOT, BURDEOS QUEZON AND BUTANAHAN, BIRUMA, CAMARINES SUR.	
LOCATION:		CALITCOT, BURDEOS, QUEZON AND BUTANAHAN, BIRUMA, CAMARINES SUR	
TITLE: <b>HAZARDOUS WASTE STORAGE &amp; FUEL OIL RECEIVING AREA (ELEVATIONS)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN			
REVISED	PRINCIPAL ENGR./ARCHT.		RECOMMENDED:
CHECKED			
ELEC.			APPROVED:
MECH.			
DWG. NO. CBBSDPP-BDA-17.005		SPEC. NO. LuzP22Z14579c	
SCALE: AS SHOWN		<b>BID DRAWING</b>	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.

SECTION VI

**BID DRAWINGS  
(ELECTRICAL WORKS)**

**SECTION IX - BID DRAWINGS****EW - ELECTRICAL DRAWINGS**

<b>DRAWING NO.</b>	<b>TITLE</b>
CaIDPP-BDE-17.001	SINGLE LINE DIAGRAM (2x50 kW CALUTCOT DPP)
CaIDPP-BDE-17.002	EQUIPMENT LAYOUT (2x50 kW CALUTCOT DPP)
CaIDPP-BDE-17.003	DETAILS OF TAKE-OFF STRUCTURE 1/2 (2x50 kW CALUTCOT DPP)
CaIDPP-BDE-17.004	DETAILS OF TAKE-OFF STRUCTURE 2/2 (2x50 kW CALUTCOT DPP)
CaIDPP-BDE-17.005	GROUNDING SYSTEM LAYOUT (2x50 kW CALUTCOT DPP)
CaIDPP-BDE-17.006	CONDUIT LAYOUT (2x50 kW CALUTCOT DPP)
CaIDPP-BDE-17.007	LIGHTING AND POWER LAYOUT (CONTROL ROOM) (2x50 kW CALUTCOT DPP)
CaIDPP-BDE-17.008	PERIMETER LIGHTING LAYOUT (2x50 kW CALUTCOT DPP)
CaIDPP-BDE-17.009	SCHEDULE OF LOAD & RISER DIAGRAM (2x50 kW CALUTCOT DPP)

**SECTION IX - BID DRAWINGS****EW - ELECTRICAL DRAWINGS**

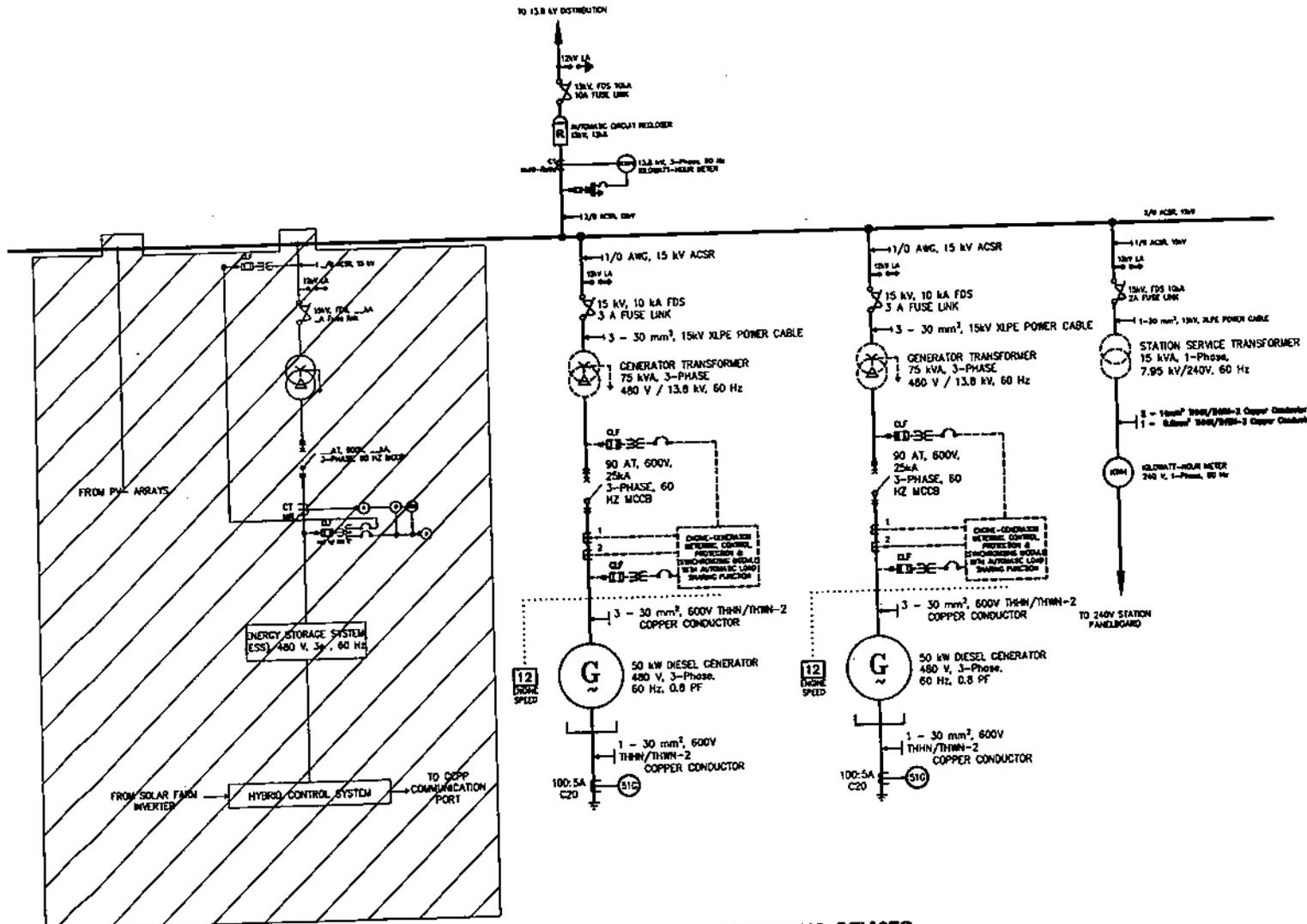
<b>DRAWING NO.</b>	<b>TITLE</b>
ButDPP-BDE-17.001	SINGLE LINE DIAGRAM (1x30 kW & 1x50 kW BUTAWANAN DPP)
ButDPP-BDE-17.002	EQUIPMENT LAYOUT (1x30 kW & 1x50 kW BUTAWANAN DPP)
ButDPP-BDE-17.003	DETAILS OF TAKE-OFF STRUCTURE 1/2 (1x30 kW & 1x50 kW BUTAWANAN DPP)
ButDPP-BDE-17.004	DETAILS OF TAKE-OFF STRUCTURE 2/2 (1x30 kW & 1x50 kW BUTAWANAN DPP)
ButDPP-BDE-17.005	GROUNDING SYSTEM LAYOUT (1x30 kW & 1x50 kW BUTAWANAN DPP)
ButDPP-BDE-17.006	CONDUIT LAYOUT (1x30 kW & 1x50 kW BUTAWANAN DPP)
ButDPP-BDE-17.007	LIGHTING AND POWER LAYOUT (CONTROL ROOM) (1x30 kW & 1x50 kW BUTAWANAN DPP)
ButDPP-BDE-17.008	PERIMETER LIGHTING LAYOUT (2x50 kW CALUTCOT DPP)
ButDPP-BDE-17.009	SCHEDULE OF LOAD & RISER DIAGRAM (2x50 kW CALUTCOT DPP)

**TYPICAL DRAWINGS**

<b>DRAWING NO.</b>	<b>TITLE</b>
CBBSDPP-BDE-17.001	SYSTEM CONFIGURATION
CBBSDPP-BDE-17.002	DETAILS OF GROUNDING SYSTEM
CBBSDPP-BDE-17.003	DETAILS OF TRANSFORMER TERMINATION
CBBSDPP-BDE-17.004	LIGHTNING PROTECTION SYSTEM
CBBSDPP-BDE-17.005	DETAILS OF CONTROL HOUSE & CABLE ENTRY
CBBSDPP-BDE-17.006	DETAILS OF LIGHTING FIXTURES
CBBSDPP-BDE-17.007	PERIMETER LIGHTING DETAILS
CBBSDPP-BDE-17.008	GENERAL NOTES
CBBSDPP-BDE-17.009	SPACE HEATER DETAILS

**NOTES:**

1. BURDENS AND RATINGS INCLUDING CIRCUIT PROTECTIONS OF INSTRUMENT TRANSFORMER SHALL BE DETERMINED BY THE CONTRACTOR.
2. ALL EQUIPMENT IN SHADED PORTION ARE FOR FUTURE INSTALLATION. ALL EQUIPMENT IN BROKEN LINES ARE TO BE HAULED, INSTALLED AND TEST. ALL OTHERS ARE INCLUDED IN THE CONTRACT.



**LEGEND AND SYMBOLS:**

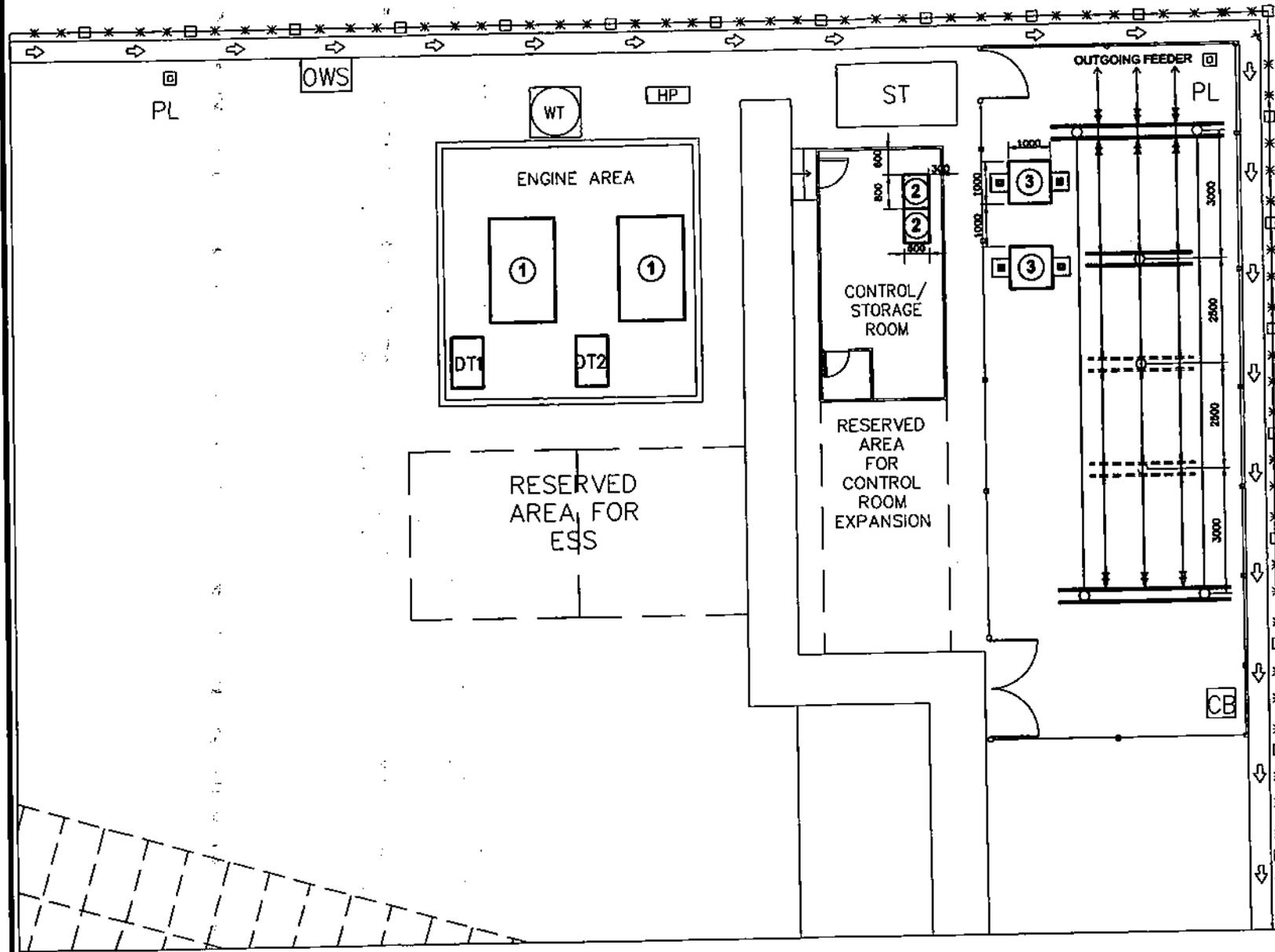
- |  |                             |  |                                |
|--|-----------------------------|--|--------------------------------|
|  | GENERATOR TRANSFORMER       |  | LIGHTNING ARRESTER             |
|  | GENERATOR CIRCUIT BREAKER   |  | CURRENT LIMITING FUSE          |
|  | DIESEL GENERATOR            |  | VOLTAGE TRANSFORMER            |
|  | STATION SERVICE TRANSFORMER |  | CURRENT TRANSFORMER (METERING) |
|  | FUSE DISCONNECT SWITCH      |  | CURRENT TRANSFORMER (RELAYING) |
|  | EARTHGROUND                 |  | KILOWATT-HOUR METER            |

**PROTECTION & MONITORING DEVICES:**

- |         |   |      |                                 |
|---------|---|------|---------------------------------|
| 61      | UNDER/OVER FREQUENCY RELAY                | W    | WATT                            |
| 59      | OVERVOLTAGE RELAY                         | VA   | VOLT-AMPERE                     |
| 50/51   | PHASE OVERCURRENT RELAY                   | VAr  | VOLT-AMPERE, REACTIVE           |
| 50N/51N | RESIDUAL OVERCURRENT RELAY                | Wh   | WATT-HOUR                       |
| 51G     | GROUND OVERCURRENT RELAY                  | VAh  | VA-HOUR                         |
| 49      | VOLTAGE RESTRAINED OVERCURRENT RELAY      | VArh | VAr-HOUR                        |
| 46      | NEGATIVE SEQUENCE CURRENT RELAY           | Hz   | FREQUENCY                       |
| 32      | DIRECTIONAL POWER RELAY                   | PF   | POWER FACTOR                    |
| 27      | UNDERVOLTAGE RELAY                        |      | PHASE ANGLE (VOLTAGE & CURRENT) |
| 12      | OVERSPEED RELAY                           |      | LINE TO LINE VOLTAGES           |
|         | AUTOMATIC & MANUAL SYNCHRONIZING FUNCTION |      | LINE TO NEUTRAL VOLTAGES        |
|         | AUTOMATIC & MANUAL LOAD SHARING FUNCTION  |      | LINE TO LINE CURRENTS           |
|         |   |      | LINE TO NEUTRAL CURRENTS        |

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.

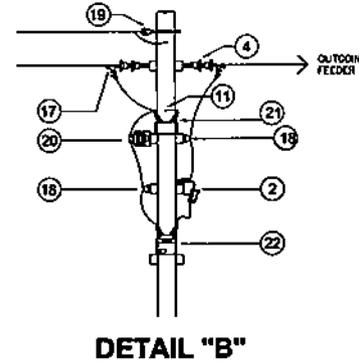
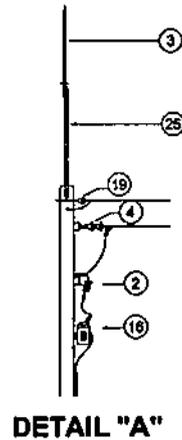
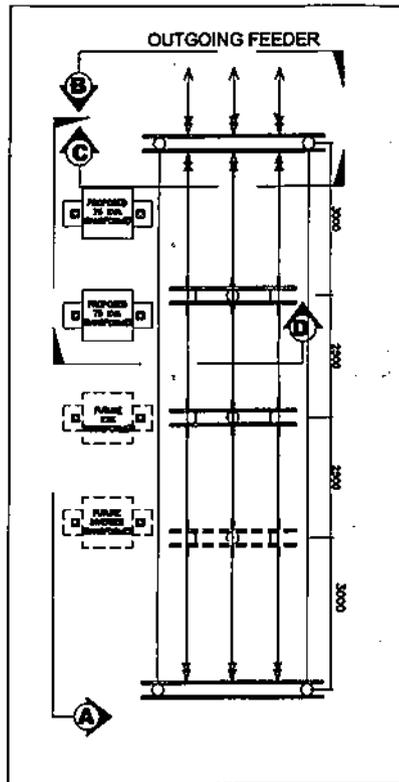
OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DALIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) WATTS BOONLAW DAM, OPERATING SITE INCLUDING DESIGN, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALAYCAY, BARANGAY GUBON AND INTERMEDIATE, GENERAL CONTRACTOR (GC)			
LOCATION: CALAYCAY, BARANGAY GUBON, GENERAL CONTRACTOR (GC)			
TITLE: <b>SINGLE LINE DIAGRAM</b> 2500 KW CALAYCAY DPP		DESIGNED BY:	
DESIGNED BY: RLD	CHKD: DATE	SUBMITTED:	
DRAWN BY: RLD	PRINCIPAL ENGR./ARCHT.	RECOMMENDED BY:	
REVIEWED BY: RLD	DATE	APPROVED:	
CIVIL/ARCHT:	DATE	MECH:	
ELEC:	DATE	MATERIAL:	
DWG. NO. CALDPP-BDE-17.001		SPEC. NO. LUZP22Z1457Sc	
SCALE: NTS		<b>BID DRAWING</b>	
REV. DATE		SCALE: NTS	
NATURE OF REVISION		SCALE: NTS	
BY		SCALE: NTS	
CHKD.		SCALE: NTS	
RECD.		SCALE: NTS	
APPR.		SCALE: NTS	
BY		SCALE: NTS	
CHKD.		SCALE: NTS	
RECD.		SCALE: NTS	
APPR.		SCALE: NTS	
BY		SCALE: NTS	
CHKD.		SCALE: NTS	
RECD.		SCALE: NTS	
APPR.		SCALE: NTS	



- NOTES:**
1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL EQUIPMENT IN BROKEN [---] LINES ARE FOR FUTURE INSTALLATION. ALL OTHERS ARE INCLUDED IN THE CONTRACT.
  3. THIS DRAWING IS FOR BIDDING PURPOSES ONLY. THE SUPPLIER SHALL SUBMIT THE ACTUAL EQUIPMENT LAYOUT FOR NPC APPROVAL.
  4. FINAL LOCATIONS OF EQUIPMENT AND ACCESSORIES/APPERTENANCES TO BE SUPPLIED, INSTALLED OR CONSTRUCTED BY THE SUPPLIER SHALL BE CLOSELY COORDINATED WITH SPUC MANAGEMENT AND PLANT HEADS/PLANT IN CHARGE TO SUIT ACTUAL SITE CONDITIONS PRIOR TO DELIVERY/INSTALLATION/ CONSTRUCTION FOR THE TIMELY AND EFFICIENT IMPLEMENTATION OF THE PROJECT.
  5. THE TRANSFORMER PAD SHALL BE DESIGNED BASED ON THE ACTUAL DIMENSION/WEIGHT OF THE TRANSFORMER.
  6. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  7. ALL EQUIPMENT IN THE SHADED AREA ARE EXISTING, ALL OTHER EQUIPMENTS ARE INCLUDED ON THE CONTRACT.
  8. THIS DRAWING SHALL BE WORKED WITH CIVIL AND MECHANICAL WORKS BID DRAWINGS.

- LEGEND:**
- ① - DIESEL GENERATOR
  - ② - GENERATOR CONTROL & PROTECTION PANEL (CCPP)
  - ③ - GENERATOR TRANSFORMER
  - DT - DAY TANK

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT BONGSAY BEBEL GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING UP BALANCE OF PLANT IN CALUPPOY, BURGOS QUEZON AND BUTAHANAN QUEZON, CALABANGON DIV.			
LOCATION: CALUPPOY, BURGOS, QUEZON			
TITLE: <b>EQUIPMENT LAYOUT</b> 2338 MW CALUPPOY DPP			
DESIGNED	BY: RLD	CHKD:	DATE:
DRAWN	BY: RLD	CHKD:	DATE:
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	BY: R. O. BARRERA
CIVIL/MECH		APPROVED	BY: R. O. BARRERA
ELEC.			
MECH.			
DWE NO. CalDPP-BDE-17.002		SPEC. NO. L.142P2221457Sc	
SCALE: 1:100		BID DRAWING	
REV. DATE		NATURE OF REVISION	
BY	CHKD.	RECD.	APPD.
		REV. 0	

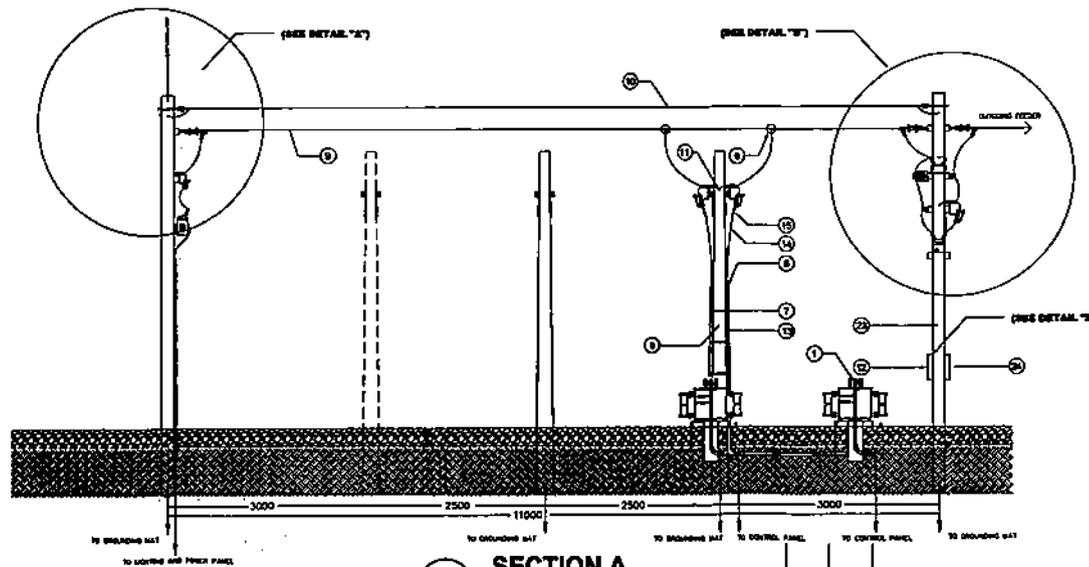


**LEGEND:**

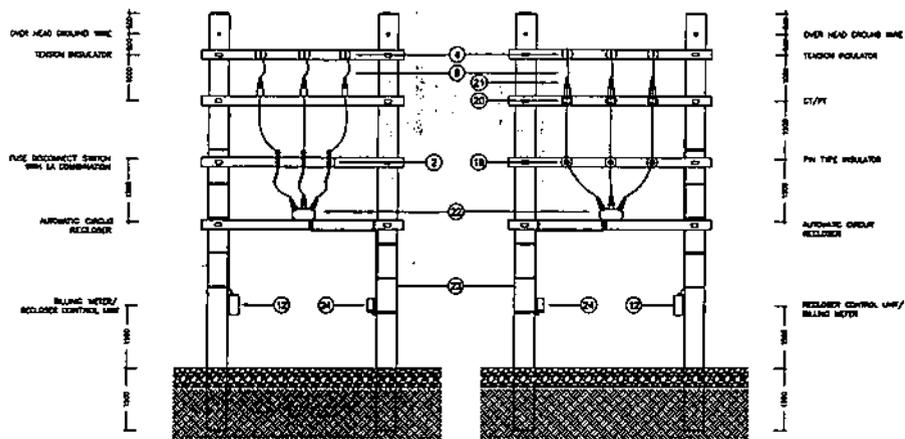
- ① - GENERATOR TRANSFORMER
- ② - FUSE DISCONNECT SWITCH WITH LA COMBINATION
- ③ - LIGHTNING ROD
- ④ - TENSION INSULATOR
- ⑤ - SEALANT
- ⑥ - T-CONNECTOR
- ⑦ - CONDUIT SUPPORT
- ⑧ - 25 FT. STEEL POLE
- ⑨ - 2/0 AWG ACSR
- ⑩ - 3/8" HIGH STRENGTH GRADE STEEL GALVANIZED OVERHEAD GROUND WIRE
- ⑪ - GROUND CLAMP
- ⑫ - BILLING METER
- ⑬ - CONDUIT
- ⑭ - POWER CABLE, 15KV XLPE
- ⑮ - TERMINATION KIT
- ⑯ - STATION SERVICE TRANSFORMER
- ⑰ - DEAD-END CLAMP
- ⑱ - PIN TYPE INSULATOR
- ⑲ - SPOOL INSULATOR
- ㉑ - CURRENT TRANSFORMER
- ㉒ - POTENTIAL TRANSFORMER
- ㉓ - AUTOMATIC CIRCUIT RECLOSER
- ㉔ - 30 FT. STEEL POLE
- ㉕ - RECLOSER CONTROLLER
- ㉖ - G.I. PIPE

**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ALL EQUIPMENT IN BROKEN  LINES ARE FOR FUTURE INSTALLATION. ALL OTHERS ARE INCLUDED IN THE CONTRACT.
3. THE SUPPLIER SHALL DETERMINE THE LENGTH OF THE OHGW BAYONET WHICH SHOULD PROVIDE 45° PROTECTION TO ALL EQUIPMENT INCLUDING THE BUS FEEDERS AGAINST LIGHTNING SURGES.

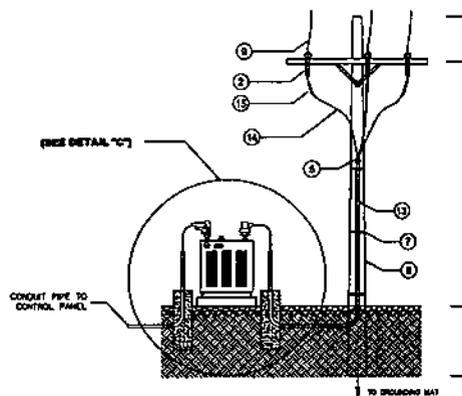


OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT BONGORAN DIESEL GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BUREOS QUEZON AND BUTORORAN, BIRABA, CAGAYAN DEL SUR			
LOCATION: CALUTCOT, BUREOS, QUEZON			
TITLE: <b>DETAILS OF TAKE-OFF STRUCTURE (1/2)</b> 2x38 MW CALUTCOT OPP			
DESIGNED	BY: RLD	CHKD	DATE
DRAWN	BY: RLD		
REVIEWED	PRINCIPAL ENGR./ARCHT.		SUBMITTED: <i>B. M. AGUILA</i>
CIVIL/ARCHT			RECOMMENDED: <i>D. Z. C. LUCAS JR.</i>
ELEC.			APPROVED: <i>N. G. ...</i>
MECH.			
DWG. NO. CalOPP-BDE-17.003		SPEC. NO. LuzP22Z1457Sc	
SCALE: NTS		BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY



SECTION C

SECTION B



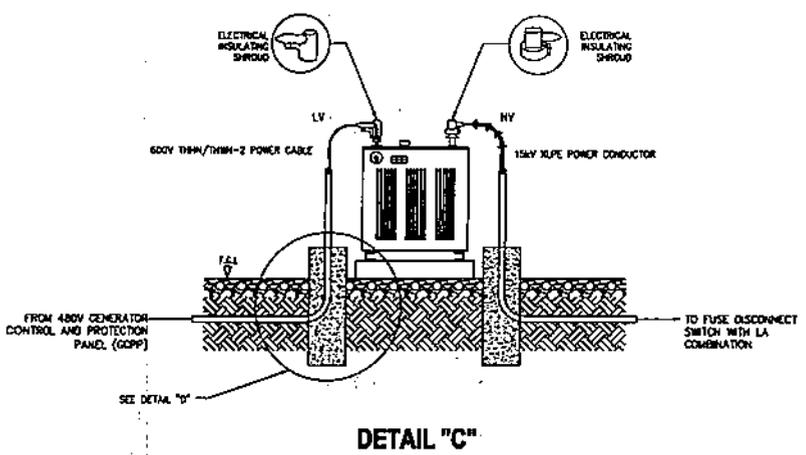
SECTION D

**LEGEND:**

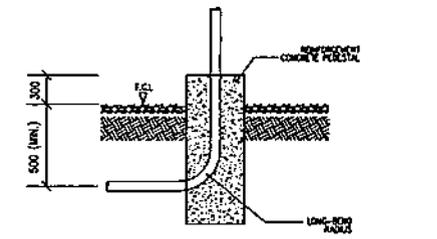
- ① - GENERATOR TRANSFORMER
- ② - FUSE DISCONNECT SWITCH WITH LA COMBINATION
- ③ - LIGHTNING ROD
- ④ - TENSION INSULATOR
- ⑤ - SEALANT
- ⑥ - T-CONNECTOR
- ⑦ - CONDUIT SUPPORT
- ⑧ - 25 FT. STEEL POLE
- ⑨ - 1/0 AWG ACSR
- ⑩ - 3/8" HIGH STRENGTH GRADE STEEL GALVANIZED OVER-HEAD GROUND WIRE
- ⑪ - GROUND CLAMP
- ⑫ - BILLING METER
- ⑬ - CONDUIT
- ⑭ - POWER CABLE, 15KV XLPE
- ⑮ - TERMINATION KIT
- ⑯ - STATION SERVICE TRANSFORMER
- ⑰ - DEAD-END CLAMP
- ⑱ - PIN TYPE INSULATOR
- ⑲ - SPOOL INSULATOR
- ⑳ - CURRENT TRANSFORMER
- ㉑ - POTENTIAL TRANSFORMER
- ㉒ - AUTOMATIC CIRCUIT RECLOSER
- ㉓ - 30 FT. STEEL POLE
- ㉔ - RECLOSER CONTROLLER
- ㉕ - G.I PIPE

**NOTES:**

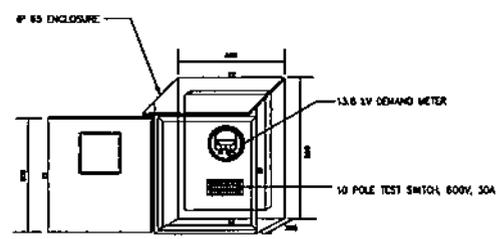
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE SUPPLIER SHALL DETERMINE THE LENGTH OF THE OHGW BAYONET SO AS TO PROVIDE 45° PROTECTION TO ALL EQUIPMENT INCLUDING THE BUS FEEDERS AGAINST LIGHTNING SURGES.
3. THIS DRAWING SHALL BE WORKED WITH DWG NOS. CBSGDPP-BDE-17.004 AND CBSGDPP-BDE-17.005.



DETAIL "C"



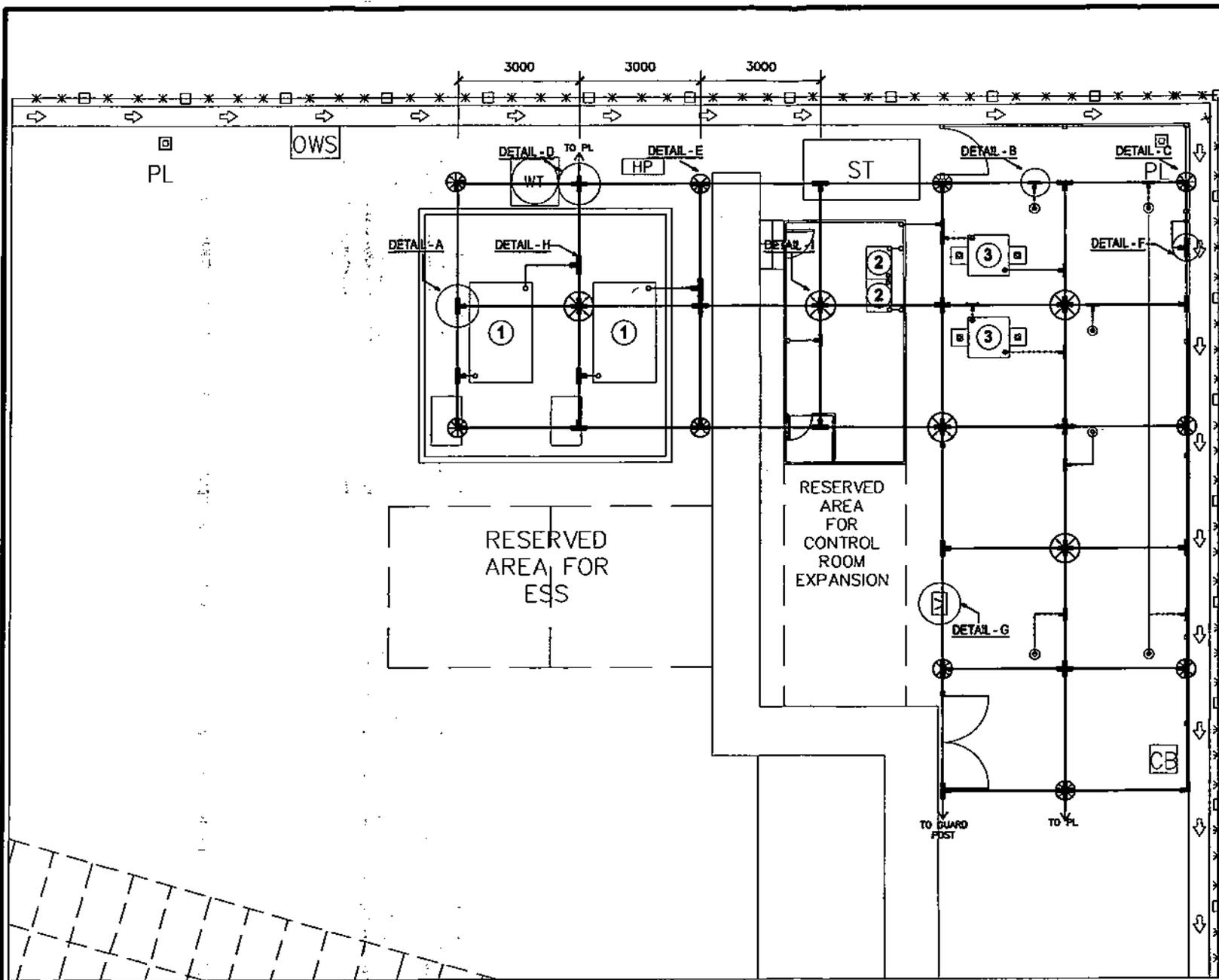
DETAIL "D"



DETAIL "E"

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING INSTALLATION, TESTING AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BURENAN GROUND AND BAYANAGAL, BURENAN, CALABANGON, BURENAN			
LOCATION: CALUTCOT, BURENAN, QUEZON			
TITLE: <b>DETAILS OF TAKE-OFF STRUCTURE (2/2)</b> 2000 KVA CALUTCOT DPP			
DESIGNED	BY	CHKD	DATE
DRAWN	BY		
REVIEWED	PRINCIPAL ENGR./ARCHT.		
DRAWN/CHKD			
ELEC.			
MECH.			
DWG. NO. <b>CaIDPP-BDE-17.004</b>		SPEC. NO. <b>LuzP22Z1457Sc</b>	
SCALE: NTS		BID DRAWING	
REV. DATE		BY	
NATURE OF REVISION		CHKD.	
		RECD.	
		APPR.	
		REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.



- NOTES:**
- DETAIL "A" SHALL BE APPLIED TO ALL MAJOR EQUIPMENT SUCH AS DIESEL GENERATOR, TRANSFORMER, GENERATOR CONTROL PANEL.
  - DETAIL "B" SHALL BE APPLIED AS FOLLOWS:  
 50mm<sup>2</sup> - FOR MOTORS/PUMPS RATED 30kW AND ABOVE, CT/PT, FDS, LA, AUTORECLOSER  
 22mm<sup>2</sup> - FOR MOTORS/PUMPS RATED BELOW 10kW, PERIMETER LIGHTING, TRENCHES AND FENCE EARTHING.
  - ALL PERIMETER LIGHTING POST AND FLAG POLE SHALL BE CONNECTED TO GROUND MAT.
  - GROUNDING CONDUCTOR SHALL BE EMBEDDED AT LEAST 0.60M.
  - THIS DRAWING SHALL BE WORKED WITH DRAWING NO. CBSOPP-BDE-17.002.

- LEGEND:**
- ① - DIESEL GENERATOR
  - ② - GENERATOR CONTROL & PROTECTION PANEL (GCPP)
  - ③ - GENERATOR TRANSFORMER
  - DT - DAY TANK
  - - 100 mm<sup>2</sup> BARE STRANDED COPPER
  - ⊗ - GROUND ROD CONNECTION
  - DT - DAY TANK

OWNER: **NATIONAL POWER CORPORATION**  
 AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT MODULAR REEEL GENERATING SETS INCLUDING INSTALLATION, RECOMMISSIONING, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALITCOT, BURGOS QUEZON AND BUTAPANAN, BURESA, CAGAN DE ORO

LOCATION: CALITCOT, BURGOS, QUEZON

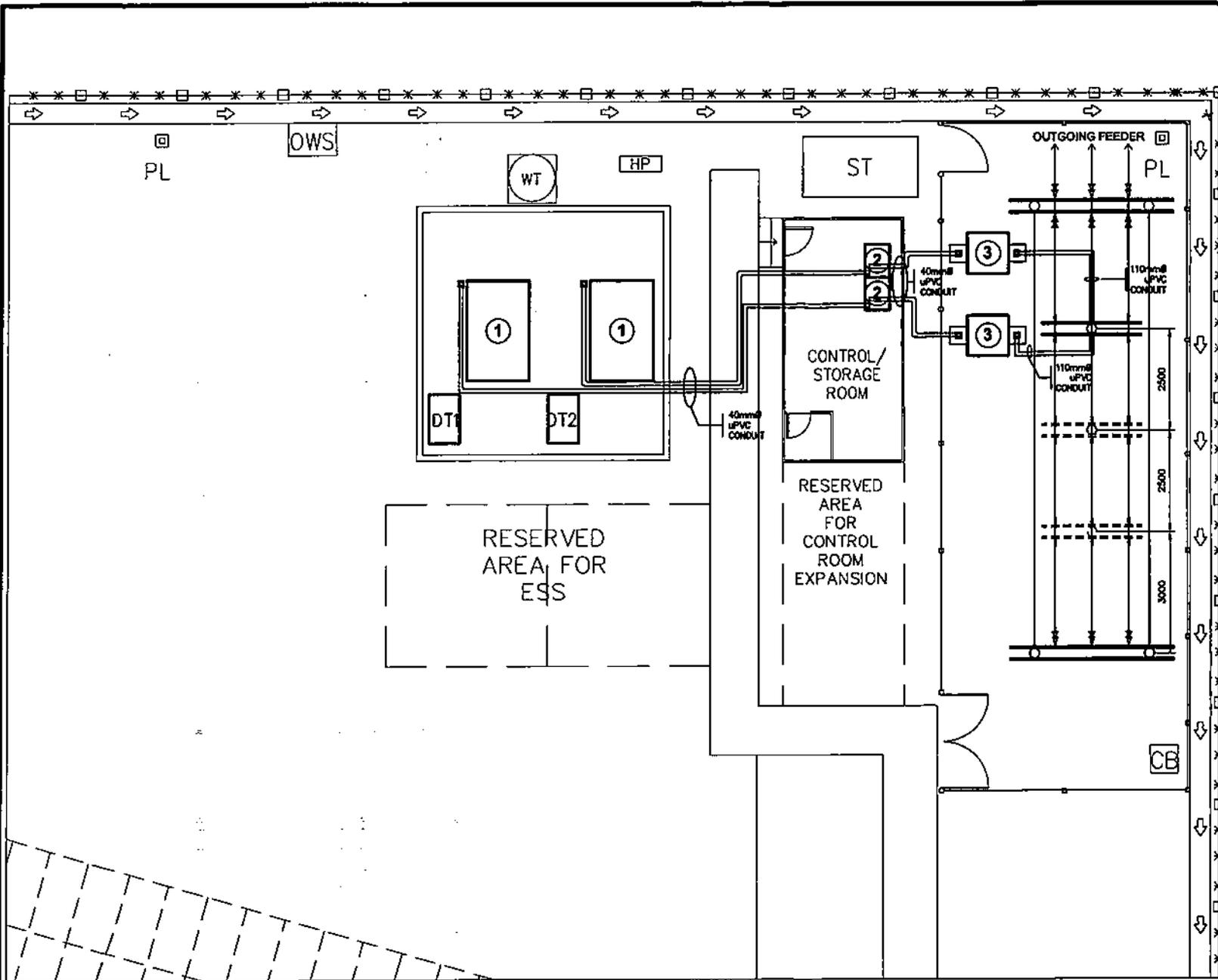
TITLE: **GROUNDING SYSTEM LAYOUT**  
 2x30 MW CALITCOT DPP

DESIGNED	BY	CHKD	DATE	SUBMITTED: <i>B. M. MAGUIA</i> RECOMMENDED: <i>C. C. LUGO, JR.</i> APPROVED: <i>N. G. DOMESTICO</i>
DRAWN	RLD			
REVIEWED	PRINCIPAL ENGR./ARCHT.			
CHECKED				
ELEC.				
MECH.				

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPO.

DWG. NO. **CaIDPP-BDE-17.005** SPEC. NO. **L.UZP22Z1457Sc**

SCALE: 1:100 **BID DRAWING** REV. 0

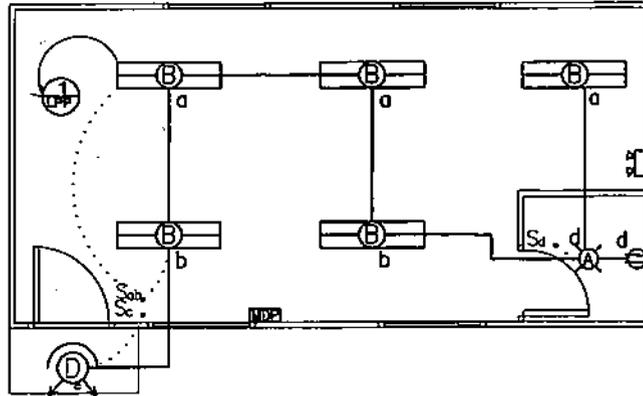


- NOTES:**
1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL EQUIPMENT IN BROKEN [---] LINES ARE FOR FUTURE INSTALLATION. ALL OTHERS ARE INCLUDED IN THE CONTRACT.
  2. CONDUIT (uPVC) SIZES ARE AS FOLLOWS:
    - a. 30mm<sup>2</sup>, 600V THHN/THWN-2 POWER CABLES - 40mmØ uPVC
    - b. CONTROL & INSTRUMENTATION CABLES - 25mmØ uPVC
    - c. 15kV XLPE POWER CABLES - 110mmØ uPVC
  3. THIS DRAWING SHALL BE WORKED WITH CIVIL AND MECHANICAL DRAWINGS.

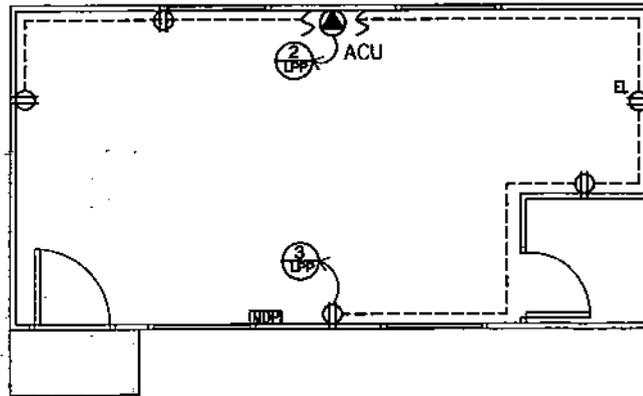
- LEGEND:**
- ① - DIESEL GENERATOR
  - ② - GENERATOR CONTROL & PROTECTION PANEL (GCPP)
  - ③ - GENERATOR TRANSFORMER
  - DT - DAY TANK
  - - uPVC CONDUIT

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS BIODIGESTER DIESEL GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, SURABOY ELECTRICAL AND MECHANICAL BRANCH, CALABANG RIVER.			
LOCATION: CALUTCOT, BURGOS, QUEZON			
TITLE:		<b>CONDUIT LAYOUT</b> 2x36 KW CALUTCOT DPP	
DESIGNED	BY	CHKD	DATE
DRAWN	RLD		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMM.	
CIVIL/ARCHT		APPROVED:	
ELEC.			
MECH.			
DWA. NO. <b>Ca/DPP-BDE-17.006</b>		SPEC. NO. <b>LuzP22Z1457Sc</b>	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPD.	
SCALE: 1:100		<b>BID DRAWING</b>	
		REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



**LIGHTING LAYOUT**



**POWER LAYOUT**

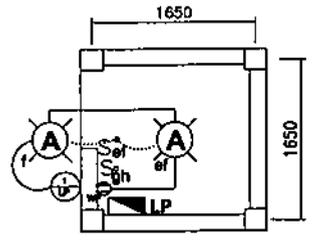
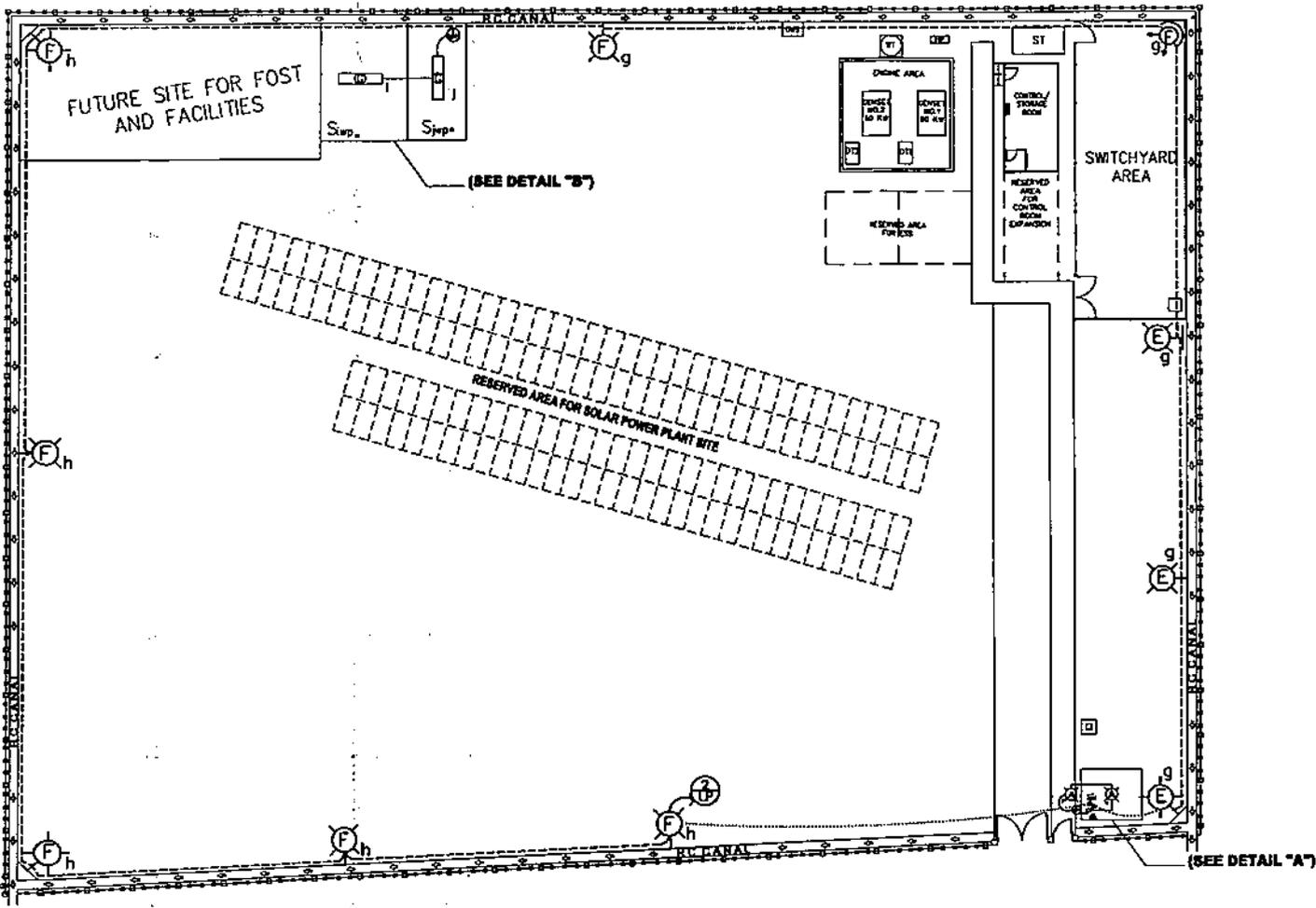
**NOTES:**

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST PROVISIONS OF THE PHILIPPINE ELECTRICAL CODE, LOCAL ORDINANCES AND REGULATIONS.
2. CONDUIT RUNS ARE INDICATIVE ONLY. THE ACTUAL LOCATION SHALL BE DETERMINED IN THE FIELD.
3. ALL WIRES SHALL BE TYPE THWN/THWN-2 600V INSULATION, 90° OPERATING TEMP., STRANDED COPPER CONDUCTOR.
4. CONDUIT SHALL BE UPVC, SCH. 40.
5. THIS DRAWING SHALL BE WORKED WITH DRAWING NOS. CalDPP-BDE-17.009, SCHEDULE OF LOADS & RISER DIAGRAM AND CBSDPP-BDE-17.007 FOR DETAILS OF LIGHTING FIXTURES.
6. THIS DRAWING SHALL BE WORKED WITH CIVIL AND MECHANICAL BID DRAWINGS.

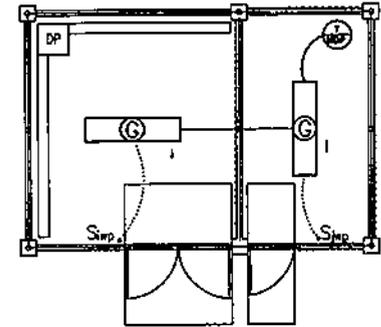
**LEGEND:**

- FIXTURE TYPE A
- FIXTURE TYPE B
- EMERGENCY LIGHT OUTLET
- FIXTURE TYPE D
- SINGLE POLE SWITCH (SUBSCRIPT DENOTES LAMP BEING CONTROLLED)
- DUPLEX SWITCH (SUBSCRIPT DENOTES LAMP BEING CONTROLLED)
- 200 VA DUPLEX CONVENIENCE OUTLET
- 200 VA DUPLEX CONVENIENCE OUTLET (WEATHER PROOF)
- EXHAUST FAN
- ENCLOSED CIRCUIT BREAKER W/BUILT-IN UNIVERSAL OUTLET FOR WINDOW TYPE ACU
- CIRCUIT RUNNING ON CEILING
- CIRCUIT RUNNING UNDERGROUND
- CONTROL CIRCUIT
- CIRCUIT HOMERUN
- MAIN DISTRIBUTION PANEL

OWNER:		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT BIOLAB DIESEL GENERATING UNIT INCLUDING WAREHOUSE INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT AT CALITCOT, BAMBOS QUEZON AND BUSTAMANA, BULACAN, CALABARZES DIV.			
LOCATION: CALITCOT, BAMBOS, QUEZON			
TITLE: <b>LIGHTING AND POWER LAYOUT (CONTROL ROOM)</b> 2400 KW CALITCOT DPP			
DESIGNED	BY	CHKD	DATE
DRAWN	BY		
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	
ENCLARCHT		APPROVED	
ELEC.			
MECH.			
DNG. NO. CalDPP-BDE-17.007		SPEC. NO. LuzP22Z1457Sc	
SCALE: 1:50		BID DRAWING	
CHKD.		RECD.	
APPR.		REV. 0	



**DETAIL "A"  
GUARD POST  
LIGHTING LAYOUT**



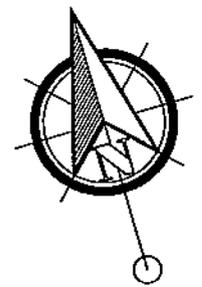
**DETAIL "B"  
HAZARDOUS WASTE STORAGE  
LIGHTING LAYOUT**

**LEGEND:**

- S<sub>x</sub> - SINGLE POLE WALL SWITCH (letter denotes fixture to be controlled)
- S<sub>xx</sub> - DUPLEX WALL SWITCH (letter denotes fixture to be controlled)
- S<sub>xwp</sub> - WEATHERPROOF SINGLE POLE WALL SWITCH (letter denotes fixture to be controlled)
- (E) - FIXTURE TYPE F
- (G) - FIXTURE TYPE G
- (E) - FIXTURE TYPE E
- - CIRCUIT RUNNING UNDERGROUND
- - CONTROL CIRCUIT
- MDP - MAIN DISTRIBUTION PANEL
- - CIRCUIT HOMERUN

**NOTES:**

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST PROVISIONS OF THE PHILIPPINE ELECTRICAL CODE, LOCAL ORDINANCES AND REGULATIONS.
2. CONDUIT RUNS ARE INDICATIVE ONLY. THE ACTUAL LOCATION SHALL BE DETERMINED IN THE FIELD.
3. ALL WIRES SHALL BE TYPE THHN/THWN-2 600V INSULATION, 90° OPERATING TEMP., STRANDED COPPER CONDUCTOR.
4. CONDUIT SHALL BE uPVC, SCH. 40.
5. THIS DRAWING SHALL BE WORKED WITH DRAWING NOS. C&DPP-BDE-17.009 FOR SCHEDULE OF LOADS & RISER DIAGRAM, C&SDPP-BDE-17.007 FOR PERIMETER LIGHTING DETAILS AND C&SDPP-BDE-17.008 FOR DETAILS OF LIGHTING FIXTURES.



OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING BUILDING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BURGOS QUEZON AND BUTAROGAN, BRANA, CAMARINES SUR			
LOCATION: CALUTCOT, BURGOS, QUEZON			
TITLE:		<b>PERIMETER LIGHTING LAYOUT</b> 2599 KW CALUTCOT DPP	
DESIGNED	BY	CHKD	DATE
DRAWN	RLD		
REVIEWED	PRINCIPAL ENCL. IN CHG.		RECOMMENDED
CHECKED			
ELEC.			APPROVED
MECH.			
DWG. NO. C&DPP-BDE-17.008		SPEC. NO. LUZP22Z1457Sc	
REV.	DATE	NATURE OF REVISION	BY
SCALE: N.T.S.		<b>BID DRAWING</b>	
			REV. <b>0</b>

SCHEDULE OF LOADS							
CIRCUIT NO.	DESCRIPTION	W	V	A	SIZES		
					BREAKER	WIRE	CONDUIT
1	1 - 8W COMPACT LED LAMP, TYPE A	396.75	230	1.73	50AF / 15AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
	B - 2 X 18W LED LAMP TUBE, TYPE B						
	1 - 100VA EXHAUST FAN						
	1 - 80W FLOOD LED FLOOD LIGHT/TYPE D						
2	1 - 2 HP AIR CONDITIONER UNIT	2700	230	12.00	50AF / 25AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2 1 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
3	4 - 200VA CONDENSANCE OUTLET	800	230	3.50	50AF / 20AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2 1 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
	1 - 2 X 2W EMERGENCY LIGHT OUTLET						
4	LIGHTING AND POWER PANEL (GUARDHOUSE)	2077.50	230	8.12	50AF / 20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
5	1 - 100VA SPACE HEATER FOR SOME MODULAR O/G SET	1500	230	6.52	50AF / 20AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2 1 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
6	1 - 100VA SPACE HEATER FOR SOME MODULAR O/G SET	1500	230	6.52	50AF / 20AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2 1 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
7	2 - 2 X 18W LED LAMP TUBE, TYPE G	80	230	0.35	50AF / 15AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
8	SPARE	1500	230	6.92	50AF / 20AT		
	TOTAL	10643.25	230	46.27			

PROVIDE: 100 AF / 60 AT, 2P MCB  
WITH BRANCH CIRCUIT OF:  
1 - 50AF/25AT, 2P, MCB  
5 - 50AF/20AT, 2P, MCB  
2 - 50AF/15AT, 2P, MCB

PROVIDE: 2 - 14mm<sup>2</sup> THHN/THWN-2 &  
1 - 8.0mm<sup>2</sup> THHN/THWN-2  
Copper Conductor  
in 25mm $\phi$  uPVC Conduit

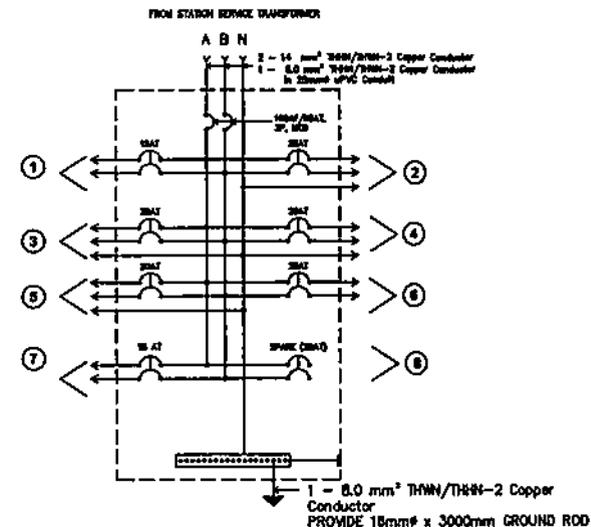
SCHEDULE OF LOADS MAIN DISTRIBUTION PANEL (MDP)

SCHEDULE OF LOADS							
CIRCUIT NO.	DESCRIPTION	W	V	A	SIZES		
					BREAKER	WIRE	CONDUIT
1	3 - 1 X 30W LED FORMER LIGHTING, TYPE E	375.00	230	1.83	50AF / 15AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
	7 - 1 X 30W LED FORMER LIGHTING, TYPE F						
2	2 - 8W COMPACT LED LAMP, TYPE A	222.80	230	0.92	50AF / 15AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
	1 - 300VA CONDENSANCE OUTLET						
3	SPARE	1800	230	6.52	50AF / 15AT		
4	SPARE						
	TOTAL	2077.50	230	8.12			

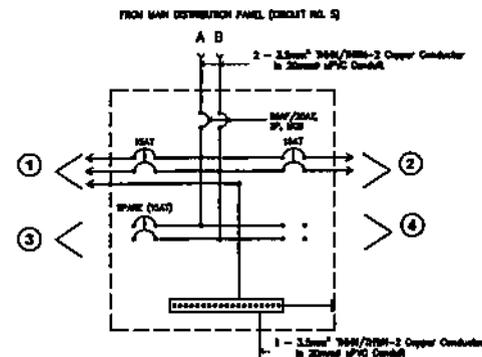
PROVIDE: 50 AF / 20AT, 2P MCCB  
WITH BRANCH CIRCUIT OF:  
3 - 50AF/15AT, 2P, MCB

PROVIDE: 3 - 3.5mm<sup>2</sup> THHN/THWN-2 Copper Conductor  
in 20mm $\phi$  uPVC Conduit

SCHEDULE OF LOADS MAIN DISTRIBUTION PANEL (LPP)



SCHEDULE OF LOADS MAIN DISTRIBUTION PANEL (MDP)



RISER DIAGRAM FOR LPP (GUARDHOUSE)

OWNER		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING UNITS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUYCOT, BURGOS, QUEZON AND BETAFAKAL, BUNGA, CAGAYAN DEL SUR			
LOCATION: CALUYCOT, BURGOS, QUEZON			
TITLE: <b>SCHEDULE OF LOADS AND RISER DIAGRAM</b> 2x50 KW CALUYCOT DPP			
DESIGNED	BY: RLD	CHKD:	DATE:
DRAWN	BY: RLD	RECOMMENDED	SUBMITTED: <i>B.M. AQUILA</i>
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	<i>C. C. LUGOD, JR.</i>
APPROVED		APPROVED	<i>M. G. SERRERA</i>
MECH.		MECH.	
DWG. NO. CalDPP-BDE-17.009		SPEC. NO. LUZZP22Z1457Sc	
SCALE: NTS		BID DRAWING	
NATURE OF REVISION		BY	CHKD. RECD. APPD.

NATURE OF REVISION

BY

CHKD.

RECD.

APPD.

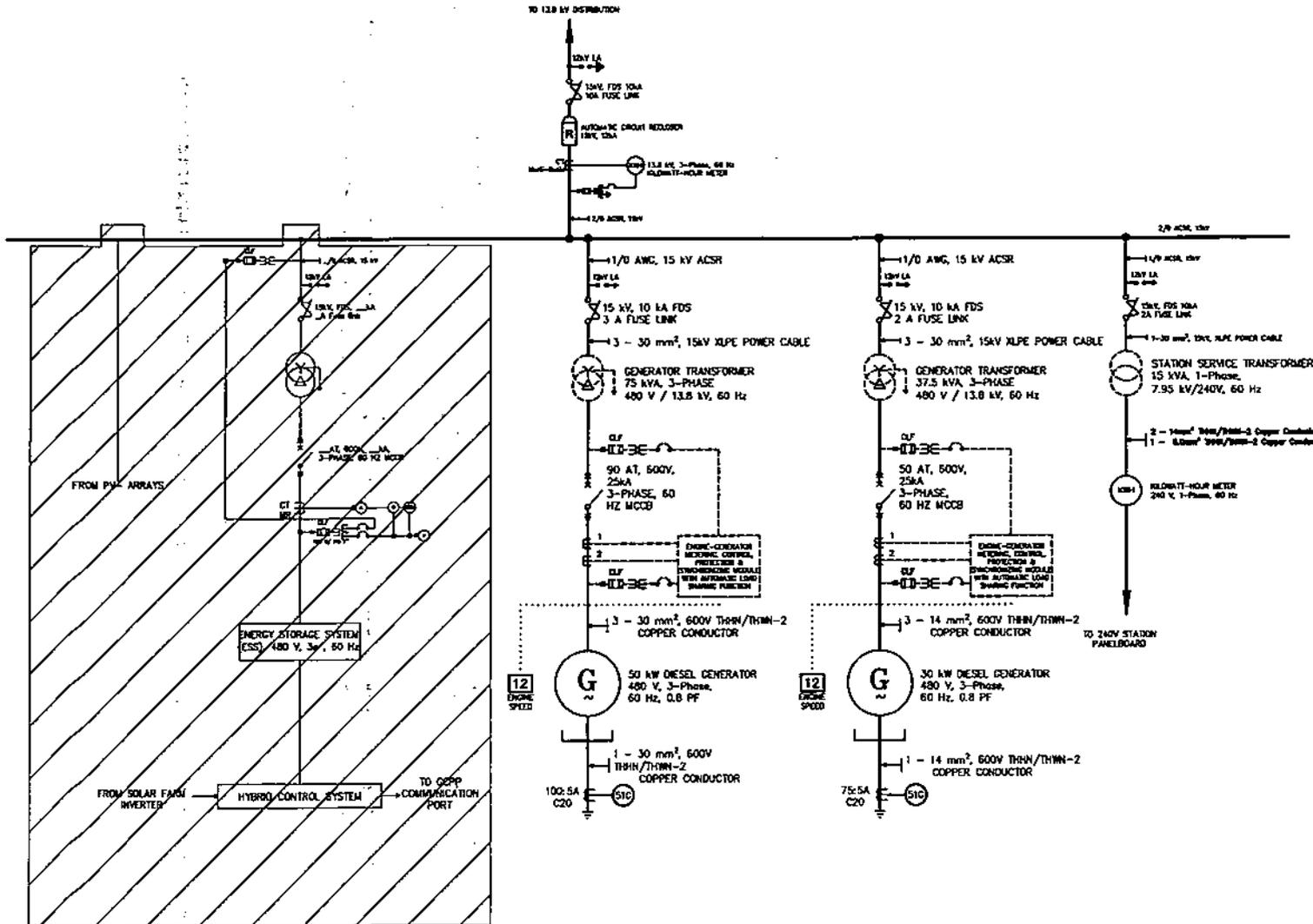
SCALE: NTS

BID DRAWING

REV. 0

**NOTES:**

1. BURDENS AND RATINGS INCLUDING CIRCUIT PROTECTIONS OF INSTRUMENT TRANSFORMER SHALL BE DETERMINED BY THE CONTRACTOR.
2. ALL EQUIPMENT IN SHADED PORTION ARE FOR FUTURE INSTALLATION. ALL EQUIPMENT IN BROKEN LINES ARE TO BE HAULED, INSTALLED AND TEST. ALL OTHERS ARE INCLUDED IN THE CONTRACT.



**LEGEND AND SYMBOLS:**

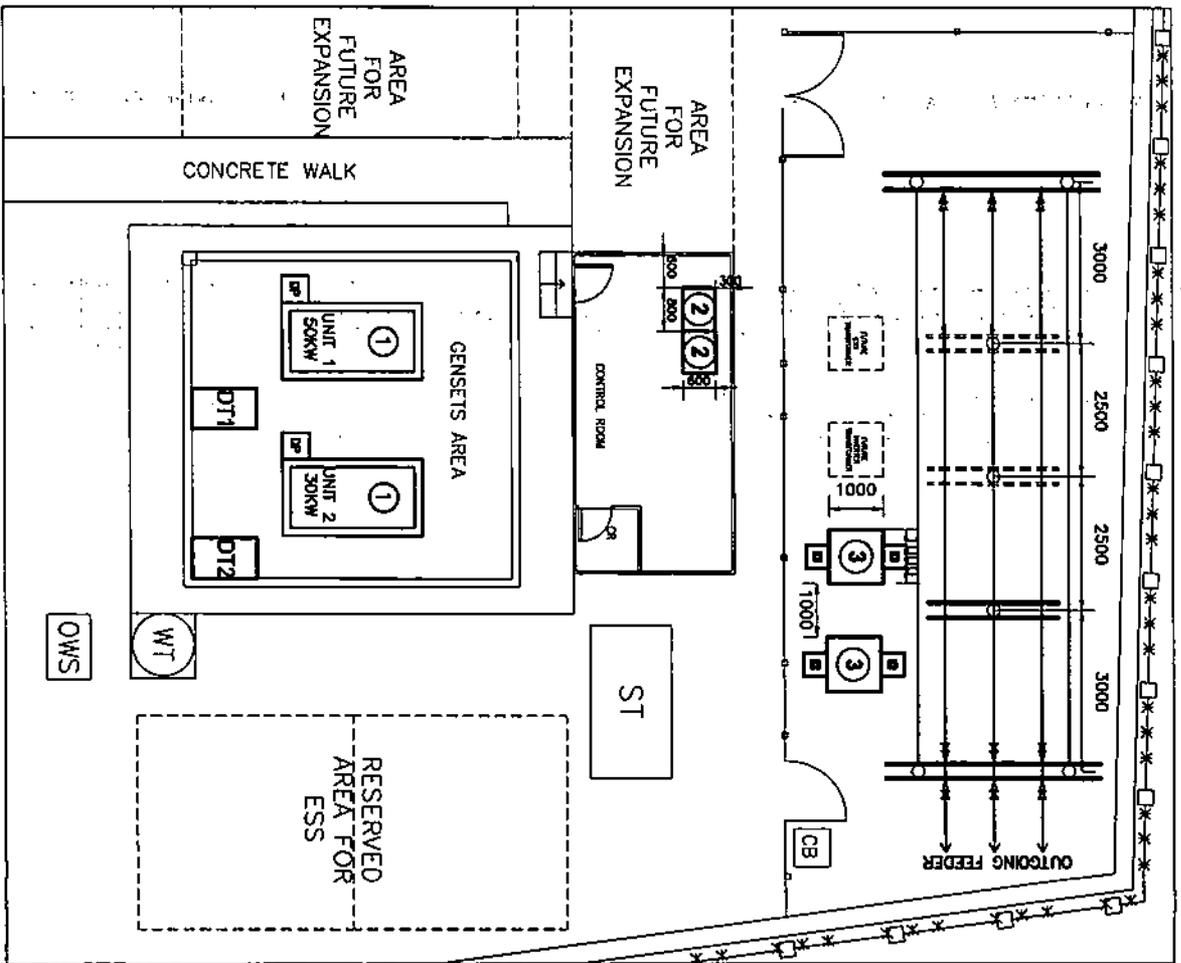
- GENERATOR TRANSFORMER
- GENERATOR CIRCUIT-BREAKER
- DIESEL GENERATOR
- STATION SERVICE TRANSFORMER
- FUSE DISCONNECT SWITCH
- EARTHGROUND
- LIGHTNING ARRESTER
- CURRENT LIMITING FUSE
- VOLTAGE TRANSFORMER
- CURRENT TRANSFORMER (METERING)
- CURRENT TRANSFORMER (RELAYING)
- KILOWATT-HOUR METER

**PROTECTION & MONITORING DEVICES:**

- 81 - UNDER/OVER FREQUENCY RELAY
- 59 - OVERVOLTAGE RELAY
- 50/S1 - PHASE OVERCURRENT RELAY
- 50M/51N - RESIDUAL OVERCURRENT RELAY
- 51G - GROUND OVERCURRENT RELAY
- 51V - VOLTAGE RESTRAINED OVERCURRENT RELAY
- 49 - ROTOR TEMPERATURE SENSOR
- 46 - NEGATIVE SEQUENCE CURRENT RELAY
- 32 - DIRECTIONAL POWER RELAY
- 27 - UNDERVOLTAGE RELAY
- 12 - OVERSPEED RELAY
- AUTOMATIC & MANUAL SYNCHRONIZING FUNCTION
- AUTOMATIC & MANUAL LOAD SHARING FUNCTION
- W - WATT
- VA - VOLT-AMPERE
- VAr - VOLT-AMPERE, REACTIVE
- Wh - WATT-HOUR
- VAh - VA-HOUR
- VArh - VAr-HOUR
- Hz - FREQUENCY
- PF - POWER FACTOR
- PHASE ANGLE (VOLTAGE & CURRENT)
- LINE TO LINE VOLTAGES
- LINE TO NEUTRAL VOLTAGES
- LINE TO LINE CURRENTS
- LINE TO NEUTRAL CURRENTS

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT MODULAR DIESEL GENERATING SITE INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALITOT, BARBERO CREEK AND BUTAMAMAN, SURINA, CAGAYAN SUR			
LOCATION: BUTAMAMAN, SURINA, CAGAYAN SUR			
TITLE:		<b>SINGLE LINE DIAGRAM</b> 1320 KW & 1x50 KW BUTAMAMAN DPP	
DESIGNED	BY	CHKD.	DATE
DRAWN	FLD		
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	
CIVIL/ARCHT			
ELEC.		APPROVED:	
MECH.			
DWG. NO. ButDPP-BDE-17.001		SPEC. NO. LuzP22Z1457Sc	
SCALE: NTS		<b>BID DRAWING</b> REV. 0	



- NOTES:**
1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL EQUIPMENT IN BOLD FONT LINES ARE FOR FUTURE INSTALLATION. ALL OTHERS ARE EXCLUDED IN THE CONTRACT.
  3. THIS DRAWING SHALL BE WORKED WITH CIVIL AND MECHANICAL DRAWINGS.

- LEGEND:**
- ① - DIESEL GENERATOR
  - ② - GENERATOR CONTROL & PROTECTION PANEL (GCPP)
  - ③ - GENERATOR TRANSFORMER
  - DT - DAY TANK

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.

**OWNER:**  
  
**NATIONAL POWER CORPORATION**  
 AGHAM ROAD, DILIMAN, QUEZON CITY

**PROJECT:** CONSTRUCTION OF POWER PLANTING FOR THE FORT LOYDERS RIVER IN BANGALIPAN, BANGALIPAN DISTRICT, BANGALIPAN, CAGAYAN DE ORO CITY  
 LOCATION: BANGALIPAN, BANGALIPAN, CAGAYAN DE ORO CITY

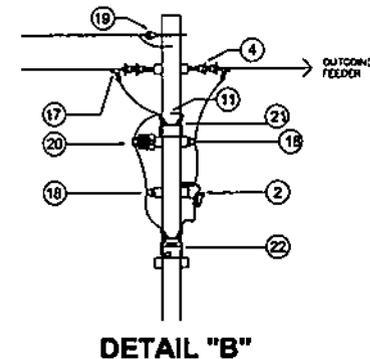
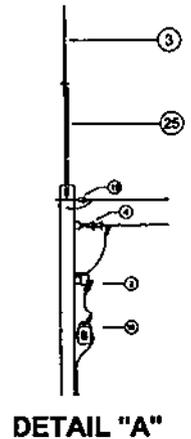
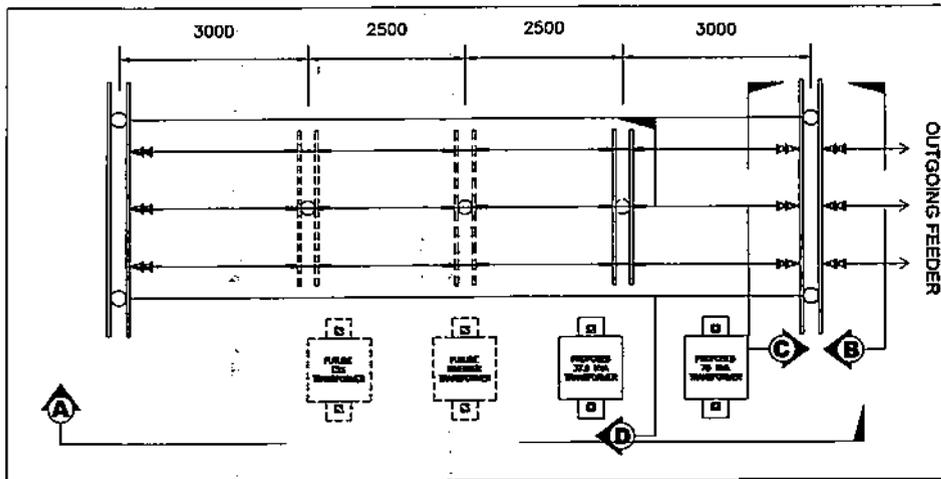
**TITLE:**  
**EQUIPMENT LAYOUT**

1:200 AND 1:5000 LHM BANGALIPAN LHM

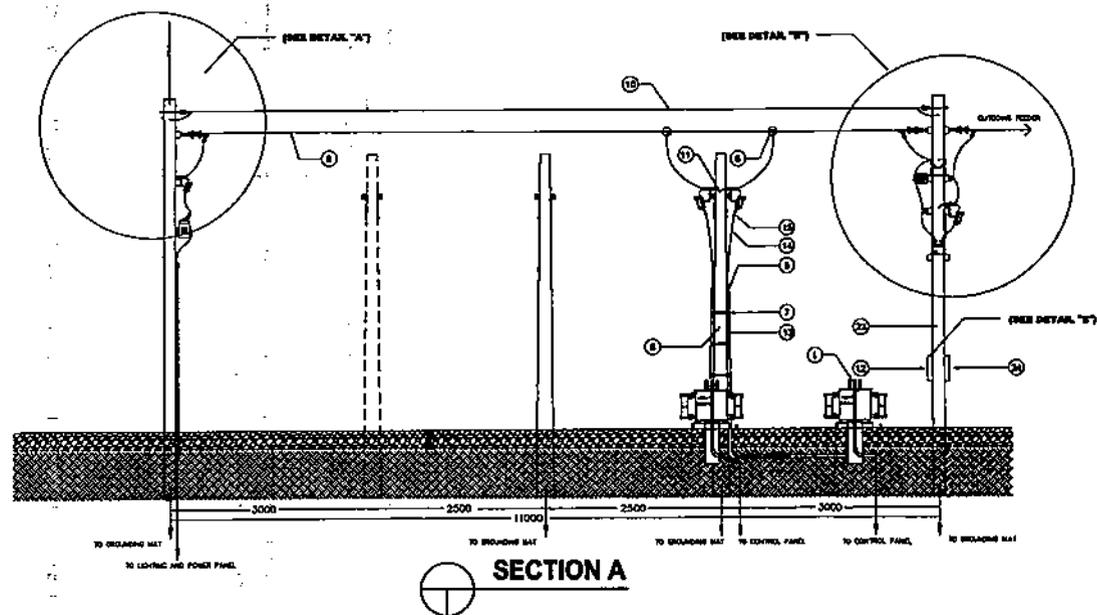
NO.	BY	CHKD.	DATE	SUBMITTER
DESIGNED				
DRAWN				
REVIEWED				
APPROVED				
DATE				
APPROVED				

PROJECT NO: BUDDP-ABDE-17.002      SPECIAL NO. LUZP22214575c

SCALE: 1:100      **BID DRAWING**      REV. 0



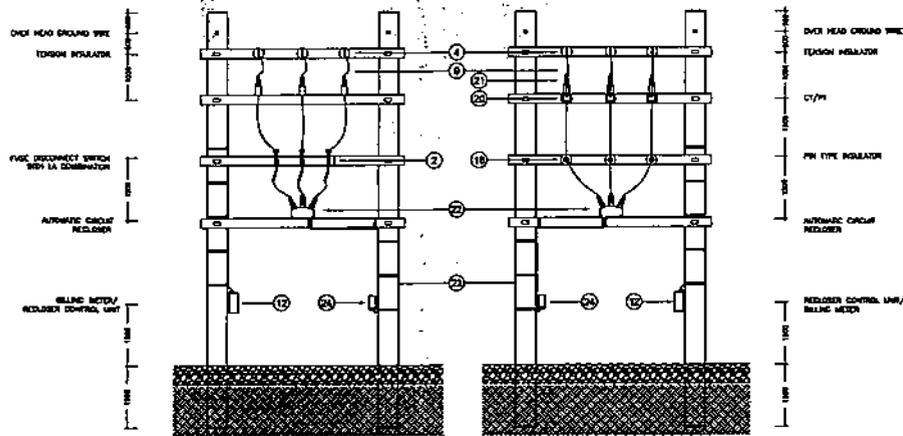
- LEGEND:**
- ① - GENERATOR TRANSFORMER
  - ② - FUSE DISCONNECT SWITCH WITH LA COMBINATION
  - ③ - LIGHTNING ROD
  - ④ - TENSION INSULATOR
  - ⑤ - SEALANT
  - ⑥ - T-CONNECTOR
  - ⑦ - CONDUIT SUPPORT
  - ⑧ - 25 FT. STEEL POLE
  - ⑨ - 2/0 AWG ACSR
  - ⑩ - 3/8" HIGH STRENGTH GRADE STEEL GALVANIZED OVERHEAD GROUND WIRE
  - ⑪ - GROUND CLAMP
  - ⑫ - BILLING METER
  - ⑬ - CONDUIT
  - ⑭ - POWER CABLE, 15KV XLPE
  - ⑮ - TERMINATION KIT
  - ⑯ - STATION SERVICE TRANSFORMER
  - ⑰ - DEAD-END CLAMP
  - ⑱ - PIN TYPE INSULATOR
  - ⑲ - SPOOL INSULATOR
  - ⑳ - CURRENT TRANSFORMER
  - ㉑ - POTENTIAL TRANSFORMER
  - ㉒ - AUTOMATIC CIRCUIT RECLOSER
  - ㉓ - 30 FT. STEEL POLE
  - ㉔ - RECLOSER CONTROLLER
  - ㉕ - G.I. PIPE



- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. ALL EQUIPMENT IN BROKEN [ ] LINES ARE FOR FUTURE INSTALLATION. ALL OTHERS ARE INCLUDED IN THE CONTRACT.
  3. THE SUPPLIER SHALL DETERMINE THE LENGTH OF THE OHGW BAYONET WHICH SHOULD PROVIDE 45° PROTECTION TO ALL EQUIPMENT INCLUDING THE BUS FEEDERS AGAINST LIGHTNING SURGES.

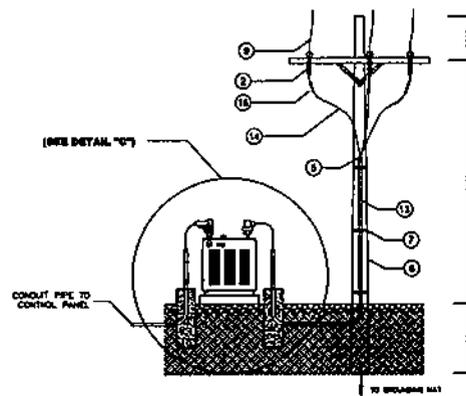
OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) MEDIUM DIESEL GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALITOT, BURENDO QUEZON AND BUTAMANKAN, BRULMA, CAMARINES SUR			
LOCATION: BUTAMANKAN, BRULMA, CAMARINES SUR			
TITLE: <b>DETAILS OF TAKE-OFF STRUCTURE (1/ 2)</b> 1320 KW & 1,250 KW BUTAMANKAN DPP			
DESIGNED	RLD	CHKD	DATE
DRAWN	RLD	SUBMITTED: <i>[Signature]</i>	
REVIEWED	PRINCIPAL ENGR. / ARCHT.		RECOMMENDED: <i>[Signature]</i>
CIVIL/ARCHT			APPROVED: <i>[Signature]</i>
ELEC			
MECH			
DWG. NO. ButDPP-BDE-17.003		SPECS. NO. LuzP22Z1457Sc	
SCALE: NTS		BID DRAWING	
REV. DATE		REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	REC'D.	APPL.



SECTION C

SECTION B



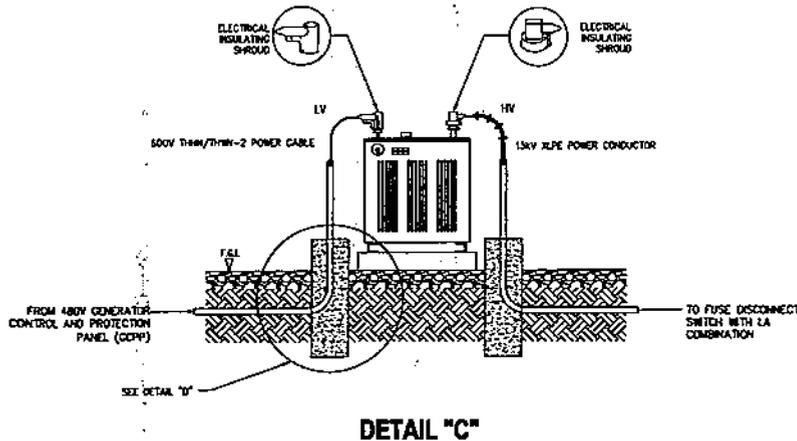
SECTION D

**LEGEND:**

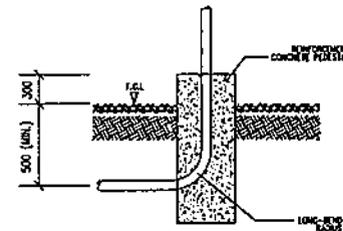
- ① - GENERATOR TRANSFORMER
- ② - FUSE DISCONNECT SWITCH WITH LA COMBINATION
- ③ - LIGHTNING ROD
- ④ - TENSION INSULATOR
- ⑤ - SEALANT
- ⑥ - T-CONNECTOR
- ⑦ - CONDUIT SUPPORT
- ⑧ - 25 FT. STEEL POLE
- ⑨ - 1/0 AWG ACSR
- ⑩ - 3/8" HIGH STRENGTH GRADE STEEL GALVANIZED OVERHEAD GROUND WIRE
- ⑪ - GROUND CLAMP
- ⑫ - BILLING METER
- ⑬ - CONDUIT
- ⑭ - POWER CABLE, 15KV XLPE
- ⑮ - TERMINATION KIT
- ⑯ - STATION SERVICE TRANSFORMER
- ⑰ - DEAD-END CLAMP
- ⑱ - PIN TYPE INSULATOR
- ⑲ - SPOOL INSULATOR
- ⑳ - CURRENT TRANSFORMER
- ㉑ - POTENTIAL TRANSFORMER
- ㉒ - AUTOMATIC CIRCUIT RECLOSER
- ㉓ - 30 FT. STEEL POLE
- ㉔ - RECLOSER CONTROLLER
- ㉕ - G.I. PIPE

**NOTES:**

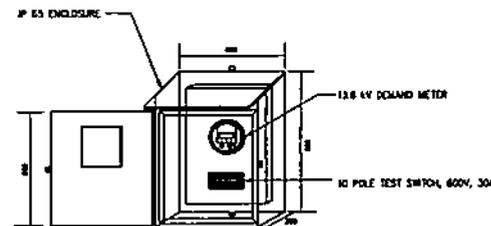
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE SUPPLIER SHALL DETERMINE THE LENGTH OF THE OHGW BAYONET SO AS TO PROVIDE 45° PROTECTION TO ALL EQUIPMENT INCLUDING THE BUS FEEDERS AGAINST LIGHTNING SURGES.
3. THIS DRAWING SHALL BE WORKED WITH DWG NOS. CB8SDPP-BDE-17.004 AND CB8SDPP-BDE-17.005.



DETAIL "C"



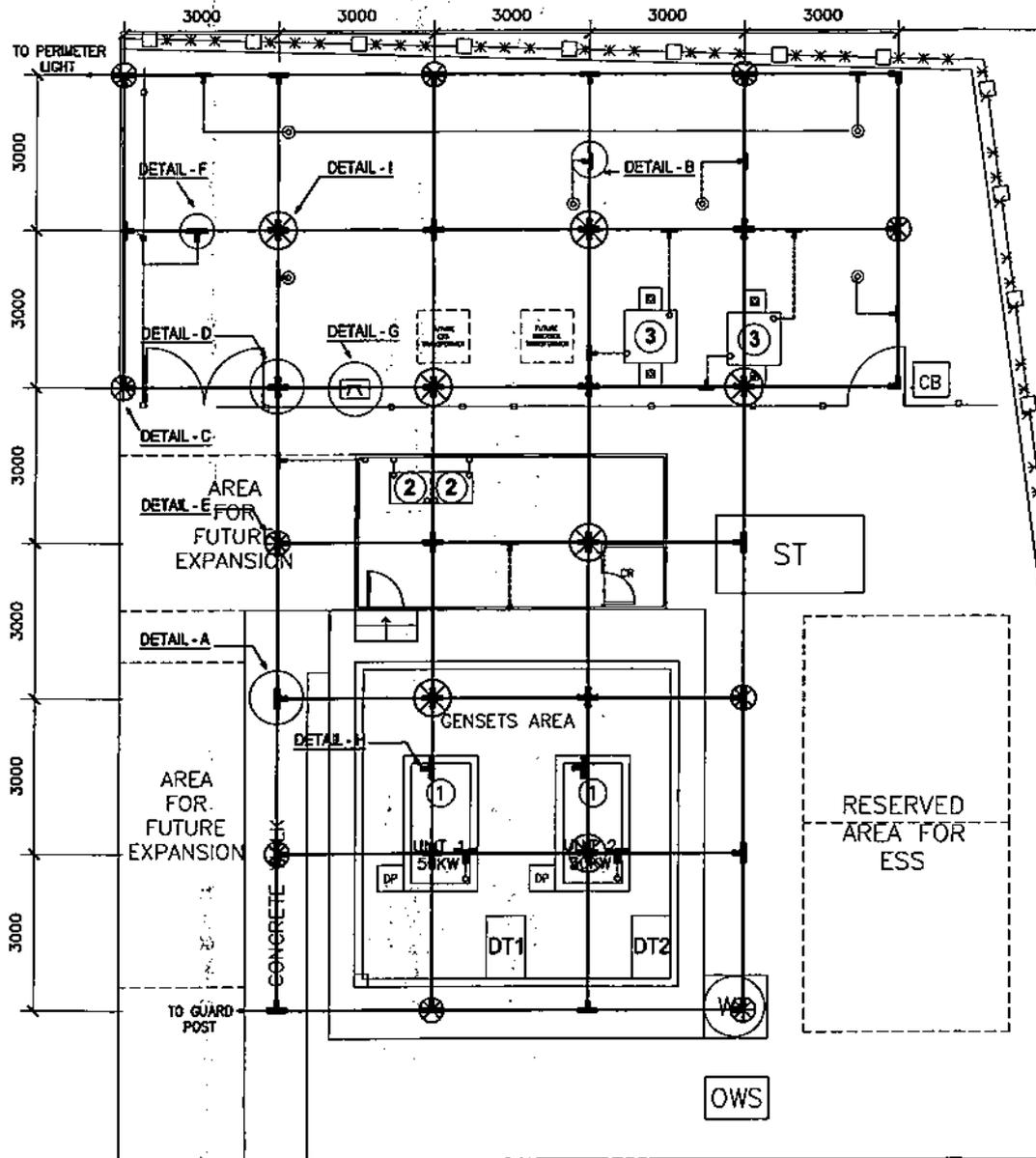
DETAIL "D"



DETAIL "E"

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HALLWAY, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALABUT, BUNSON CANTON AND BUTANAMAN, SIRIMA, CAMARINES SUR			
LOCATION: BUTANAMAN, SIRIMA, CAMARINES SUR			
TITLE: <b>DETAILS OF TAKE-OFF STRUCTURE (2/ 2)</b> 1200 KW & 1200 KW BUTANAMAN DPP			
DESIGNED	FLD	CHKD	DATE
DRAWN	FLD	SUBMITTED: <i>B. M. AGUILA</i>	
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED: <i>C. C. LUGOD, JR.</i>	
ENCLINCHMT		APPROVED: <i>[Signature]</i>	
ELEC.		MECH. <i>[Signature]</i>	
MECH.			
DWG. NO. <b>ButDPP-BDE-17.004</b>		SPCS. NO. <b>LuzP22Z14578c</b>	
SCALE: <b>NTS</b>		<b>BID DRAWING</b>	
REV.	DATE	NATURE OF REVISION	BY
			CHKD. RECD. APPR.
			REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.



**NOTES:**

1. DETAIL "A" SHALL BE APPLIED TO ALL MAJOR EQUIPMENT SUCH AS DIESEL GENERATOR, TRANSFORMER, GENERATOR CONTROL PANEL.
2. DETAIL "B" SHALL BE APPLIED AS FOLLOWS:  
 50mm<sup>2</sup> - FOR MOTORS/PUMPS RATED 30KW AND ABOVE, CT/PT, FDS, LA, AUTORECLOSER  
 22mm<sup>2</sup> - FOR MOTORS/PUMPS RATED BELOW 10KW, PERIMETER LIGHTING, TRENCHES AND FENCE EARTHING.
3. ALL PERIMETER LIGHTING POST AND FLAG POLE SHALL BE CONNECTED TO GROUND MAT.
4. GROUNDING CONDUCTOR SHALL BE EMBEDDED AT LEAST 0.60M.
5. THIS DRAWING SHALL BE WORKED WITH DRAWING NO. CBSDPP-BDE-17.002.

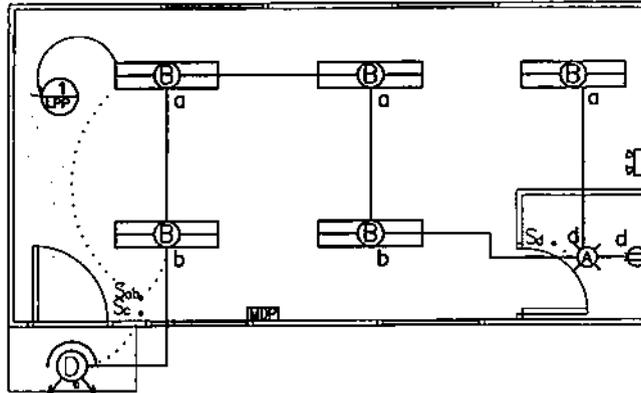
**LEGEND:**

- ① - DIESEL GENERATOR
- ② - GENERATOR CONTROL & PROTECTION PANEL (GCPP)
- ③ - GENERATOR TRANSFORMER
- DT - DAY TANK
- - 100 mm<sup>2</sup> BARE STRANDED COPPER
- ⊗ - GROUND ROD CONNECTION
- DT - DAY TANK

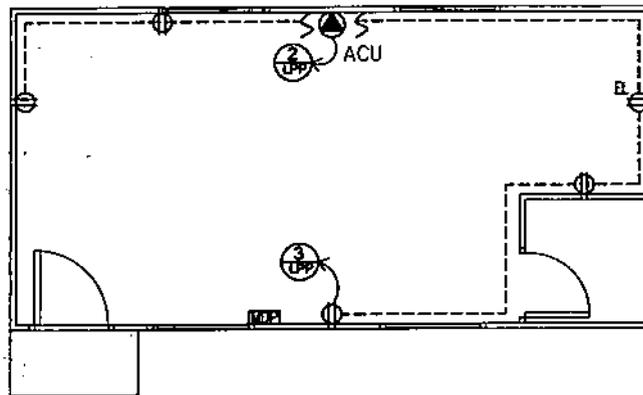
<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUYOD, BURGOS QUEZON AND BUTARAHAN, SIBUGA, CAMARINES SUR	
LOCATION: BUTARAHAN, SIBUGA, CAMARINES SUR	
<b>TITLE:</b> <b>GROUNDING SYSTEM LAYOUT</b> <small>1538 kW &amp; 1538 kW BUTARAHAN DTP</small>	
DESIGNED: RLD DRAWN: RLD REVIEWED: PRINCIPAL ENGR. J. ANCHUT. CYP/ANCHUT ELEC. MECH.	SUBMITTED: <b>B. M. AGUILA</b> RECOMMENDED: <b>C. C. LUGOD, JR.</b> APPROVED: <b>N. S. SORIANO</b>
OWS NO. <b>BIDPP-BDE-17.005</b> SPEC. NO. <b>LuzP22Z1457Sc</b>	
<b>SCALE: 1:100</b> <b>BID DRAWING</b> REV. <b>0</b>	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.





**LIGHTING LAYOUT**



**POWER LAYOUT**

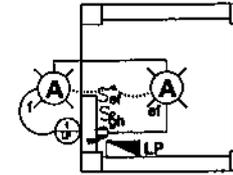
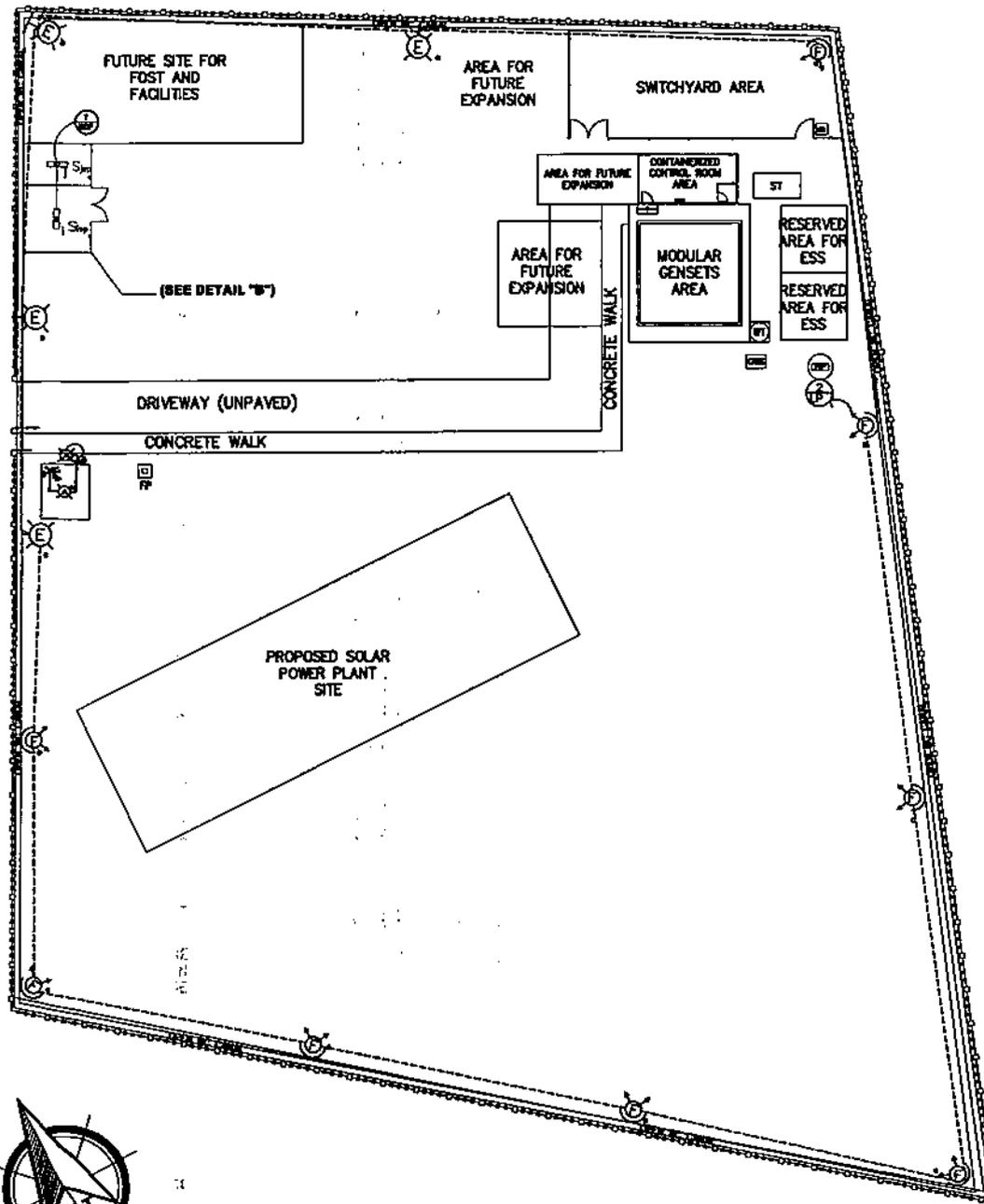
**NOTES:**

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST PROVISIONS OF THE PHILIPPINE ELECTRICAL CODE, LOCAL ORDINANCES AND REGULATIONS.
2. CONDUIT RUNS ARE INDICATIVE ONLY. THE ACTUAL LOCATION SHALL BE DETERMINED IN THE FIELD.
3. ALL WIRES SHALL BE TYPE THHN/THWN-2 600V INSULATION, 90° OPERATING TEMP., STRANDED COPPER CONDUCTOR.
4. CONDUIT SHALL BE UPVC, SCH. 40.
5. THIS DRAWING SHALL BE WORKED WITH DRAWING NOS. ButDPP-BDE-17.008, SCHEDULE OF LOADS & RISER DIAGRAM AND CBSDPP-BDE-17.007 FOR DETAILS OF LIGHTING FIXTURES.
6. THIS DRAWING SHALL BE WORKED WITH CIVIL AND MECHANICAL BID DRAWINGS.

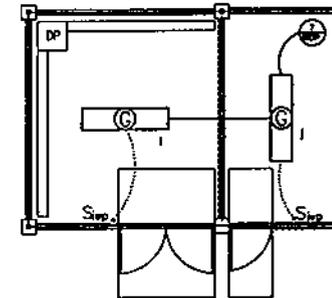
**LEGEND:**

- (A) - FIXTURE TYPE A
- (B) - FIXTURE TYPE B
- (EL) - EMERGENCY LIGHT OUTLET
- (D) - FIXTURE TYPE D
- S<sub>a</sub> - SINGLE POLE SWITCH (SUBSCRIPT DENOTES LAMP BEING CONTROLLED)
- S<sub>b</sub> - DUPLEX SWITCH (SUBSCRIPT DENOTES LAMP BEING CONTROLLED)
- (2) - 200 VA DUPLEX CONVENIENCE OUTLET
- (WP) - 200 VA DUPLEX CONVENIENCE OUTLET (WEATHER PROOF)
- (EF) - EXHAUST FAN
- (CB) - ENCLOSED CIRCUIT BREAKER W/BUILT-IN UNIVERSAL OUTLET FOR WINDOW TYPE ACU
- - CIRCUIT RUNNING ON CEILING
- - CIRCUIT RUNNING UNDERGROUND
- ..... - CONTROL CIRCUIT
- (+M) - CIRCUIT HOMERUN
- MDP - MAIN DISTRIBUTION PANEL

OWNER		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE POLE IN 13KV RICHMAN DESAL GENERATING SETS INCLUDING WAREHOUSE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALATOG, BUNEDD QUEZON AND BUTAMAMAK, BUENA, CAMARINES SUR			
LOCATION: BUTAMAMAK, BUENA, CAMARINES SUR			
TITLE: <b>LIGHTING AND POWER LAYOUT (CONTROL ROOM)</b> 1100 KW & 1200 KW BUTAMAMAK DPP			
DESIGNED	RLD	CHKD	DATE
DRAWN	RLD	SUBMITTED: <i>B. M. AGUILA</i> Senior Engineer	
REVIEWED	PRINCIPAL ENGR. J. ARCHT.	RECOMMENDED: <i>C. C. LUGOD, SR.</i> Manager, E&C	
CIVIL ARCHT.		APPROVED: <i>N. G. SANCHEZ</i> Manager, E&C	
ELEC.			
MECH.			
Dwg. No. ButDPP-BDE-17.007		Spec. No. LuzP22Z145/Sc	
SCALE: 1:50		BID DRAWING	
REV. DATE NATURE OF REVISION BY CHKD. RECD. APPL.			REV. 0



DETAIL "A"  
GUARD POST  
LIGHTING LAYOUT



DETAIL "B"  
HAZARDOUS WASTE STORAGE  
LIGHTING LAYOUT

**LEGEND:**

- S<sub>1</sub> - SINGLE POLE WALL SWITCH  
(letter denotes fixture to be controlled)
- S<sub>2x</sub> - DUPLEX WALL SWITCH  
(letter denotes fixture to be controlled)
- S<sub>wpp</sub> - WEATHERPROOF SINGLE POLE WALL SWITCH  
(letter denotes fixture to be controlled)
- (F) - FIXTURE TYPE F
- (G) - FIXTURE TYPE G
- (E) - FIXTURE TYPE E
- - CIRCUIT RUNNING UNDERGROUND
- ..... - CONTROL CIRCUIT
- [MOP] - MAIN DISTRIBUTION PANEL
- - CIRCUIT HOMERUN

**NOTES:**

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST PROVISIONS OF THE PHILIPPINE ELECTRICAL CODE, LOCAL ORDINANCES AND REGULATIONS.
2. CONDUIT RUNS ARE INDICATIVE ONLY. THE ACTUAL LOCATION SHALL BE DETERMINED IN THE FIELD.
3. ALL WIRES SHALL BE TYPE THHN/THWN-2 600V INSULATION, 90° OPERATING TEMP., STRANDED COPPER CONDUCTOR.
4. CONDUIT SHALL BE UPVC, SCH. 40.
5. THIS DRAWING SHALL BE WORKED WITH DRAWING NOS. BU10PP-BDE-17.008 FOR SCHEDULE OF LOADS & RISER DIAGRAM, CBSOPP-BDE-17.007 FOR PERIMETER LIGHTING DETAILS AND CBSOPP-BDE-17.008 FOR DETAILS OF LIGHTING FIXTURES.



OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITY FOR THE FOUR (4) LINES MODULAR DIESEL GENERATING SETS INCLUDING HAIR, INSULATION, TEST AND COMMISSIONING BY BALANCE OF PLANT IN CALUTOG, BURGOS QUEZON AND BUTANAMAN, SAMA, CAMARINES SUR			
LOCATION: BUTANAMAN, SAMA, CAMARINES SUR			
<b>TITLE</b>			
<b>PERIMETER LIGHTING LAYOUT</b>			
1230 KW & 1250 KW BUTANAMAN DPP			
DESIGNED	BY: RLD	CHKD:	DATE:
DRAWN	BY: RLD	RECOMMENDED	SUBMITTED: <i>[Signature]</i> E. M. AGUILA <small>Professional Engineer</small>
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	E. C. LUGOD, JR. <small>Master Electrician</small>
CHKD/ARCHT		APPROVED:	N. G. SORIANO <small>Master Electrician</small>
ELEC.			
MECH.			
DWG. NO. BU10PP-BDE-17.008		SPEC. NO. LUZP22Z1457Sc	
SCALE: 1:300		<b>BID DRAWING</b>	
		REV. 0	

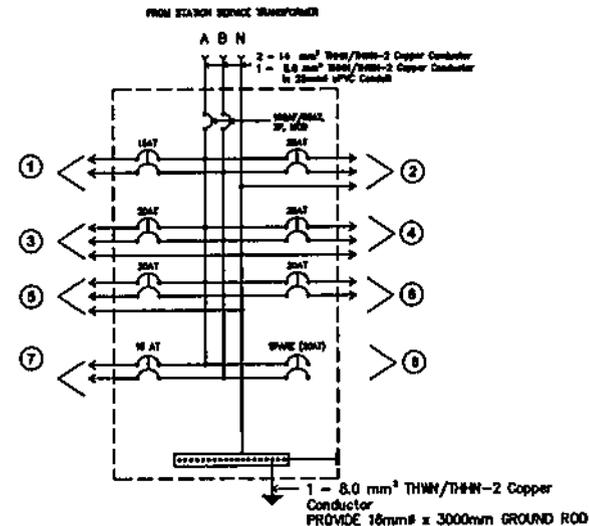
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPL.

CIRCUIT NO.	DESCRIPTION	W	V	A	SIZES		
					BREAKER	WIRE	CONDUIT
1	1 - 9W COMPACT LED LAMP, TYPE A	388.75	230	1.73	50AF / 15AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
	2 - 2 X 18W LED LAMP TUBE, TYPE B						
	1 - 100MA EXHAUST FAN						
1	1 - 60W FLOOD LED LIGHT, TYPE D						
2	1 - 2 HP AIR CONDITIONER UNIT	2760	230	12.00	50AF / 25AT	2 - 5.5mm <sup>2</sup> THHN/THWN-2 1 - 8.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
	4 - 300MA CONDENSER OUTLET	885	230	3.30	50AF / 20AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2 1 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
1 - 3 X 2W EMERGENCY LIGHT OUTLET							
4	LIGHTING AND POWER PANEL (GUARDHOUSE)	2172.50	230	8.45	50AF / 20AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	25mm $\phi$ uPVC
5	1 - 100WA SPACE HEATER FOR 30KW MODULAR D/G SET	1500	230	6.52	50AF / 20AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2 1 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
6	1 - 100WA SPACE HEATER FOR 30KW MODULAR D/G SET	1500	230	6.52	50AF / 20AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2 1 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
7	3 - 2 X 18W LED LAMP TUBE, TYPE C	90	230	0.35	50AF / 15AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
8	SPARE	1500	230	6.52	50AF / 20AT		
	TOTAL	10796.25	230	48.28			

PROVIDE: 100 AF / 60 AT, 2P MCB WITH BRANCH CIRCUIT OF:  
1 - 50AF/25AT, 2P, MCB  
5 - 50AF/20AT, 2P, MCB  
2 - 50AF/15AT, 2P, MCB

PROVIDE: 2 - 14mm<sup>2</sup> THHN/THWN-2 &  
1 - 8.0mm<sup>2</sup> THHN/THWN-2  
Copper Conductor  
in 25mm $\phi$  uPVC Conduit

SCHEDULE OF LOADS MAIN DISTRIBUTION PANEL (MDP)



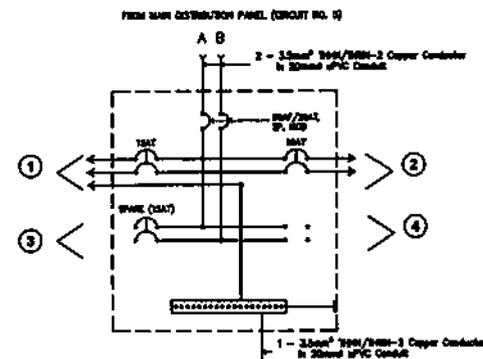
SCHEDULE OF LOADS MAIN DISTRIBUTION PANEL (MDP)

CIRCUIT NO.	DESCRIPTION	W	V	A	SIZES		
					BREAKER	WIRE	CONDUIT
1	4 - 1 x 30W LED PERIMETER LIGHTING, TYPE E	450.00	230	1.86	50AF / 15AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
	8 - 1 x 30W LED PERIMETER LIGHTING, TYPE F						
2	2 - 9W COMPACT LED LAMP, TYPE A	222.50	230	0.97	50AF / 15AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mm $\phi$ uPVC
	1 - 300MA CONDENSER OUTLET						
3	SPARE	1500	230	6.52	50AF / 15AT		
4	SPARE						
	TOTAL	2172.50	230	8.46			

PROVIDE: 50 AF / 20AT, 2P MCCB WITH BRANCH CIRCUIT OF:  
3 - 50AF/15AT, 2P, MCB

PROVIDE: 3 - 3.5mm<sup>2</sup> THHN/THWN-2 Copper Conductor  
in 20mm $\phi$  uPVC Conduit

SCHEDULE OF LOADS MAIN DISTRIBUTION PANEL (LPP)

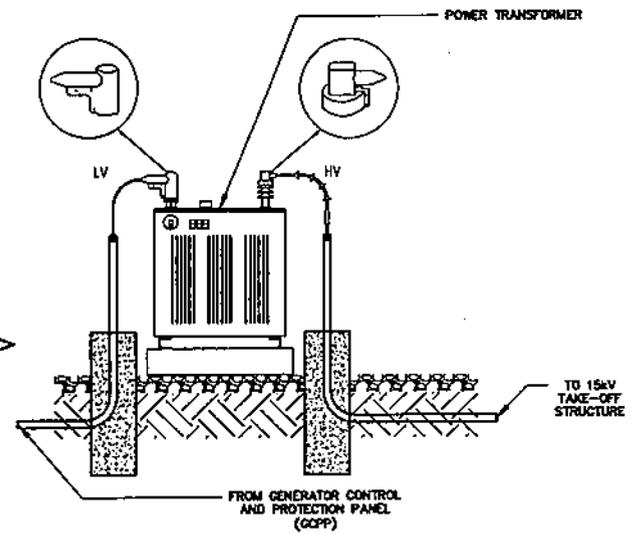
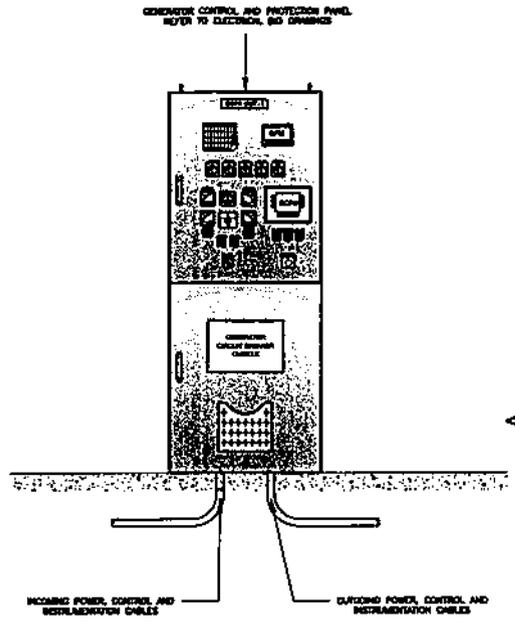
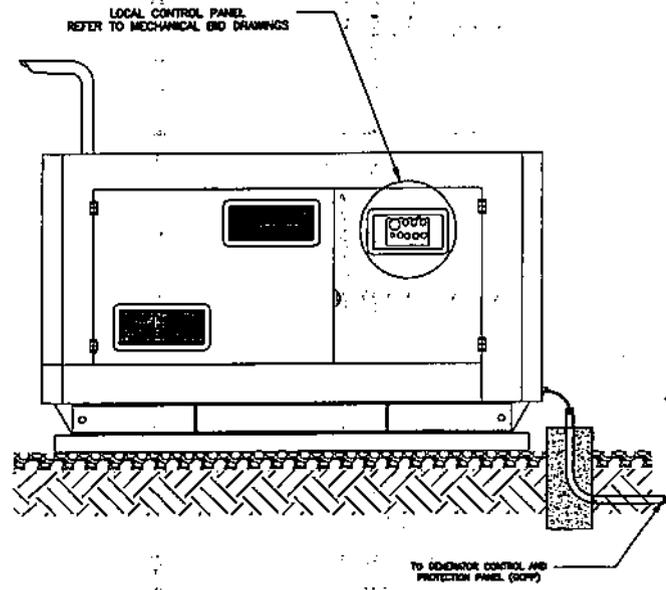


TO BE CONNECTED TO THE ENGINE BUS BAR TERMINAL OF MAIN DISTRIBUTION PANEL(S) INSIDE THE CONTROL ROOM AT THE PORCH/HOUSE  
RISER DIAGRAM FOR LPP (GUARDHOUSE)

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONTRIBUTION OF POWER FACILITIES FOR THE POWER PLANTS MODULAR DIESEL GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALITOG, BURGOS QUEZON AND INTERMUNICIPAL, BURGAS, CAMARINES SUR			
LOCATION: BUTAWAKANAN, BURGAS, CAMARINES SUR			
TITLE: <b>SCHEDULE OF LOADS AND RISER DIAGRAM</b> 1236 KW & 1250 KW BUTAWAKANAN DPP			
DESIGNED BY	FLD	CHKD. DATE	SUBMITTED
DRAWN BY	FLD		 B. M. AGUILA
REVIEWED BY	PRINCIPAL ENGR. (ARCHT.)		 R. E. LUGOD, JR.
CIVIL/ARCHT			 N. G. SERRANO
ELEC.			APPROVED:
MECH.			 N. G. SERRANO
DWG. NO. ButDPP-BDE-17.009		SPEC. NO. LUZP22Z1457Sc	
SCALE: NTS		BID DRAWING	
REV. 0			

NATURE OF REVISION

BY CHKD. RECD. APPD.



**NOTES:**

1. THIS DRAWING IS INTENDED FOR BIDDING PURPOSES ONLY. THE LOCATION AND LAYOUT OF ALL THE EQUIPMENT TO BE SUPPLIED SHALL BE REFERRED TO THE CIVIL, MECHANICAL AND ELECTRICAL BID DRAWINGS.
2. ALL THE DETAILS OF THE FOLLOWING EQUIPMENT SHALL BE IN ACCORDANCE WITH ALL THE TECHNICAL SPECIFICATIONS INDICATED IN THIS DOCUMENT. NON-COMPLIANCE TO THE REQUIREMENTS SHALL BE GROUNDS FOR DISQUALIFICATION.

**LEGEND:**

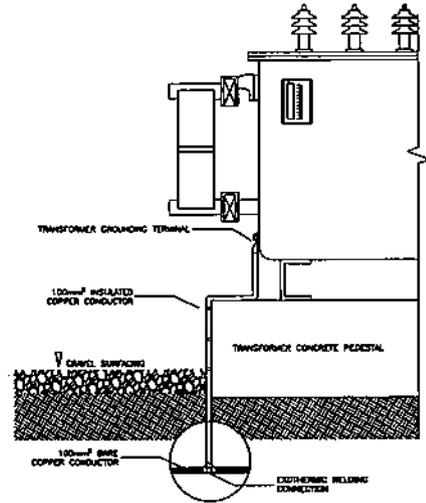
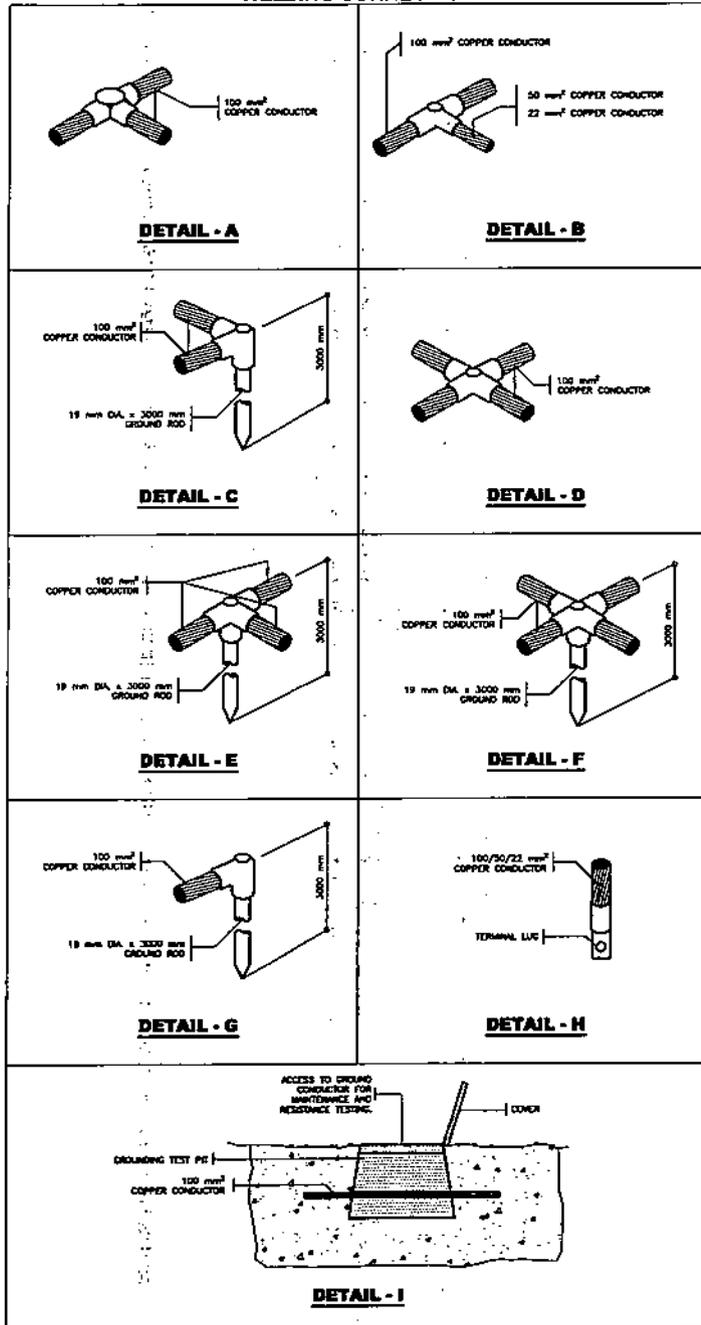
- LCP - LOCAL CONTROL AND PROTECTION PANEL
- GCPP - GENERATOR CONTROL AND PROTECTION PANEL
- DPM - DIGITAL POWER METER

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILMAN QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) MWDC MODULAR DIESEL GENERATING SETS INCLUDING INSTALLATION, METALLIZATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUYOT, MARIBOS CREEK AND BUTANAHAN, SIRUNA, CAMARINES SUR			
LOCATION: CALUYOT, QUEZON AND BUTANAHAN, SIRUNA, CAMARINES SUR			
TITLE: <b>SYSTEM CONFIGURATION</b>			
TYPICAL DRAWINGS			
DESIGNED	BY	CHKD	DATE
DRAWN	FLD		
REVIEWED	PRINCIPAL ENGR. (IN CH.)		SUBMITTED: <i>B. M. AGUILA</i>
CONTRACT			RECOMMENDED: <i>C. C. LUGOD, JR.</i>
ELEC.			APPROVED: <i>N. G. SOMARIBAN</i>
MECH.			Manager, E&I

DRG. NO. CBSDPP-BDE-17.001 SPEC. NO. LuzP22Z1457Sc

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.	SCALE: N.T.S.	<b>BID DRAWING</b>	REV. 0
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**DETAILS OF EXOTHERMIC WELDING CONNECTION**



**EQUIPMENT GROUNDING CONNECTION**

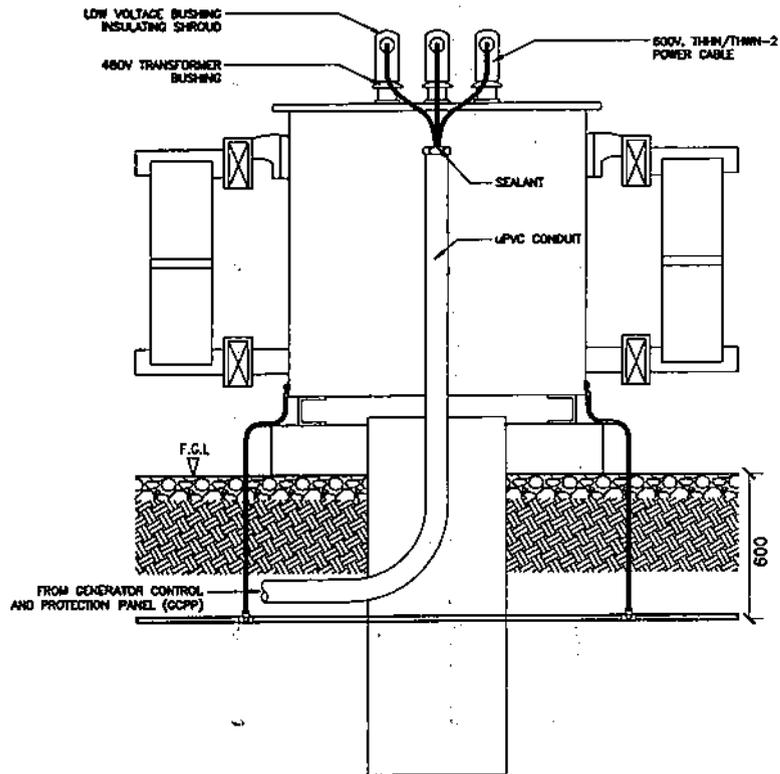
**NOTES:**

- ALL DIMENSIONS INDICATED ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
- INSTALLATION OF NEW GROUNDING SYSTEM SHALL BE WORKED WITH EQUIPMENT GROUNDING CONNECTION-1 AND DETAILS OF EXOTHERMIC WELDING CONNECTION.
- GROUNDING CONDUCTOR SHALL BE EMBEDDED AT LEAST 0.60M.
- ALL EQUIPMENT GROUNDING SHALL BE CONNECTED TO THE EXISTING GROUNDING MAT.
- THE SUPPLIER SHALL PROVIDE TWO (2) TERMINALS FOR EQUIPMENT BODY GROUNDING OF ALL MAJOR EQUIPMENT (i.e. DIESEL GENERATOR, GENERATOR CONTROL AND PROTECTION PANEL, GENERATOR TRANSFORMER) AND SHALL BE CONNECTED TO THE EXISTING/NEW GROUNDING MAT USING 100MM<sup>2</sup> INSULATED COPPER CONDUCTOR AND EXOTHERMIC WELDING PROCESS.
- CT/PT, AUTOMATIC CIRCUIT RECLOSER, STEEL POLES AND FENCE EARTHING SHALL BE PROPERLY GROUNDING WITH 50MM<sup>2</sup> INSULATED COPPER CONDUCTOR.
- CABLE TRAYS SHALL BE PROPERLY GROUNDING WITH 22MM<sup>2</sup> INSULATED COPPER CONDUCTOR.
- IF THERE IS NO EXISTING GROUNDING MAT OR INSTALLATION OF NEW GROUNDING SYSTEM ON THE PLANT SITE, THE SUPPLIER SHALL USE GROUNDING RODS FOR ALL EQUIPMENT GROUNDING AS SHOWN ON EQUIPMENT GROUNDING CONNECTION-2.

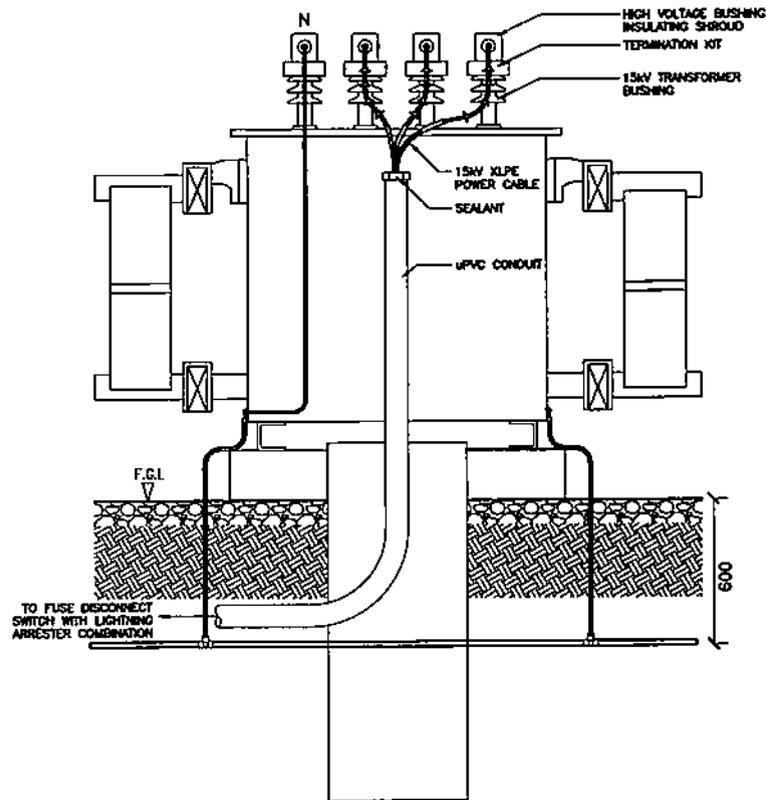
OWNER:	 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN QUEZON CITY
PROJECT:	CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) LINE BUREAU DESER, GENERATING UNIT INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALABACAN, MARICOR QUEZON AND BUTAMAMAHAN, BULUJA, CAGAIANES SUR
LOCATION:	CALABACAN, QUEZON AND BUTAMAMAHAN, BULUJA, CAGAIANES SUR
TITLE:	<b>DETAILS OF GROUNDING SYSTEM</b>
TYPICAL DRAWINGS	
DESIGNED:	BY: CHD DATE: SUBMITTED: <i>B. M. MAGULA</i>
DRAWN:	RLD
REVIEWED:	PRINCIPAL ENGR./ARCHT. RECOMMENDED: <i>C. Z. C. LUGOD, JR.</i>
CIVIL/ARCHT:	
ELECT:	APPROVED: <i>N. S. BARRERA</i>
MECH:	MECH. DEO

ONG. NO. CBSDPP-BDE-17.002 SPEC. NO. LuzP22Z1457Sc

REV.	DATE	NATURE OF REVISION	BY	CHD.	RECD.	APPD.



TRANSFORMER LOW VOLTAGE CABLE TERMINATION

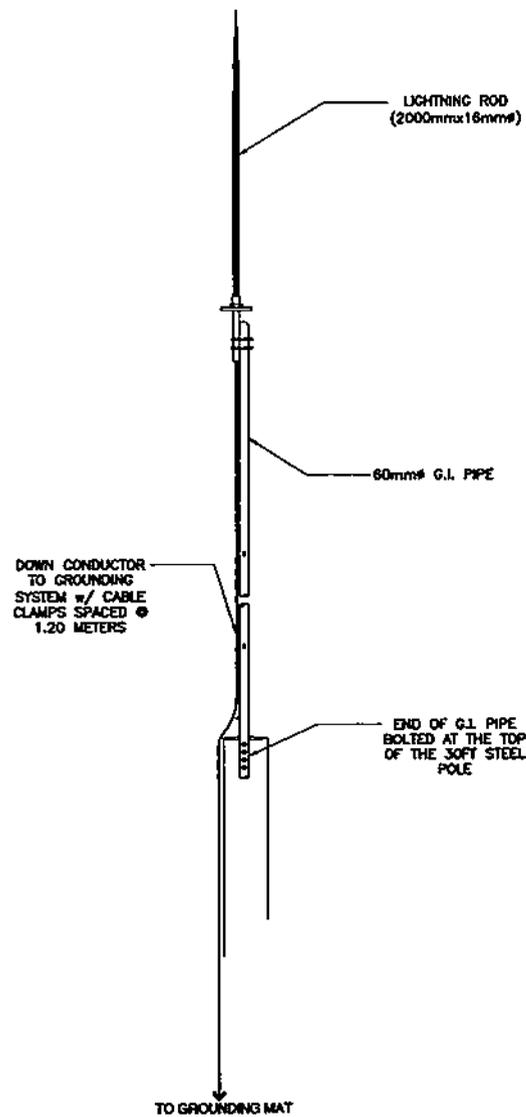


TRANSFORMER HIGH VOLTAGE CABLE TERMINATION

NOTES:

1. THE NUMBER OF POWER CABLES PER PHASE FOR THE LOW VOLTAGE (LV) SIDE IS FOR BIDDING PURPOSES ONLY. THE SUPPLIER SHALL VERIFY WHAT IS INDICATED IN THE SINGLE LINE DIAGRAM AND SHALL PROVIDE PROPER CABLE TERMINATION.
2. THE CONTRACTOR SHALL PROVIDE TERMINATION KIT FOR THE HIGH VOLTAGE (HV) POWER CABLES AND SHALL DESIGN PROPER TERMINATION FOR THE NEUTRAL CABLE.
3. THE LV AND HV TERMINATIONS SHALL BE PROVIDED WITH SUITABLE INSULATING SHROUD. THE INSULATING SHROUD SHALL BE MANUFACTURED THROUGH DIP MOULDING PROCESS AND SHALL BE MADE FROM FLEXIBLE POLYVINYL CHLORIDE (PVC) MATERIAL, SUITABLE FOR LOW VOLTAGE TO HIGH VOLTAGE APPLICATIONS.
4. THE INSULATING SHROUD SHALL BE FLAME RETARDANT, CONFORMING WITH THE UL 94 STANDARDS AND SHALL BE TYPE TESTED FOR ELECTRIC STRENGTH IN ACCORDANCE WITH IEC 60243-1 OR APPROVED EQUIVALENT STANDARDS.

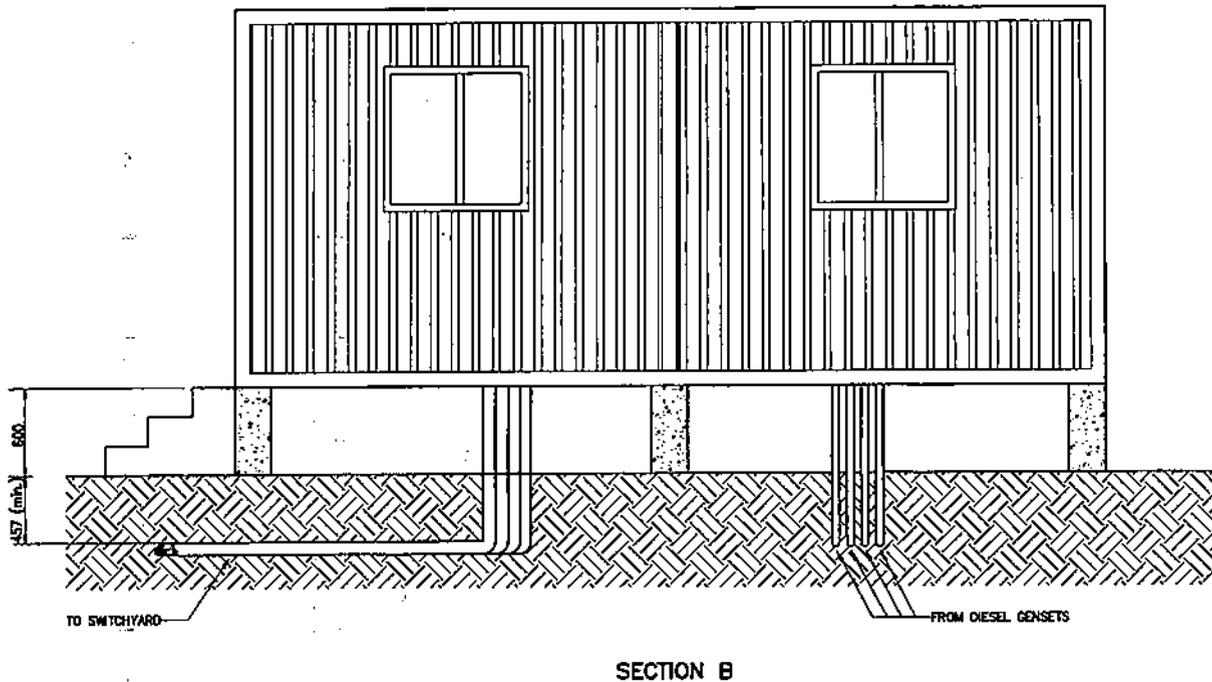
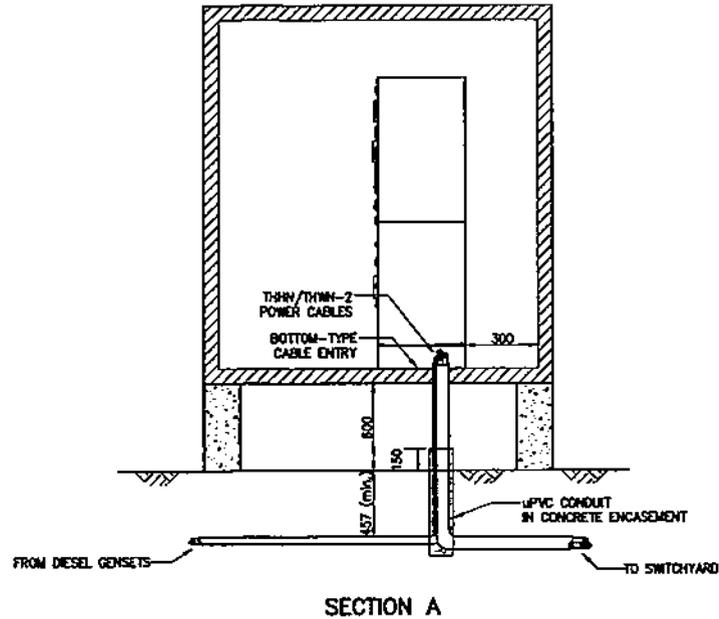
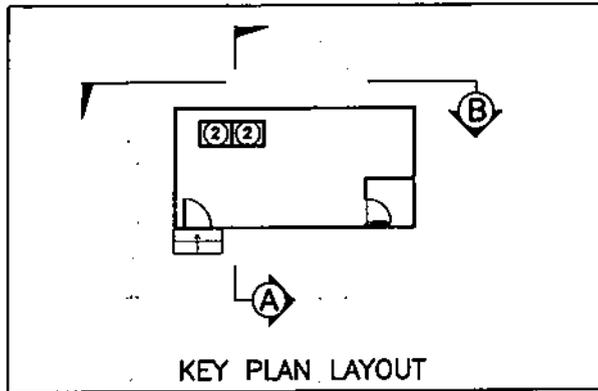
OWNER:				<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MICULAK DIESEL GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALATOGOT, QUEZON AND BUTAWANAN, SOROGA, CAMARINES SUR					
LOCATION: CALATOGOT, QUEZON AND BUTAWANAN, SOROGA, CAMARINES SUR					
TITLE: <b>DETAILS OF TRANSFORMER TERMINATION</b>					
TYPICAL DRAWINGS					
DESIGNED	BY	CHKD	DATE	SUBMITTER:	<i>[Signature]</i> B. MAGURA
DRAWN	RLD			RECOMMENDED BY:	<i>[Signature]</i> C. Z. C. LUGO, JR.
REVIEWED	PRINCIPAL ENGR./ARCHT.			APPROVED:	<i>[Signature]</i> N. G. SOROGA
CHAIRMAN				MECH.	
ELEC.					
DWG. NO. CBSDPP-BDE-17.003			SPEC. NO. LUPZ22Z1457Sc		
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.
SCALE: N.T.S.			BID DRAWING		REV. 0



**LIGHTNING PROTECTION SYSTEM**

- NOTES:**
1. THE LIGHTNING PROTECTION SYSTEM SHALL BE INSTALLED APPROXIMATELY AS SHOWN ON THE DRAWING.
  2. THE DOWN CONDUCTOR SHALL BE CONNECTED TO THE GROUNDING MAT.
  3. THE CONTRACTOR SHALL SUBMIT SPECIFICATION, FABRICATION AND INSTALLATION DRAWING FOR APPROVAL OF NPC.
  4. THE G.I. PIPE SHALL HAVE AN INTERNAL DIAMETER OF 60mm AND SHALL HAVE A MINIMUM LENGTH OF 3.0 M

OWNER:				<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT MODULAR REHEL GENERATING SETS INCLUDING TRANSFORMERS, MISCELLANEOUS, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALATOGOT, SORSOGON QUEZON AND BUTABUTANAN, SORSOGON, CAGAYAN DE ORO					
LOCATION: CALATOGOT, QUEZON AND BUTABUTANAN, SORSOGON, CAGAYAN DE ORO					
TITLE: <b>LIGHTNING PROTECTION SYSTEM</b>					
TYPICAL DRAWINGS					
DESIGNED	BY	CHKD	DATE	SUBMITTED:	<i>B. M. AGUILA</i>
DRAWN	FLD			RECOMMENDED:	<i>G. Z. C. LUGOB, JR.</i>
REVIEWED	PRINCIPAL ENGR. / ARCHT.			APPROVED:	<i>N. G. SOMEREBIA</i>
CHECKED					Manager, E&C
ELEC.					Manager, E&C
MECH.					
DRG. NO. <b>CBBSDPP-BDE-17.004</b>			SPEC. NO. <b>LUZP22214575c</b>		
REV.	DATE	NATURE OF REVISION	BY	CHKD.	REC'D.
SCALE: N.T.S.			<b>BID DRAWING</b>		REV. <b>0</b>



**NOTES:**

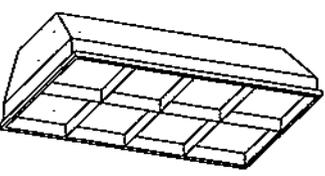
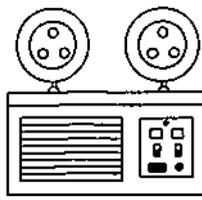
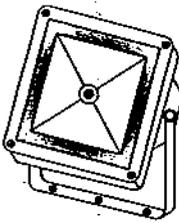
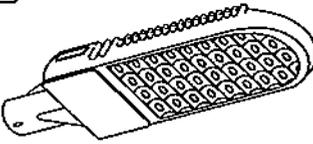
1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THE NUMBER OF FEEDERS AND CONDUITS ARE FOR BIDDING PURPOSES ONLY. THE CONTRACTOR SHALL DESIGN THE APPROPRIATE CABLE ENTRY FOR ALL THE POWER, CONTROL AND INSTRUMENTATION CABLES INCLUDING CABLES FOR POWER AND LIGHTING TO BE USED.
3. THE CONTRACTOR SHALL SECURE PROTECTION FOR THE CABLES AND PANELS AGAINST SUDDEN INGRESS PENETRATIONS.
4. THIS DRAWING SHALL BE WORKED WITH CIVIL BID DRAWINGS.

**LEGEND:**

- GCPP — GENERATOR CONTROL AND PROTECTION PANEL
- MDP — GENERATOR CONTROL AND PROTECTION PANEL

OWNER:				<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTOG, BURENOS QUEZON AND BUTANAMAN, SIRUNA, CAMARINES SUR					
LOCATION: CALUTOG, QUEZON AND BUTANAMAN, SIRUNA, CAMARINES SUR					
TITLE: <b>DETAILS OF CONTROL HOUSE &amp; CABLE ENTRY</b> TYPICAL DRAWINGS					
DESIGNED	BY	CHKD	DATE	SUBMITTED:	<i>B. M. AGUILA</i> Principal Engineer A, E&C
DRAWN	RLD			RECOMMENDED:	<i>C. Z. C. LUGOD, JR.</i> Manager, E&C
REVIEWED	PRINCIPAL ENGR. / ARCHT.			APPROVED:	<i>N. G. ROMERO</i> Manager, E&C
ENLARGED					
ELEC.					
MECH.					
DWG. NO. <b>CBBSPPP-BDE-17.005</b>			SPECS. NO. <b>LUZP2221457Sc</b>		
REV. 0			SCALE: <b>N.T.S.</b>		<b>BID DRAWING</b>

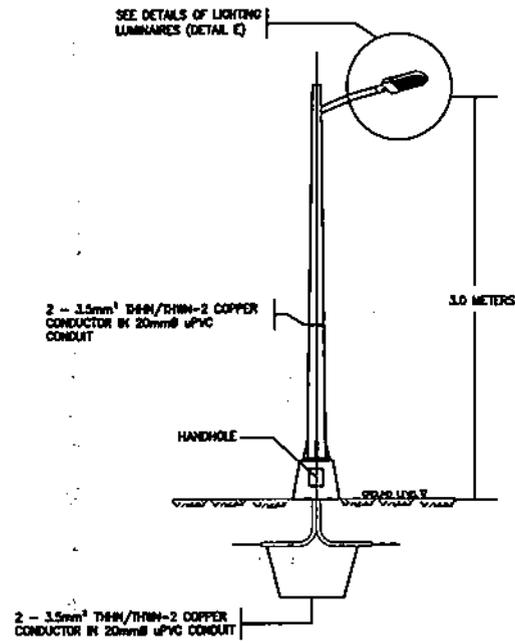
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

<p><b>A</b></p> 	<p><b>B</b></p> 	<p><b>C</b></p> 	
<p>1 x 9 WATTS COOL WHITE, CLASSIC GLOBE SHAPE, FROSTED FINISH, E27 BASE, COMPACT LED LAMP</p> <p>APPLICABLE AREA: COMFORT ROOM, GUARDHOUSE, PUMPHOUSE</p>	<p>IP20 FLUSH MOUNTED TYPE LIGHTING FIXTURE, WITH MIRROR FINISH ALUMINUM REFLECTOR, 2 x 18 WATTS COOL WHITE HIGH OUTPUT LED LAMP TUBE LUMINAIRE.</p> <p>APPLICABLE AREA: CONTROL HOUSE/ HOUSE/STORAGE AREA</p>	<p>PORTABLE EMERGENCY LIGHTING FIXTURE, 2 x 2 WATTS LED WARM WHITE WITH BUILT-IN SEALED LEAD ACID BATTERY CHARGING TIME &lt; 20 HRS; USAGE TIME &lt;= 4 HRS</p> <p>APPLICABLE AREA: ENGINE &amp; CONTROL HOUSE</p>	
<p><b>D</b></p> 	<p><b>E</b></p> 	<p><b>F</b></p> 	<p><b>G</b></p> 
<p>IP65 RATING 50 WATTS LED FLOOD LIGHT, FORGED WITH HIGH QUALITY ALUMINUM ALLOY WITH CLEAR TEMPERED GLASS AND BUILT-IN COOLING FINS.</p> <p>APPLICABLE AREA: SWITCHYARD AREA, TRANSFORMER BAY</p>	<p>IP 66 RATED, 30 WATTS LED PERIMETER LIGHTING WITH ADJUSTABLE EASY TILTING, AND BUILT-IN HEAT SINK. FIXTURE SHALL BE SUPPLIED WITH HOT-DIPPED GALVANIZED TAPERED POST. (3 METERS IN HEIGHT)</p> <p>APPLICABLE AREA: ROAD WAY</p>	<p>IP65 RATING 30 WATTS LED FLOOD LIGHT, FORGED WITH HIGH QUALITY ALUMINUM ALLOY WITH CLEAR TEMPERED GLASS AND BUILT-IN COOLING FINS. (3 METERS IN HEIGHT)</p> <p>APPLICABLE AREA: SWITCHYARD AREA, TRANSFORMER BAY</p>	<p>IP65 WATER AND DUST PROOF LIGHTING FIXTURE WITH POLYCARBONATE HOUSING AND 2 x 16 WATTS, 600mm, HIGH OUTPUT, LED TUBE</p>

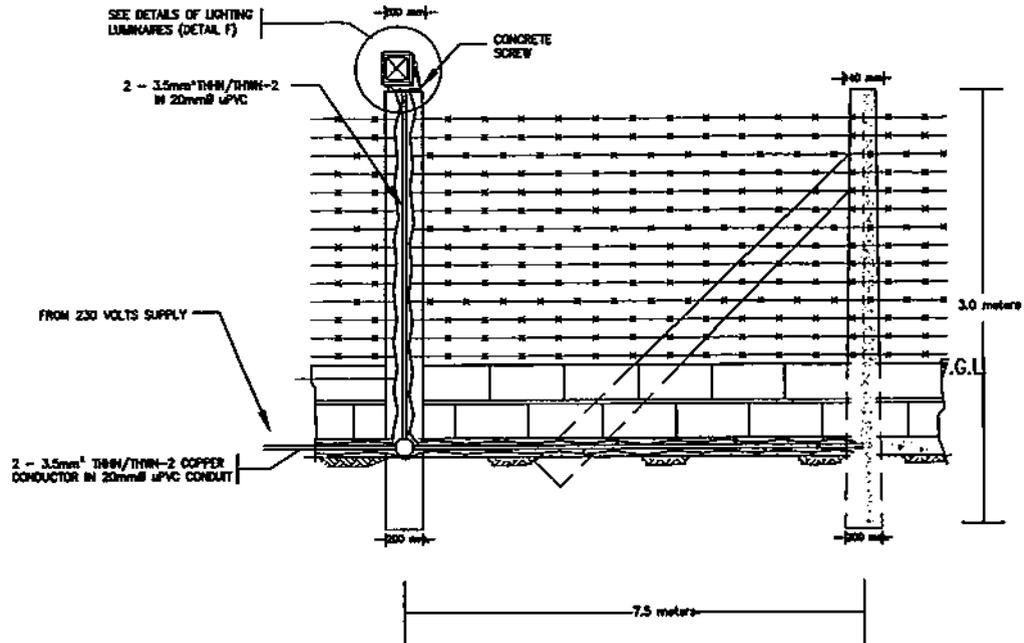
**DETAILS OF LIGHTING FIXTURES**

OWNER:				<b>NATIONAL POWER CORPORATION</b>	
				AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATORS SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTOG, BURENDO QUEZON AND BUTANMANAN, BRUMA, CAGUIGUA PER.					
LOCATION: CALUTOG, QUEZON AND BUTANMANAN, BRUMA, CAGUIGUA PER.					
TITLE: <b>DETAILS OF LIGHTING FIXTURES</b> TYPICAL DRAWINGS					
DESIGNED	BY	CHKD	DATE	SUBMITTED:	<i>B. M. AGUILA</i> Principal Engineer A
DRAWN	RLD			RECOMMENDED:	<i>E. G. LUGOD, JR.</i> Manager, E&O
REVIEWED	PRINCIPAL ENGR. / ARCHT.			APPROVED:	<i>N. G. DOMESTICO</i> Manager, E&O
CIVIL/ARCHT					
ELEC.					
MECH.					
DWG. NO. <b>CBSDPP-BDE-17.006</b>		SPEC. NO. <b>LUP2221457Sc</b>			
SCALE: NTS	<b>BID DRAWING</b>			REV. <b>0</b>	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.
1	3/8/2020	CHANGE OF SITE				



TYPE "E" DETAILS



TYPE "F" DETAILS

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS WOODLAKES DIESEL GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALITCOT, BAMBONG QUEZON AND BUTANAMAN, SIBUMA, CAMARINES SUR			
LOCATION: CALITCOT, QUEZON AND BUTANAMAN, SIBUMA, CAMARINES SUR			
TITLE: <b>PERIMETER LIGHTING DETAILS</b> TYPICAL DRAWINGS			
DESIGNED	BY	CHKD	DATE
DRAWN	RLD		
REVIEWED	PRINCIPAL ENGR./ARCHT.		RECOMMENDED
CIVIL/ARCHT.			
ELEC.			
MECH.			
SUBMITTED:		B. M. AGUILA	
RECOMMENDED:		C. Z. C. LUGOD, JR.	
APPROVED:		M. G. SORIANO	
DWG. NO. CBBSDPP-BDE-17.007		SPEC. NO. LUZP2221457Sc	
SCALE: NTS		BID DRAWING	
REV. 0		REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPL.
1	3/5/20	CHANGE OF SITE				

**GENERAL NOTES:**

1. SPACE HEATERS SHALL BE INSTALLED ON THE GENERATOR FRAME TO MAINTAIN TEMPERATURE OF THE ENTIRE GENERATOR ABOVE THE DEW POINT WHILE NOT IN USE. POWER SUPPLY SHALL BE 240VAC SINGLE PHASE AND SHALL BE SOURCED FROM THE EXISTING STATION SERVICE TRANSFORMER. AUTOMATIC CONTROL FOR SPACE HEATERS SHALL BE INTEGRATED IN THE GENERATOR CONTROL AND PROTECTION PANEL (GCPP).
2. TEMPERATURE DETECTORS SHALL BE PROVIDED IN THE STATOR SLOTS AND AT THE END OF THE VENTILATING DUCTS ARRANGED TO RECEIVE HEAT FROM THE HOTTEST SPOT OF THE WINDINGS WITH APPROPRIATE CONTACTS FOR MONITORING, ALARM, DETECTION AND PROTECTION OF THE WINDINGS PROVIDED AT THE GCPP. AT CERTAIN PRE-SET TEMPERATURE (ALARM SETTING), THE TEMPERATURE DETECTOR WILL TRIGGER AN ALARM SO THAT AN ADJUSTMENT OR ACTION BEFORE ANY INSULATION DAMAGE OCCURS MAY BE DONE. THE CIRCUIT BREAKER FOR THE ALTERNATOR WILL AUTOMATICALLY TRIP IN THE EVENT THAT THE TEMPERATURE DETECTORS MEASURE THE WINDING TEMPERATURE TO BE ABOVE THE (SHUTDOWN SETTING) VALUE
3. ALL WORKS TO BE DONE AND EQUIPMENT TO BE SUPPLIED SHALL BE IN COMPLIANT TO THE LATEST PROVISIONS OF THE FOLLOWING STANDARDS:
  - a. ANSI/IEEE - AMERICAN NATIONAL STANDARDS INSTITUTE AND/OR INSTITUTE OF ELECTRICAL & ELECTRONIC ENGINEERS
    - C37.60 - REQUIREMENTS FOR OVERHEAD, PAD-MOUNTED, DRY VAULT AND SUBMERSIBLE AUTOMATIC CIRCUIT RECLOSERS AND FAULT INTERRUPTERS FOR AC SYSTEMS
    - C57.12.20 - STANDARD FOR OVERHEAD-TYPE DISTRIBUTION TRANSFORMER 500KVA AND SMALLER: HIGH VOLTAGE 34500V AND BELOW; LOW VOLTAGE, 7970/13800Y V AND BELOW
  - b. NEMA - NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
    - MG 1 - STANDARD FOR MOTORS AND GENERATORS
    - WC-5 - THERMOPLASTIC-INSULATED WIRE AND CABLE FOR THE TRANSMISSION AND DISTRIBUTION OF ELECTRICAL ENERGY
    - AB 1 - MOLDED CASE CIRCUIT BREAKER
    - ICS2 - INDUSTRIAL CONTROLS AND SYSTEMS: CONTROLLERS, CONTACTORS AND OVERLOAD RELAYS RATED 600VOLTS
    - ICS - GENERAL STANDARDS FOR INDUSTRIAL CONTROL AND SYSTEMS
    - MG-1 - MOTORS AND GENERATORS
    - MG-2 - SAFETY STANDARD FOR CONSTRUCTION & GUIDE FOR SELECTION, INSTALLATION AND USE OF ELECTRIC MOTORS AND GENERATORS
  - c. UL - UNDERWRITERS LABORATORIES, INC. (ALL PARTS APPLY)
    - 44 - RUBBER-INSULATED WIRES AND CABLES
    - 83 - THERMOPLASTIC INSULATED WIRES AND CABLES
    - 508A - INDUSTRIAL CONTROL EQUIPMENT
    - 1063 - MACHINE TOOL WIRE (MTW) FOR STRANDED CONDUCTOR ONLY
  - d. IEC - INTERNATIONAL ELECTRO-TECHNICAL COMMISSION
    - 60255 - ELECTRICAL RELAYS
    - 60044 - INSTRUMENT TRANSFORMER
    - 60071 - INSULATION COORDINATION
    - 60076 - POWER TRANSFORMERS, PARTS 1-5
    - 60060 - HIGH VOLTAGE TEST TECHNIQUE
    - 62271 - HIGH VOLTAGE SWITCHGEAR AND CONTROL GEAR
    - 60502 - POWER CABLES WITH EXTRUDED INSULATION AND THEIR ACCESSORIES FOR RATED VOLTAGES PARTS 1 & 2

- 60694 - COMMON SPECIFICATION FOR HIGH VOLTAGE SWITCHGEAR AND CONTROL GEAR STANDARDS
  - e. NFPA - NATIONAL FIRE PROTECTION ASSOCIATION
    - 272 - STANDARD METHOD OF TEST FOR FIRE AND SMOKE CHARACTERISTICS OF WIRES AND CABLES
  - f. ASTM - AMERICAN SOCIETY FOR TESTING AND MATERIALS
  - g. ISO - INTERNATIONAL STANDARDS ORGANIZATION
    - 9001 - QUALITY SYSTEM MODEL FOR QUALITY ASSURANCE IN DESIGN/DEVELOPMENT, MANUFACTURE AND TESTING
    - 9002 - QUALITY SYSTEM MODEL FOR QUALITY ASSURANCE IN PRODUCTION, INSTALLATION & SERVICING
  - h. PEC - PHILIPPINE ELECTRICAL CODE
3. THE CONTRACTOR'S EQUIPMENT TO BE SUPPLIED SHALL BE SUBJECT TO ALL TESTS AND INSPECTION TO ENSURE THE SATISFACTORY PERFORMANCE OF ALL THE EQUIPMENT. ALL THE TESTS AND INSPECTION SHALL BE DONE WITH NO ADDITIONAL COST TO NPC AND SHALL BE COMPLIANT TO THE REQUIREMENTS OF THIS TENDER:
    - a. EW-10.0 FACTORY ASSEMBLY AND TESTS
  3. NON-COMPLIANCE TO THE REQUIREMENTS STATED IN THIS TENDER SHALL BE GROUNDS FOR DISQUALIFICATION.

		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT MODULAR DIESEL GENERATING SETS INCLUDING PAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALITCOT, BUNDOON QUEZON AND BUTAIBANAN, BULUHA, CAMARINES SUR			
LOCATION: CALITCOT, QUEZON AND BUTAIBANAN, BULUHA, CAMARINES SUR			
<b>TITLE</b>		<b>GENERAL NOTES</b>	
TYPICAL DRAWINGS			
DESIGNED	BY	CHKD	DATE
DRAWN	FLD		
REVIEWED	PRINCIPAL ENGR./ARCHT.		SUBMITTED:
CHECKED/REV			RECOMMENDED: <i>C. Z. C. LUGADO, JR.</i>
ELEC.			APPROVED: <i>H. G. SORIANO, JR.</i>
MECH.			Manager, CCO
DWG. NO. CBBSDPP-BDE-17.008		SPEC. NO. LuzP22Z1457Sc	
REV.		SCALE: N.T.S.	
DATE		BID DRAWING	
NATURE OF REVISION		REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.	SCALE: N.T.S.

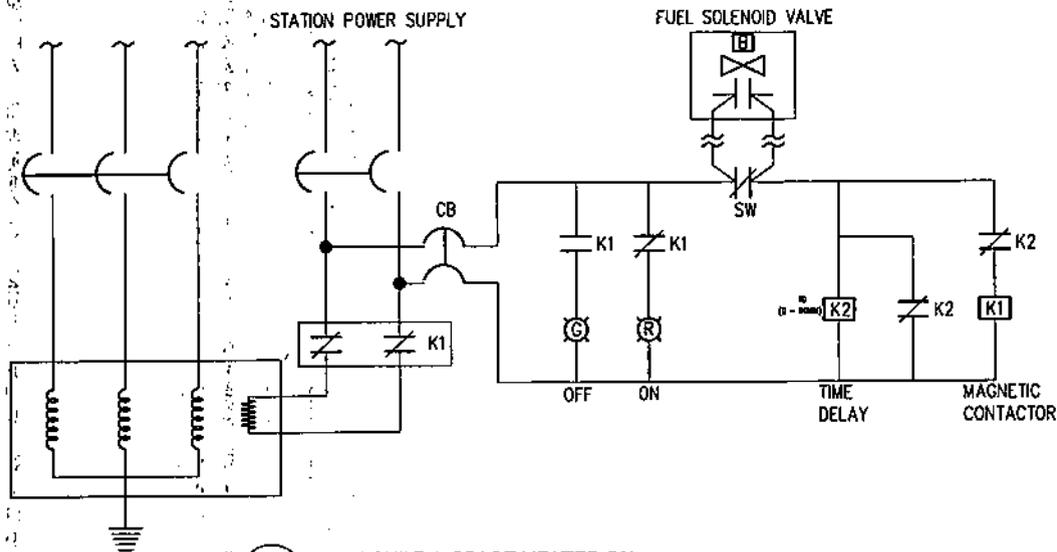


FIGURE 1: SPACE HEATER ON  
SCALE NTS

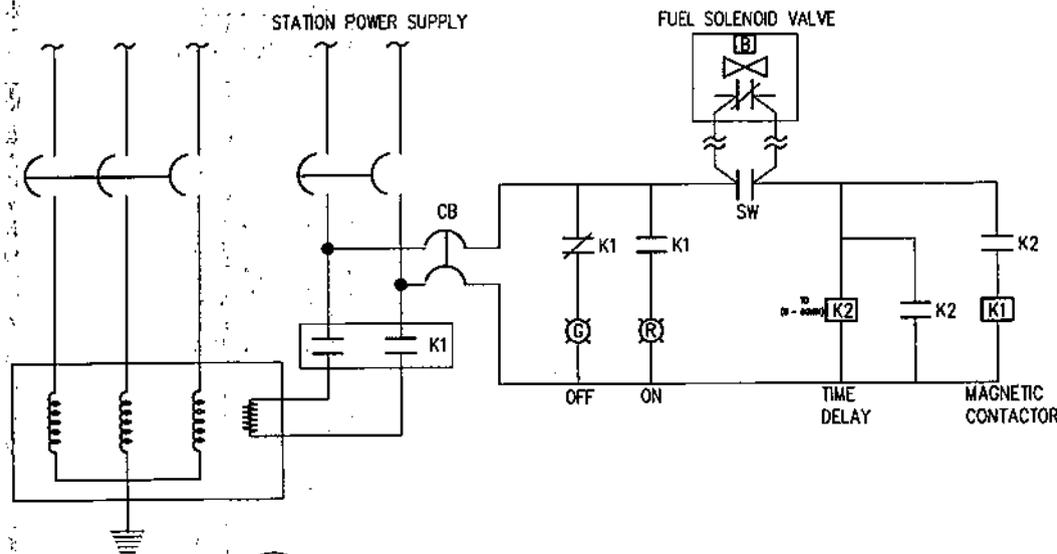


FIGURE 2: SPACE HEATER OFF  
SCALE NTS

NOTES:

1. SPACE HEATER IS IN OPERATION WHEN THE DIESEL-GENERATOR (DG) SET IS NOT IN OPERATION/SHUTDOWN. WHEN THE DG SET SHUTS DOWN OR PUT OUT OF OPERATION, THE FOLLOWING SERIES HAPPEN TO THE SPACE HEATER CIRCUIT (REFER TO FIGURE 1):
  - (1) THE NORMALLY OPEN CONTACT (SW) INTERLOCKED TO OPERATING RELAY (S) OF FUEL SOLENOID VALVE (FSV) WILL CLOSE;
  - (2) ENERGIZE THE TIME DELAY RELAY 'K2'?
  - (3) AND THE NORMALLY OPEN K2 CONTACT WILL CLOSE AUTHORIZING THE CONTACTOR 'K1' AND POWER UP THE SPACE HEATER;
  - (4) AND SWITCH THE GREEN (OFF) INDICATING LIGHT TO RED (ON).

NOTE: WHEN THE GENERATOR IS SHUT DOWN, THE GENERATOR IS STILL HOT. IMMEDIATE OPERATION OF SPACE HEATER IS UNNECESSARY. THE TIME DELAY RELAY SHALL BE SET TO A PREDETERMINED TIME BEFORE SPACE HEATER WILL OPERATE.

2. SPACE HEATER IS NOT IN OPERATION WHEN DIESEL-GENERATOR SET IS IN OPERATION/RUNNING. WHEN THE DG SET IS STARTED OR PUT IN OPERATION, THE FOLLOWING SERIES HAPPEN TO THE SPACE HEATER CIRCUIT (REFER TO FIGURE 2):
  - (1) THE CLOSED CONTACT (SW) INTERLOCKED TO OPERATING RELAY (S) OF FUEL SOLENOID VALVE (FSV) WILL OPEN;
  - (2) DE-ENERGIZING THE TIME DELAY RELAY 'K2'?
  - (3) THE CLOSED K2 CONTACT WILL OPEN AND DE-ENERGIZING THE CONTACTOR 'K1'?
  - (4) DE-ENERGIZE THE SPACE HEATER, AND SWITCH THE RED (ON) INDICATING LIGHT TO GREEN (OFF).

OWNER:				<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUYOT, BURENDE OQUEZON AND BUTAHAMAM, SRIAMA, CAMARINES SUR					
LOCATION: CALUYOT, QUEZON AND BUTAHAMAM, SRIAMA, CAMARINES SUR					
TITLE: <b>SPACE HEATER DETAILS</b>					
TYPICAL DRAWINGS					
DESIGNED	BY	CHKD	DATE	SUBMITTED:	<i>B. MAGUIA</i>
DRAWN	FLD			RECOMMENDED:	<i>Engr. A. BESO</i>
REVIEWED	PRINCIPAL ENGR./ARCHT.			RECOMMENDED:	<i>G. Z. C. LUGO JR.</i>
CIVIL/MECH				APPROVED:	<i>N. G. SACRISTERRA</i>
ELEC.					Manager, DGO
MECH.					
DWG. NO. CBBSDPP-BDE-17.009			SPECS. NO. LUZP22Z1457Sc		
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.
SCALE: N.T.S.			<b>BID DRAWING</b>		REV. 0

SECTION VI

**BID DRAWINGS  
(MECHANICAL WORKS)**



**SECTION VI - BID/ REFERENCE DRAWINGS****MW - MECHANICAL DRAWINGS**

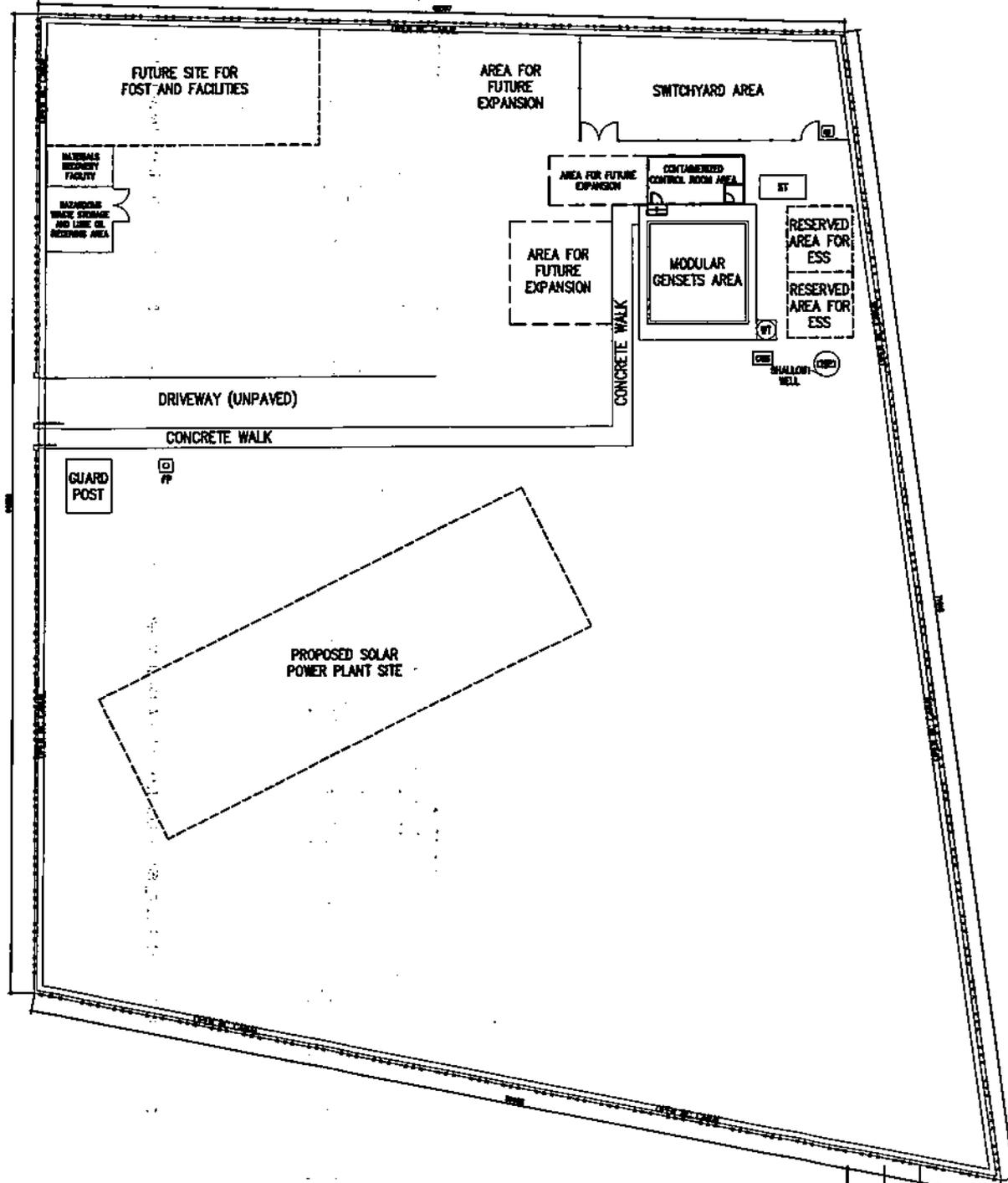
<b>DRAWING NO.</b>	<b>TITLE</b>
CalDPP-BDM-17.001	Plant Layout (2 X 50KW Calutcot DPP)
CalDPP-BDM-17.002	Equipment and Piping Layout (2 X 50KW Calutcot DPP)
ButDPP-BDM-17.001	Plant Layout (2 X 50KW Butawananan DPP)
ButDPP-BDM-17.002	Equipment and Piping Layout (2 X 50KW Butawananan DPP)

**TYPICAL DRAWINGS**

CBBSDPP-BDM-17.001	Typical Fuel Oil Filling System (P&I Diagram)
CBBSDPP -BDM-17.002	1000 Liters Fuel Oil Day Tank (Typical)
CBBSDPP -BDM-17.003	Typical Domestic Water System And Oil-Water Line
CBBSDPP -BDM-17.004	Domestic Water System (P&I Diagram)
CBBSDPP -BDM-17.005	Shallow Well Details
CBBSDPP -BDM-17.005	Generator Set Weatherproof Enclosure (Typical for all Gensets)







**NOTES:**

1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. THE LOCATION SITE OF GENSETS SHALL BE GRADED DEVELOPED BY THE SUPPLIER.
4. EQUIPMENT SUCH AS GENSETS, TRANSFORMERS AND CONTROL PANELS SHALL BE HAULED FROM SPUG-LOO, MINUYAN WAREHOUSE, SAN JOSE DEL MONTE BULACAN TO PLANT SITE. THE CONTRACTOR SHALL HAUL SUCH EQUIPMENT AND STORE TEMPORARILY AT PLANT SITE.
5. BALANCE OF PLANT AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS SHALL BE SUPPLIED, CONSTRUCTED/INSTALLED, TESTED AND COMMISSIONED BY THE CONTRACTOR.
6. WORK THIS DRAWING WITH APPLICABLE CIVIL AND ELECTRICAL DRAWINGS.

LEGEND	
	EQUIPMENT/STRUCTURES
	RESERVED AREA FOR FUTURE EQUIPMENT/STRUCTURES
WT	WATER TANK
FOST	FUEL OIL STORAGE TANK
HP	HAND PUMP
ST	SEPTIC TANK
OWS	OIL-WATER SEPARATOR
ESS	ENERGY STORAGE SYSTEM
FP	FLAG POLE



OWNER:	<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY		
PROJECT:	CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUYOG, DIVISOR QUEZDA AND BUTAWAMAN, SIRURA, CAMARINES SUR		
LOCATION:	BUTAWAMAN, SIRURA, CAMARINES SUR		
TITLE:	<b>PLANT LAYOUT</b> 1 X 50 KW AND 1 X 30 KW BUTAWAMAN DPP		
DESIGNED BY:	CHKD BY:	DATE:	SUBMITTED:
DRAWN BY:	CHKD BY:	DATE:	RECOMMENDED:
REVIEWED BY:	CHKD BY:	DATE:	APPROVED:
CIVIL ARCHT:			
ELEC:			
MECH:			
DWG. NO.	ButDPP-BDM-17.001	SPEC. NO.	LuzP22Z1457Sc
SCALE:	1:275	BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY
			CHKD. RECD. APPL.
			REV. 0

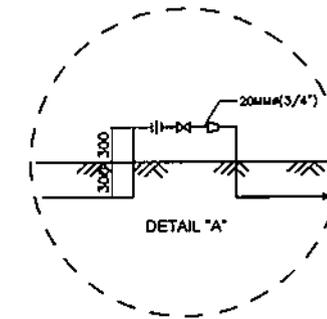
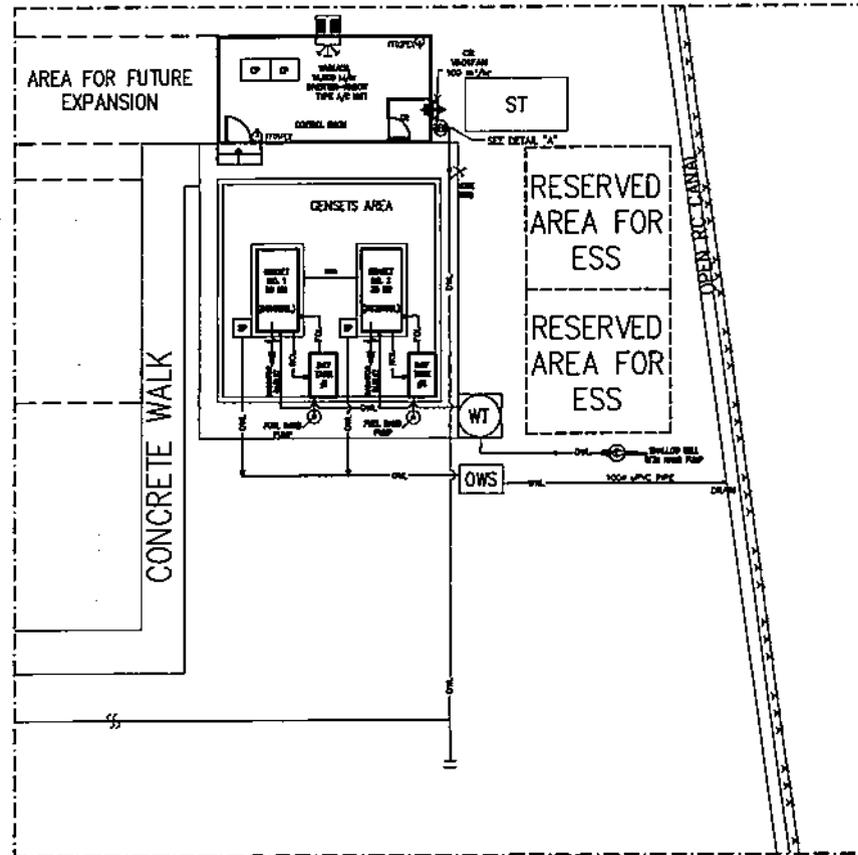
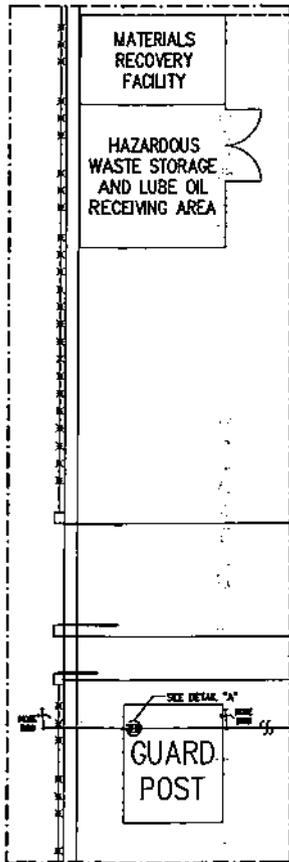
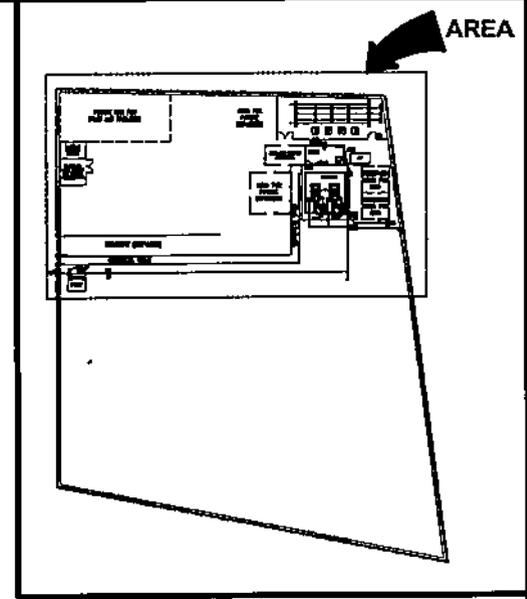
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPL.

LEGEND (1 OF 2)	
	PROPOSED LOCATION EQUIPMENT/FACILITIES
	RESERVED AREA FOR FUTURE EQUIPMENT/STRUCTURES
	WINDOW TYPE AIR CONDITIONING UNIT
	WALL MOUNTED SUPPLY FAN
	FOL FUEL OIL LINE
	DWL DOMESTIC WATER LINE
	OWL OIL-WATER LINE
	WWL WASTE WATER LINE

LEGEND (2 OF 2)	
ROL	RETURN OIL LINE
OWS	OIL-WATER SEPARATOR
DP	DRAIN PIT
ESS	ENERGY STORAGE SYSTEM
WT	WATER TANK
TP	TRANSFORMER PAD
CP	CONTROL PANEL
CB	CATCH BASIN

**NOTES:**

1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. THIS DRAWING SHOWS THE ARRANGEMENT OF EQUIPMENT WHICH INCLUDE GENSETS, DAY TANKS, FUEL OIL AND WATER SUPPLY LINES, WASTE OR DRAIN LINE, TRANSFORMERS, ELECTRICAL POSTS, CONTAINERIZED CONTROL ROOM/ STORAGE ROOM, CONTAINERIZED BUNKHOUSE AND BALANCE OF PLANT AND ASSOCIATED CIVIL APPURTENANCES/STRUCTURES.
4. THE CONTRACTOR'S SCOPE OF WORK SHALL INCLUDE ASSISTANCE DURING THE TEST AND COMMISSIONING OF THE DIESEL GENERATING SETS SUPPLIED BY NPC.
5. ALL THE MECHANICAL WORKS SYSTEMS WITH ITS ASSOCIATED ELECTRICAL EQUIPMENT AND OTHER ACCESSORIES SUPPLIED SHALL BE INSTALLED, TESTED, AND COMMISSIONED BY THE CONTRACTOR.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AT SITE THE MEASUREMENTS/INFORMATION OR DATA SHOWN ON THIS DRAWING INCLUDING AFFECTED CIVIL STRUCTURES/FACILITIES. THE EQUIPMENT SHALL BE ADJUSTED TO SUIT ACTUAL SITE CONDITIONS. FINAL ARRANGEMENT OF EQUIPMENT MAY BE RE-ARRANGED BY THE CONTRACTOR SUBJECT TO RENEW/APPROVAL OF NPC DURING PROJECT IMPLEMENTATION. THE CONTRACTOR SHALL SUBMIT DESIGN CALCULATIONS AND FOUNDATION DETAILS FOR ALL EQUIPMENT AND CIVIL STRUCTURES TO BE SUPPLIED/CONSTRUCTED UNDER THIS SCOPE FOR APPROVAL OF NPC.
7. MINIMUM DEPTH OF EMBEDDED PIPE SHALL BE NOT LESS THAN 300 MM IN OPEN GROUNDS AND 400 MM UNDER ROADWAYS. FOR PIPE THAT CROSSES ROADWAY, PIPE SLEEVES OF STEEL MATERIALS OR RSC SHALL BE PROVIDED.
8. EMBEDDED FUEL OIL PIPE SHALL BE PAINTED/APPLIED WITH TAPE WRAPPING IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION.
9. WORK THIS DRAWING WITH APPLICABLE CIVIL AND ELECTRICAL DRAWINGS.
10. ALL OTHER WORKS, MATERIALS AND SERVICES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN THE TECHNICAL SPECIFICATION.

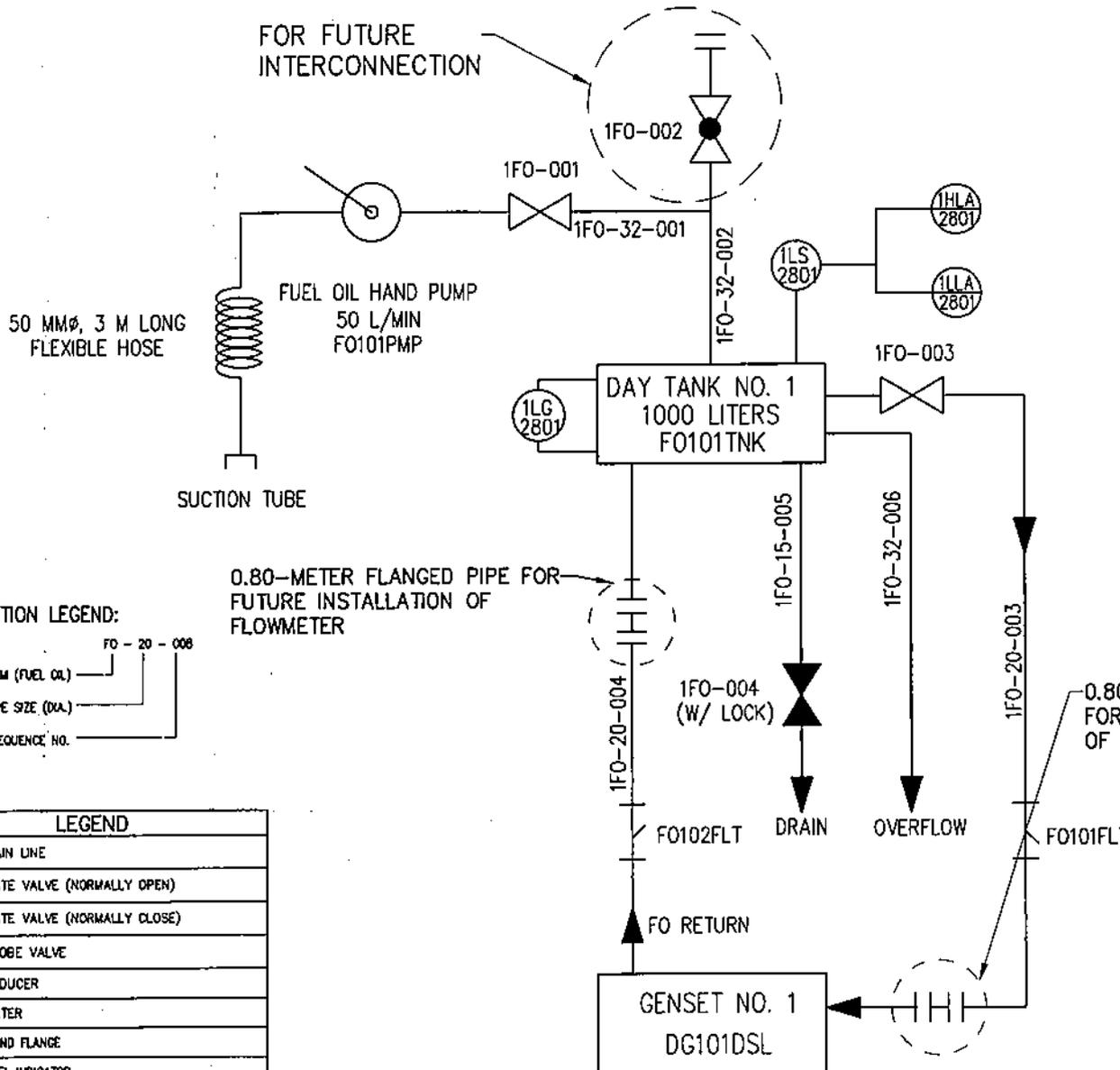


OWNER		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTOG, SURIGAO QUEZON AND BUTAWAHAN, SIBUNA, CAMARINES SUR.			
LOCATION: BUTAWAHAN, SIBUNA, CAMARINES SUR			
TITLE		<b>EQUIPMENT AND PIPING LAYOUT</b> 1 X 50 KW AND 1 X 30 KW BUTAWAHAN DPP	
DESIGNED	BY: JPC	CHKD: R. M. CANSAWAN	DATE: 17 JUNE 2022
DRAWN	BY: JPC	RECOMMENDED: J. A. ...	DATE: 17 JUNE 2022
REVIEWED	PRINCIPAL ENGR. FARGENT	APPROVED: N. C. ...	DATE: ...
CHECKED BY			
ELEC.			
MECH.			
DWG. NO. ButDPP-BDM-17.002		SPECS. NO. LuzP22Z1457Sc	
SCALE: 1:150		BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY

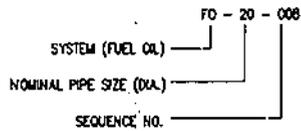
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ELEVATION OF DAY TANK SHALL NOT BE LESS THAN THOSE INDICATED ON RELEVANT CIVIL DRAWINGS, BUT MAY BE ADJUSTED/INCREASED TO CONFORM WITH THE ENGINE REQUIREMENTS PER MANUFACTURER'S RECOMMENDATION.
3. FUEL OIL PIPES SHALL CONFORM TO ASTM A 53 GRADE B, SEAMLESS AND SCHEDULE 40. SIZE OF FUEL PIPES TO/FROM THE ENGINE MAY BE REVISED TO CONFORM WITH THE ENGINE MANUFACTURER REQUIREMENTS SUBJECT TO NPC APPROVAL.
4. VALVES 65 MMØ AND ABOVE SHALL BE CAST IRON, FLANGED ENDS, OSY OR RISING STEM, CLASS 150. VALVES 50 MMØ AND BELOW SHALL BE CAST BRONZE, FLANGED OR SCREWED ENDS, RISING STEM, CLASS 150.
5. FUEL OIL PIPES WHICH ARE BURIED UNDERGROUND SHALL BE APPLIED WITH 1MM MINIMUM THICKNESS OF TAPE WRAPPING APPLIED SPIRALLY WITH OVERLAP OF 50% OR APPROVED EQUIVALENT. FOR PIPES THAT CROSSES ROADWAYS, PIPE SLEEVE OF GALVANIZED STEEL MATERIAL OR RSC SHALL BE PROVIDED.
6. LEVEL SWITCH FOR HIGH AND LOW LEVEL ALARM SHALL BE PROVIDED AND TO BE MONITORED AT THE GENERATOR CONTROL & PROTECTION PANEL LOCATED AT THE CONTROL ROOM.
7. FINAL DETAILS AND ADJUSTMENTS SHALL BE DONE IN THE FIELD BY THE CONTRACTOR DURING INSTALLATION.
8. HAND PUMP SHALL HAVE CAPACITY OF NOT LESS THAN 50 LITERS PER MINUTE @ 10M DISCHARGE HEAD, DOUBLE ACTING ROTARY TYPE, HEAVY DUTY CAST IRON CONSTRUCTION WITH BRASS INTERNALS WITH EASY CLEAN WIRE SCREEN, EASY DISPENSING THROUGH SYNTHETIC RUBBER HOSE, WITH TELESCOPIC SUCTION TUBE, ADJUSTED TO FIT 50MM DIAMETER TO 210 LITERS DRUM. THE SUPPLY SHALL INCLUDE RUBBER HOSE NOT LESS THAN 50MM DIAMETER AND 3 METERS LONG, REINFORCED WITH SPIRAL-PLUED SYNTHETIC FABRIC WITH WIRE HELIX COMPLETE CONNECTION ACCESSORIES AT BOTH ENDS.
9. DIESEL GENSETS WITH CONTROL PANELS, AND TRANSFORMERS SHALL BE HAULED FROM NPC MINUYAN WAREHOUSE AND DELIVERED AT RESPECTIVE PLANT SITES BY THE CONTRACTOR. ALL OTHER EQUIPMENT, VALVES, PIPING & OTHER INSTRUMENTS SHALL BE SUPPLIED, INSTALLED AND TESTED BY THE CONTRACTOR.
10. THE DIAGRAM SHOWN IS TYPICAL FOR EACH UNIT. THE TAG NO. SHOWN ARE FOR UNIT NO. 1. TAG NUMBERS OR SPIN FOR UNIT 2 SHALL BE THE SAME AS UNIT 1 EXCEPT FOR UNIT NUMBER. EX. DG101DSL, DG201DSL, 1FO-001, 2FO001.



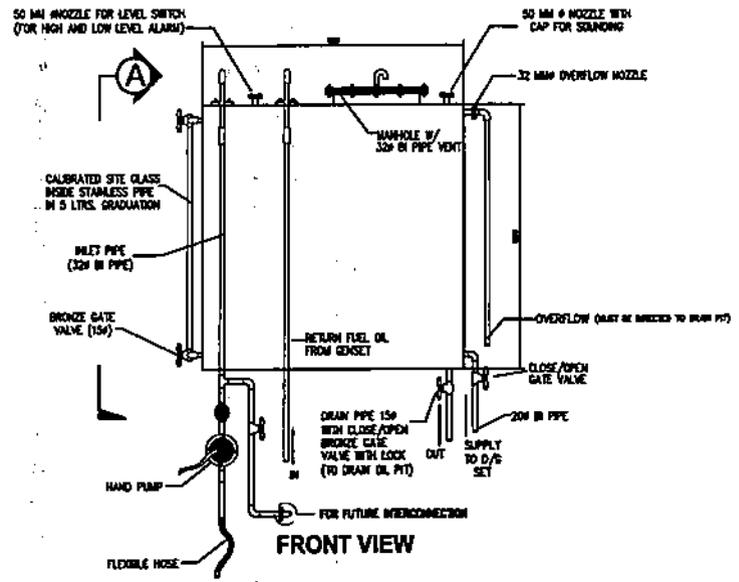
**PIPE DESIGNATION LEGEND:**



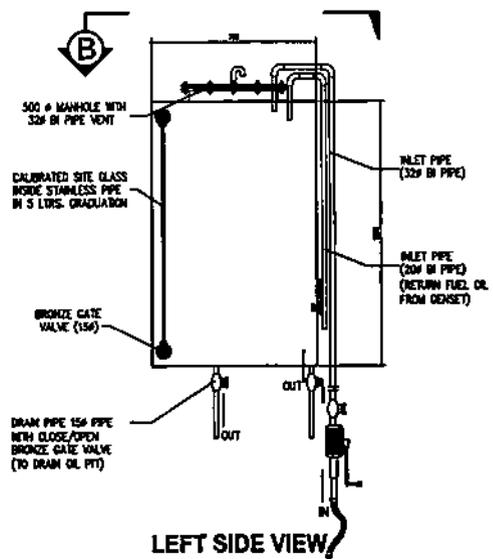
LEGEND	
—	MAIN LINE
⊗	GATE VALVE (NORMALLY OPEN)
⊗	GATE VALVE (NORMALLY CLOSE)
⊗	GLOBE VALVE
▷	REDUCER
⊥	FILTER
⊥	BUND FLANGE
FI	FUEL INDICATOR
LS	LEVEL SWITCH
FM	FLOW METER
LG	LEVEL GAUGE
HLA	HIGH LEVEL ALARM
LLA	LOW LEVEL ALARM

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OR BALANCE OF PLANT IN CALITCOT, BUSINESS QUICZON AND BUTAWAHAN, SIRUMA, CAMARINES SUR.			
LOCATION: CALITCOT, QUEZON AND BUTAWAHAN SIRUMA, CAMARINES SUR			
TITLE: <b>TYPICAL FUEL OIL FILLING SYSTEM P AND I DIAGRAM</b>			
DESIGNED	BY: JVP/P	CHKD: [ ]	DATE: 17 JUNE 2022
DRAWN	BY: JVP/P	CHKD: [ ]	DATE: 17 JUNE 2022
REVIEWED	PRINCIPAL ENGR. / ARCHT.		RECOMMENDED: J.A. TAYAL JR.
CIVIL/ARCHT	[ ]		APPROVED: R.G. SORIANO
ELEC.	[ ]		[ ]
MECH.	[ ]		[ ]
DWG. NO. CBBSDPP-BDM-17.001		SPECS. NO. L12P22Z1457Sc	
SCALE: NTS	BID DRAWING		REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPD.

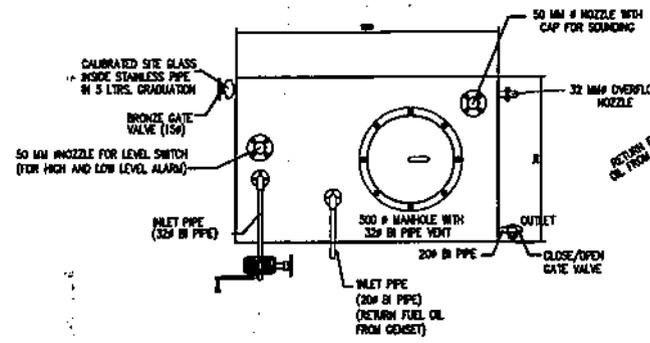


FRONT VIEW

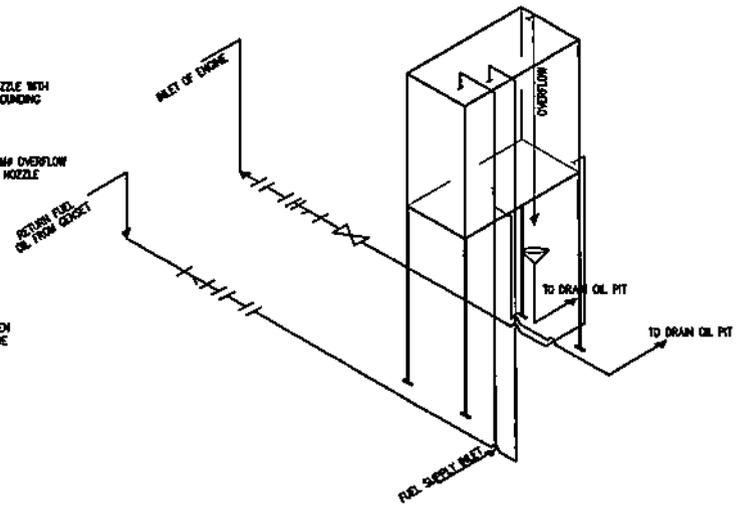


LEFT SIDE VIEW

FUEL OIL STORAGE DAY TANK



TOP VIEW



TYPICAL ISOMETRIC LAYOUT

- NOTES:
1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY;
  2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED;
  3. ELEVATION OF DAY TANK SHALL NOT BE LESS THAN THOSE INDICATED ON RELEVANT CIVIL DRAWINGS, BUT MAY BE ADJUSTED/INCREASED TO CONFORM WITH THE ENGINE REQUIREMENTS PER MANUFACTURER'S RECOMMENDATION;
  4. THE TANK SHALL BE SHOP-FABRICATED, RECTANGULAR MADE OF ASTM A 36 OR APPROVED EQUAL WITH MINIMUM THICKNESS OF 5 MM, WITH INTERIOR AND EXTERIOR COATING TO CONFORM WITH THE TECHNICAL SPECIFICATIONS CLAUSE GW-12.3;
  5. EACH DIESEL GENERATING SET SHALL BE PROVIDED WITH FUEL DAY TANK; AND
  6. LEVEL SWITCH FOR HIGH AND LOW LEVEL ALARM SHALL BE PROVIDED AND TO BE MONITORED AT THE GENERATOR CONTROL & PROTECTION PANEL LOCATED AT THE CONTROL ROOM.
  7. OVERFLOW PIPE (32#) SHALL BE ATLEAST 300MM ABOVE GROUND.

LEGEND	
—	MAIN LINE
⊗	GATE VALVE (NORMALLY OPEN)
	STRAINER

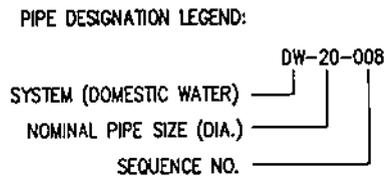
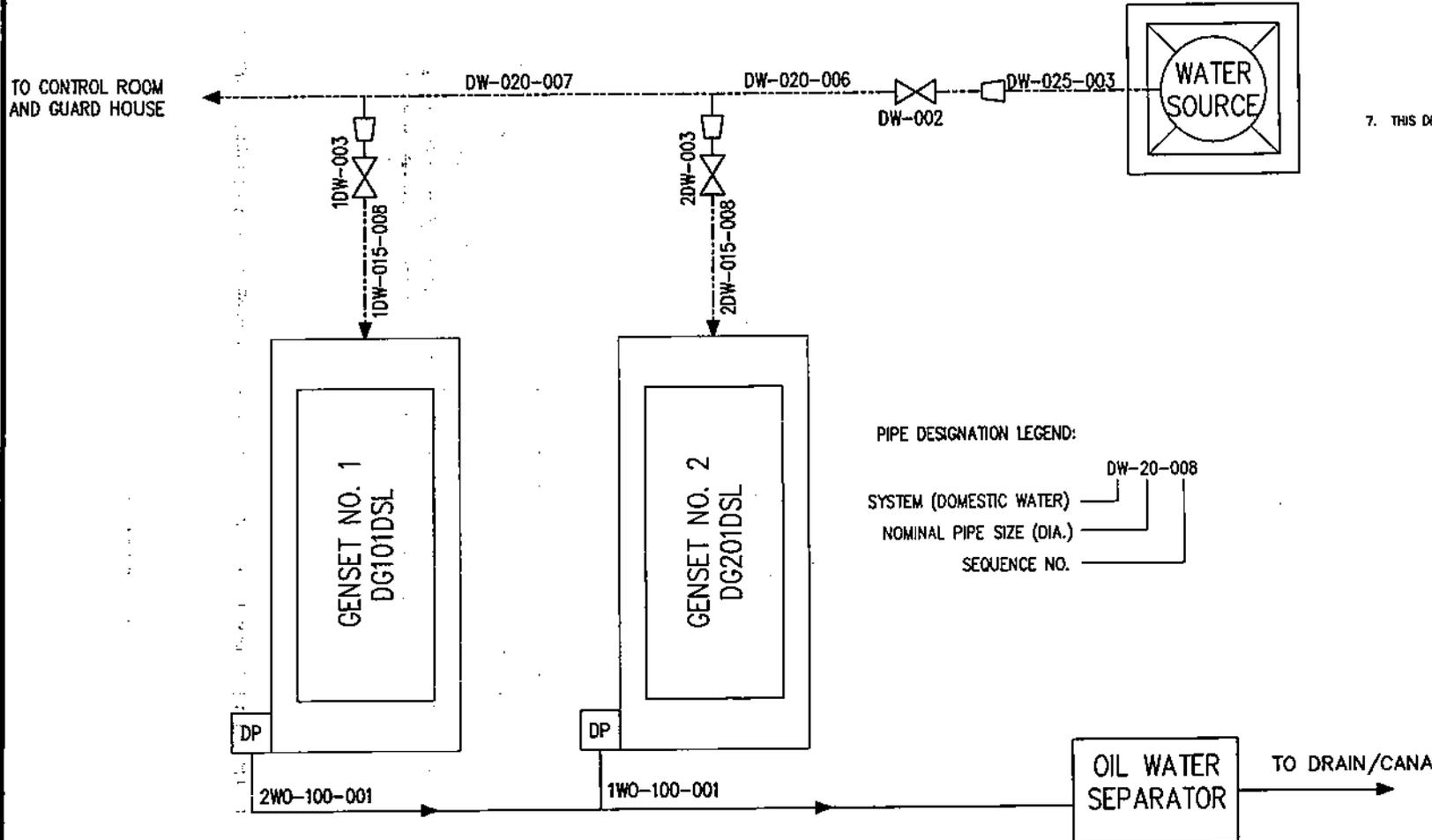
OWNER:	 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY		
PROJECT:	CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT MODULAR DIESEL GENERATING SETS INCLUDING MAINTENANCE, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUYOG, BURGOS QUEZON AND BUTAMAKAN, SOROGA, CAMARINES SUR.		
LOCATION:	CALUYOG, QUEZON AND BUTAMAKAN SOROGA, CAMARINES SUR		
TITLE:	<b>1,000 LITERS FUEL OIL DAY TANK (TYPICAL)</b>		
DESIGNED:	BY: J.P.P.	CHKD: J.P.P.	DATE: 06 JUNE 2023
DRAWN:	BY: J.P.P.	CHKD: J.P.P.	DATE: 07 JUNE 2023
REVIEWED:	PRINCIPAL ENGR. / ARCHT.		RECOMMENDED: J. S. TAPAY JR.
CALUYOG/IT:			APPROVED: N. G. SOROGERRA
ELEC.:			Manager, DSO
MECH.:			
DWG. NO. CBBSDPP-BDM-17.002 (SPEC. NO. LUZP22Z1457Sc)			
SCALE: NTS	BID DRAWING		REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPL.

LEGEND	
---	DOMESTIC WATER LINE
---	OIL-WATER LINE
⊗	GATE VALVE (NORMALLY OPEN)
▷	REDUCER
— —	FLANGED INTERCONNECTOR
DP	DRAIN FIT

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THIS DRAWING IS TYPICAL FOR TWO (2) SITES.
3. ALL PIPING, PIPE FITTINGS AND SUPPORTS, VALVES AND OTHER ACCESSORIES REQUIRED SHALL BE SUPPLIED, INSTALLED AND TESTED BY THE CONTRACTOR INCLUDING THE REQUIRED EXCAVATION AND BACKFILLING WORKS.
4. DOMESTIC WATER/ OIL-WATER PIPING AND FITTINGS SHALL BE MADE OF UNPLASTICIZED POLYVINYL CHLORIDE (UPVC) SCHEDULE 80 OR CLASS 150 CONFORMING TO ASTM D-1784 OR APPROVED EQUIVALENT (EXCEPT OTHERWISE SHOWN OR AS SPECIFIED).
5. WATER SYSTEM PIPE SHALL GENERALLY BE INSTALLED UNDERGROUND NO LESS THAN 300MM DEPTH.
6. ALL UPVC/PE PIPE DIMENSIONS SHOWN ARE IN NOMINAL DIAMETER (MM) WITH THE FOLLOWING EQUIVALENTS:  
 100MM (4") = 110 OUTSIDE DIAMETER (O.D.)  
 80MM (3") = 90MM OUTSIDE DIAMETER (O.D.)  
 40MM (1 1/2") = 50MM O.D.  
 32MM (1 1/4") = 40MM O.D.  
 25MM (1") = 32MM O.D.  
 20MM (3/4") = 25MM O.D.  
 15MM (1/2") = 20MM O.D.
7. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.

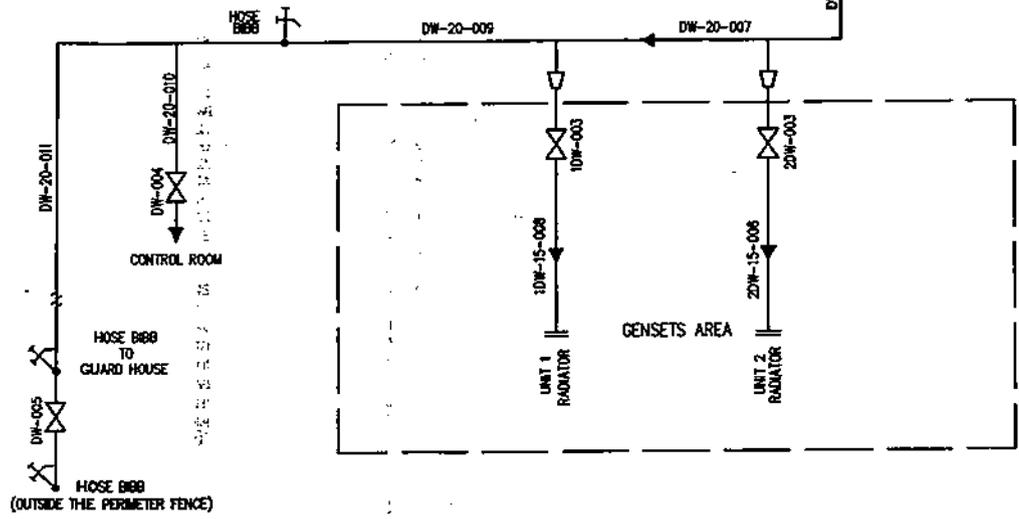
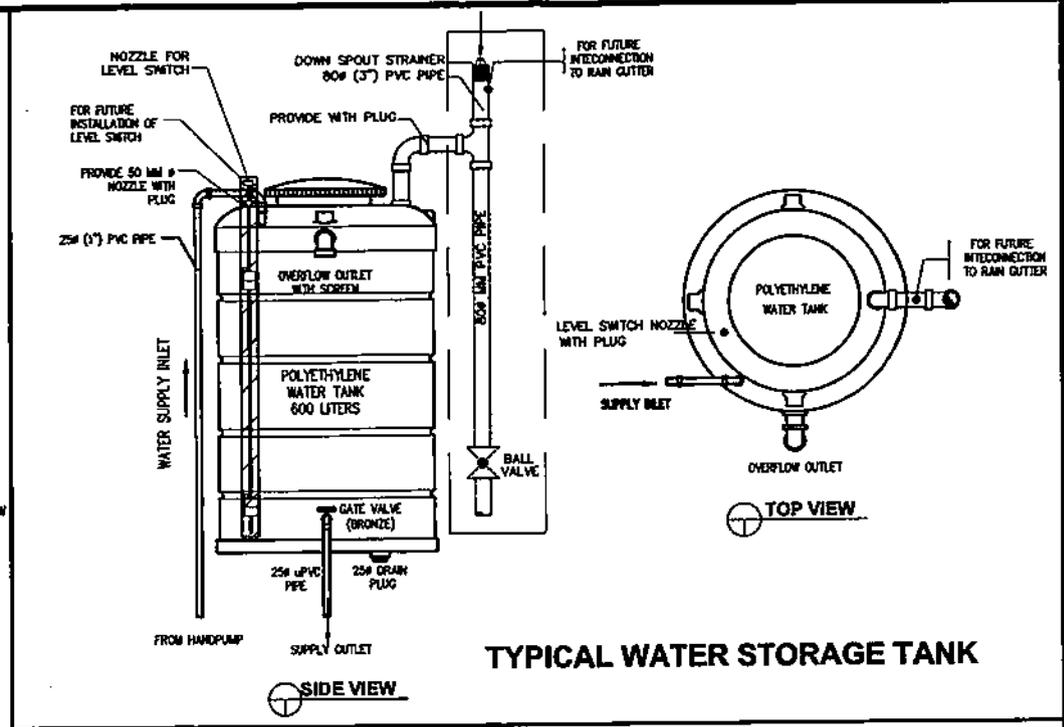
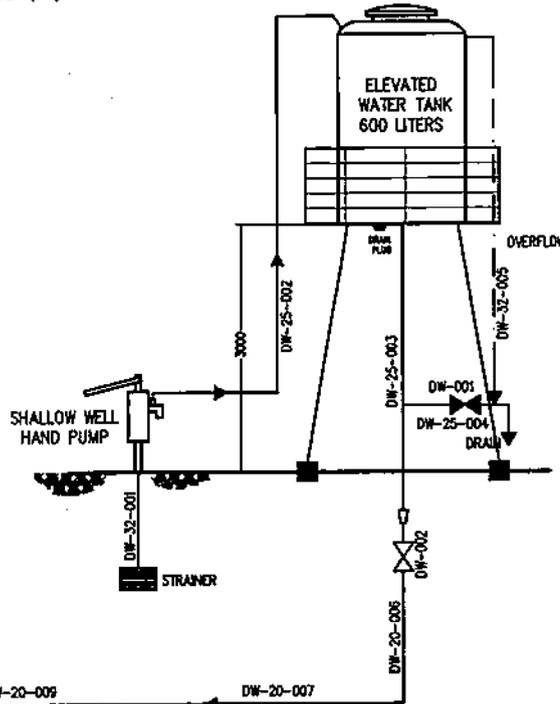


OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNIT WOODLARK DESIGN GENERATING SETS INCLUDING HAULING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALUTCOT, BURGOS QUEZON AND BUTAMAMAN BRUMA, CAMARINES SUR			
LOCATION: CALUTCOT, QUEZON AND BUTAMAMAN BRUMA, CAMARINES SUR			
TITLE: <b>GENSET WATER SYSTEM AND OIL-WATER LINE</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	PRINCIPAL ENGR./ARCHT.		RECOMMENDED
CIVIL/ARCHT			
ELEC.			APPROVED
MECH.			
DWG. NO. <b>CBBSDPP-BDM-17.003</b>		SPEC. NO. <b>LuzP22Z1457Sc</b>	
SCALE: NTS		<b>BID DRAWING</b>	
REV. DATE		NATURE OF REVISION	
BY	CHKD	REC'D	APP'D
		REV. 0	

**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. THIS DRAWING IS TYPICAL FOR TWO (2) SITES.
3. ALL PIPING, PIPE FITTINGS AND SUPPORTS, VALVES AND OTHER ACCESSORIES REQUIRED SHALL BE SUPPLIED, INSTALLED AND TESTED BY THE CONTRATOR INCLUDING THE REQUIRED EXCAVATION AND BACKFILLING WORKS.
4. DOMESTIC WATER PIPING AND FITTINGS SHALL BE MADE OF UNPLASTICIZED POLYVINYL CHLORIDE (UPVC) SCHEDULE 80 OR CLASS 150 CONFORMING TO ASTM D-1784 OR APPROVED EQUIVALENT (EXCEPT OTHERWISE SHOWN).
5. WATER SYSTEM PIPE SHALL GENERALLY BE INSTALLED UNDERGROUND NO LESS THAN 300MM DEPTH.
6. ALL UPVC/PE PIPE DIMENSIONS SHOWN ARE IN NOMINAL DIAMETER (MM) WITH THE FOLLOWING EQUIVALENTS:  
 80MM (3") = 90MM OUTSIDE DIAMETER (O.D.)  
 40MM (1 1/2") = 50MM OUTSIDE DIAMETER (O.D.)  
 32MM (1 1/4") = 40MM O.D.  
 25MM (1") = 32MM O.D.  
 20MM (3/4") = 25MM O.D.  
 15MM (1/2") = 20MM O.D.
7. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.

LEGEND	
—	MAIN DOMESTIC PIPELINE
⊗	GATE VALVE (NORMALLY OPEN)
⊘	GATE VALVE (NORMALLY CLOSE)
⊙	BALL VALVE
∇	CHECK VALVE
▷	REDUCER
⊥	HOSE BIBB
—	BLIND FLANGE



PIPE DESIGNATION LEGEND:  
 SYSTEM (DOMESTIC WATER) — DW-20-008  
 NOMINAL PIPE SIZE (OIA.) —  
 SEQUENCE NO. —

OWNER:	<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY		
PROJECT:	CONSTRUCTION OF POWER FACILITIES FOR THE FOUR (4) UNITS MODULAR DIESEL GENERATING SETS INCLUDING BUILDING, INSTALLATION, TEST AND COMMISSIONING OF BALANCE OF PLANT IN CALITCOT, BURGOS QUEZON AND BUTAKANAN SARANA, CAMARINES SUR.		
LOCATION:	CALITCOT, QUEZON AND BUTAKANAN SARANA, CAMARINES SUR.		
TITLE:	<b>DOMESTIC WATER SYSTEM (TYPICAL)</b> P AND I DIAGRAM		
DESIGNED:	BY: JPC	CHKD: JPC	DATE: 17 JUNE 2022
DRAWN:	BY: JPC	CHKD: JPC	DATE: 17 JUNE 2022
REVIEWED:	PRINCIPAL ENGR. / ARCHT.		RECOMMENDED: J.A. TRINIDAD, JR.
CIVIL/ARCHT:			APPROVED: N.G. SERRERA
ELEC:			
MECH:			
DWG. NO. CBBSDPP-BDM-17.004    SPECS. NO. LuzP22Z1457Sc			

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.	SCALE	BID DRAWING	REV.
							NTS		0

