REPUBLIC OF THE PHILIPPINES

NATIONAL POWER CORPORATION

(Pambansang Korporasyon sa Elektrisidad)

BID DOCUMENTS

Name of Project: TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

Project Location: BUSUANGA, PALAWAN
RIZAL, PALAWAN

Specification No. : LuzP19Z1082Sx | HO-P1G22-007 (PB2)

Contents :

Design and Development Department

SECTION I

INVITATION TO BID

National Power Corporation
INVITATION TO BID
PUBLIC BIDDING – BCS 2022-0235

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

PR Nos./PB Ref No. & Description	Similar Contracts	Pre-bid Conference	Bid Submission / Opening	ABC/ Amt. of Bid Docs
HO-PIG22-007 / PB220407-NA00106 (PB2) Transfer of 2 x 500kW MAN Diesel Generating Sets and Auxiliaries Including Associated Electrical Equipment from Busuanga DPP to Rizal DPP, Palawan • PCAB License: License Category of at least **"Category D – Electrical Works"** and registration classification of at least **"Small B – Electrical Works"**	Construction / transfer of power facilities of Diesel Generating Sets or erection, installation, test and commissioning of Diesel Power Plant	06 May 2022 9:30 A.M	19 May 2022 9:30 A.M	₱ 14,790,350.00 / ₱ 25,000.00
S4-PIC21-065 / PB220215-NA (PB2) Supply, Delivery, Installation, Test and Commissioning of 2 x 50 kW Modular Diesel Gensets, Associated Electrical Equipment & Balance of Plant for the Electrification of 3 Barangays at Sibanag Island, Basilisa, Province of Dinagat Island under the Off-Grid Electrification Project	Supply, Delivery, Installation, Test and Commissioning or Construction of Power Facilities, Installation, Test and Commissioning of Diesel Generating Set/s with at least one-unit capacity of 50 kW Prime or Continuous Power with power transformer/s of at least 75 kVA rating	06 May 2022 9:30 A.M	19 May 2022 9:30 A.M	₱ 19,243,256.00 / ₱ 25,000.00

S1-MRO22-005 / PB211222-JD00485 Supply and Delivery of Circuit Breaker & 7 Others for 163kW Perkins Diesel Generating Sets of Plants under Mindoro/Romblon Operations Division	Supply and Delivery of Diesel Generating Sets or Mechanical and/or Electrical Parts / Components / Equipment for Diesel Generating Sets	06 May 2022 9:30 A.M	19 May 2022 9:30 A.M	₱ 1,916,600.00 / ₱ 5,000.00
Venue: Kañao Function Room, NPC Bldg. Diliman, Quezon City				

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

PR No/s. / PB Ref No/s.	Delivery Period / Contract Duration	Relevant Period of SLCC reckoned from the date of submission & receipt of bids
HO-PIG22-007	Two Hundred Forty (240) Calendar Days	-
S4-PIC21-065	Two Hundred Forty (240) Calendar Days	Fifteen (15) Years
S1-MRO22-005	Sixty (60) Calendar Days	Ten (10) Years

3. Bidding will be conducted through open competitive bidding procedures using a non-discretionary "*pass/fail*" criterion as specified in the 2016 revised Implementing Rules and Regulations (IRR) of Republic Act (RA) No. 9184.

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

4. Prospective Bidders may obtain further information from National Power Corporation, Bids and Contracts Services Division and inspect the Bidding Documents at the address given below during office hours (8:00AM to 5:00PM), Monday to Friday.

5. A complete set of Bidding Documents may be acquired by interested Bidders from the given address and website(s) and upon payment of the applicable fee for the Bidding Documents, pursuant to the latest Guidelines issued by the GPPB. *Bidding fee may be refunded in accordance with the guidelines based on the grounds provided under Section 41 of R.A. 9184 and its Revised IRR.*

6. The National Power Corporation will hold Pre-Bid Conference **(see table above)** and/or through video conferencing or webcasting which shall be open to prospective bidders.

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

   a. Only a maximum of two (2) representatives from each bidder / company shall be allowed to participate during the virtual pre-bid conference.

b. A "No Face mask / No Entry" policy shall be implemented in the NPC premises. Face mask shall be 3-ply surgical or KN95 mask type.
c. The requirements herein stated including the medium of submission shall be subject to GPPB Resolution No. 09-2020 dated 07 May 2020
d. The Guidelines on the Implementation of Early Procurement Activities (EPA) shall be subject to GPPB Circular No. 06-2019 dated 17 July 2019

7. Bids must be duly received by the BAC Secretariat through (i) manual submission at the office address indicated below; (ii) online or electronic submission before the specified time stated in the table above for opening of bids. Late bids shall not be accepted.

8. All Bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in **ITB** Clause 14.

9. Bid opening shall be on Kañao Function Room, NPC Head Office, Diliman, Quezon City and/or via online platform to be announced by NPC. Bids will be opened in the presence of the bidders' representatives who choose to attend the activity.

10. The National Power Corporation reserves the right to reject any and all bids, declare a failure of bidding, or not award the contract at any time prior to contract award in accordance with Sections 35.6 and 41 of the 2016 revised IRR of R.A. No. 9184, without thereby incurring any liability to the affected bidder or bidders.

11. For further information, please refer to:

Bids and Contracts Services Division,
Logistics Department

BIR Road cor. Quezon Avenue
Diliman, Quezon City
Tel Nos.: 8924-5211 and 8921-3541 local 5611
Fax No.: 8922-1622
Email: bcsd@napocor.gov.ph / bcsd_napocor@yahoo.com

12. You may visit the following websites:

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

ATTY. ROGEL T. TEVES
Vice President, Power Engineering Services and
Chairman, Bids and Awards Committee

SECTION II

INSTRUCTION TO BIDDERS

SECTION II - INSTRUCTIONS TO BIDDERS

1. Scope of Bid

NPC invites Bids for the **TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP**, with Project Identification Number **LuzP19Z1082Sx.**

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

2. Funding Information

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

3. Bidding Requirements

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

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

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

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

The Procuring Entity, as well as the Bidders and Contractors, shall observe the highest standard of ethics during the procurement and execution of the contract. They or through an agent shall not engage in corrupt, fraudulent, collusive, coercive, and obstructive practices defined under Annex "I" of the 2016 revised IRR of RA No. 9184 or other integrity violations in competing for the Project.

5. Eligible Bidders

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

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

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

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

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

6. Origin of Associated Goods

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

7. Subcontracts

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

7.1. The Bidder must submit together with its Bid the documentary requirements of the subcontractor(s) complying with the eligibility criterial stated in **ITB** Clause 5 in accordance with Section 23.4 of the 2016 revised IRR of RA No. 9184 pursuant to Section 23.1 thereof.

7.2. Subcontracting of any portion of the Project does not relieve the Contractor of any liability or obligation under the Contract. The Supplier will be responsible for the acts, defaults, and negligence of any subcontractor, its agents, servants, or workmen as fully as if these were the Contractor's own acts, defaults, or negligence, or those of its agents, servants, or workmen.

8. Pre-Bid Conference

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

9. Clarification and Amendment of Bidding Documents

Prospective bidders may request for clarification on and/or interpretation of any part of the Bidding Documents. Such requests must be in writing and received by the Procuring Entity, either at its given address or through electronic mail indicated in the **IB**, at least ten (10) calendar days before the deadline set for the submission and receipt of Bids.

10. Documents Comprising the Bid: Eligibility and Technical Components

10.1. The first envelope shall contain the eligibility and technical documents of the Bid as specified in **Form NPCSF-INFR-01 - Checklist of Technical and Financial Documents, Section VIII - Bidding Forms.**

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

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

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

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

11. Documents Comprising the Bid: Financial Component

11.1. The second bid envelope shall contain the financial documents for the Bid as specified in **Form NPCSF-INFR-01 - Checklist of Technical and Financial Documents, Section VIII - Bidding Forms.**

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

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

12. Alternative Bids

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

SECTION II - INSTRUCTIONS TO BIDDERS

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13. Bid Prices

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

14. Bid and Payment Currencies

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

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

15. Bid Security

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

15.2. The Bid and bid security shall be valid until **One Hundred Twenty (120) calendar days** from the date of opening of bids. Any bid not accompanied by an acceptable bid security shall be rejected by the Procuring Entity as non-responsive.

16. Sealing and Marking of Bids

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

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

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

17. Deadline for Submission of Bids

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

18. Opening and Preliminary Examination of Bids

18.1. The BAC shall open the Bids in public at the time, on the date, and at the place specified in paragraph 9 of the **IB**. The Bidders' representatives who are present shall sign a register evidencing their attendance. In case

videoconferencing, webcasting or other similar technologies will be used, attendance of participants shall likewise be recorded by the BAC Secretariat.

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

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

19. Detailed Evaluation and Comparison of Bids

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

19.2. If the Project allows partial bids, all Bids and combinations of Bids as indicated in the **BDS** shall be received by the same deadline and opened and evaluated simultaneously so as to determine the Bid or combination of Bids offering the lowest calculated cost to the Procuring Entity. Bid Security as required by **ITB** Clause 15 shall be submitted for each contract (lot) separately.

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

20. Post Qualification

Within a non-extendible period of five (5) calendar days from receipt by the Bidder of the notice from the BAC that it submitted the Lowest Calculated Bid, the Bidder shall submit its latest income and business tax returns filed and paid through the BIR Electronic Filing and Payment System (eFPS), and other appropriate licenses and permits required by law and stated in the **BDS**.

21. Signing of the Contract

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

SECTION III

BID DATA SHEET

SECTION III - BID DATA SHEET

ITB Clause	
5.2	For this purpose, contracts similar to the Project refer to contracts which have the same major categories of work, which shall refer to projects involving construction/transfer of power facilities of Diesel Generating Sets or erection, installation, test and commissioning of Diesel Power Plant 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.
7.1	Only a maximum of fifty percent (50%) of the Works may be subcontracted. All Subcontractors must be approved by NPC.
10.1	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.
	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.
10.3	The required License issued by the Philippine Contractors Accreditation Board (PCAB): License Category of at least **"CATEGORY D – GENERAL BUILDING"** and registration classification of at least **"SMALL B – BUILDING AND INDUSTRIAL PLANT"** ***OR*** at least **"SMALL B – MECHANICAL WORK"**

10.4	The list of key personnel shall include the following minimum requirements: **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 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.
10.5	The list of construction equipment (owned or leased) shall include the following minimum requirements: a. Concrete Mixer (1 bagger) - 1 unit b. Concrete Vibrator - 1 unit c. Welding Machine (300amp) - 1 unit d. Oxy-acetylene cutting outfit - 1 unit e. Boom Truck with Crane - 1 unit f. Jackhammer - 1 unit
10.6	Bidders shall also submit the following requirements in their first envelope, Eligibility and Technical Component of their bid: 1. Duly signed and completely filled up Technical Data Sheets for Mechanical Works (Section VI – Part II MW) 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. 2. Certificate of Site Inspection duly signed by authorized NPC official, Annex 1 of Section VI – General Works (GW) 3. Complete eligibility documents of the proposed sub-contractor, if any
10.7	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.
12	No further instructions
15.1	The bid security shall be in the form of a Bid Securing Declaration or any of the following forms and amounts: 1. The amount of not less than *2% of ABC*, if bid security is in cash, cashier's/manager's check, bank draft/guarantee or irrevocable letter of credit; 2. The amount of not less than *5% of ABC* if bid security is in Surety Bond.
19.2	Partial Bid is not allowed. The project is grouped in a single lot and the lot shall not be divided into sub-lots for the purpose of bidding, evaluation, and contract award.
20	a. 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); b. 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. c. Documents to be Submitted during the Post Qualification process as Reference for the Approval of Manufacturer's Brochures/Drawings specified in Technical Data Sheets for Electrical Works (Section VI – Part II EW) d. The licenses and permits relevant to the Project and the corresponding law requiring it as specified in the Technical Specifications, if any.

21	The following documents shall form part of the contract: 1. Notice to Proceed 2. Construction schedule and S-curve 3. Manpower Schedule 4. Construction Methods 5. Equipment Utilization Schedule 6. Construction safety and health program of the contractor duly approved by the Bureau of Working Condition (BWC) of the Department of Labor and Employment (DOLE) or proof of submission to BWC 7. PERT/CPM.

SECTION IV

GENERAL CONDITIONS OF CONTRACT

SECTION IV – GENERAL CONDITIONS OF CONTRACT

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SECTION IV – GENERAL CONDITIONS OF CONTRACT

1. Scope of Contract

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

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

2. Sectional Completion of Works

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

3. Possession of Site

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

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

4. The Contractor's Obligations

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

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

5. Performance Security

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

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

6. Site Investigation Reports

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

7. Warranty

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

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

8. Liability of the Contractor

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

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

9. Termination for Other Causes

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

10. Dayworks

Subject to the guidelines on Variation Order in Annex "E" of the 2016 revised IRR of RA No. 9184, and if applicable as indicated in the **SCC**, the Dayworks rates in the Contractor's Bid shall be used for small additional amounts of work only when the

Procuring Entity's Representative has given written instructions in advance for additional work to be paid for in that way.

11. Program of Work

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

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

12. Instructions, Inspections and Audits

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

13. Advance Payment

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

14. Progress Payments

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

15. Operating and Maintenance Manuals

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

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

SECTION V

SPECIAL CONDITIONS OF CONTRACT

SECTION V – SPECIAL CONDITIONS OF CONTRACT

GCC Clause	
2	Sectional completion is not specified.
4	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 3rd party and charge all expenses incurred to the Contractor's collectibles/securities; and 4. Report the condition to the Bureau of Working Conditions of the DOLE for their appropriate action. 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.
4.1	NPC shall give access to the Site for the Contractor to commence and proceed with the works on the start date. The access to the site referred herein shall not be exclusive to the Contractor but only to enable him to execute the Work.
5	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: i. The bond is a penal bond, callable on demand and the entire amount thereof shall be forfeited in favor of the Obligee upon default of the Principal without the need to prove or to show grounds or reasons for demand for the sum specified therein; ii. The amount claimed by the Obligee under this bond shall be paid in full and shall never be subject to any adjustment by the Surety; iii. In case of claim, the Surety shall pay such claim within sixty (60) days from receipt by the Surety of the Obligee's notice of claim/demand letter notwithstanding any objection thereto by the Principal.
6	No site investigation report.
7.2	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.
10	No dayworks are applicable to the contract.
11.1	The Contractor shall submit the Program of Work to the Procuring Entity's Representative within Ten (10) calendar days of delivery of the Notice of Award/Letter of Acceptance.
11.2	The period between Program of Work updates is Thirty (30) calendar days. The amount to be withheld for late submission of an updated Program of Work is One percent (1%) of contract amount.

12	During contract implementation, the Procuring Entity shall conduct Constructors Performance Evaluation in accordance with Section 12, Annex E of the Revised Implementing Rules and Regulation of R.A. 9184 using the NPC Constructors Performance Evaluation System (CPES) Guidelines. 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.
13	The maximum amount of advance payment is fifteen percent (15%) of the Contract Price and paid in lump sum.
14	No further instructions.
15.1	The date by which "as built" drawings and operating and maintenance manuals are required is within thirty (30) calendar days after completion of contract.
15.2	The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals by the date required is Five percent (5%) of contract amount.

SECTION VI

TECHNICAL SPECIFICATIONS

(PART I – TECHNICAL SPECIFICATIONS)

GW – General Works

CW – Civil Works

MW – Mechanical Works

EW – Electrical Works

PART I

TECHNICAL SPECIFICATIONS

GW - GENERAL WORKS

PART I - TECHNICAL SPECIFICATIONS

GW - GENERAL WORKS

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PART I - TECHNICAL SPECIFICATIONS

GW - GENERAL WORKS

GW-1.0 GENERAL

This section covers the general technical requirements for furnishing all supervision, labor, materials, supplies, tools and equipment in accordance with the specifications contained herein and as shown on the accompanying drawings to complete the **Transfer of 2 x 500 kW MAN B & W Diesel Generating Sets and Auxiliaries Including Electrical Equipment from the Busuanga DPP (BDPP) to Rizal DPP (RDPP).**

The NPC and the Contractor shall jointly undertake the assessment, determination/verification and inventory of the BDPP's electro-mechanical equipment and its components/parts; and structures to be pulled-out and transferred to RDPP in accordance with the Clause GW-4.2 to 4.3 (Inventory) and Clause MW-4.6 (Inventory of Equipment to be Pulled Out/Dismantled and Transferred).

The Contractor shall accept full responsibility for its work including detailed design, calculations and drawings as required, performance qualifications, specifications, documentation, reports, fabrication, corrosion protection, cleaning, shop testing, preparation for shipment, reinforcement of roads and bridges as maybe deemed necessary, field testing and compliance with the applicable codes and standards and the requirements of this specifications.

It should be noted that during the site visit/inspection to be conducted by the Bidder prior to submission of the bid, the Bidder shall fully coordinate and confirm with the respective plant heads or his representative/s the final location/arrangement of the equipment/structures shown on the bid drawings. Any changes of location/arrangement as agreed during the said visit shall be the basis in the submission of the bid price proposal.

Workmanship shall be of first class quality and in accordance with the best modern engineering practice for dismantling, hauling, loading/unloading, construction (civil works), re-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 of the equipment from the drawings and all errors in or resulting from the workmanship of the Contractor 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.

The Contractor shall strictly observe the general requirements of this specification (General Works) in conjunction with the specific requirements specified in the relevant specifications (Civil, Mechanical and Electrical Works). The specific technical specifications shall take precedence over the general requirements (General Works) in case of any inconsistency.

GW-1.1 Project Description

The project constitutes the transfer of two (2) units of 500 kW MAN B & W Diesel Generating Sets and its system's auxiliaries/accessories and associated electrical equipment including structures and facilities from BDPP to RDPP which cover dismantling; crating; packing; transport and hauling; loading and unloading; re-assembly; installation/erection, cleaning/flushing, and supply of particular equipment including lacking/missing and irretrievable equipment, parts/components and those that will be damaged during dismantling, transport and re-erection; painting; documentation; inspection; (assistance and conduct of) testing and commissioning, including clean-up activities.

The existing powerhouse of RDPP shall be used to accommodate the gensets and its auxiliary equipment and other facilities to be transferred arranged as shown on the bid drawings.

GW-1.2 Project Location

Rizal, Palawan is approximately 203 Kilometers south of Puerto Princesa City, and Bounded by West Philippine Sea in the Northwest, Municipality of Brookes Point and Quezon in the east and Bataraza in the South. It can be reached via sea travel (Manila port to Puerto Princesa port, Palawan) or via air travel (Manila to Puerto Princesa, Palawan). Access to Rizal DPP located in Brgy. Punta Baja, Rizal, Palawan is through unpaved road with estimated five (5) hours ride from Puerto Princesa City.

Busuanga DPP is located near Mt. Tapyas of Coron Palawan and has an approximate distance of 21.3 km from Francisco B. Reyes Airport. It will take around 30-45 minutes of travel by land to get to Busuanga DPP from Francisco B. Reyes Airport.

GW-1.2.1 Site Inspection

The Contractor/Bidder shall conduct site inspection of the project location.

It should be noted that during the site visit/inspection to be conducted by the Bidder prior to submission of the bid, the Bidder shall fully coordinate and confirm with the respective plant heads or his representative/s the final location/arrangement of the equipment/structures shown on the bid drawings. Any changes of location/arrangement as agreed during the said visit shall be the basis in the submission of the bid price proposal.

Certificate of Site Inspection shall be issued and duly signed by authorized NPC representative to be submitted during bid opening. See attached form in Annex 1.0 page VI-GW-38.

GW-1.3 Project Duration

The Contractor shall complete the works as specified within **Two Hundred Forty (240) Calendar Days** which shall become effective from receipt of the Notice to Proceed. The total contract period is inclusive of twenty (20) rainy/unworkable days, considered unfavorable for the execution of works at site.

GW-2.0 SCOPE OF WORK

GW-2.1 General

It is not the intent of this specification to neither specify all technical requirements nor to set forth those requirements covered by applicable codes and standards. The Contractor shall furnish high quality work, materials and equipment meeting the requirements of this specification and industry standards.

NPC's personnel shall supervise the dismantling, re-assembly, installation/erection of the equipment, structure and its auxiliaries/accessories to be transferred and shall assist the testing and commissioning for the re-assembled equipment and for the newly supplied equipment Contractor shall be responsible in the conduct of testing and commissioning.

The Contractor shall conduct actual inspection of the plants sites and thoroughly investigate and familiarize himself with all the conditions at sites, make assessment on the existing physical conditions and configurations of the plant equipment and auxiliaries, 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.

The Contractor shall secure insurance against loss or damage incidental to dismantling/disassembly, hauling/transportation, reassembly, and erection/ installation of all plant electro-mechanical equipment and associated structural supports to be relocated.

The Contractor shall also be responsible to assess and determine all and every work and service although not specifically detailed but are deemed required to fully complete the work and placing ready for the safe and reliable operation of the transferred Diesel Generating Sets and its system's auxiliaries and associated electrical equipment including civil structures. Relative costs of any additional works or materials which the Contractor deemed required or necessary to complete the works shall be included in the bid proposal.

Any and/or all expenses arising through the lack of knowledge or understanding regarding the existing conditions of the site shall be the responsibility of the Contractor and no additional payment thereof shall be made by NPC.

GW-2.2 Architectural Works (Not Applicable)

GW-2.3 Civil Works

The Contractor shall furnish all supervision, labor, materials, supplies, tools and equipment to complete all the Civil Works under this contract. The works and services to be performed by the Contractor shall essentially consist of but not limited to the following:

a) Moving-in including furnishing, construction, operation and maintenance of general construction facilities and moving-out thereof after completion and acceptance;

b) Site investigation and site grading (if applicable);

c) Dismantling, hauling, transportation, re-assembly, installation, construction and erection of all transferred equipment and auxiliaries and other facilities that will be transferred from BDPP to RDPP, but not limited to the following:

  c.1 Fuel Oil Day and Water Expansion Tanks' Steel Supports;
  c.2 Radiator's Steel Supports;
  c.3 Exhaust Silencers and Pipes Steel Supports; and
  c.4 Air Intake Filters' Steel Supports

d) Demolition and disposal of excavated and demolished materials at the area within each plant compound or as directed by NPC;

e) Structural excavation and backfill for equipment foundations of transformers, cable and pipe trenches and for all miscellaneous Balance-of-Plant (BOP) structures required;

f) Concreting works for equipment foundations of transformers, cable and pipe trenches and for all miscellaneous Balance-of-Plant (BOP) structures required;

g) Construction of transformer pads and cable trenches;

h) Overlaying of gravel surfacing at the switchyard area; and

i) All other works and services required to complete the project.

GW-2.4 Mechanical Works

a. Dismantling, hauling, transportation, packing/unpacking, re-assembly, installation/erection, flushing, cleaning and assistance to testing of all BDPP's mechanical equipment, auxiliaries, instrumentation and other accessories that will be transferred to RDPP, but not limited to the following:

  a.1) Two (2) units of 500 kW Diesel Genset and its associated parts, components and accessories;

  a.2) Fuel Oil Transfer System consisting of Two (2) units of Day Tanks;

a.3) Two (2) units of Air Tank/Bottle;

a.4) Engine Cooling Water System consisting of Two (2) sets of Radiator Assembly *(except for 1 unit of Radiator Fan Motor 480V, 60Hz, 35A, 22kW, 1180 rpm to be replaced)* and Two (2) sets of Expansion Tank;

a.5) Intake Air System consisting of Two (2) sets of Air Filter and Two (2) sets of Intake Manifold;

a.6) Exhaust System consisting of Two (2) sets of Exhaust Manifold, Two (2) sets of Chimney and Two (2) sets of Muffler (approximate 3Ton/Unit);

a.7) Charging Air Cooling Water Assembly consisting of Two (2) units of Charging Air Cooling Water Pump;

a.8) Water Softening System (Skid Mounted) consisting of One (1) set of Water Softening System complete with Booster Pressure Pump, associated tanks, controls and instrumentation;

a.9) Various sizes of pipes, valves, filters/strainers, pipe fittings, pipe supports, gauges or instruments and other pipe accessories for the above diesel generating set auxiliary equipment; and

a.10) All other works and services including those not specifically detailed herein but are required to fully complete the project as specified in the relevant technical specifications.

b. Supply, Delivery, Installation/Erection and assistance to testing of mechanical equipment/auxiliaries and other accessories which consists of but not limited to the following:

b.1) One (1) unit of Radiator Fan Motor 18 kW, 220/380V, 60Hz to be installed in the existing Radiator Assembly *as substitute for Radiator Fan Motor 480V, 60Hz, 35A, 22kW, 1180rpm;*

b.2) One (1) set of 3.0 M^3/Hr Leak Fuel Oil Pump @ 30 meters head, gear type with built-in adjustable relief valve, designed for outdoor installation, complete with associated controls and instrumentation, associated valves, filter, spare parts for one (1) year operation per Manufacturer's recommendation and other necessary accessories;

b.3) One (1) set of 1.0 M^3 Leak Fuel Tank complete with pipe, fittings, pipe supports, four level point magnetic type level switch (very high, high, low and very low) for alarm and start/stop functions integrated with the leak fuel oil pump including associated valves and other accessories;

b.4) One (1) lot of Fuel Oil Piping Materials, valves, strainers, including pipe fittings, gaskets, flanges, bolts and nuts, pipe supports and other incidentals to complete the fuel oil supply piping system including interconnection with the existing fuel oil supply pipe;

b.5) Two (2) sets of skid mounted Compressed Air Starting System (excluding air bottle) complete with Air Compressors (Electric-Driven @ 100% Capacity), 20m³/hr minimum capacity @ 30 bars, complete with associated valves, drain trap, relief valve, pressure gauges, controls and instrumentation, recommended spare parts & tools and accessories;

b.6) One (1) lot of Compressed Air Piping Materials, valves, including pipe fittings, gaskets, flanges, bolts and nuts, pipe supports and other incidentals to complete the safety and relief valves including interconnection with the existing Compressed Air supply pipe;

b.7) One (1) lot of Piping Materials that will be used to compensate any shortages of transferred/relocated piping including pipe fittings, gaskets, valves, flanges, bolts and nuts, pipe supports and other incidentals to complete the piping systems of the Diesel Engines and its auxiliaries;

b.8) One (1) lot of foundation bolts which are irretrievable for all the above-mentioned equipment;

b.9) One (1) lot of Chemical Cleaning and Hot Oil Flushing for the newly installed fuel, cooling and lube oil piping system, which include degreasing, pickling, neutralizing, preservation and drying.

b.10) One (1) lot of Painting Materials to be applied to all new and relocated equipment, pipes, steel structures, tanks, pipe supports and other incidentals; and

b.11) All other works and services including those not specifically detailed herein but are required to fully complete the project as specified in the relevant specific technical specifications.

GW-2.5 Electrical Works

a. Dismantling, Hauling, Transportation, Packing/Unpacking, Re-assembly, Installation, Test and Commissioning of the following electrical equipment:

a.1) 2 x 630kVA, 480V/13.53kV, 3-phase, 60Hz Generator Transformer including draining and storing of the existing transformer insulating oil to the designated storage facility by plant head/personnel; and

a.2) 1 x 160kVA, 13.53kV/240V, 3-phase, 60Hz Auxiliary Transformer including draining and storing of the existing transformer insulating oil to the designated storage facility by plant head/personnel.

b. Dismantling, Hauling, Refurbishing, Transportation, Packing/Unpacking, Installation and Test of Motor Control Center for 2 x 500 kW D/G set.

c. Supply and Filling of Transformer Insulating Oil for the Generator and Auxiliary Transformers;

d. Supply, Installation, Test and Commissioning of the following new electrical equipment:

d.1) Generator Control and Protection Panel (GCPP) for 2 x 500 kW D/G set equipped with monitoring, metering, control, protection and synchronizing equipment/devices;

d.2) 15 kV Fuse Disconnect Switches with Lightning Arrester Combination; and

d.3) Bus Conductor and Line Materials and Hardware;

e. Supply, Laying and Test of Power, Control and Instrumentation Cables including appurtenances required for the interfacing of all equipment;

f. Supply, Installation and Test of Grounding Materials complete with ground conductors, ground rods, weld metal powder and other grounding accessories including connection of the transferred and/or supplied electrical equipment to the existing grounding system;

g. Supply and Installation of Conduit and Cable Trays System;

h. Replacement of parts, accessories, protective relays and other instruments of electrical equipment to be transferred necessary for the smooth operation of the generating sets; and

i. All other works and services including those not specifically detailed herein but are required to complete the project

GW-3.0 SITE CONDITIONS

GW-3.1 Site Conditions

The Contractor shall be responsible for visiting the site and take particular reference to accessibility to the site. The Contractor shall thoroughly investigate and familiarize himself with all the conditions at the sites, the surrounding area, means of communication and transportation and all other factors that could hamper the smooth execution of the contract.

Any and/or all expenses arising through the lack of knowledge or understanding regarding the existing conditions of the sites shall be the responsibility of the Contractor and no additional payment thereof shall be made by NPC.

The conditions stated below shall be taken into consideration for the project site unless otherwise specifically indicated in the relevant technical specifications.

Elevation above sea level	:	0 to 500 m
Ambient temperature	:	Up to 45°C
Barometric pressure	:	0.974 - 1.03 kg/cm2 abs
% Relative humidity	:	85%
Design for seismic loads	:	Seismic zone factor 0.4
Max. wind velocity	:	250 km/hr and/or as specified in the latest edition of National Structural Code of the Phil.

There are two (2) pronounced seasons in both provinces, the dry and wet season. The wettest months are from August to November. The other months of the year are generally dry with occasional rain showers. The prevailing atmospheric condition is generally warm, humid, and salt laden.

GW-3.2 Earthquake and Wind Design Requirements

Plant and equipment may be subjected to both horizontal and vertical seismically induced acceleration of 0.40 g. and more depending on:

a) Natural period and mode of vibration;
b) Damping (inherent or specifically provided);
c) Manner of failure (ductile or brittle); and
d) Location (at ground level or at a higher level).

The plant and equipment required under this contract shall meet the seismic design requirement for earthquake conditions to conform with the latest edition of National Structural Code of the Philippines.

It is evident from the design response spectra that the degree of response varies markedly with the period of vibration. It is essential, therefore, that all equipment, or its supporting structure which has modes of vibration or components with modes of vibration with a natural period longer than 0.1 seconds be identified.

Provision shall be made for seismic movement by providing seismic movement joints between components that are interconnected and may have different vibratory characteristics. These joints shall be capable of withstanding the sum of the maximum deflection of each component resulting from a design earthquake.

The plant and equipment under this contract shall meet the requirements for a wind velocity of not less than 250 km/hr gust and/or as specified in the latest edition of National Structural Code of the Philippines.

GW-3.3 Sound Control

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

The Contractor shall indicate the Sound Pressure levels in the proposal for review and evaluation by NPC.

If the Contractor expects the maximum sound level of the supplied equipment to exceed 120 dBA at a distance of 1 meter, Contractor shall use acoustical treatment features, subject to NPC's review and acceptance, to achieve the sound control design objectives.

GW-4.0 MATERIALS AND EQUIPMENT

GW-4.1 General

Generally, all materials and equipment to be used shall come from BDPP unless otherwise specified in the relevant sections of this specification.

The Contractor shall perform 100% visual inspection of all equipment and materials to be transferred. Any equipment or component which could not be possibly retrieved and re-used and needs to be replaced shall become part of the scope of work.

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

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

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

GW-4.2 Inventory

Immediately upon effectivity of the Contract, NPC and the Contractor or their authorized representatives, shall jointly take a physical inventory of all BDPP's equipment and materials including its associated structures, consumable goods, spare parts, tools and other inventory items to be dismantled, repacked and transported to RDPP.

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

BDPP/RDPP Management shall be responsible for determining the BDPP's Diesel Generating Sets and associated electrical equipment, system auxiliaries/accessories, structures and facilities to be pulled out and for transfer to RDPP in accordance with Clause M-4.6 (Inventory of Equipment to be Pulled Out/Dismantled and Transferred).

GW-4.3 Technical Description of BDPP's Electro-Mechanical Equipment, Auxiliaries/Accessories and Structures

The BDPP's electro-mechanical equipment/components and its associated structures which shall be dismantled, hauled, transported, re-assembled, installed, assisted for testing and commissioning by the Contractor are enumerated and described in this section.

The Contractor shall supply all equipment and materials which are damaged, missing or lacking in required quantity and those which are not suitable for re-use or re-installation at RDPP.

Prior to submission of Bids, the Contractor 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 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 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, but not limited to the following:

GW-4.3.1 Mechanical Equipment

Equipment	Technical Data/Remarks
a. Diesel Genset (MAN B & W)	▪ Two (2) units of Diesel Engine for transfer Rating : 576 kW Weight : 7.5 Tons Size : 4.14L x 1.6W x 2.33H ▪ Two (2) units of Alternator for transfer Rating : 648 kVA Weight : 3.6 Tons Size : 1.91L x 1.57W x 1.33H ▪ Completeness of the components and accessories i. e., turbocharger and etc., shall be verified during site inspection

Equipment	Technical Data/Remarks
b. Fuel Oil Transfer System	▪ Two (2) units of Day Tank for Transfer Capacity : 3000 Liters Weight : 2000 kg./unit Size : 2.7L x 1.23W x 1.48H ▪ Completeness of the components and accessories shall be verified during site inspection.
c. Water Softening System	▪ For Transfer ▪ Boost pressure pump, and associated tanks shall be verified during the site inspection.
d. Compressed Air Starting System	▪ Two (2) units of Air Bottle for Transfer ▪ Defective Motor-Driven Air-Compressor and Engine-Driven Air Compressor. For replacement ▪ Sizes, dimensions and rating shall be verified during the site inspection.
e. Engine Cooling System consisting of fans, motor, radiator, expansion tank	▪ Two (2) sets for Transfer (except for one (1) unit of radiator fan motor w/ 22kW rating for replacement) ▪ One (1) unit of radiator fan motor for Transfer Rating : 18 kW Weight : 20 kg. Diameter : 0.6 m Height : 0.4 m ▪ Total Weight to be transferred : 20 Ton ▪ Completeness of the components and accessories shall be verified during site inspection.
f. Intake Air System consisting of air filter, intake manifold and accessories	▪ Two (2) sets for Transfer Weight : 1 Ton/Unit Diameter : 1.03 m Height : 1.95 m ▪ Completeness of the components and accessories shall be verified during site inspection.
g. Exhaust System consisting exhaust manifold, chimney and muffler (3Tons)	▪ Two (2) sets for Transfer ▪ Completeness of the components and accessories shall be verified during site inspection.
h. Charging Air Cooling Water Pump and accessories	▪ Two (2) sets for Transfer ▪ Sizes, dimensions and rating shall be verified during the site inspection.
i. Piping, valves, filters, fittings, pipe supports, gauges or instruments and other pipe accessories for the following generating set auxiliary system. i.1 Fuel Oil Unloading and Transfer System i.2 Lube Oil System i.3 Air Starting System i.4 Intake & Exhaust System i.5 Engine Cooling System	▪ For Transfer ▪ Completeness of the system accessories shall be verified during site inspection.

GW-4.3.2 Electrical Equipment

Equipment	Technical Data/Remarks
a. Generator Transformer (TRAPO-UNION)	▪ Two (2) unit for Transfer Rating : 630 kVA Weight : 3.6 Tons Dim. : 1.91L x 1.57W x 1.33H
b. Auxiliary Transformers (TRAPO-UNION)	▪ One (1) unit for Transfer Rating : 630 kVA Weight : 2.5 Ton Size : 2.0 L x 2.26W x 1.83H

GW-4.3.3 Structural Supports

Steel Structure/Support	Remarks
a. Fuel Oil Day Tanks b. Water Expansion Tanks c. Exhaust Silencers and Pipes d. Air Intake Filters	Sizes and conditions to be determined and verified during the site inspection.

GW-4.4 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, but not limited to, the latest revisions and editions of applicable codes and standards issued by the following authorities:

ACI - American Concrete Institute
AISC - American Institute of Steel Constructions
ANSI - American National Standard Institute
API - American Petroleum Institute
ASCE - American Society of Civil Engineers
ASEP - Association of Structural Engineers of the Philippines
ASME - American Society of Mechanical Engineers
ASTM - American Society for Testing and Materials
AWS - American Welding Society
AZI - American Zinc Institute
CEA - Canadian Electrical Association
DEMA - Diesel Engine Manufacturers Association
ICBO - Internal Conference of Building Officials
ICEA - Insulated Cable Engineers Association
ICS - General Standards for Industrial Control and Systems
IEC - International Electrotechnical Commission
IEEE - Institute of Electrical and Electronic Engineers
ISO - International Standards Organization
NEC - National Electrical Code
NEMA - National Electrical Manufacturers Association
NFPA - National Fire Protection Association
NPCP - National Plumbing Code of the Philippines
NSCP - National Structural Code of the Philippines
PEC - Philippine Electrical Code

PTC 17 - Power Test Code for Internal Combustion Engines
SSPC - Steel structures Painting Council
TEMA - Tubular Exchanger Manufacturers Association
UBC - Uniform Building Code of the Int. Conference of Building Officials
UL - Underwriters Laboratories, Inc.

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

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

In case of conflicting requirements between authorities cited above or between authorities cited and those specified, such disagreement shall be resolved by NPC and its decision shall be final. The responsibility shall be on the Bidder to show the suitability of any alternative standards he may wish to use.

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

GW-4.5 Tropical Serviceability

GW-4.5.1 General

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

In choosing materials and their finishes, due regard is to be given to the humid tropical conditions under which equipment is to work. Cubicles used for switchgear and control cabinets in outdoor plant shall be vermin-proof and fungus-proof.

Totally enclosed motors and enclosures containing electrical control and switching equipment and instrument for outdoor installations shall be equipped with temperature controlled electrical heaters. The construction of the enclosures and installation of heaters shall be as to ensure effective circulation of air while ensuring that no damage to equipment occurs due to overheating.

GW-4.5.2 Metals

Iron and steel are in general to be galvanized or painted, as appropriate. Small iron and steel plate (other than SUS 316 stainless steel) of all instruments and electrical equipment, the cores of electromagnets and the metal parts or relays and mechanisms are to be treated in an approved manner to prevent rusting. Cores or other components which are laminated, or which cannot be rustproof, shall have all the expected parts thoroughly cleaned and heavily enameled, lacquered or compounded.

GW-4.5.3 Screws, Nuts, Springs, Pivots, Etc.

The use of iron and steel is to be avoided in instruments and electrical relays, wherever possible. Steel screws, when used, are to be zinc, cadmium or chromium plated or, when plating is not possible, owing to tolerance limitations, are to be of corrosion-resisting steel. All wood screws are to be of dull nickel plate brass or other approved finish. Instrument screws (except those forming part of a magnetic circuit), are to be brass or bronze. Springs are to be of non-rusting materials, e.g., phosphor bronze or nickel silver, as far as possible. Pivots and other part for which non-ferrous material is unsuitable are to be of approved rustproof steel, where possible.

GW-4.5.4 Fabric, Cork, Paper, Etc.

Fabrics, cork, paper and similar materials, which are subsequently to be protected by impregnation are to be adequately treated with an approved fungicide. Sleeving and fabrics treated with linseed oil or linseed oil varnishes shall not to be used.

GW-4.5.5 Adhesives

Adhesives are to be specially selected to ensure the use of a type that is impervious and resistant to attack of mildew and insects. Synthetic resin cement only shall be used for joining wood.

GW-5.0 EQUIPMENT MARKING

GW-5.1 Identification System

Prior to dismantling, the Contractor 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 and approved by the NPC.

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 erection 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.

GW-5.2 Nameplates and Labels

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

Nameplates generally contain all necessary information or brief technical description under which the equipment has been designed to operate and shall include the following: manufacturer's name, type of equipment, serial number, year of manufacture, Standard Plant Identification Number (SPIN), weight 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.

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.

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 valves and instruments shall be secured by screws or by flexible wires.

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 and subject for NPC's approval.

GW-5.3 Tag Numbers/Standard Plant Identification Number (SPIN)

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

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

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

GW-6.0 DISMANTLING, DEMOLITION AND RELOCATION REQUIREMENTS

GW-6.1 General

The Contractor shall make full provision in his bid for the relocation, dismantling, crating, hauling, transporting, demolition, disposal of debris and temporary storage of all existing equipment and associated structures and installations at BDPP (to be transferred to RDPP Site) and at existing RDPP (to be disposed at designated area within the plant or as directed by NPC).

The Contractor shall furnish all necessary plant, equipment, tools and labor to execute the relocation works.

The Contractor shall submit together with his bid the general procedure or overall work program covering the dismantling, crating, hauling, transporting demolition disposal of debris and temporary storage of all equipment and materials to be transferred to RDPP Site including demolition and disposal works for the existing plant and equipment within the RDPP.

Materials and equipment which are required to be relocated shall be handled with care at all times to prevent damage of any kind during the dismantling and any such damage shall be made good by the Contractor to the satisfaction of NPC.

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

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

All works shall be coordinated with NPC at site and with existing installation so that interference in the performance of works will be avoided. In case interference occurs, NPC will decide which work is to be relocated.

GW-6.2 Preparation

NPC shall make available and provide access to BDPP for the dismantling activities of the Contractor. After contract award and prior to dismantling, the Contractor shall submit detailed dismantling schedule and methodology or work program for review and approval of the NPC. The work program shall include detailed dismantling 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.

Any changes in any part of the approved work program shall be subject for review and approval by NPC.

The Contractor shall inspect and check properly all electrical cables and pipes and shall ensure that these are securely disconnected from their respective main source before the conduct of the actual dismantling activities.

Piping systems shall be totally drained prior to dismantling. Lube oil, fuel oil and chemicals shall be properly disposed in a container with appropriate labels describing the contents. Water contents on pipes may be disposed in the existing drainage lines. Water found to be contaminated shall be properly treated prior to disposal.

All peripheral pipes, electrical power and control cables, conduits and cable trays including protruding steel supports that may obstruct the free movement of equipment going out from the power plant shall be dismantled first and removed.

The Contractor shall identify the most convenient access and manner of moving the equipment out of a fixed structure/s at BDPP. The Contractor shall provide temporary shelter/cover (tarpaulin or equivalent type of cover) on the torn down part until the torn down part is properly packed and crated.

All bevels, threads, flange faces and other sealing surfaces shall be suitably protected with wood, plastic or soft metal to prevent damage to these surfaces during shipping and handling.

All pipes shall be capped using plastic or soft caps or plugs. All caps shall be taped.

All packaging or crating shall be suitable for long term outdoor storage on or off the ground.

GW-6.3 Dismantling of Existing Installations

The Contractor shall provide all the necessary equipment, tools, and labor for the dismantling, transferring and moving out of all the equipment and its associated structures and accessories.

During dismantling works, the electro-mechanical equipment shall be carefully lifted or glided using only the approved tools, equipment, and procedures that will prevent damage to the equipment. Whenever possible, the Contractor shall transport/haul the equipment by skids to reduce the dismantling works.

The Contractor shall engage the services of highly qualified engineer/specialist who shall be responsible for the supervision of all dismantling and hauling works. Suitably skilled personnel shall execute dismantling operations in an orderly sequence in such a manner as to minimize the number and size of the resulting dismantled parts/components.

To avoid pilferage, the Contractor shall maintain a well-guarded and secured area, as designated by the NPC, for all dismantled equipment and materials after each day's work.

Utmost care shall be strictly observed by the Contractor during the dismantling of the plant equipment and components at BDPP up to unloading to each designated laydown areas to avoid damage of any kind to structures, equipment, and installations. In the event that any such damage, breakage or losses should occur due to carelessness, the Contractor shall repair, replace or otherwise make good all damaged items to the satisfaction of the NPC and all cost related thereof shall be chargeable to the account of the Contractor.

The Contractor shall comply with the plant security procedures and requirements. The Contractor shall also be liable for loss of or damage to any property (including property of NPC) or any loss, claim, damage, or expenses of whatsoever nature arising out of death, injury, illness, or disease of any person caused by the execution of all the works under this contract except to the extent that such loss or claim are due to negligence of the NPC.

GW-6.4 Demolition

The Contractor shall exercise due care and diligence during demolition of structures, equipment and installations including the provision of screens and canopies to protect them from dust and debris. If any damage should occur, the Contractor shall repair, replace or otherwise make good all damaged items to the approval of NPC.

All demolition operations shall be carried out in an orderly manner so as to cause minimum interference with other activities.

GW-6.5 Storage and Transportation

All dismantled materials and equipment shall be transported to the location where they are to be re-erected and reinstalled. If not immediately required at the location, they shall be carefully stored and maintained at such place and in such a manner as NPC may direct until such time as they are required at their new location.

The Contractor shall provide temporary shelter/cover such as tarpaulin or equivalent type of cover for protection of the equipment during the storage.

The Contractor shall clean the area of debris and hazardous materials resulting from the removal/dismantling of the equipment from the sites mentioned herein. The areas should be free from safety and environmental hazards during and after the dismantling activities.

GW-6.6 Disposal of Demolished Materials

All debris and demolished materials shall be transported to a location designated by NPC and dumped or otherwise disposed of as directed.

If, in the assessment of NPC, any demolished materials which are not required to be used elsewhere have a commercial value, he may direct the Contractor to set aside and salvage such materials, the proceeds of which shall be credited to NPC.

All salvable materials shall be carefully handled to avoid damage and shall be piled neatly at a location adjacent to the work or as directed by NPC. All salvable materials shall become the property of NPC and the Contractor shall be held responsible for all materials not accounted for. The salvable material shall not be used by the Contractor for any of his construction operations, unless otherwise authorized by NPC.

GW-7.0 PACKING/CRATING, SHIPMENT AND STORAGE

GW-7.1 Preparation

The Contractor shall prepare materials and equipment for shipment/transport to protect it from damage during shipment and subsequent storage.

All dismantled 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.

Equipment shall be completely drained of all water and thoroughly dry prior to shipment/transport. When such draining requires removal of plugs, drain valves, etc., the Contractor shall make sure that these parts are re-inserted or reassembled prior to shipment. Other fluids (coolant, fuel oil, lube oil, etc.) shall be drained only if the Contractor deems it necessary and subject to the approval of NPC.

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 may be left in open temporary storage at the designated place, the Contractor shall ensure that the delivered items have appropriate protection from water and other elements.

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 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 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 segregated, 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^3
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, the Contractor shall furnish advance copies of all non-negotiable shipping documents, invoices, packing list and other pertinent documents.

The Contractor 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.

GW-7.2 Shipment/Transport

The Contractor 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 shall be deemed to have visited the site 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, etc. arising out of neglect of Contractor shall be the responsibility of the Contractor. Likewise, any additional claim attributable to Contractor'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 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 and concurred by NPC. All shortages and damages noted shall be immediately replaced by the Contractor at his own cost and shall ensure the timely delivery of replacement without affecting the agreed overall project implementation schedule. The Contractor shall be responsible for the care and custody of the equipment from storage until erection.

The Contractor 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 on site all the times.

The Contractor shall ship the required equipment and materials on clear commercial bill of lading and the cost of all freight, insurance, shipping, handling, and road transport charges shall be included in the Bid Price.

GW-7.3 Storage

If the dismantled equipment and materials including those to be supplied by the Contractor 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 shall be responsible for securing all the transferred and his supplied equipment and materials 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.

If the Contractor 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.

GW-8.0 ERECTION & INSTALLATION REQUIREMENTS

All dismantled materials, electro-mechanical equipment and associated structures which are transported to RDPP 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 under this Contract. In the event of conflict within these documents, the Contractor 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 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 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 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 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. The cost of which shall be included in the cost for the installation of respective equipment. Transferred equipment and associated structures whose foundation/anchor bolts were no longer retrieved shall be supplied and installed by the Contractor.

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 of the foundation. Should incorrect positioning be ascertained after the concrete pouring, the Contractor 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 of his responsibility for correct welding, electrodes and for minimizing distortion in the finished structure and piping systems.

GW-9.0 DRAWINGS AND INSTRUCTION MANUALS

GW-9.1 Tender Documents and Construction Drawings

The drawings called for in this section shall be the Bid Drawings and Reference Drawings attached in the Tender Documents.

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

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

The Bid drawings show the work to be done as definitely and in as much detail as possible. Bid drawings may be used for planning the work but shall not be used for construction purposes or for furnishing materials, unless authorized or approved by NPC.

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

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

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

GW-9.2 Contractor/Manufacturer's Drawings and Instruction Manuals

GW-9.2.1 General

The Contractor shall submit five (5) copies of construction and detailed drawings, as-built drawings and other documents for NPC's review, approval, information, and reference for all his supplied equipment under this contract or as specified in this section and relevant specifications. The sequence of submission shall be such that information is available for checking or approval of each drawing or document received.

To provide the basis for programming the checking of the Contractor's drawings, the Contractor shall, within at least ten (10) calendar days from effectivity date of the contract, prepare and submit to NPC for approval a drawing and document lists summarizing the drawings he proposes to submit in accordance with the requirements specified herein, together with the dates on which he proposes to submit such drawings. These lists shall be updated monthly to show the status of the drawings and documents submitted and any additional proposed drawings. NPC shall have the right to require the Contractor to submit additional information as may reasonably be required.

The name and signatures of the Contractor/Manufacturer's designer and approving officer who process the drawing for NPC's approval shall be included in the title block for each drawing/document submitted.

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

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

All approved drawings shall form part of the Contract. Approval of the Contractor's drawings shall not be construed to relieving the Contractor of any of his responsibility for the correctness of his calculations and drawings nor for the strict compliance with the Contract.

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

GW-9.2.2 Equipment to be furnished by the Contractor

The Contractor shall submit for approval a complete description of all materials to be used in the work prior to fabrication, manufacturing and/or purchasing. The description shall include catalogue numbers, illustrations, diagrams, dimensional data, etc., as maybe required to fully describe the materials.

The drawings included in the tender documents are for bidding purposes only, unless otherwise authorized by NPC. The Contractor shall make all required or any necessary detailed drawings including calculations if necessary, to meet the intent of the specifications. The detailed drawings shall be submitted for review and approval of NPC prior to construction and erection/installation works.

GW-9.2.3 As-Built Drawings/Operation & Maintenance Manuals

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

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

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

The Contractor shall provide five (5) copies of the Instruction Manuals/O & M Manuals required for all equipment supplied under this Contract. Covers and binders to be used for the manuals shall be robust and oil-resistant.

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

Instruction Manuals shall include the final as-built copy of all plans and drawings including special tools list and spare parts list.

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

GW-9.3 Processing of Drawings

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

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

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

Five (5) prints with dark lines on a white background shall be furnished to NPC for each drawing submitted for approval. Two (2) copies will be returned to the Contractor either marked "Approved", "Approved with Corrections Indicated", or Returned for Corrections". Prints marked "Approved" or "Approved with Corrections Indicated" authorize the Contractor to proceed with the procurement/fabrication, assembly and construction of the works shown on the drawings, with corrections, if any, indicated thereon.

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

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

Drawings and documents marked "Noted" without comments are deemed approved. If comments/corrections are indicated thereon, the Contractor shall finalize the drawings/documents and resubmit for NPC review and reference.

GW-10.0 INSPECTION AND TESTS

GW-10.1 General

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

The Contractor shall submit five (5) copies of test procedures for NPC's review/approval for all his supplied materials and equipment covered by the Contract at least forty (45) calendar days prior to the conduct of actual test.

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

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

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

NPC shall provide the fuel, lubricating oil, lubricant, chemicals and other consumables to be used during the test and commissioning, unless otherwise specified in the relevant sections of the technical specifications.

During the test and commissioning period, NPC shall provide operation and maintenance personnel to conduct the test at site. The Contractor shall provide assistance to NPC in the operation and maintenance of the plant including any repair or adjustment resulting from faulty re-assembly and re-installation works. After installation of all equipment and devices supplied by the Contractor and the transferred equipment, the Contractor shall perform the required pre-commissioning test. All pre-commissioning tests to be performed for all transferred equipment and devices shall be closely coordinated with NPC.

GW-10.2 Tests at Contractor's Premises

GW-10.2.1 Inspection at Contractor's Premises

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

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

GW-10.2.2 Factory Acceptance Tests (If Applicable)

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

The Contractor shall carry out tests, as may be required by the specified Standards and the Quality Control and Assurance Program, as well as the entire test program approved by NPC. Prior to the witnessing of Factory Acceptance Test (FAT), the Contractor shall remove all faults found and correct all failures noted to the best of his knowledge such that no functional or procedural errors will occur during the test.

At the commencement of the witnessing the FAT, all equipment and materials shall be brought together in one place, integrated and the configuration/set-up at the factory shall be identical to that to be installed at the site and any equipment and software necessary for the proper operation of the equipment shall have reached its final form, not to be changed during the FAT and until commencement of commissioning at site.

The Contractor shall immediately advise NPC if and when failures occur, and take remedial action subject to NPC's approval and proceed with the FAT as and when directed by NPC. It shall be NPC's prerogative to order a repeat of all such tests that it deems may have been affected by the failure.

The Contractor shall ensure that during the test, all hard copies from output devices are retained and that no outside parties interfere in any way with testing, equipment or test instruments, fixtures and jigs for the entire duration of the FAT. Only Contractor's personnel who are needed on the testing of the equipment shall be allowed in the test area. The Contractor shall appoint a chief-tester who shall be responsible for conducting the test, ensuring at all times that the test instruments, fixtures, jigs and extender cards, and those of the Contractor's personnel who in any way may contribute to the test, including testers, specialists and maintenance personnel, and are available prior to scheduled commencement of each test as maybe instructed by the Contractor. The Contractor shall also be responsible that an accurate record of tests are kept and each individual test is duly initialed and dated by the Contractor and stamped or marked either "passed" or "failed" with annotations of antecedents and observations concerning the test. For each day of testing, the Contractor shall submit to NPC the proposed disposition of each criterion that failed during the previous day of testing, prior to commencement of the tests scheduled for that day. Tests witnessed by NPC will be initialed accordingly by him on the test record. The test record and dispositions, and any other pertinent supporting data and documents shall form part of a test report to be submitted in accordance with the specification.

GW-10.3 Pre-Commissioning/Commissioning Test

After installation of all transferred equipment and Contractor's supplied equipment, the Contractor shall provide the services of highly qualified Commissioning Engineer who shall be responsible in providing technical advice and overall supervision for the performance of the Pre-commissioning Tests. He shall also closely coordinate with NPC personnel who will be conducting the commissioning test.

All tests shall be carried-out in accordance with the approved procedures submitted by the Contractor or as directed/coordinated with NPC.

The Contractor shall be responsible in compiling, recording and submitting the test reports to NPC.

Measuring and testing instruments, tools, equipment and devices to be used for all of the Contractor's supplied equipment shall be supplied by the Contractor. Special tools and instruments especially designed and manufactured for the transferred equipment and components shall be furnished by NPC and the same shall be returned in good condition after use by the Contractor who shall be responsible for their safekeeping. In case of failure to return the tools and instruments, their value shall be debited to the Contractor's account.

GW-10.3.1 Pre-Commissioning Test

The following are typical Pre-commissioning Test functions to be conducted but not limited to:

a) Hydrostatic and pneumatic tests of field assembled equipment and piping;
b) Wiring continuity test;
c) Megger testing of equipment;
d) Alignment of equipment;
e) Checking of safety valve settings;
f) Checking of settings for switches and instrument transmitters;
g) Calibration of C & I equipment;
h) Checking and testing of electrical relays, CT's and PT's;
i) H.V. test for relevant equipment;
j) Functional test of all supplied equipment;
k) Checking for tightness, rotation, vibration, direction of auxiliary electrical motors, etc.;
l) Setting of protective devices;
m) Lube Oil flushing of field installed engine lube oil pipe; and
n) Chemical cleaning and Hot Oil Flushing of field installed engine piping system.

GW-10.3.2 Commissioning Test

The Commissioning Test shall be carried-out after the Pre-Commissioning Test has been conducted to ascertain its fitness for operation and shall include the following:

a) Trial run of individual auxiliary equipment;
b) System sequential operation;
c) Generating unit tripping device test;
d) No load operation of diesel generation sets;
e) Test of control systems safety and operating functions;
f) Unit synchronization;
g) Unit load test and load rejection tests (at 50%, 75%,100% and 110%);
h) Unit start-up/stop tests;
i) Automatic change-over of standby equipment;

GW-10.4 Tests Failures

If any equipment or component supplied by the Contractor fails to pass any test, or any transferred equipment fails to pass the test due to faulty installation by the Contractor, NPC may direct the Contractor to make any necessary corrections or alterations for defects or order equipment/component replacement, as maybe deemed appropriate.

Any and all expenses due to additional tests or retests made necessary by failure of Contractor's supplied equipment/component, e.i., failure to meet the guarantees and other requirements of the specification, and/or failure of transferred equipment due to faulty reassembly/installation, shall be borne by the Contractor. The costs of witnessing the Factory Acceptance Tests by NPC or his representative(s) as a result of re-test to be conducted on his supplied equipment shall also be borne by the Contractor.

GW-10.5 Test Reports/Certificates

Five (5) certified copies of the reports of all NPC's specified tests and other manufacturer standard tests shall be furnished to NPC within a maximum of fifteen (15) days following the completion of the tests. Test certificates shall include, in addition to the test results, the following information:

a) Date of the performance of test;
b) Equipment data;
c) NPC's tag number; and
d) The equipment serial number.

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

GW-10.6 Waiver of Factory Tests Witnessing/Inspection by NPC for Equipment to be Furnished by the Supplier

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

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

GW-11.0 QUALITY ASSURANCE REQUIREMENTS

GW-11.1 General

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

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

GW-11.2 Quality Assurance Program

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

a) Establish procedures for adequate planning and resourcing of all quality related activities including the preparation of quality plans;

b) Establish measures for the identification and control of items throughout all stages of the Contract. This shall include measures to maintain traceability as identified in agreed quality plans;

c) Arrange for the protection of the quality of the product to include delivery to the specified destination; and

d) Control their measuring and test equipment in accordance with the established procedures for measurements and calibration systems and ensure that such equipment that may be used by subcontractors to verify work is similarly controlled.

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

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

GW-11.3 Quality Plan

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

GW-11.4 Records

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

All records shall be concisely compiled, indexed and cross-referenced to the project contract number and the relevant subcontract numbers. They shall be clearly identifiable to the individual parts and assemblies to which they refer.

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

GW-11.5 Particular Quality Assurance (QA) Requirements

GW-11.5.1 General

As a supplemental document to the QA program, the Contractor shall submit for approval of NPC, a separate document with detailed particular requirements and specific acceptance criteria of all equipment.

GW-11.5.2 At Shop

Corresponding to each major and minor equipment, the following data are required for submission to and approval of NPC:

a) Test and inspection procedure;
b) Guaranteed technical rated or design data;
c) List of holdpoints and/or routine tests;
d) Acceptance criteria and reference standards; and
e) Test results/data with comparison to the guaranteed data. All allowable tolerances with respect to dimensional control of assemblies and sub-assemblies at shop shall be clearly indicated in the manufacturer's drawings.

GW-11.5.3 At Site

The dry tests at site shall be in accordance with the latest edition of ANSI or applicable IEC Standard.

NPC or its duly authorized representative shall control said site tests, in collaboration with the Contractor's representatives.

GW-11.6 Reporting and Corrective Action

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

GW-12.0 CORROSION PROTECTION AND PAINTING

GW-12.1 General

The Contractor shall apply corrosion protection and painting to all relocated/transferred equipment and facilities and those to be supplied by the Contractor including its associated structures and foundations in accordance with the provisions of this specification.

Considering that transferred equipment and structures have already been provided with final painting, painting is no longer necessary except for painted surfaces which have been damaged during the relocation works and therefore require touch-up painting or unless otherwise specified in the relevant sections of the specifications. Transferred equipment and structures whose surfaces are already corroded or show signs of corrosion shall be painted in accordance the requirements specified in this section or as recommended by the Manufacturer/Contractor subject to NPC's approval. Color of Final painting shall be similar to the existing final color of the transferred equipment and structures or as approved by NPC.

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

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

Within sixty (60) calendar days from the effectivity of the Contract, the Contractor shall submit for the approval of NPC, a full schedule of coating systems including the following information:

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

GW-12.2 Treatment for Shipping

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

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

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

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

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

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

GW-12.3 Application of Paint

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

No painting shall take place outdoor during the presence of rain, fog, dew or where the surfaces may be otherwise damp; in particular and no application of paint should be made on plaster surfaces that are not completely dry. No coating shall be applied unless the surface is at minimum of 30C above dew point.

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

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

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

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

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

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

All steel pipes laid underground shall be applied with two (2) coats of Coal Tar epoxy polyamide of 170 microns DFT each coat. Unless otherwise specified, asphalt jute or any approved equivalent may be used for pipes laid underground.

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

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

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

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

GW-12.4 Hot Dip Galvanizing

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

The thickness of applied layer shall correspond to a minimum rate of 600 gm/m^2.

GW-13.0 SPARE PARTS AND TOOLS

GW-13.1 Spare Parts

The Contractor shall supply all the spare parts listed and specified in the relevant technical specifications for all his supplied equipment under this contract. However, items not specifically mentioned but required for regular maintenance shall be supplied to ensure reliable operation for one (1) year from the date of Project Completion. Spare parts shall include all items that are expected to be consumed or replaced during the commissioning stage and these shall be identified in the Spare Parts List. Scope of supply does not include spare parts for relocated/transferred equipment.

During the Guarantee Period, if the quantity specified in the final list of spare parts is found not sufficient for one (1) year reliable operation, then the Contractor shall supply the additional spare parts at his own cost.

All spare parts shall be delivered into storage areas nominated by NPC and the delivery will be deemed to be complete when the packages have been opened by Contractor, their contents checked by NPC. The Contractor at his own cost shall replace damaged or incorrect item.

All bidders are required to submit in their proposal the detailed list of spare parts to be supplied with its corresponding costs. This list is preliminary and subject to changes in order to conform to the final design without any additional cost. The final list of spare parts shall be submitted to NPC for approval not later than one (1) month prior to the delivery of the equipment.

Contractor shall indicate the expected life of the parts requiring replacement and the minimum recommended inventory of the spare parts for installation, start-up, continuous operation and maintenance. Contractor shall state whether the recommended spare part is a stock item or a special item, and shall furnish name and location of the nearest Supplier, and approximate lead-time required for delivery.

GW-13.2 Tools and Appliances

The following tools and appliances shall be supplied under this Contract including all items listed in the relevant sections of the Technical Specifications which the Contractor shall give a full list with complete detail in the Schedule of Tools and Appliances:

a) One (1) set of standard and special tools and instruments required for start-up, test and commissioning, operation and normal maintenance of all the equipment and auxiliaries supplied by the Contractor; and.

b) Any special tools or appliances required solely for erection purposes.

Special tools are defined as all tools required for installation, assembling, dismantling and adjustment of all the works and usually not available in a standard machine shop.

Any special tools, instruments, devices and equipment made available to the Contractor by NPC for purposes of installation, erection and testing of the transferred equipment, shall be returned in good condition. In case of failure to return the specified tools and equipment, their value shall be debited to the Contractor's account.

Each tool or appliance supplied by the Contractor is to be clearly marked with its sign for purposes of identifying the name, function of each tool and the specific item(s) for which it is used. Each set of tools and appliances listed in a) above shall be fitted into a custom built lockable box clearly marked with the name of the item or equipment for which they are used and with a list of the tools contained, stamped and attached on an attached metal tab.

If the weight of any box, or its size, is such that it cannot be conveniently carried, it shall be supported on steerable rubber tired wheels. All large tools and wrenches shall be mounted on a suitable shadow board arranged for wall mounting.

Every special tool and instrument shall be accompanied or furnished with maintenance or instruction manuals in English language.

All tools and appliances supplied shall be handed over to NPC in perfect condition at the time of taking over.

All bidders are required to submit in their proposal the detailed list of standard and special tools to be supplied with its corresponding costs. This list is preliminary and subject to changes in order to conform to the final design without any additional cost. The final list shall be submitted to NPC for approval not later than one (1) month prior to the delivery of the equipment.

GW-14.0 MEASUREMENT OF PAYMENT

Measurement for payment for all works shall be based on the requirements specified in the relevant clauses of the technical specifications or 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 and for the satisfactory completion of the each work.

Failure of the Supplier to submit the approved "As-Built" or "Final" Drawings to NPC on the respective dates specified in Clauses GW-6.3.7 and GW-6.3.8, NPC shall withhold Five percent (5%) of contract amount from payments due to the Supplier

GW-15.0 CERTIFICATE OF COMPLETION AND ACCEPTANCE

When all the works and services have been satisfactorily completed as required in the Contract, the Contractor may give notice to this effect to NPC. Such notice shall be deemed to be the basis for NPC to issue a Certificate of Completion in respect of the Works within fifteen (15) days of receipt of such notice.

The Guarantee Period for the completed Works shall commence on the date of issue of the relevant Certificate of Completion.

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

The issuance of Final Acceptance Certificate shall entitle the Contractor to final payment and to full release of retention money.

GW-16.0 GUARANTEE

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

ANNEX 1.0

NATIONAL POWER CORPORATION

CERTIFICATE OF SITE INSPECTION

_____
(Plant Name/Delivery Site)

_____
Date

This is to certify that

_____ of
(Name of Representative)

_____ has conducted site
(Name of Company/Firm)

Inspection for the **TRANSFER OF 2 X 500 KW MAN B & W DIESEL GENERATING SET AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP.**

This certification is being issued to

_____
(Name of Company/Firm)

Authorized NPC Official:

Signature: _____

Name: _____

Position: _____

Contact No. _____

PART I

TECHNICAL SPECIFICATIONS

CW - CIVIL WORKS

SECTION VI – TECHNICAL SPECIFICATIONS

CW – CIVILWORKS

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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 Supplier/Contractor's construction equipment, setting up of the Supplier/Contractor's camp and the disposition of the Supplier/Contractor's various facilities at the end of the Contract.

CW-1.2 Moving-in

The Supplier/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 Supplier/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 SUPPLIER/CONTRACTOR'S CAMP FACILITIES

The Supplier/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 Supplier/Contractor deems necessary for maintaining health, peace and order in the camp and work areas. The areas that may be used by the Supplier/Contractor within the plant site shall be designated by the NPC.

The Supplier/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 Supplier/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 Supplier/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 Supplier/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 Supplier/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 Supplier/Contractor's operation, the Supplier/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 Supplier/Contractor shall indemnify NPC against all liabilities, claims, damages and/or lawsuits arising thereto.

CW-1.7 Construction Power

The Supplier/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 Supplier/Contractor elect to utilize the NPC's power supply, he shall make an arrangement with NPC concerned group as to the billing rates and other requirements needed for direct connection to NPC.

CW-1.8 Camp Security

The Supplier/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 Supplier/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 Supplier/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 Supplier/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 Supplier/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 Supplier/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 Supplier/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 Supplier/Contractor shall be responsible for dewatering foundation areas so that work can be carried out on a suitably dry condition. The Supplier/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 Supplier/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 Supplier/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 Supplier/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 STRUCTURAL EXCAVATION, FILL AND BACKFILL

CW-4.1 Scope

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

CW-4.2 Materials

CW-4.2.1 Structural Excavation

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

CW-4.2.2 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:

Sieve Designation (Square Mesh Sieves)	Percentage by Weight Passing
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-4.2.3 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-4.2.4 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 Supplier/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-4.3 Construction

CW-4.3.1 Excavation

a. General

The Supplier/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 Supplier/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 Supplier/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 Supplier/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 Supplier/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 Supplier/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-4.3.2 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-4.3.3 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 Supplier/Contractor as stated in CW-4.3.1b.

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-4.2.3.
Selected materials shall be placed in 15-cm layers and compacted until the required bearing capacity is attained.

CW-4.3.4 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 $cm^2$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-4.4 Measurement and Payment

CW-4.4.1 Structural Excavation

Measurement for payment for structural excavation performed by the Supplier/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-4.4.2 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-4.4.3 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-4.4.4 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-4.4.5 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-5.0 CONCRETE

CW-5.1 Scope

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

CW-5.2 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-5.3 Materials

CW-5.3.1 Cement

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

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-5.3.2 Reinforcing Steel

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

CW-5.3.3 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-5.3.4 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-5.3.5 Formwork

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

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

CW-5.4 Storage of Materials

CW-5.4.1 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-5.4.2 Reinforcing Steel

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

CW-5.5 Concreting

CW-5.5.1 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-5.5.2 Formwork Construction

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

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

Formwork for concrete placed underwater shall be watertight.

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

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

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

Coating: Before placing the concrete, the contact surface of forms shall be coated with a non-staining mineral oil or suitable non-staining form coating compound or shall be given two coats of nitrocellulose lacquer, except as specified otherwise. Mineral oil shall not be used on forms for surfaces, which are to be painted. For surfaces not exposed to view in the finished structure, sheathing may be wetted thoroughly with clean water. All excess coating shall be removed by wiping with cloths. Reused forms shall have the contact surfaces cleaned thoroughly. Those that have been coated shall be given an additional application of the coating. Plaster waste molds shall be layered with two coats of the thin shellac or lacquer and coated with soft or thinned non-staining grease.

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

CW-5.5.3 Placing Reinforcement

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

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

CW-5.5.4 Mixing Concrete

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

CW-5.5.5 Placing Concrete

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

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

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

CW-5.5.6 Finishing Concrete

After the concrete has been deposited, distributed and vibrated, the concrete shall be struck off and screened by mechanical means approved by the NPC. The finishing machine shall be of the screening and troweling type designed and operated both to strike off and to consolidate. Hand finishing may be

employed when suitable finishing machines are not available. Finishing of concrete shall be done, as directed, to the satisfaction of the NPC.

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

CW-5.5.7 Removal of Forms

Formwork shall not be removed without the permission of NPC; where such permission, however, shall not relieve the Supplier/Contractor of its responsibility for the safety of the work. Blocks and bracing shall be removed at the time the forms are removed and in no case shall any portion of the wood forms be left in the concrete.

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

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

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

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

CW-5.5.8 Curing and Protection

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

CW-5.5.9 Sampling and Testing of Concrete

The Supplier/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 Supplier/Contractor's expense.

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

As work progresses, test cylinders shall be fabricated from the concrete samples and tested in accordance with ASTM C31 and ASTM C39. At least one set of four (4) cylinders shall be made from each 10 cu.m of the concrete placed of each class. Also at least one set shall be made per day for each class of concrete placed each day.

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.

Concrete deemed to be not acceptable using the above criteria maybe rejected unless the Supplier/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-5.5.10 Tolerances and Repair for Concrete Construction

Concrete structures shall be constructed to the lines shown on the drawings or where so required to suit actual field requirements. Any structure that does not conform to such lines shall be repaired or removed and made anew by the Supplier/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-5.5.11 Second Stage Concrete

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

CW-5.6 Measurement and Payment

Measurement for payment for Concrete, except concreting works that are associated to various construction and/or installation/erection works (i.e. equipment foundation and pedestals, perimeter wall footing and posts, etc.) included in the Bill of Quantities under separate pay item, will be based on the volume of concrete placed and accepted within the neat lines of the structure as shown on the drawings or in accordance with the manner of measurement set forth in the various sections of the Technical Provisions. No deduction will be made for rounded or beveled edges or space occupied by the metal items 10 sq. cm. or less in cross section, embedded in concrete.

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

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

CW-6.0 REINFORCING STEEL

CW-6.1 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-6.2 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-6.2.1 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-6.2.2 Sampling

The NPC's Representative will sample reinforcement bars at the source of supply or at the point of distribution, and the Supplier/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-6.3 Construction Requirement

CW-6.3.1 Order List for Bent Bars

Before materials are ordered, the Supplier/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 Supplier/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 Supplier/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-6.3.2 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 6mmΦ to 20mmΦ inclusive	D=6d
Bars 25mmΦ and 28mmΦ	D=8d
Bars 32mmΦ 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-6.3.3 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-6.3.4 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 takes precedence over all permissible reinforcement placement variations; nothing in the variations listed below is to be constructed 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-6.3.5 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 Supplier/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 Supplier/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 Supplier/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:

Splice Type	Grade 40 Min.Lap	But Not Less Than
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 (11/2) turns or by butt-welding unless otherwise shown on the drawings.

CW-6.4 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:

Designation	Size (mm)	Weight (kg/m)
#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 Supplier/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 Supplier/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-7.0 STRUCTURAL STEEL

CW-7.1 General

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

CW-7.1.1 Submittals

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

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

Certificates of Conformance for the following:

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

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

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

CW-7.1.2 Delivery and Storage

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

CW-7.2 Materials

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

Except as modified herein, blast clean surfaces in accordance with SSPC SP6. Wash clean surfaces that become contaminated with rust, dirt, oil, grease or other contaminants with solvents until thoroughly clean. Ensure that steel to be embedded in concrete and surfaces when assembled, are free from rust, grease, dirt and other foreign matter.

CW-7.2.1 Steel

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

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

CW-7.2.2 Bolts, Nuts and Washers:

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

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

CW-7.2.3 Accessories:

Welding electrodes and steel structural members shall use:

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

CW-7.3 Execution

CW-7.3.1 Fabrication

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

CW-7.3.2 Welding of Structural Steel Work:

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

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

CW-7.3.3 Shop Painting

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

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

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

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

CW-7.3.4 Erection

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

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

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

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

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

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

Any structure that does not conform shall be repaired, removed and/or erected anew by the Supplier/Contractor at no additional cost to NPC.
Tolerances on structural steel shall be in accordance with the "Code of Standard Practice" of the AISC "Manual of Steel Construction".

CW-7.3.5 Tests and Inspections

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

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

[1] Not applicable on non-critical structures/joints and as directed/required by NPC Design Engineer.

CW-7.4 Measurement and Payment

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

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

CW-8.0 REINFORCED CONCRETE FOUNDATION AND ASSOCIATED STRUCTURES FOR EQUIPMENT AND OTHER COMPONENT (DESIGNED/CONSTRUCTED BY SUPPLIER/CONTRACTOR)

CW-8.1 Scope

In accordance with the specification contained in this section, the Supplier/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-8.2 Design and Construction

The design and construction of reinforced concrete foundations and other elements for equipment and related component to be furnished by the Supplier/Contractor shall be the responsibility of the Supplier/Contractor. Reinforced concrete foundations shall be designed based on the actual weights, dimensions and relevant design parameters of the equipment and structures subject toNPC'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 Supplier/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 Supplier/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-8.3 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.

PART I

TECHNICAL SPECIFICATIONS

MW - MECHANICAL WORKS

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SECTION MW - MECHANICAL WORKS

MW-1.0 GENERAL

The works 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 or as otherwise directed by NPC for the **Transfer of 2 x 500 kW MAN B & W Diesel Generating Sets and Auxiliaries Including Electrical Equipment from the Busuanga DPP (BDPP) to Rizal DPP (RDPP).**

The work shall be performed and completed with high quality workmanship in accordance with generally accepted modern practice in the dismantling; crating and packing as applicable; transport and hauling; loading and unloading; construction of equipment foundations; re-assembly; supply, installation and test of Balance-of-Plant (BOP) including those irretrievable and those that will be damaged during dismantling, transport and re-erection; painting; documentation; inspection; assistance to testing and commissioning; and clean-up activities.

All equipment and materials which the Contractor shall supply and install shall be new and unused. They shall be suitable for their intended purpose and shall comply with all applicable regulations, quality and dimension standards.

The Contractor shall strictly observe the requirements specified in this specification in conjunction with those specified in Section GW - General Works specifications. This section shall take precedence over the General Works specifications in case of any contradiction.

MW-2.0 SCOPE OF WORK

The Contractor shall furnish all supervision, labor, materials, supplies, tools and equipment to complete all the Mechanical Works specified in Clause GW-2.4 of the General Works specifications.

The Contractor shall carefully store and maintain all dismantled equipment and materials transported to the new location site, if not immediately re-assembled/re-installed, including equipment and BOP to be supplied by Contractor until such time as they are required/installed at their new location. The Contractor shall provide temporary shelter/cover such as tarpauline or equivalent type of cover for protection of the equipment during the storage.

The scope shall include all works and services, although not specifically mentioned and detailed but are required for the safe, efficient, and reliable operation of the diesel generating set.

MW-3.0 MECHANICAL WORKS GENERAL REQUIREMENTS

MW-3.1 General

The requirements specified herein shall apply to all equipment and materials to be supplied by the Contractor and those to be transferred from BDPP to RDPP.

The Contractor shall provide the services of qualified engineers who shall be responsible for the dismantling; re-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.

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

MW-3.2 Equipment Foundation

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

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

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

The 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.

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

MW-3.3 Piping System

MW-3.3.1 General

The Contractor shall supply and install all the piping system as required and specified to provide a complete and acceptable installation necessary for the safe and efficient operation of the 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 shall submit, if required to suit actual site conditions, for NPC's review and approval detailed drawings covering the arrangement, actual layout, route and interface connections. Any required modification from the approved drawings or specification to suit actual site conditions, shall be permitted only with prior consent of NPC.

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

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

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

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

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

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

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

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

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

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

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

Unless otherwise stated, all piping shall be designed for a Nominal Pressure of 10kg/cm^2.

Where pipeline are laid, the trench shall be provided with a cushion pad of at least 150 mm sand and sandy soil bedding materials prior to pipe laying, unless otherwise shown on the drawings.

Asphalt jute of 6 mm thickness or approved equivalent shall be applied to the external surface of pipes laid underground. Prior to application of asphalt jute, the external surfaces shall be primed with two (2) coats of Coal Tar epoxy polyamide of 170 microns DFT each coat. Galvanized pipes need not be required to be primed and shall be applied directly with asphalt jute or approved equivalent.

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

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

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

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

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

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

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

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

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

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

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

MW-3.3.2 Pipe and fittings

Unless otherwise specified, all pipes to be used shall generally conform to ASTM A 53, Grade A, seamless or welded 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.

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 and 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-3.3.3 Drains and Vents

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

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

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

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

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

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

MW-3.3.4 Pipe Supports

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

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

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

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

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

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

When the pipe is covered with insulation and is to rest on the support, protection saddles shall be used whenever possible. Protection saddles shall be welded to the piping to prevent slipping and/or falling. The saddle material shall be the same as the pipe material, however, alloy saddles shall not be welded to alloy piping in the field. On lines of 50 mm diameter and below where service temperatures are 100 ^{0}C and under, the pipe shall slide or rest directly on the support and shall be left bare of insulation at such locations.

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

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

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

MW-3.3.5 Welding

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

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

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

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

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 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-3.3.6 Insulation and Lagging

All insulation materials to be supplied under this contract shall be submitted to NPC for review and approval which shall include the type, quality, characteristics and schedule of insulating materials.

All piping, ducting, vessels and equipment which could have a surface temperature of 50 ^{0}C or higher shall be furnished and installed with insulation material.

The external surfaces of the insulation materials shall not exceed 50 ^{0}C with 30 ^{0}C ambient temperature.

All finishing materials shall permit differential expansion between the finish and the insulated surface.

The piping and equipment shall be completely insulated before the commencement of the trial operation, but the final lagging of all valves, fittings, and pipe flanges shall not be carried out until the system has been continuously under operating pressure and temperature for at least two (2) weeks, so as to enable the joints to be inspected.

Piping insulations shall be finished with easily removable aluminum covering. However, piping to be arranged in trenches should be covered with insulating materials held in place with galvanized woven wire mesh. Over the mesh, a coat of refractory cement shall be applied and the whole covered with bitumastic or equivalent paint to render it waterproof.

All outdoor insulation shall be completely weather tight sealed.

All insulation shall be covered with 0.5 mm and 1.0 mm aluminum sheets jacket for piping and vessels having diameter of 200 mm or less and above 200 mm, respectively.

Pipe flange insulation shall be in the form of aluminum sheet boxes lined either with mineral wool blanket or preformed block insulation so arranged such as it can be removed for inspection or maintenance without disturbing the insulation of adjacent pipework.

Valves are to be insulated with metal boxes in the same manner as for pipe flanges.

MW-3.4 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 or included in the relocation works shall be installed in accordance with the requirements specified herein.

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

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

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

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

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

All valves shall be located and designed so that the maintenance and change of valve internals is possible without removing the valve casing from the pipe.

The stems of all valves for outdoor service shall have weatherproof protection covers of approved construction.

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

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

All valves 65mm and larger shall have a body and bonnet material of at least cast iron. Cast steel material shall be used for high pressure or temperature applications. Stem, seat ring & seat, wedge or disc shall be made of bronze, for high pressure or temperature applications stainless steel shall be used.

Valves 50mm and below shall be made of bronze unless otherwise other materials are approved by NPC.

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

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

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

Gate and globe valves, 50mm and smaller shall be made of bronze 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 57 kg (125 lbs).

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

MW-3.5 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-3.6 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-3.7 Nameplate and Labels

Equipment, valves and instruments to be supplied by the Contractor under the Balance of Plant, shall be provided with nameplates which are engraved thereon the Standard Plant Identification Number or SPIN, Equipment Description, Type, Serial No. and other data per Manufacturers Standard including Labels in accordance with the requirements specified in Section GW-5.0 – Equipment Marking, of the General Works specifications.

MW-4.0 DISMANTLING, TRANSPORT/HAULING AND INSTALLATION

MW-4.1 General

Generally, all equipment, materials and associated steel structures to be dismantled, transported/hauled, re-assembled and installed shall come from the BDPP to its new location within the RDPP site.

The equipment and materials shall consist mainly of two (2) 500 kW MAN Diesel Generating Sets and its auxiliaries including associated electrical equipment and other devices specified in the relevant sections of this specification.

The general requirements for the dismantling, transport/hauling, re-assembly, and installation of all equipment to be transferred shall be as specified in Clause GW-6.0 of the General Works specification.

All works shall be properly coordinated with other fields and with existing installations, structures, piping, and equipment so that interference shall be avoided. All existing structures, equipment and piping which cannot be avoided by the works shall be appropriately relocated, re-installed, and restored to its original appearance by the Contractor with prior approval from

NPC. The Contractor shall provide all necessary materials for all the required relocation and reinstallation activities.

Final adjustments in the location of any other equipment, if necessary, shall be done in the field by the Contractor 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 by NPC. The Contractor shall return the same in good condition after use. In case of failure to return the tools, instruments or devices and equipment, their value shall be debited to the Contractor's account.

The Contractor 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.

All transferred equipment and materials shall be stored at the temporary storage yard to be designated by NPC within the RDPP by the Contractor.

MW-4.2 Scope of Work

The Contractor's scope of work shall cover the dismantling, hauling/transporting, re-assembly, installation/erection, assistance to test and commissioning of all transferred mechanical equipment and materials including its associated auxiliaries from BDPP to RDPP as specified in Clause GW-2.0, General Works specifications.

The Contractor 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 Contractor shall supply all the required piping materials, pipe fittings, pipe supports/racks, valves as required and other piping accessories to complete the various piping systems.

The Contractor shall supply all materials/parts that will be damaged during dismantling works including irretrievable/defective materials/equipment, those that are lacking in measure or quantity, and those that are not suitable for re-installation in the new location. It shall include, but not limited to replacement bolts, including anchor bolts for Diesel Gensets 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 shall match the specifications of the original ones. In case of difficulty in procuring such materials/parts, the Contractor 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 and/or touched-up by the Contractor in accordance with Section GW-12.0, Corrosion Protection and Painting, of the General Works Specifications.

The Contractor shall assist NPC in conducting all the tests required for the transferred equipment including the pre-commissioning test and assistance during the commissioning test of the transferred equipment and auxiliaries in accordance with Section GW-10.0 of the General Works Specifications. The Contractor shall perform any repair or adjustment resulting from faulty re-assembly and re-installation works at no cost to NPC.

MW-4.3 Erection and Installation Requirements

The general requirements for the erection and installation requirements of all equipment to be transferred shall be as specified in Clause GW-8.0 of the General Works specification.

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 mechanical equipment and associated auxiliaries shall be as shown on the bid drawings.

Any transferred equipment that are not indicated in the drawings shall be installed by the Contractor as directed by NPC.

MW-4.4 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 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 shall give due notice to the NPC field inspectors in advance whenever such foundations are available for placement of equipment.

The Contractor shall make all necessary preparation prior to the testing and shall provide the testing instrument/apparatus. The Contractor shall submit to NPC a work inspection and test procedure covering the equipment installed and shall be in accordance with Section GW-10.0 of the General Works specifications. An agreement is to be established on the degree of inspection and tests to be witnessed by NPC and his authorized representatives before the start of testing.

Test not requiring the presence of NPC shall be, in any case, notified in advance, otherwise such tests shall be deemed unsatisfactory and shall not be accepted. On the other hand, the Contractor shall then proceed with the tests and shall submit test reports in five (5) copies to NPC.

Test not requiring the presence of NPC shall be, in any case, notified in advance and the Contractor shall then proceed with the tests and submit the test reports in five (5) copies to NPC within a maximum of fifteen (15) days following the completion of the tests. Failure to notify NPC in advance of such tests to be performed shall be deemed unsatisfactory and shall not be accepted.

After installation of all the transferred equipment and its associated auxiliaries and accessories, NPC shall conduct test with the assistance of the Contractor in accordance with the requirements specified in clause GW-10.0 of the General Works specifications.

MW-4.5 Defects and Damages

Defects and damages to the equipment including existing equipment and structures resulting from faulty disassembly, re-assembly, transport/shipment and installation works by the Contractor shall be repaired/corrected and/or replaced at no cost to NPC.

MW-4.6 Inventory of Equipment to be Pulled Out/Dismantled and Transferred

Immediately upon effectivity of the Contract, NPC and the Contractor 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 dismantled, repacked, transported and installed to the new location.

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

The mechanical equipment/materials and its associated structures which shall be dismantled, hauled, transported, re-assembled, installed, assisted for testing and commissioning by the Contractor are enumerated and described in Clause GW-4.3.1 of the General Works specifications along with the electrical equipment in Clause GW-4.3.2 and plant structures and equipment's associated structural supports in Clause GW-4.3.3.

The Contractor 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 re-installation in the RDPP.

MW-5.0 FUEL OIL TRANSFER SYSTEM

MW-5.1 General

This section provides the essential information for the Fuel Oil Transfer System and Storage System to provide a complete and continuous fuel oil supply/recirculation for the relocated gensets' fuel requirements.

The work shall include the supply, installation and test of all new equipment as 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.

MW-5.2 Scope of Work

The scope of works shall cover the following essential requirements for Fuel Oil Transfer System and Storage System which shall include but not limited to:

a) Supply, installation and test of one (1) set of 3.0 m^3/hr. Leak Fuel Transfer Pump complete with piping, fittings, valves, instrumentation and controls, spare parts for one (1) year operation per Manufacturer's recommendation and other accessories to the existing day tank.

b) Supply, installation and test of one (1) set of 1.0 m^3 capacity Leak Fuel Tank complete with piping, fittings, valves, instrumentation and controls and other accessories; and

c) Supply, installation and test of one (1) lot of piping materials, pipe fittings, pipe supports as required and other accessories to complete the system including cleaning/flushing interconnections with the existing fuel oil supply piping.

MW-5.3 Piping Materials

Fuel oil piping shall be constructed from ASTM A53 Gr. A, 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 butt/socket welded joints and fittings.

Fuel oil piping shall generally be installed above ground. Fabrication and installation of piping shall generally be in accordance with Section MW-3.3 of this specification.

MW-5.4 Cleaning and Flushing

The Contractor shall make all necessary preparation prior to the cleaning and flushing of transferred and new pipelines and shall provide the cleaning and flushing instrument/apparatus. The Contractor shall submit to NPC a cleaning and flushing procedure covering the transferred and new pipeline for fuel, cooling and lube oil and shall be in accordance with ASTM D4174.

MW-5.5 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 Contractor at his own expense to the satisfaction of NPC.

After installation of the transferred equipment has been completed by the Contractor, NPC shall conduct functional and performance test with the assistance of the Contractor in accordance with the requirements specified in Clause GW-10.0 of the General Works specifications.

MW-5.6 Painting

Painting/repainting of Leak Oil Tank, pumps, piping and other accessories shall generally be applied in accordance with the requirements of Section GW-12.0, General Works specifications, unless otherwise specified below.

MW-6.0 WATER SOFTENING SYSTEM

MW-6.1 General

The gensets shall also utilize the existing BDPP's Water Softening System to be transferred and shall be tapped to the existing water supply lines of RDPP to provide the necessary make-up cooling water for the engine high and low temperature cooling system.

The Water Softening System is a skid mounted and operated on a 480 V, 60 hz, 3 phase which shall be tapped to the motor control center of the plant.

MW-6.2 Scope of Work

The scope of works shall consists of but not limited to the following requirement for existing BDPP's Water Softening System to be transferred:

a. Supply, installation and test of piping materials, pipe fittings, pipe supports as required and other accessories to complete the water softening system including interconnections to diesel generating set cooling system.

MW-6.3 Acceptance Test

Before the Completion of Works, the transferred equipment shall be tested by NPC with the assistance of the Contractor to determine whether the requirements of the system have been met. Any defects found that are inherent in the hauling and installation works shall be remedied at the expense of the Contractor.

MW-7.0 COMPRESSED AIR STATING SYSTEM

MW-7.1 General

The Compressed Air Starting System shall be of optimum capacity to provide the transferred diesel generating sets with the necessary air supply during start up. Manufacturer's standard air starting system which differs from the system described below and shown on the drawing may be considered subject for NPC's approval.

MW-7.2 Scope of Work

The work shall include the supply, installation and test of new equipment as 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. Supply, installation and test of two (2) sets of Motor-Driven Air Compressors, 20 m^3/hr. (2 x 100% capacity) minimum capacity @ 30 bars, complete with associated valves, drain trap, relief valve, pressure gauges, controls and instrumentation, recommended spare parts & tools and accessories; and

b. One (1) lot of Compressed Air Piping Materials, valves, including pipe fittings, gaskets, flanges, bolts and nuts, pipe supports and other incidentals to complete the safety and relief valves including interconnection with the existing Compressed Air supply pipe; and

The supplied air starting system shall utilize the existing BDPP's two (2) units air receiver to be transferred.

The air starting system shall be complete with valves, relief valve, pressure reducing valve, pressure gauges and switches, piping, other accessories and controls for safe and reliable operation of the compressed air system as shown on the attached P & I diagram. An alarm shall be annunciated in the control panel in the event of low pressure in the compressed air system.

The power supply of the motor driven air compressors shall be 480 V, 60 hz, 3 phase or as required by the Manufacturer/Contractor which shall be sourced from the supplied motor control center.

Motor starters and pressure controllers shall be included in the motor-driven air compressor to automatically maintain the air pressure.

Each compressor shall be supplied complete with necessary controls including the specified and recommended spare parts, tools and other accessories.

Each compressor and driver shall be mounted on a steel frame provided with synthetic rubber or spring pads for elastic non-vibration mounting.

Manual and automatic operation shall be provided for the air compressed air system both at locally mounted panel and remotely at the generator control and protection's auxiliary panel.

MW-7.3 Spare Parts

The Contractor shall supply the standard spare parts for one (1) year operation or as recommended by the manufacturer. Any replacement spare parts required during the warranty period shall be supplied by the Contractor at no cost to NPC.

MW-7.4 Acceptance Test

Before the Completion of 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.

MW-7.5 Submittal

The Contractor shall submit the type and model of the compressed air system for the approval of NPC prior to purchase.

MW-8.0 INSPECTION AND TESTS

All tests and inspections (shop test, site test and commissioning) shall be carried out in accordance with the requirements specified in Clause GW-10.0, Inspection and Tests of the General Works Specifications, relevant sections of the specific technical specifications (Civil, Mechanical & Electrical Works specifications) and respective test procedures duly approved by NPC.

When the generating sets are ready for commercial service, reliability test shall also be conducted continuously without major failure for a period of twenty four (24) hours or at any programmed/scheduled operating hours available at the plant site which the generating sets and all its associated auxiliaries are required to operate under the normal working conditions of the power plant.

Prior to the tests, the Supplier shall submit five (5) copies of test procedures for NPC's review/approval for all equipment covered by the Contract at least forty five (45) calendar days prior to the conduct of actual test. No tests shall be conducted unless relevant test procedures are submitted and approved by NPC.

MW-9.0 PAINTING

The Supplier shall be responsible for the application of protective coating of all equipment and materials supplied by the Contractor in accordance with the manufacturer's recommendation or otherwise specified in Clause GW-12.0 of the General Works specifications.

The Contractor shall apply corrosion protection and painting to all relocated/transferred equipment and facilities including its associated structures and foundations in accordance with the provisions of this specification.

The scope shall include adequate supply of touch-up coating which shall be used for painting of all supplied equipment and materials that will be damaged during shipment, unpacking and installation works including surfaces that show signs of corrosion.

Final color to be used for the generating sets and auxiliaries shall conform to Manufacturer's standard, unless otherwise specified. Application of painting shall be in accordance with the recommendation of the coating manufacturer.

Final Color of the Pedestal or Free Standing type control panel shall conform to Munsell No. 5 Y 8/1or as directed/approved during contract stage. Application of painting shall be in accordance with the recommendation of the coating manufacturer.

Before any painting is made, all surfaces must be prepared properly, removing rust, scale, welding slugs and spatters, grease and encrustation of any nature. The various paints to be used shall be of approved quality and type.

MW-10.0 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 required excavation, sand bedding, backfilling, testing, painting and other works and services described in the pertinent provisions of the specifications.

PART I

TECHNICAL SPECIFICATIONS

EW - ELECTRICAL WORKS

PART I – TECHNICAL SPECIFICATION

SECTION EW – ELECTRICAL WORKS

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SECTION EW - ELECTRICAL WORKS

EW 1.0 GENERAL ELECTRICAL REQUIREMENTS

EW-1.1 General

The transfer of two (2) units 500kW MAN diesel generating set from Busuanga DPP to Rizal DPP, including the supply of additional and/or replacement of associated electrical equipment/parts for medium and low voltage installation, shall be complete with all the requirements firmly and safely connected and interconnected with operating switches, interlocks, signalization, alarms and metering instruments to the extent required to put the power plant in satisfactory operating conditions.

All minor items (such as auxiliary relays, terminal blocks, accessories, etc.) which are necessary although not expressly described in the Technical Specifications must be supplied by the Contractor in order to guarantee the trouble free operation and ease in the maintenance of the transferred and supplied equipment (or parts of equipment supplied) with particular reference to the provisions to be taken into consideration in order to avoid dangerous or wrong operations.

All equipment to be transferred including all additional and/or replacement shall be designed/installed/aligned in such a way as to bear without damage and permanent deformation the consequences of over-voltage of internal or atmospheric origin and short circuit calculations shall be provided, giving full evidence, that each electrical component can withstand the maximum stresses under fault conditions, e.g., upon failure of the corresponding main protection device and time-delayed fault clearing by the back-up protection device.

Outdoor installations shall be protected against solar radiation by means of adequate covers, where required, with non-deteriorating material to be supplied by the Contractor.

The Contractor shall ensure that all equipment is insensitive to any signals emitted by wireless communication equipment.

All the metallic frames of the electrical equipment shall be securely connected to the general earthing system in compliance with accepted Standards.

EW-1.2 Scope of Electrical Works

The scope of electrical work covers the furnishing of all labor, materials, equipment, tools and other necessary incidentals for the complete operation of electrical system of the plant which shall essentially consist of but not limited to the following:

a. Dismantling, Hauling, Transportation, Packing/Unpacking, Re-assembly, Installation, Filling of Insulating Oil, Test and Commissioning of the following electrical equipment:

   1. 2 x 630kVA, 480V/13.53kV, 3-phase, 60Hz Generator Transformer including draining and storing of the existing insulating oil to the designated storage facility by plant head/personnel; and

   2. 1 x 160kVA, 13.53kV/240V, 3-phase, 60Hz Auxiliary Transformer including draining and storing of the existing insulating oil to the designated storage facility by plant head/personnel.

b. Dismantling, Refurbishing, Hauling, Transportation, Packing/Unpacking, Installation and Test of Auxiliary Control and Monitoring Panel;

c. Supply and Test of Insulating Oil for the Generator Transformers and Auxiliary Transformer;

d. Supply, Installation, Test and Commissioning of the following new electrical equipment:

   1. Generator Control and Protection Panel (GCPP) for 2 x 500 kW D/G set equipped with monitoring, metering, control, protection and synchronizing equipment/devices;

   2. 15 kV Fuse Disconnect Switches with Lightning Arrester Combination; and

   3. Bus Conductor and Line Materials and Hardware;

e. Supply, Laying and Test of Power, Control and Instrumentation Cables including appurtenances required for the interfacing of all equipment;

f. Supply, Installation and Test of Grounding Materials complete with ground conductors, ground rods, weld metal powder and other grounding accessories including connection of the transferred and/or supplied electrical equipment to the existing grounding system;

g. Supply and Installation of Conduit and Cable Trays System;

h. Replacement of parts, accessories, protective relays and other instruments of electrical equipment to be transferred necessary for the smooth operation of the generating sets; and

i. All other works and services including those not specifically detailed herein but are required to complete the project.

EW-1.3 Codes and Standards

Unless specified otherwise in the various sections of this technical specifications for equipment, the design, materials, manufacture and testing of all works under this Contract shall comply with the latest revision or edition of the various standards specified for each equipment section of the specification.

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

In addition to the codes and standards mentioned in the technical specification for each equipment, 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.

No deviation from the accepted standards shall be made subsequent to the Contract without the written approval of NPC.

Standards listed in individual technical 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. Contractor shall submit copies of such standards for NPC's review and approval.

EW-1.4 Insulation Levels

The insulation levels for different system voltages shall be as indicated on the section of the equipment

EW-1.5 Minimum Clearances

The center-line spacing and clearances above ground level of the conductors shall be as shown on the bid drawings, or in the absence of such information, shall match the ANSI or IEC Standards.

Clearances of energized metal parts are summarized below:

Nominal System Voltage	*d_1 (mm)*	*d_2 (mm)*	*D (mm)*	*H (mm)*
13.8	300	350	900	3500

where: d_1 = minimum clearance between live metal parts and ground

d_2 = minimum clearance between live metal parts of two phases

D = practical distance between phase center lines

H = minimum height of live conductors above ground.

EW-1.6 Creepage Distance

Creepage distance of bushing of equipment, string of insulators, station post insulators and rigid support insulators shall comply with the requirements stipulated in the section of the equipment.

EW-1.7 Auxiliary Services Voltages

The auxiliary equipment shall be designed for the conditions of voltage and frequency mentioned in the section of the equipment.

EW-1.8 Color Standard

Each equipment shall be painted in accordance with the color specified herein.

Equipment	*Color*
Outdoor equipment	RAL 7035 or natural anodized
Indoor Equipment (including inside cubicle)	RAL 7032

EW-1.9 Color and Code of Phase Indication

Color and code of phase indication shall be as follows:

Phase	*Color*	*Code*
First phase	Red	A
Second phase	Yellow	B
Third phase	Blue	C

EW-1.10 Environmental Requirement and Operating Conditions

All equipment shall conform with the environmental requirements and conditions applying to the location where it is to be used. Additional heating by equipment inside buildings must be taken into account.

All equipment and materials to be furnished/transferred shall meet the performance and rating requirements of this specification and all Contractor's guarantees shall be based on operation within the prevailing environmental conditions. This also applies during storage and if susceptible to moisture absorption or fungus attack, the equipment and materials shall be treated with fungicidal varnish and otherwise be adequately tropicalized as far as necessary in accordance with national and international environmental and health and safety regulations.

Special measures shall be taken such as the use of chemically treated insert parts and proper surface preparation and paint application in accordance with this Specification for equipment installed at Site with a corrosive atmosphere, to protect exposed metal parts and other materials susceptible to chemical reaction.

Materials susceptible to deterioration from climatic conditions or subject to the formation of fungus or any other form of parasitic life shall preferably not be used, but if used and cannot be avoided, these must be permanently protected.

For all outdoor equipment, the operation of the equipment must not be influenced by dew, fog, rain, wind, sun radiation, quick changes of temperature, dust, smoke, salts, aggressive gases, and steams. Outdoor installations shall be protected against solar radiation by means of adequate covers, where required, with non-deteriorating material to be provided by the Contractor.

EW-1.11 Interchangeability and Standardization of Small Equipment

All like parts shall be fully interchangeable with no requirement for alteration or adjustment.

The Contractor shall be responsible for the standardization of all small equipment, materials and devices to be supplied. Necessary coordination work shall be arranged and performed with the manufacturers for the purposes of such standardization.

All equipment, parts and elements of mass production shall be standardized. Such items of equipment, parts and elements shall include, but shall not be limited to, the following:

a. Motors
b. Flanges
c. Valves
d. Bolts
e. Gauges and detectors

f. Electrical instruments and measuring devices
g. Terminals and terminal boxes
h. Primary, secondary and auxiliary relays
i. Contactors, fuses and switches
j. Lamps, bulbs, sockets, plugs, pushbutton, etc.
k. Lubricants
l. etc.

EW-1.12 Surface Treatment and Corrosion Protection

EW-1.12.1 General

Equipment and all steel parts shall be painted, hot-dip galvanized or treated with protective coatings to prevent corrosion and provide a smart and pleasing appearance. This work shall comprise the surface treatment, priming and application of paint or metallic coatings in the workshop and at the site, including all paint repair works that may be necessary. Corrosion protection shall include the steel surfaces of structures cast into concrete.

The works of corrosion protection shall include all equipment and installations for sand blasting and paintings.

The Contractor shall furnish, with his proposal, a complete description of the corrosion protection he intends to provide. After purchase order, the Contractor shall submit applicable cleaning and coating procedures and specific description of coating material to be used.

Where possible, equipment shall be designed such that all surfaces can be finish-coated or recoated after erection at the site.

EW-1.12.2 Requirements to the Finished Coating

All finished surfaces shall be level and free of tears, burrs, clots and impurities. The coat of paint shall be of even thickness, also in corners and on edges. Moreover, all finished surfaces shall be uniform in respect of color and gloss.

The paint film, under visual examination, must in any case present the appearance of an accurate application and be free of lesions, porosity, cracks or bubbles.

Any damage during transport, mounting, welding, etc. shall be repaired by Contractor. Repair methods shall be submitted for approval of NPC. This also applies to damages to components supplied by a sub-Contractor.

EW-1.12.3 Guarantees

The guarantee period of the paint work shall be two (2) years. During this period, it will be the responsibility of the Contractor to repair or replace without charge all paintwork showing defects (such as discoloration, peeling, wrinkles, bubbles, flakes or rust, etc.) where it may be proven that the deterioration arises from:

a. Poor quality paint;
b. Insufficient cleaning of the surface before painting;
c. Incorrect choice of paint for the service required; and
d. Incorrect application of paint itself to the surface.

In such cases, the Contractor shall take charge of restoration of all parts which have shown defects.

For the guarantee against corrosion penetration, NPC requires a ten-year guarantee period. The rust penetration shall be measured according to ISO 4628/3-1982. After ten years, the rust penetration shall not exceed Ri 2. Ri 3 penetration shall entitle NPC to repair the surface at the expense of the Contractor.

The guarantee shall commence on the day of the issuance of the Certificate of Provisional Acceptance.

EW-1.12.4 Reference Standard

Except otherwise specified elsewhere in the specification, the surface treatment and corrosion protection for all metal parts shall be in conformity with the latest revision of the standards listed below:

ASTM 123	Zinc (hot-dip galvanized) coating on Iron and Steel products
DIN 55928	Protective painting of steel structure instructions
DIN 55945	Painting Materials – Notions
DIN 18363	Paint work – Buildings
DIN 18364	Surface Protection Work for Steel
DIN 53210	Determination of Rust Degree
DIN 55151	Determination of Adhesion
ISO 4628/3	Determination of Rust Penetration

Other internationally known standards however, shall also apply provided such standards are equivalent in all respect with the reference standards prescribed above. The Contractor shall submit copies of such standards for NPC's review and approval.

EW-1.13 Equipment Designation (Equipment Marking)

EW-1.13.1 Identification System

All equipment and all component parts including cables, control wiring and terminals shall be designated with an alphanumeric code allowing clear identification of the equipment and components during design, installation and operation of the plant/substation. Equipment, cables, control wiring and terminals shall be systematically marked, both on the drawings and documents and on the equipment, cables, wires and terminals themselves.

Equipment designation codes shall be indicated on all planning 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.

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

Wherever applicable, labels/plates bearing the E.D.S code shall be attached to equipment in the Contractor's works.

The material and fastening methods proposed for E.D.S labels/plates are subject to the approval of NPC.

EW-1.13.2 Labels and Plates

A stainless steel nameplate or equivalent anti corrosive nameplate with clearly legible writing shall be permanently attached to each assembled piece of equipment at an easily visible place. It shall provide all necessary information pertaining to the equipment, but as a minimum, the following must be included: Manufacturer's name, type of equipment, serial number, year of manufacture, project identification number, weight, E.D.S. code and other relevant information in compliance with applicable standards. Any special maintenance instructions shall also be shown at this or other suitable location.

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

If it is not practical to include NPC's equipment identification, or tag number on the equipment nameplate, then a separate durable stainless steel tag with NPC's identification number shall be provided and securely attached to the equipment.

Labels shall also be provided for equipment and devices mounted on control boards, relay cabinets, desks and other places as required for proper identification, as well as for operational, functional and safety reasons. The labeling, size of label-plates and their location shall be subject for approval of NPC. A sample label-plate (with indication of material used) with lettering shall be submitted for this purpose.

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, labels and warning plates shall be in English.

EW-1.14 Spare Parts

EW-1.14.1 General

A list of mandatory spare parts to be supplied by the Contractor is specified in the Technical Data Sheets under this specification. If in case any of the mandatory spare parts are not applicable to the equipment to be supplied, the Contractor is required to provide alternative spare parts which are applicable with the same quantities as required.

NPC has the option to choose in the list of the recommended spare parts given by the Contractor as the replacement for the mandatory spare parts, which the Contractor failed to offer or provide an alternative replacement.

In addition to the above, the Contractor shall also include in the proposal, a list of recommended spare parts which are considered necessary for the safe and reliable operation and maintenance of the equipment. The Contractor shall indicate the expected life of the parts requiring replacements and the minimum recommended inventory of the spare parts for installation, start-up, continuous operation and maintenance.

Contractor shall state whether the recommended spare parts are stock or special items, and shall furnish name and location of the nearest Manufacturer/Distributor, and approximate lead time required for delivery. NPC has the option to consider or not to consider the recommended spare parts as given by the Contractor with the corresponding price.

All spare parts shall be readily interchangeable with the ones, which these are to replace. These shall be of the same material, of identical size and manufacture and shall have the same properties as the corresponding parts of the installed equipment. Specified conditions relating to tests, treatment of surfaces and painting, etc. of the installed equipment shall also apply to spare parts.

All spare parts shall be properly packed (and where necessary treated) in such a manner as to allow prolonged storage at the Site, considering the ambient conditions prevailing there. In due time, the Contractor shall inform the NPC of the eventual precautions to be taken for the proper storage of the spare parts.

The Contractor shall provide a spare parts list containing at least the following information:

a. Name and address of manufacturer and other identification no.
b. Item description including EDS-code, drawing no., material designation, units to be ordered

c. List of items (designated by EDS-code) for which the respective spare parts can be used
d. Item price

EW-1.15 Tests

EW-1.15.1 Field Test and Acceptance Tests

Field tests and acceptance tests shall be performed by the Contractor and witnessed by NPC representative to determine whether requirements of the specification have been fulfilled. The Contractor shall provide instructions and acceptance criteria for field testing for NPC's review and approval prior to conduct of such tests and commissioning the equipment.
No field tests shall be performed unless the submitted instruction and acceptance criteria for field testing is approved by NPC.

EW-1.15.2 Test Failures

If any equipment fails to pass any test, NPC may, at his own judgment, direct the Contractor to make any necessary corrections or alterations to it for minor defects or to replace it forthwith for major defects. Any and all expenses that might result by the supply and installations of new parts or by modification of existing parts and any and all expenses resulting in additional tests made necessary by failure of equipment to meet the guarantees and other requirements of the specification shall be borne by the Contractor. The costs of witnessing the Factory Acceptance Tests by NPC representative(s) as a result of re-test to be conducted on the equipment shall also be borne by the Contractor.

EW-1.15.3 Test Reports/Certificates

Five (5) certified copies of the reports of all NPC's specified tests and other manufacturer standard tests shall be furnished to NPC.

For equipment which had the required type test already, the type test certificates shall be submitted by the Contractor together with his proposal.

For the routine tests, acceptance tests and field tests, the test certificates shall include, in addition to the test results, the following information:

a. Test Certificate Date
b. Equipment data
c. Client's reference number
d. Equipment serial number

The Contractor shall submit *Certified* Test Data. The Contractor shall bear the cost of furnishing these records and reports.

EW-1.16 Miscellaneous

EW-1.16.1 Provisions for Erection and Installation

All parts of the equipment to be assembled on site must be connected by means of screws and bolts/nuts, welding is not acceptable except for accessories and where expressly stated.

It must be possible, except in particular cases, to introduce and draw out all the indoor equipment through the doors or opposite opening.

EW-1.16.2 Contractor's Supervision

The Contractor shall provide a competent Service Engineer or Technician during installation and perform the complete tests, commissioning and start-up of all equipment.

The Contractor shall send only service engineer or technician who have adequate working knowledge of the English language.

NPC reserves the right, if services for a longer period are needed, to ask for extension of the Contractor's supervisors until such time that NPC's personnel have been fully trained in the operation, test and maintenance of the equipment supplied by the Contractor, at no cost to NPC.

The service engineer or technicians shall not be considered employee of NPC for all legal intents and purposes and the Contractor shall be responsible for the payment to said service engineer or technician of all indemnities accruing of any labor accident which may occur in the course of the work and for which the Contractor maybe responsible either under the Philippine Laws or any foreign laws.

EW 2.0 GENERATOR AND AUXILIARIES

EW-2.1 Scope

The scope of electrical work covers the furnishing of all labor, materials, equipment, tools and other necessary incidentals required for the transfer of 2 x 500kW MAN diesel generating sets and its auxiliaries from Busuanga DPP to Rizal DPP.

The Contractor shall furnish and install all other necessary equipment that are not specifically stated in this specification which are necessary for the smooth operation of the transferred equipment.

The Contractor shall also provide assistance during the testing and commissioning of the transferred and supplied equipment.

It is not NPC's intent to specify all technical requirements nor to set forth those requirements adequately covered by applicable codes and standards.

EW-2.2 Standard

The ratings, characteristics, and tests shall be in accordance with the IEC Standard and/or equivalent ANSI, IEEE, and NEMA Standards, each as they apply, unless otherwise categorically specified.

All equipment covered by this specification shall be designed, manufactured, assembled and tested in accordance with, but not limited to, the latest issues of applicable ANSI/IEEE/IEC or equivalent standards, including all addenda, in effect at time or purchase order unless otherwise stated in this specification.

EW-2.3 Generator Characteristics (for reference only)

The continuous load capability of the alternator shall be the specified nominal rating measured at the terminal. Given the condition and age of the generator set, it shall be capable of continuous operation under normal load conditions at 80% of the rated capacity without exceeding temperature rise in accordance with ANSI standard or equivalent applicable standard.

The alternator shall be able to meet the local conditions as specified in General Works specifications.

The generator characteristics are as follows:

Rated Continuous Output	: at least 80% of the rated capacity
Power Factor	: 0.80 Lagging (min.)
Frequency	: 60 Hz (± 5%)
Angular Speed	: 720 RPM
Voltage	: 480 V (±5%)
Generator Winding	: Wye Connection with neutral
Allowable Voltage Variations	: At the rated output, frequency, voltage and power factor, the generator can operate satisfactorily though the terminal voltage may vary at ±5% of rated value.

EW-2.4 Generator Control and Protection Panel (GCPP)

The Generator Control and Protection Panel to be furnished, as replacement for the existing control panel in Busuanga DPP, shall be suitable for remote and local operation including indication functions necessary for monitoring, metering, control and protection of the diesel generating set/s. The GCPP to be supplied shall be designed with Generator Circuit Breaker included in the panel. Generator Circuit Breaker mounted on the D/G set container is not acceptable. The GCPP will be installed inside Rizal DPP's control room.

Generator Control and Protection Panel shall be equipped with the following minimum requirements for the operator interface with the diesel engine generator in addition to those specified in the Single Line Diagram.

a. Protection and Control

The protection relay system shall be designed to bring the unit to automatic opening of breaker for electrical fault according to calculated tripping parameters.

The protection scheme shall be provided with adequate number of input/output contacts of suitable rating to carry out the prescribed tripping functions, alarm indication, fault recording function and supplementary signaling functions as maybe necessary for the initiation of automatic closing/tripping or switching control.

The protection relays shown on the drawings are the minimum protection required. The Contractor may offer different protection scheme in which based on his experience is suitable for the specified rating of the Diesel Generator set/s.

b. Monitoring and Metering

All indicating instruments shall fulfill the requirements for accuracy class 0.3 except for the frequency meter which shall have ±0.01Hz. The panel shall be equipped with the following minimum required metering devices and indicating instruments:

1. Metering (current, voltage, power (kW, kVAr), energy, frequency, power factor, stator winding temperature) capable to measure single and three phase parameters through respective control switches;

2. Event Recorder (to be able to capture the latest events);

3. Data Logger (all data is stored in non-volatile memory so that information is retained even when power to the unit is lost);

4. User Programmable Fault Reports; and

5. Other metering and indicating instrument as specified in Mechanical Work Specifications.

c. Synchronizing Module

The panel shall be equipped with the synchronizing function for automatic and manual modes, selector switch, (automatic, manual, and off), and the necessary indicators, metering, and other required appurtenances.

The Protection, Control, Monitoring and Metering of the GCPP should still be capable of operating when synchronizing for either automatic or manual mode of the synchronizing module.

The Contractor may offer different synchronizing module in which based on his experience is suitable for the specified rating of the diesel generating sets.

All interface devices and other accessories whether or not expressly called for or indicated on the bid drawings but are necessary for the remote control and synchronization function of the new diesel generating unit shall be provided by the Contractor. All instruments, scales, relay coils contacts and other features shall be suitable for the apparatus controlled or for the purpose intended.

All DC and AC power supply required for annunciation, control, monitoring and protection of the system shall be integrated in the GCPP. The power and voltage requirements will be determined by the manufacturer in accordance with the ratings and consumption of its equipment/device.

Aside from the GCPP to be installed inside the control room which generally controls and monitors the generating sets, the Contractor shall provide separate local panel to be mounted on the engine skid or at any appropriate location on the generating set equipped with selective monitoring/metering with start, stop and emergency stop push buttons.

These selective monitoring/metering instruments shall have simultaneous reading with those on the GCPP during operation. The monitoring/metering instruments (individual analogue indicators)/controls to be provided are as follows but not limited to:

a. RPM meter
b. Hours Run Counter
c. Oil Pressure Gauge
d. Oil Temperature Gauge
e. Cooling Water Temperature Gauge
f. Start/Stop Pushbuttons
g. Emergency Stop Pushbutton

The Contractor may offer a generator control and protection panel with proprietary standard design of the manufacturer containing the required functions suitable to the generating sets.

EW-2.4.1 Panel Construction

The panel shall be constructed from a minimum of 2.0 mm thickness steel sheet with edges formed into a rectangular pattern welded steel sheets so that each section is rigid, self-supporting and enclosed. It shall be adequately protected and suitable for indoor and outdoor application and all climate condition.
The panel shall be labeled with ISO symbols and comply with IP 65 for external environmental resistance and IP 44 and NEMA 12 for the resistance of the internal sealed modules.

Incoming power, and control cables shall enter the assembly from the bottom.

The panel shall be designed with dimensions not to exceed the size shown on the reference Bid Drawing.

EW-2.4.2 Fault Annunciator System (Alarm System)

The annunciator system shall distinguish any abnormal conditions during operation by means of visual and audible warning. It shall be of modular design, preferably microprocessor-based designed for operation on a DC supply. It shall consist of window cabinets, mounting chassis, plug-in assemblies, alarm relays, lamps, test pushbuttons, acknowledgement pushbuttons and reset pushbuttons. The window cabinets shall be mounted flush on the GCPP. Plug-in modules and lamps shall be provided for all specified windows, including spares. The lamps shall be mounted on individual compartments. Window legends shall be in English language. Letterings shall be clearly distinguishable at a distance of approximately 3 m. All the solid state modules shall consist of the plug-in printed circuit cards, and shall be interchangeable as far as possible and shall be plugged into the cabinets from the front, on a point by point basis. Annunciations can be made also by using display panels.

Alarm input circuit design shall be such that back feed from another alarm input will not be possible. This is to permit sharing of field contact with future supervisory control and monitoring system. Each annunciator window shall have a retransmitting contact circuit which shall operate with the alarm. The annunciator shall have one common re-transmitting contact circuit which shall operate when any of the alarms operate. The field contacts shall be energized by DC supply from the annunciator. In addition, group alarms for engine-generator and transformer shall be available.

The supply voltage for the annunciator system shall be monitored and must give an alarm in case of interruption of the alarm equipment power supply. All DC and AC power supply required for annunciation, control, monitoring and protection of the system shall be an integral part of the GCPP.

A minimum of 30 windows shall be provided on each annunciator.

EW-2.4.3 Communication Ports

Communication ports shall be available in the Local Control Panel of the diesel generating set and Generator Control and Protection Panel (GCPP) exclusively intended for control, protection, synchronization, communication, monitoring and metering. The communication to be established between various equipment in the entire power plant (e.g. other generator sets and power generating equipment, Power Plant Control System (PPCS), protection and control devices, instrumentation equipment, SCADA systems, etc.) shall be MODBUS and Ethernet-based protocol.

EW-2.4.4 Terminal Blocks

Terminal blocks shall be mounted so as to give easy access for external wiring and termination and shall give clear view of the arrangement of the cable tails to allow for future extensions and alterations with an approximately 25% extra terminals per terminal block.

Every terminal point shall have individual and complete identification on the wiring diagram.

EW-2.4.5 Nameplate

The Generator Control and Protection Panel (GCPP) shall be provided with adequately sized nameplate made of black surface exposing the white core. In addition, each piece of equipment mounted on or inside the panel shall also be provided with nameplate to show each operating position for easy and convenient identification. The nameplate markings shall be in English language.

EW-2.5 Generator Circuit Breaker

The generator circuit breaker for the GCPP shall be as stated in the Technical Data Sheets.

Circuit breakers of the molded case type shall be equipped of electronic (solid-state) trip mechanism with a 12/24 VDC shunt trip coil and 230VAC, 60 Hz single phase power supply for stored-energy mechanism.

If vacuum or air type circuit breaker is specified, it shall be equipped with a 12/24 Volts DC shunt trip coil and a stored-energy closing mechanism which is charged by a 230 VAC, 60 Hz single phase motor, suitable for hand operation with an appropriate tripping mechanism to be actuated by the protective relays.

The breaker compartment shall include indicating lights and control wiring to give a "red" indication for breaker closed position and a "green" indication for breaker open position. Indication shall be visible from the front with door closed at all times when the circuit breaker is within the housing. The red indicating light shall be wired so as to provide a continuous indication of continuity of the shunt trip when the breaker is closed. The circuit breaker shall be provided with an operation counter, a local control switch, and a "Local/Remote" selector switch.

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.

The circuit breaker shall be capable of "switching-in" the generator when synchronizing with one or more units in parallel operation.

Isolating means shall be provided for locally closing and tripping electrically operated breakers without opening the door of the breaker compartment.
Generator circuit breaker shall preferably be maintenance-free and environmental friendly.

EW-2.6 Equipment Wiring

Equipment interfaced wiring shall be of stranded copper with thermo-plastic insulation and shall comply with the requirements of UL 83 standard. Minimum size shall be 2.0 mm^2 or larger for control circuit except annunciator wire which shall be 1.2 mm^2 or larger. The minimum size of current transformer wire shall be 3.5 mm^2.
All wiring shall be neatly run marked at both ends and securely fixed in such a manner that whenever practicable, wiring can be easily identified and checked against diagram.

The panel shall be provided with earth wiring and connection to create an environment that meets the requirements of electromagnetic compatibility.

EW-2.7 Spare Parts and Tools

Spare Parts and Tools for the generating set and its auxiliaries shall be supplied by the Contractor in accordance with the requirements specified in the General Works Specification and Part II–Technical Data Sheets.

If found not applicable to the proposed equipment model/design, the Contractor shall submit a Manufacturer's certification indicating that the spare parts and standard/special tools listed is not applicable to the equipment being offered. However, NPC reserves the right to request the Contractor to provide the same or its equivalent if it is determined as deemed necessary during the evaluation, checking and review/approval of the final lists to be submitted by the Contractor during the Contract Stage at no cost to NPC.

EW-2.8 Equipment Grounding

All major equipment such as engine-generator, transformer, generator control and protection panels (GCPP), and all other metallic parts 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 grounding conductors or ground connections to the plant existing grounding system as required.

EW-2.9 Test

EW-2.9.1 General

The Contractor shall carry out at his own expenses all tests necessary to ensure the satisfactory condition of all equipment to be supplied.

The test equipment, test method, measurements and computations shall be in accordance with the latest applicable requirements of IEC-60034 and equivalent ANSI standard.

EW-2.9.2 Test on the Generator Control and Protection Panel

The Generator Control and Protection Panel shall be completely assembled and adjusted at the factory and given the manufacturer's routine shop tests and other tests as specified herein.

a. Check of All Meters and Instruments

The calibration and internal connection of all meters and instruments are assumed to have been made in the normal production process.

However, to establish that the connections between the associated incoming blocks and these instruments and meters are correct, it is required that three-phase voltage and current be applied at the terminal blocks with the proper phase angle relationship to check the direction of rotation.

b. Complete Functional Test of all Protective Relays

This test is intended to completely check the functional operation of the equipment. The test shall be a check of all the tripping, closing, auxiliary circuits, interlocking, etc.

c. 1000 Volts Megger Test

Each circuit or bus shall be given an individual 1000 V megger test with a minimum permissible reading of 6 mega-ohms.

d. Mechanical Inspections

This shall be a physical inspection of the equipment as a whole to ensure that all components are mechanically sound and that there are no imperfections. Also attention should be given to establishing that all special requirements of the Specification have been met.

EW-2.10 Data and Information to be Submitted After Award of Contract

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

a. Technical Data Sheets of the GCPP provided by the Manufacturer;

b. Technical brochures and catalogues of the GCPP to support the Technical Data Sheets of the equipment;

c. Technical brochures and catalogues of the additional and/or replacement equipment/parts (if any);

d. Equipment layout, including mounting details, schematic and control circuit diagrams (alarm and trip) and drawings for all relays; and

e. Field Tests to be performed and test reports duly signed and witnessed by NPC representatives.

Certified Test Reports

The Contractor shall supply, at the time stated in NPC order, the required quantity of certified copies of final test reports, including data and results of all tests required by this specification with respect to all values or relations specified herein or stated in the standards.

EW 3.0 GENERATOR TRANSFORMERS AND AUXILIARY TRANSFORMER

EW-3.1 Scope

This specification covers the technical and associated requirements for the operation of the Generator Transformer and Auxiliary Transformers including accessories to be transferred and/or supplied for use in electric generating station.

It is not NPC's intent to specify all technical requirements nor to set forth those requirements adequately covered by applicable codes and standards.

EW-3.2 Standard

All equipment covered by this specification shall be conditioned, assembled and tested in accordance with, but not limited to, the latest issues of applicable ANSI/IEEE or IEC standards, including all addenda, in effect at time or purchase order unless otherwise stated in this specification.

EW-3.3 Insulating Oil

The contractor shall replace the insulating oil of the generator transformers and auxiliary transformer to be transferred.

The oil shall be naphthenic based mineral oil. It shall be free from Polychlorinated Biphenyls (PCB) chemical, moisture, acid alkali and sulfur compounds and shall not form a deposit at normal operating temperature.

Except for inhibitors, no additives are permitted.

The oil furnished shall be compatible with other oils meeting the requirements of ASTM D3487 and this specification. The oil shall be suitable for mixing with other insulating oils in any combination and the mixture shall still meet the required functional properties of this specification.

The oil shall accept 2, 6-ditertiary-butyl-paracresol (DBPC) as an oxidation inhibitor, added as necessary to bring inhibitor content of the oil to the required ASTM D3487, Type I or II value. The Contractor shall state if any other type of oxidation inhibitor is acceptable and if so, its advantages over DBPC.

The power factor of the oil shall not exceed 0.05 percent at 25°C or 0.3 percent at 100°C, as determined by ASTM Test Method D924 (oil samples shall be taken in accordance with ASTM D923).

The oil flow pattern shall exclude turbulence and impinging of oil on any part of the solid insulation system.

Containers for oil shall be so designed that, with the indicated level for initial filling at 25°C, the oil will not fall below a safe operating level, nor rise to such a height as to overflow or leak.

Before delivery, a test certificate shall be submitted to NPC for approval. The test certificate shall contain result for tests carried out in order to confirm the oil's quality as specified.

EW-3.4 Protection and Instrumentation

The contractor shall replace, if found necessary upon testing of the transformer, all protection devices and instrumentation that are not capable of providing its required function as described in this specification.

Additionally, the contractor shall also supply and install all standard protective devices and instrumentation that are not specified hereunder. The Contractor shall provide alarm and trip contacts and shall wire them to the appropriate terminal boards.

EW-3.5 Accessories

In case of lacking and/or necessary replacement, the following standard accessories shall be provided for the transformer:

a. Base designed for rolling and skidding parallel to either center line
b. Lugs for lifting complete transformer
c. Eyes for lifting cover
d. Drain plug (for oil-filled transformer)
e. Filling plug (for oil-filled transformer)
f. Liquid or oil level indicator (for oil-filled transformer)
g. Pressure relief valve (for oil-filled transformer)
h. Dial type thermometer
i. Pressure-vacuum gauge
j. Alarm and trip contacts for accessory gauges

EW-3.6 Installation

The Contractor shall install the transformer on the location as shown on the drawing, inspect the internal parts and connections, remove the temporary shipping supports, fill the transformer with oil, install part removed for shipment and make all the necessary external connections.

EW-3.7 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:

a. Technical Data Sheet of the Insulating Oil provided by the Manufacturer;

b. Technical brochures and catalogues of the additional and/or replacement equipment/parts (if any);

c. Certification from the manufacturer that the supplied insulating oil is PCB free; and

d. Field Test to be Performed and Certified Test and Inspection Reports.

EW 4.0 AUXILIARY CONTROL AND MONITORING PANEL (For Reference Only)

EW-4.1 Scope

This specification covers the technical and associated requirements for the operation of the Auxiliary Control and Monitoring Panel including its components to be transferred and refurbished for use in electric generating station.

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 modify the panel, if needed, and furnish the materials/components necessary for the safe and reliable operation of the Auxiliary Control and Monitoring Panel meeting the requirements of these specification and industry standards.

EW-4.2 Standard

All equipment furnished under this part shall be manufactured and tested in accordance with NEMA ICS-2 or IEC standards, "Standards for Industrial Control Devices, Controllers and Assemblies", and other applicable standards.

EW-4.3 Protection and Instrumentation

The contractor shall replace and supplement, if found necessary upon assessment and testing of the auxiliary control and monitoring panel, all protection devices and instrumentation that are lacking and uncapable of providing its required function.

Additionally, the contractor shall also supply and install all standard protective devices and instrumentation that are not specified hereunder.

EW-4.3.1 Combination Motor Starter and Feeder Breaker Units

Combination Motor Starter Units

All combination magnetic full voltage starter units shall include disconnecting and branch circuit overcurrent protective devices; 230/120 volt dry type control transformers; 240 Volt, 3-phase, 60 Hz contactors with manual reset thermal overload relays; and 120 Volt AC operating coils. The smallest combination starter unit shall be NEMA Size 1 or equivalent to IEC standard.

The combination starter units shall have a symmetrical interrupting rating which exceeds the available short circuit current at the Power Control Center bus to be determined by the Contractor.

Starters shall reliably operate with 85% of rated bus voltage applied and shall not drop out at voltage lesser than 75 % of rated bus voltage.

Combination starter units furnished in the power control centers shall be full voltage single-speed non-reversing (FVNR) or full voltage single-speed reversing (FVR) as determined by the Contractor and approved by NPC. Spare starters shall be furnished in each PCC and no more than two (2) NEMA size starters shall be located in each vertical section.

Circuit Breakers

Each combination motor starter unit and each feeder tap unit shall include one (1) 3-pole, single throw, 600 volt, molded case circuit breaker with symmetrical interrupting rating at 240 Volts of at least 25,000 amperes or greater as determined by the Contractor. All breakers shall be manually operated with quick-make, trip-free mechanism of the toggle type. The breakers shall be equipped with suitable arc quenching devices. Main current carrying contacts shall be silver plated and shall be capable of carrying their rated current without exceeding the Underwriters' Laboratories specified temperature rise. All circuit breakers shall be of the same manufacturer.

Disconnecting and Branch Circuit Overcurrent Protective Devices

Disconnecting and branch circuit overcurrent protective devices shall be magnetic instantaneous trip only type circuit breakers and shall be sized and rated by the Contractor appropriately.

Manual operating handles shall be furnished to operate the circuit breakers. Provisions shall be made for padlocking each handle in the open position.

Starter Contactors

The rated continuous current carrying capacity of each starter contactor to be used shall be as listed in NEMA or IEC Standard. Contactors shall be applied in accordance with their kW rating only. The interrupting capacity of each starter contactor shall be not less than 10 times the rated continuous current carrying capacity.

The electrical life, without maintenance, of each starter contactor to be used shall be not less than 500,000 operations with each opening or closing of the load contacts to constitute one complete operation. The mechanical life of each starter contactor shall be not less than 5,000,000 operations.

Combination starter units which require line voltage to energize the main contactor operating coils or those for which main contactor coil inrush exceeds 600VA shall be equipped with auxiliary contactors (interposing relays) for use in the operating coil circuit. Each auxiliary contactor shall be operated from the 120 Volt circuit of the control transformer.

Overload Relays

All starters shall be equipped with overload relays and shall operate within a range of plus or minus 5 percent of the overload relay trip setting. Assemblies which do not meet this requirement both when field tested and when in actual operation shall be replaced by the Contractor.

Alternative proposal shall be considered based on furnishing bimetallic type temperature compensated overload relays or electric alloy type overload relays, provided that such proposals are accompanied by manufacturing information clearly indicating details of construction and experience records of the overload relay proposed.

Indicating Lights

Each starter shall be furnished with two (2) indicating lights on the door to indicate when the motor is stopped or running.

Instrumentation

1. Each starter which feeds a motor greater than or equal to 25 hp shall have an elapsed time meter (ETM) located on the front of its starter compartment.

2. In addition, each starter unit and feeder tap unit shall have an ammeter and ammeter switch located on the front of its starter compartment.

EW-4.3.2 Feeder Tap Units

Feeder tap units shall include thermal magnetic trip type breakers. Circuit breaker thermal element shall be bimetallic type, capable of withstanding sustained overload and short circuit currents without injury and without affecting the calibration of the bimetallic element. The thermal elements shall have inverse time characteristics. The instantaneous elements shall trip the breaker at the minimum standard trip setting.

EW-4.4 Wiring

Control wiring shall be 600 V, 1.5 mm^2 minimum, and power wiring shall be 600 V, 5.5 mm^2 minimum, stranded copper wire with heat, moisture and flame resistant cross-linked polyethylene insulation in accordance with ICEA S-66-524 or IEC standard or an alternative type acceptable to NPC. Where flexibility is required, stranded wire shall be used. The wiring shall pass the flame test conducted in accordance with IEC Standard. Wire markers shall be used on both ends of all wires.

All wiring shall be suitably protected against contact with sharp edges, neatly bundled, and secured with wire ties. Wires shall be continuous; no splicing is permitted.

Terminal lugs shall be compression type with insulated sleeves and shall have ring-type tongue except on the starter terminals where it will not fit. Terminal blocks shall be screw type suitable for holding ring type tongue and shall be rated 600 Volt, 10 ampere (minimum).

For the internal wiring, not more than two (2) wires shall be connected to one terminal block point. Not more than one (1) wire shall be on any terminal lug.

Adequate space shall be provided on both sides of the terminal block for connecting wires and for wire markers. A minimum of 10 percent spare terminal points in each starter shall be available for future use.

EW 5.0 POWER, CONTROL AND INSTRUMENTATION CABLES

EW-5.1 Scope

This part specifies the detailed requirements for the manufacture, delivery, installation, test and commissioning of medium and low voltage, power, control and instrumentation cables, including all termination, fixing, mounting materials for the complete operational system of the 2 x 500 kW diesel generating sets to be transferred from Busuanga DPP to Rizal DPP.

The Contractor shall furnish, install, and connect all insulated wire and cable required for the component parts of the power, control, annunciation, instrumentation, communication, including lugs and terminals, terminal blocks, stress cone material, cable joints, splicing materials, cable grips and wedges, cable terminators, identification tags, and other miscellaneous equipment required to make a complete installation ready for operation.

Requirements for cables shall be as follows:

a. 15 kV single core, XLPE cables

b. Power cables are rated for 1000V that conform to IEC/DIN/VDE or equivalent standard

c. Control, annunciator, and temperature detector cables rated 600 V shall be multiple conductor

d. Instrumentation cables shall be multiple, twisted pairs with an overall shield

EW-5.2 Standard

The cables to be furnished shall be manufactured in accordance with, but not limited to the latest issues of ASTM, IEC, NEC and/or equivalent international codes and standards including all addenda, in effect at time of purchase order unless otherwise stated in this specification.

ASTM	**American Society for Testing and Materials**
B3	Specification for Soft or Annealed Copper Wire
B8	Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
B33	Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes
B189	Specification for Lead-Coated and Lead-Alloy-Coated Soft Copper Wire for Electrical Purposes
D1248	Specification for Polyethylene Plastics Molding and Extrusion Materials
IEC	**International Electro-Technical Commission**
60028	International Standard of Resistance for Copper
60060	High Voltage Test Techniques
60093	Methods of Test for Volume Resistivity and Surface Resistivity of Solid Electrical Insulating Materials
60183	Guide to selection H.V. cables
60189	Low frequency cables and wires with PVC insulation
60228	Conductors of insulated cables
60229	Tests on Cable Over-Sheaths, which have a special protective function and are applied by extrusion
60502	Extruded Solid dielectric insulated power cables for rated voltages from 1 kV to 30 kV
60986	Guide to short circuit temperature limits of electric cables with a rated voltage from 1.8/3(3.6) kV to 18/30(36) kV
1034	Smoke emission tests
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 and Servicing
NEC	**National Electrical Code**
PEC	**Philippine Electrical Code, Part I**

These codes and standards set forth minimum requirements which may be exceeded by Contractor if, in Contractor's judgment and with NPC's acceptance, superior or more economic designs or materials are available for successful and continuous operation of Contractor's equipment required by this specification.

EW-5.3 Technical Requirements

EW-5.3.1 General

The cables shall be designed for trouble-free service for the highest system voltage.
All cables and their accessories 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 employed, due to switching operations, sudden load variations, faults etc.

All 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 constructed to fulfill the requirements when operating with full load or at any load factor.

The cable shall be suitable for use in ducts, trays and for direct burial in ground.

All cables and wires shall to be used shall be able to continuously carry their rated currents and withstand maximum fault current without damage or deterioration under the most detrimental temperature conditions which prevail during the dry season.

EW-5.3.2 Conductor

Copper conductors for power, control and instrumentation cables shall be concentric-lay-stranded, bare, or coated in accordance with ASTM B3, ASTM B8, or ASTM B33 or equivalent IEC Standards.

EW-5.3.3 Insulation

Insulation shall be of the type specified in the Technical Data Sheets. Insulation type shall be in accordance with National Electrical Code Designation or equivalent IEC Standards.

EW-5.3.4 Jacket

A tough, ozone, low chlorine, heat, flame and moisture-resistant PVC or HDPE jacket capable of providing protection against sunlight, acids, alkalis and oils shall be furnished for all cables. Jacket materials shall meet the requirements of applicable IEC Standards.

EW-5.3.5 Grounding Conductor

Copper grounding conductors shall be furnished within-multi-conductor 600 V power cables. Total cross-sectional area of the grounding conductors shall be in accordance with the National Electrical Code requirements or equivalent IEC Standards. Grounding conductors shall be bare.

EW-5.3.6 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-5.3.7 Technical Requirements for Control and Instrumentation Cable

For Instrumentation Cables, the following additional criteria shall apply:

Drain Wire

Class B, 7 strands, annealed, tinned copper drain wire (not less than two AWG sizes smaller than the insulated conductor but not smaller than 20 AWG), to be laid spirally with the same direction and lay as the twisted pair.

Shielding Tape

Type of shielding tape, if not specified in the Technical Data Sheets shall be a 100 percent coverage of a minimum of 2.0 mil Aluminum/polyester tape with metallic face of tape in continuous positive contact with the drain wire. Minimum overlap of shielding tape shall be not less than 20% of its width. The twisted pairs shall have their shields isolated from one another.

The semi conducting thermosetting compound screen layer shall be able to be peeled-off easily, without leaving any residue on the insulation.

Cabling

Pairs are to be cabled with fillers, if required, and binder tape which are flame resistant and non-hygroscopic.

EW-5.3.8 Technical Requirements for Medium Voltage Power Cables

For medium voltage power cables, the following criteria shall apply:

Conductor Screen

The outer surface of the conductor shall be firmly and continuously bonded to the inner surface of the insulation and shall have no tendency to separate from the insulation due to the effect of bending during installation, load cycling and short circuit service conditions.

Insulation

The cable insulation shall consist of a homogenous extrusion of cross-linked polyethylene (XLPE) complying with the requirements specified in IEC 60502.

Insulation Shield

Extruded layer of semiconducting thermosetting compound compatible with the insulation. Average thickness of the insulation shall be not less than the nominal value specified in IPCEA or IEC 60502. The maximum thickness in any particular point shall not be greater than 25% of the nominal value specified.

Metal Tape

Annealed copper tape over insulation shielding per ICEA S-19-81with a minimum overlap of 12%. The construction of the metallic screen shall guarantee a perfect contact with insulation semi-conducting screen to constitute an equipotential system. The dimensional characteristics shall be calculated in such a way as to ensure a permissible short circuit current specified in the Technical Data Sheets without causing overheating in the close layers.

Oversheath or Outer Jacket

The oversheath shall consist of a compound applied by an extrusion process, adequate to the rated cable temperatures, if one of the following alternatives to be specified by the Contractor.

a. Sheath of polyvinyl chloride (PVC) colored black, with anti-termite repellant, non-poisoning type adequate for termite type "ODONTERMUS FORMASANUS" and "COPTERMES FRENCHI".

b. Black sheath of high density polyethylene (HPDE), with characteristics according to IEC 60811, ST4 type or equivalent IPCEA or ASTM Standards.

The nominal thickness shall be 0.3 mm and the maximum thickness in any particular point shall not be greater than 25% of the nominal value.

Maximum Conductor Temperature

The insulating material shall be able to withstand the maximum permissible temperature for conductor, as stated below:

Continuous	:	90°C
After short circuit	:	250°C

EW-5.3.9 Application

All cables shall be suitable for installation in cable tray (NEC type TC), conduit, trench, underground duct in wet and dry locations, and above ground raceway in damp and dry locations.

EW-5.3.10 Accessories

Each end of each cable shall be hermetically sealed with a heat shrinkable elastomeric cap fitting or other suitable means, to protect against the entrance of moisture.

EW-5.3.11 Cable and Cable Reel Marking

Cable shall be identified by surface printing of the jacket indicating: manufacturer, conductor metal (thermocouple cable only), size, insulation type, voltage rating, number of conductors, and sequential meter marker and date of manufacture.

Each cable reel shall be marked on both sides with indelible lettering as indicated in the Technical Data Sheets.

EW-5.3.12 Color Coding

All three conductor power cables shall be color coded in accordance with method 4 of the ICEA standard unless otherwise amended in the Technical Data Sheets.

All control cables shall be color coded in accordance with the K2 sequence as specified in the ICEA standard unless otherwise amended in the Technical Data Sheets.

Instrumentation cable shall have individual pairs colored Black/White. On multi pair construction, the pairs shall be numbered unless otherwise amended in the Technical Data Sheets.

For thermocouple extension cable type E the positive conductor (chromel) shall be purple, and the negative conductor (constantin) shall be red.

EW-5.4 Cable Installation

Cable runs shall be continuous from terminal to terminal to the extent permitted by available commercial lengths.

Insulated wire and cables shall be handled with care so as to avoid kinking and damage to insulation and outer jackets. Cables shall not bend around a radius less than recommended by the manufacturer.

All lugs, terminals, spade or ring terminals and terminal blocks required which are not furnished with the equipment shall be furnished and all connections required to provide a complete installation ready to operate shall be made. Cable identification tags of a permanent type shall be provided and installed on all cables used for power, control, annunciation, instrumentation, communication, and lighting (except branch lighting conductors) for identification of the cables. Splices made in handholes, and boxes shall also be permanently and prominently tagged. Tags shall bear the cable or wire designations. Samples of the proposed tags shall be submitted for approval.

Cable wedges, basket-weave grips, and clamps shall be furnished and installed to support vertical or inclined cable runs.

High voltage cables shall be terminated with slip-on type cable terminators suitable for the type of cable furnished. The cable terminators shall provide dielectric stress relief using factory pre-formed components and shall conform to IEEE Standard 48, "Standard Test Procedures for High Voltage Alternating Current Cable Termination."

Metallic tapes of shielded cables shall be grounded at only one end of the cables.

Connections in lighting wires and cables shall be insulated with not less than two half-lapped layers of plastic insulating tape, or with high grade rubber tape over which friction tape shall be applied. Splices shall be soldered. They shall be made mechanically and electrically perfect before solder is applied.

Sufficient slack shall be allowed in each run to permit contraction and expansion. Where a number of single-conductor cables or wires comprising a circuit are trained through a pull box, terminal box, wiring gutter, or tray, they shall be neatly cabled and tied together. Cables shall be laced, using an approved lacing cord, and the method of lacing shall be subject to approval. Exposed wires and cables shall be cleaned of all wire pulling lubricant which may have remained on the cables after pulling through conduits or ducts.

Supports, Racks and Conduits

Cables entering free standing equipment compartments from below shall be supported near the floor by means of approved cable clamps and brackets. Use of electrical galvanized rigid steel conduit, fittings and compatible hardware is not precluded. The Contractor shall submit his own design, complete with component description for the above conditions, for approval of NPC.

Cables supports and racks together with fixing bolts, nuts and screws shall be of galvanized steel. All steelwork supports shall be designed with a safety factor of not less than four.

Multi-core cables shall be clamped to the racks with smooth finish split packing pieces with bore diameters to suit the cable sizes. The packing pieces shall be of non-magnetic material. Single core power cables shall be erected in separate non-magnetic clamps for approval of NPC. Wooden cleats will not be accepted.

For any cable trays to be provided outdoors, if applicable, covers of approved design and materials shall be included and erected as necessary to protect the cables against the effect of sun, weather, rain, and mechanical damage etc.

The fixing of racks and associated hardware to the building structural steelwork, where approved by NPC, shall be by means of bolted clamps. Weld gun stud fixing shall be allowed only if approved by NPC.
The methods of fixing racks, supports and conduits to walls or ceiling shall be submitted by the Contractor for approval of NPC.

Laying in Racks

The Contractor shall ensure that cables are not subjected to undue pressure by cleats and clamps.

The spacing of racks in cable runs shall suit the type of cable to be erected and shall be in accordance with relevant standard.

The spacing of support clamps for single and multi-core power cables having a core section of 300 sq. mm or larger shall be subject for approval of NPC.

EW-5.5 Marking and Identification

All electrical cables shall be properly marked to facilitate easy and accurate identification by NPC.

All equipment terminals shall be marked by the Contractor to facilitate correct phasing and circuit connections using appropriate markers. Such markers shall be made permanent.

Identification marking by Contractor shall be legible and located for easy reading. Any tag supplied by the Contractor shall be corrosion resistant or made of stainless steel with circuit number (and phase number where specified) stamped or engraved thereon. Handwritten tags are not acceptable.

EW-5.6 Tests

EW-5.6.1 General

Cables shall be tested at the factory in accordance with applicable standards to determine their compliance with the requirements of this specification. Tests shall be conducted on samples and on the entire length of cables in accordance with the applicable standards.

EW-5.6.2 Design Tests

Cable and materials shall be subjected to the design (or type) tests, if specified in accordance with the test standards specified herein. Design test can be omitted if a design test record of the same cables can be submitted. In general, the following test shall be performed as a minimum:

Conductor Tests.

Tests shall be performed on selected samples of the conductors before the application of any covering. These tests shall include as a minimum:

1. Tensile strength test
2. Elongation test
3. Conductor resistivity test
4. Dimension measurement
5. Surface finish inspection
6. Water and saline absorption test
7. Shrinkage test
8. Water penetration test

Physical and Aging Tests on the Cable, Insulation and Jacket.

Tests shall be performed on selected samples of the cable insulation and jackets. These tests shall include as a minimum:

1. Thickness measurement
2. Tensile strength test
3. Elongation test
4. Aging test
5. Head distortion test

EW-5.6.3 Routine Tests

As part of routine testing at least the following test and measurements shall be carried out as a minimum:

a. Checking of the conductor, insulation and oversheath dimensions
b. Conductor resistance measurements
c. Dielectric tests

Additionally, for the high voltage cables, the following tests shall also be performed:

a. Partial discharge test
b. Impulse voltage test 1.54 x BIL at +20°C, each 3 negative and positive impulses (followed by power frequency test) on one sample of each cable type to be supplied
c. Capacitance test
d. Insulation resistance test
e. Test on outer sheath (IEC 229)
f. Water penetration test

EW-5.6.4 Acceptance Test (Test After Installation)

Cables shall be tested after installation before they are place in normal service to verify the integrity of the cable and to detect major insulation damage that may have occurred during shipping, storage and installation.

a. Checking of the conductor, insulation and oversheath dimensions
b. Conductor resistance measurements
c. Dielectric tests

The test shall include at least the following:

15 kV Power Cables

a. Insulation resistance test
b. Determination of Polarization Index
c. Insulation Power Factor
d. Continuity Check
e. Shield Grounding Check
f. Cable Termination Check

600 Volts Power and Control Cables

a. Insulation Measurement
b. Determination of Polarization Index
c. Continuity Check
d. Shield Grounding Check
e. Cable Termination Check

EW-5.7 Data and Information to be Submitted After Award of Contract

The Contractor shall furnish the following information for each type of cable after award of contract for NPC's review and approval:

a. Manufacturer's Technical Data Sheet of the Power, Instrumentation and Control Cables;

b. Brochures/Catalogues with complete description of technical characteristics of each type of cables;

c. Design (Type) Test Reports, if not submitted with the proposal;

d. Cross-section and details of power, control, and instrumentation cables;

e. Cable rating calculations;

f. Installation procedure and splicing methods for high voltage cable;

g. Description of High Voltage cable terminations and sealing ends;

h. Description of cable supporting structures, cable tray, cable rack, cable fixing method, cable connection, cable spacer, cable clamps, bending radius, etc.;

i. Power, control and instrumentation cable routing plan;

j. Cable schedule, including cable numbers, identification, sizes, etc.;

k. Routine Tests Reports; and

l. Field Tests to be performed and Field Test Reports duly signed by NPC representative(s).

EW 6.0 SWITCHYARD APPURTENANCES AND ACCESSORIES

EW-6.1 Scope

This part specifies the detailed requirements for the manufacture, delivery, installation, test and commissioning of switchyard equipment and all accessories for the complete operational system of the 2x500 kW diesel generating sets.

The Contractor shall furnish, install, and connect all the necessary equipment and other miscellaneous accessories required to make a complete installation ready for operation.

Requirements shall be as follows:

a. 15kV ACSR Power Conductor;

b. 15kV Fuse Cutout with Lightning Arrester Combination;

EW-6.2 15kV ACSR Power Conductor

EW-6.2.1 General

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-6.2.2 Technical Characteristics and Requirements

Described 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-6.3 Fuse Cut Out with Lightning Arrester Combination

This specification covers the supply and delivery of fuse cut out 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-6.3.1 Technical Characteristics and Requirements

The fuse cut out 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 cut out 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 buttonhead-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 buttonhead 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 porcelain jacket, which shall have a high creepage 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-6.4 Data and Information to be Submitted After Award of Contract

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

a. Outline drawings showing all critical dimensions and weights, including the following:

   1. Base mounting dimensions;
   2. Cable Terminal locations;
   3. Connection points for all external connections;

b. Description and instructions covering the installation, operation and maintenance of the equipment and all accessories; drawings or cuts showing assembly of the accessories.

EW-7.0 GROUNDING SYSTEM

This specification covers the technical and associated requirements for the connection of the equipment grounding of all transferred and/or supplied equipment to the grounding system, 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, auxiliary control 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-7.1 Technical Characteristics and Design Requirements

The ruling criteria in the grounding connection 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.

All major equipment, e.g. generator, transformer, generator control and protection panel, etc., and minor equipment, e.g. motor, panelboard, etc., shall be connected to the grounding mat with adequate size of ground conductor as shown in the bid drawing. If there is no existing grounding mat, all equipment shall be grounded by means of ground rods.

EW-7.2 Equipment and Materials Requirements

EW-7.2.1 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-7.2.2 Ground Rods

The ground rod shall be copper-bonded 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.

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-7.2.3 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-7.2.4 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-7.2.5 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-7.2.6 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^2 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.

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-7.2.7 Cable Tray Earthing

Cable trays and ladders shall be connected to the earthing system at every ten (10) meters interval.

EW-8.0 CONDUITS AND CABLE TRAYS SYSTEM

This specification covers the technical and associated requirements for the supply, laying and installation of conduits and cable trays as required within the plant, 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 and cable trays shall be furnished at no additional cost to NPC.

EW-8.1 Technical Requirements and Characteristics

The conduits and cable tray 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:

a. Plug and fillers, coupling and bends;
b. Spacers, inserts and ties for conduits;
c. Conduit splicing solvent and connector material for uPVC conduit, if uPVC conduits are used;
d. Fire barriers, duct and conduit sealant; and
e. Cable tray brackets, anchor bolts or expansion bolts, hangers, lock washers, shims, etc.

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

a. High mechanical strength
b. Corrosion resistant
c. 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 check 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 the 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.

Metallic Conduits (If to be provided)

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.

Cable Trays

The Contractor shall furnish and install cable trays, supports and accessories for the use of power and control cables as required. All necessary hardware such as screws, bolts, concrete inserts, clamps, supports, fittings and divider strips for the cable trays shall be included.

The cable trays shall be hot-dipped galvanized steel, ladder rung type proper for laying installation and shall be manufactured based on the bid drawing. Before fabrication, the Contractor shall submit all fabrication and installation details for NPC approval.

The cable tray system shall be supported at intervals not exceeding 1.5 meters unless specifically approved for supports at greater interval.

Cable trays, accessories and fittings shall be free of any rough edges or sharp projections, which would cause damage to cables.

Cable trays other than solid bottom trays shall be designed to accept cable clamping devices and cable barriers without drilling or welding.

Tray design shall provide for inter-changeability of like parts and easy assemblage of the system without the use of special tools.

Cable tray covers shall be solid. The preferred cover-fastening device shall require no drilling of the cable tray for installation. Cable tray covers shall be attached to the tray with a heavy duty device to permit easy removal and replacement. The cover including the cover clamp shall be equally suitable for vertical and horizontal runs.

Connector plates shall be high pressure rigid plate types, connected by ribbed-neck; case hardened plated steel bolts with flanged serrated locknuts, locknut with serrated washer or locknut with captive washer. Design shall provide for undiminished structural strength of the connection. Hardware for use with expansion plates may be different to allow for movement of the tray.

Cable tray shall be electrically continuous and shall be effectively grounded. Completed cable tray systems shall be rigid and have all components firmly bolted and in good electrical contact with the grounding system.

Cable tray supports shall be of heavy-duty reinforced type, hot-dip galvanized steel, suitably sized to accommodate the tray system, cables and live loads normally experienced during cable installation. The maximum deflection between two consecutive supports shall not exceed 7.5 mm for ladder type trays.

EW-9.0 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-9.1 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-7.0 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-9.2 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-7.0 of the Technical Data Sheets which shall be submitted by the Contractor together with Manufacturer's brochure/drawings during the Implementation stage.

E-1.0 Generator Control and Protection Panel

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-1.1	Manufacturer	By Contractor	
E-1.2	Each GCPP to be supplied shall be equipped with metering, status, alarm and trip indication light, synchronizing devices, protection relays as shown on the bid drawing	Yes	
E-1.3	Class (indoor, outdoor)	Indoor	
E-1.4	Generator Circuit Breaker		
	a. Manufacturer	By Contractor	
	b. Model	By Contractor	
	c. Continuous Current Rating	Refer to Single Line Diagram	
	d. Construction	Air Circuit Breaker	
	e. Type	Spring Charged Motor Operated	
	f. Symmetrical Current	Refer to Single Line Diagram	
E-1.5	Enclosure Details		
	a. Protection Class	IP 44	
	b. Metal Steel Sheet Thickness, mm	2	
	c. Cable Entrance	Bottom	
	d. Dimension (L x W x H), mm	Refer to Bid Drawing	
	e. Weight, kg	Manufacturer's Data	
	f. All materials are non-hygroscopic to prevent fungus growth	Yes	
	g. The GCPP shall be provided w/ nameplate	Yes	
	h. Outline drawing showing details of the GCPP enclosure including its components as shown on the bid drawing shall be furnished by the Contractor for NPC approval	Yes	
E-1.6	Programmable Logic Controller	Included	
E-1.7	Metering System		
	Metering device to be provided shall consist of the following:	Yes	
	a. Ammeter	Included	
	b. Voltmeter	Included	
	c. Watt-Hour meter	Included	
	d. Power Factor Meter	Included	

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
	e. Frequency	Included	
	f. kW	Included	
	g. kVAR	Included	
	h. Running Hour meter (GCPP only)	Included	
	i. Alternator Winding Temperature (GCPP only)	Included	
	j. Other engine metering required as specified in Mechanical Specifications (GCPP only)	Included	
E-1.8	Monitoring System (GCPP only)		
	a. An Annunciator Window with Common Audio Alarm & Trip indication for:		
	a.1. Monitoring of abnormal conditions during operation of the system including generator and transformer protective devices	Included	
	a.2. Detection of alternator winding temperature	Included	
	b. Data Logger and Event Recorder	Included	
	c. User Programmable Fault Reports	Included	
	d. PLC Failure, Circuit Breaker Status (On, OFF, Trip), Engine Start/Stop, etc.	Yes	
	e. Other engine monitoring required In Local Control Panel shall be included in the GCPP	Yes	
E-1.9	Synchronizing System (GCPP only)		
	a. Synchronizing device for Auto and manual synchronization	Yes	
	b. GCPP shall be equipped with protection relays to provide signal and alarm to protect the D/G set from damage during fault	Yes	
E-1.10	The Contractor shall provide all the required Generator Protection devices for the all the D/G set ratings as shown on the Single Line diagram	Yes	
E-1.11	Test Requirement		
	a. Routine Test to be Performed	Yes	
	b. Certified Routine Test Reports to be Submitted	Yes	

E-2.0 Insulating Oil

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-2.1	Manufacturer	By Contractor	
E-2.2	Place of Manufacture	By Contractor	
E-2.3	Insulating Oil shall be mineral oil in accordance with ASTM D3487	Yes	
E-2.4	Additional Properties		
	a. Min. Flash Point, °C (ASTM D92)	145	
	b. Pour point, max °C (not higher than	-40	
	c. Kinematic, Viscosity at 40°C	Max 12	
	d. Elect. Breakdown limit (IEC 60156)	Min. 30	
E-2.5	Polychlorinated Biphenyls (PCBs) free	Yes	
E-2.6	Oil Test Results shall be submitted to NPC (PCB analysis and Electrical & Physical Test)	Yes	
E-2.7	Weight of Oil, kg	Manufacturer's Data	

E-3.0 Power, Control & Instrumentation Cable

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
15kV Power Cable			
E-3.1	Manufacturer	By Contractor	
E-3.2	Continuous current carrying capacity of conductor at 90°C Operating Temperature	Manufacturer's Data	
E-3.3	Conductor Cross-Section, mm^2	25	
E-3.4	Type of cable	Single Core	
E-3.5	Max. Outside Diameter, mm	Manufacturer's Data	
E-3.6	Conductor Shape	Circular Stranded Wire	
E-3.7	Conductor Material	Annealed Copper	
E-3.8	Insulation		
	a. Material	Cross-linked polyethylene (XLPE)	
	b. Thickness, mm	> 4.0	
E-3.9	Outer covering/Jacket		
	a. Material	PVC Sheath Jacketing	
	b. Thickness, mm	Manufacturer's Data	
	c. Termite Protection Required	Yes	
E-3.10	Shielded (yes, no)	Yes	
	a. Type of Shielding	Copper Tape Screen	
E-3.11	Provided with Filler and Binder Tape	Yes	
600V Power, Instrumentation and Control Cable			
E-3.12	Manufacturer	By Contractor	
E-3.13	Type		
	a. Power	THHN/THWN-2	
	b. Control & Instrumentation	Royal Cord	

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-3.14	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-3.15	Conductor Material	Annealed Copper	
E-3.16	Conductor Shape	Circular Stranded Conductors	
E-3.17	Type of Insulation	Lead Free, PVC	
E-3.18	Outer covering/Jacket	Oil, Chemical and Abrasion Resistant Tough Polyamide (Nylon)	
E-3.19	Meets ASTM, UL 83 & 1063, and PNS 35 Specifications and requirements of PEC	Yes	

4.0 Fuse Disconnect Switch With Lightning Arrester Combination

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-4.1	Manufacturer	By Contractor	
E-4.2	Class (indoor, outdoor)	Outdoor	
E-4.3	Rated voltage, kV	15	
E-4.4	Nominal system voltage, kV	13.8	
E-4.5	Frequency, Hz	60	
E-4.6	BIL, kV	110	
E-4.7	Ampere Frame	100	
E-4.8	Interrupting Capacity, kA	10	
E-4.9	Fuse Link		
	a. Type	Universal buttonhead design	
	b. Current Rating, A	Refer to Single Line Diagram	
E-4.10	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	
	e. Maximum Continuous Operating Voltage (MCOV), for the arresters having the following duty cycle voltage, kV rms	8.4	
	f. Nominal discharge current, kA	10	
	g. Creepage distance, mm	465	
	h. Supporting brackets, bolts, nuts, etc.	Yes	

5.0 Bus Conductor and Hardware

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
Stranded Conductor Requirements			
E-5.1	Manufacturer	By Contractor	
E-5.2	Type designation	Aluminum Conductor Steel Reinforced (ACSR)	
E-5.3	Code Name	By Contractor	
E-5.4	Conductor size	2/0 AWG	
E-5.5	Ampacity, A	270	
E-5.6	Outer Layers		
	a. Material	Aluminum	
	b. Stranding No.	6	
	c. Calculated Cross-sectional Area, mm^2	Manufacturer's Data	
	d. Coefficient of Elongation (/°C)	Manufacturer's Data	
E-5.7	Core		
	a. Material	Galvanized Steel	
	b. Stranding No.	1	
	c. Calculated Cross-sectional Area, mm^2	Manufacturer's Data	
	d. Coefficient of Elongation (/°C)	Manufacturer's Data	
E-5.8	Conductor Coefficient of Linear Expansion (/°C)	Manufacturer's Data	
Conductor Hardware			
E-5.9	Tension Clamp		
	a. Type	Bolted, U-Bolt	
	b. Material of Body	Aluminum Alloy	
E-5.10	Connectors		
	a. Type	wedge pressure clamp for stranded conductor connection	
	b. Angle and T-connectors type	wedge pressure clamp for stranded conductor connection	

E-6.0 Grounding System

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
Grounding Grid Design Criteria			
E-6.1	Fault duration, sec	3	
E-6.2	Total fault level (line to ground), kA	8	
E-6.3	Ground mat design resistance	5 Ohms (max.)	
E-6.4	Grounding connection	Exothermic	
E-6.5	Permissible temperature rise of grid copper conductor, °C	300	
E-6.6	Grid conductor		
	a. Manufacturer	By Contractor	
	b. Minimum Size, mm^2	100	
	c. Material	tin-annealed copper stranded conductor (bare)	
E-6.7	Burial depth of grid conductor below finished grade, m	0.6	

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
Equipment Grounding			
E-6.8	Bonding Conductor (riser)		
	a. Manufacturer	By Contractor	
	b. Size, mm^2	100, 50 & 22	
	c. Material	tin-annealed copper stranded conductor with 1.2 kV PVC Insulation	
E-6.9	Ground Rod		
	a. Manufacturer	By Contractor	
	b. Type	Copper rod	
	c. Diameter, mm	≥ 19 mm	
	d. Length/section, m	≥ 3 m	

E-7.0 Spare Parts

ITEM	DESCRIPTION [3]	QTY. [1]	UNIT PRICE	TOTAL PRICE [2]
E-7.1	Generator Circuit Breaker for Generator Control & Protection Panel	One Set for 500kW D/G Set		
E-7.2				
E-7.3				
E-7.4				
E-7.5				
E-7.6				
E-7.7				
E-7.8				
E-7.9				

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-10.0 MEASUREMENT OF PAYMENT

Measurement of payment for all electrical works shall be based on the bid price of each item as shown in the Bill of Quantities – Electrical Works, Section VII of the Bid Document. The cost of each item shall cover all works required and described in the pertinent provisions of the specifications.

SECTION VI

TECHNICAL SPECIFICATIONS

PART II - TECHNICAL DATA SHEETS

PART II – TECHNICAL DATA SHEETS

MW – MECHANICAL WORKS

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PART II – TECHNICAL DATA SHEETS

MW – MECHANICAL WORKS

TRANSFER OF 2 X 500 KW DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

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; and

2. 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.

I. EQUIPMENT DATA (TO BE SUPPLIED)

ITEM	DESCRIPTION	UNITS	NPC REQUIREMENT	BIDDER'S PROPOSAL
M.1.0	**COMPRESSED AIR STARTING SYSTEM**			
M.1.1	AC Motor-Driven Air Compressor			
M.1.2	Manufacturer		By Contractor	
M.1.3	Place of Manufacture		By Contractor	
M.1.4	Quantity		Two (2)	
M.1.5	Capacity	m^3/hr	20 minimum per unit	
M.1.6	Type		Reciprocating, multi-stage, piston type, direct or V-belt driven by motor	
M.1.7	Discharge Pressure (min.)	Mpa	3	
M.1.8	Rated speed	rpm	By Contractor	
M.1.9	Cooling		Air-cooled	
M.1.10	Motor type		TEFC	
M.1.11	Motor Rating	kW	≤5.5 kW	
M.1.12	Motor Power Source Voltage	V	480	
M.1.13	Motor Frequency/Phase		60Hz/3-phase	
M.1.14	Total Weight of Assembly	kg	By Contractor	
M.2.0	**LEAK OIL PUMP AND TANK**			
M.2.1	**Pump**			
M.2.1.1	Manufacturer		By Contractor	
M.2.1.2	Place of Manufacture		By Contractor	
M.2.1.3	Type (Outdoor)		Gear	
M.2.1.4	Quantity		One (1)	
M.2.1.5	Capacity	m^3/h	1.0	
M.2.1.6	Total Head	m	30	
M.2.1.7	Speed	rpm	By Contractor	
M.2.1.8	Efficiency	%	By Contractor	
M.2.1.9	Power Required	HP	≤ 2	
M.2.1.10	Material			
	Casing		Cast Iron	
	Gear		Ductile Iron	
	Shaft		H. Gr. Carbon Steel	
M.2.1.11	Weight	kg	By Contractor	
M.2.2	**Motor**			
M.2.2.1	Manufacturer		By Contractor	
M.2.2.2	Place of Manufacture		By Contractor	
M.2.2.3	Type & Protection (Outdoor)		By Contractor	
M.2.2.4	Insulation Class		By Contractor	
M.2.2.5	Motor type		By Contractor	

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EQUIPMENT DATA (TO BE SUPPLIED) Cont'd....

ITEM	DESCRIPTION	UNITS	NPC REQUIREMENT	BIDDER'S PROPOSAL
M.2.2.6	Motor Rating	kW	≤ 2	
M.2.2.7	Motor Power Source Voltage	V	220	
M.2.2.8	Motor Frequency/Phase		60Hz/1-phase	
M.2.2.9	Rated Current		By Contractor	
M.2.2.10	Weight	kg	By Contractor	
M.2.2.11	Rated speed	rpm	By Contractor	
M.2.2.12	Cooling		Air-cooled	
M.2.3	**Leak Oil Tank**			
M.2.3.1	Leak Oil Tank Capacity	m^3	One (1)	
M.2.3.2	Quantity		One (1)	
M.2.3.3	Leak Oil Tank Dimension	L x W x H	By Contractor	
M.2.3.4	Leak Oil Tank Plate Material	ASTM	A 36	
M.2.3.5	Leak Oil Tank Plate Thickness	mm	5 minimum	

Name of Firm _____ Name & Signature of Representative _____ Designation _____

PART II – TECHNICAL DATA SHEETS

EW- ELECTRICAL WORKS

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PART II
TECHNICAL DATA SHEETS

EW – Electrical Works

SECTION E-1.0 – E-7.0

Documents to be Submitted during the Post Qualification as Reference for the Approval of Manufacturer's Brochures/Drawings

1. The following shall be filled-out and to be submitted during the post qualification.
2. Filled-out data by the Contractor shall only serve as reference for the review and approval of brochures/drawings during implementation stage.
3. Full technical data of the equipment are indicated in the Technical Specifications (EW-9.2) which will be submitted during the implementation stage for review and approval.
4. Non-submission of the documents shall be ground for disqualification.

Name of Firm	Name & Signature of Representative	Designation

E-1.0 GENERATOR CONTROL & PROTECTION PANEL

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-1.1	Manufacturer	By Contractor	
E-1.2	Generator Circuit Breaker	Air Circuit Breaker	
	a. Manufacturer	By Contractor	
	b. Model	By Contractor	
	c. Continuous Current Rating	Refer to Single Line Diagram	

E-2.0 INSULATING OIL

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-2.1	Manufacturer	By Contractor	
E-2.2	Place of Manufacturer	By Contractor	
E-2.3	Insulating Oil shall be mineral oil in accordance with ASTM D3487	Yes	
E-2.4	Additional Properties		
	a. Mln. Flash Point, °C (ASTM D92)	145	
	b. Pour point, max °C (not higher than	-40	
	c. Kinematic, Viscosity at 40°C	Max 12	
	d. Elect. Breakdown limit (IEC 60156)	Min. 30	
E-2.5	Polychlorinated Biphenyls (PCBs) free	Yes	
E-2.6	Oil Test Results shall be submitted to NPC (PCB analysis and Electrical & Physical Test)	Yes	
E-2.7	Weight of Oil, kg	Manufacturer's Data	

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E-3.0 POWER, CONTROL & INSTRUMENTATION CABLE

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
15kV Power Cable			
E-3.1	Manufacturer	By Contractor	
E-3.2	Continuous current carrying capacity of conductor at 90°C Operating Temperature	Manufacturer's Data	
E-3.3	Conductor Cross-Section, mm^2	Refer to Single Line Diagram	
E-3.4	Conductor Material	Annealed Copper	
E-3.5	Insulation Material	Cross-linked polyethylene (XLPE)	
600V Power, Instrumentation and Control Cable			
E-3.6	Manufacturer	By Contractor	
E-3.7	Type		
	a. Power	THHN/THWN-2	
	b. Control & Instrumentation	Royal Cord	
E-3.8	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-3.9	Conductor Material	Annealed Copper	

E-4.0 FUSE DISCONNECT SWITCH WITH LIGHTNING ARRESTER COMBINATION

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-4.1	Manufacturer	By Contractor	
E-4.2	Rated voltage, kV	15	
E-4.3	Frequency, Hz	60	
E-4.4	BIL, kV	110	
E-4.5	Ampere Frame	100	
E-4.6	Interrupting Capacity, kA	10	
E-4.7	Fuse Link		
	a. Type	Universal buttonhead design	
	b. Current Rating, A	Refer to Single Line Diagram	
E-4.8	Lightning Arrester		
	a. Type	Metal Oxide Varistor (MOV), gapless	

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E-5.0 BUS CONDUCTOR

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-5.1	Manufacturer	By Contractor	
E-5.2	Type designation	Aluminum Conductor Steel Reinforced (ACSR)	
E-5.3	Conductor size	2/0 AWG	
E-5.4	Ampacity, A	270	

E-6.0 GROUNDING SYSTEM

ITEM	DESCRIPTION	NPC REQUIREMENTS	CONTRACTOR'S DATA
E-6.1	Grounding Connection	Exothermic	
E-6.2	Permissible temperature rise of grid copper conductor, °C	300	
E-6.3	Grid conductor		
	a. Manufacturer	By Contractor	
	b. Minimum Size, mm^2	100	
	c. Material	tin-annealed copper stranded conductor (bare)	
E-6.4	Bonding Conductor		
	a. Manufacturer	By Contractor	
	b. Size, mm^2	100, 50 & 22	
	c. Material	tin-annealed copper stranded conductor with 1.2 kV PVC Insulation	
E-6.5	Copper Ground Rod		
	a. Manufacturer	By Contractor	
	b. Diameter, mm	≥ 19 mm	
	c. Length/section, m	≥ 3 m	

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E-7.0 SPARE PARTS

ITEM	DESCRIPTION [3]	QTY. [1]	UNIT PRICE	TOTAL PRICE [2]
E-7.1	Generator Circuit Breaker for Generator Control & Protection Panel	One Set for 500kW D/G Set		
E-7.2				
E-7.3				
E-7.4				
E-7.5				
E-7.6				
E-7.7				
E-7.8				
E-7.9				
E-7.10				

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).

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SECTION VII

BILL OF QUANTITIES

TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS FROM BUSUANGA DPP TO RIZAL DPP

SUMMARY OF BILL OF QUANTITIES

Item	Description of Work or Materials	Total Price in Pesos (In Words)	Total Price in Pesos (In Figures)
A.	TOTAL CIVIL WORKS		P _____
B.	TOTAL MECHANICAL WORKS		P _____
C.	TOTAL ELECTRICAL WORKS		P _____
	GRAND TOTAL		P _____

Name of Firm

Name and Signature of Authorized Representative

Designation

CIVIL WORKS

TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SET FROM BUSUANGA DPP TO RIZAL DPP

Item No.	Description of Work or Materials	Work to be Done*	Ref.	Unit	Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
CW-1.0	CIVIL WORKS		Refer to NPC TS and Drawings				
CW-1.1	Cable Trench (Including Steel Plate Cover)	Furnish & Construct		l.m	20	_____ (₱ _____)	₱ _____
CW-1.2	Day Tank Steel Support	Design, Furnish & Construct		pc	2	_____ (₱ _____)	₱ _____
CW-1.3	Equipments Pad Foundation (including excavation, bedding, and anchor bolts)	Design, Furnish & Construct		lot	1	_____ (₱ _____)	₱ _____

*Note * - Includes the supply of foundation bolts, as applicable, and other accessories (irretrievable from Siquijor) which are necessary to complete the re-assembly and installation works of the above quipment and auxiliaries.*

TOTAL CIVIL WORKS _____ (₱ _____) ₱ _____

Name of Firm

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MECHANICAL WORKS

TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS FROM BUSUANGA DPP TO RIZAL DPP

Item No.	Description of Work or Materials	Work to be Done	Reference	Unit	Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-1.0	**MAIN EQUIPMENT AND AUXILIARIES TO BE TRANSFERRED ***		GENERAL WORKS GW-2.0 :Scope of Works GW-2.4: Mechanical Works				
MW-1.1	**Diesel Genset and its asssociated components/parts and accessories as required for the safe, efficient, and reliable operation** a. MAN Diesel Engine Capacity: 576 kW Weight : 7.5 Tons Size : 4.14L x 1.6W x 2.33H b. Siemens Alternator Capacity: 648 kVA Weight : 3.6 Tons Size : 1.91L x 1.57W x 1.33H	Dismantle, Pack, Haul/Transport, Install, Allign		Sets	2	(₱)	₱
MW-1.2	**Fuel Oil Storage and Transfer System and its Accessories** a. 2 sets of 3.0 KL FO Day Tank, Weight: 2000 kg Dimension: 2.7L x 1.23Wx 1.48H	Dismantle, Pack, Haul/Transport, Install, Cleaning/flushing		Lot	1	(₱)	₱
MW-1.3	**Compressed Air Starting System and its Accessories** a. 2 sets of Air Tank/Bottle and its accessories, 30 Bars	Dismantle, Pack, Haul/Transport, Install		Lot	1	(₱)	₱
MW-1.4	**Engine Cooling System and its Accessories** a. 1 set of Radiator Motor, 18 kW, 20 kg., Size: 0.6 m Diameter, Height : 0.4 m b. 2 sets of Expansion Tank, Valves and its accessories	Dismantle, Pack, Haul/Transport, Install, Cleaning/flushing		Lot	1	(₱)	₱
MW-1.5	**Air Intake System and its Accessories** a. 2 sets of Air Filter: Diameter: 1.03 M, Height: 1.95 M, Weight: 1 Ton b. 2 sets of Intake Manifold	Dismantle, Pack, Haul/Transport, Install		Lot	1	(₱)	₱
MW-1.6	**Exhaust System and its Accessories** a. 2 sets of Muffler/Chimney/Exhaust Pipe, pipe supports, pipe insulation and its accessories	Dismantle, Pack, Haul/Transport, Install		Lot	1	(₱)	₱

*Note * - Includes the supply of foundation bolts (as applicable) and other components/parts and accessories that are lacking/missing and/or irretrievable from other/source DG Set/s and their auxiliaries which are necessary to complete the re-assembly and installation works of the above equipment and auxiliaries for the reliable and smooth operation of the DG Set and auxiliaries to be transferred.*

Name of Firm

Name and Signature of Authorized Representative

Designation

MECHANICAL WORKS

TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS FROM BUSUANGA DPP TO RIZAL DPP

Item No.	Description of Work or Materials	Work to be Done	Reference	Unit	Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-1.7	**Charging Air Cooling Water Assembly and its accessories** a. 2 sets of Charging Air Cooling Water Pump complete with pipe, fittings, pipe supports, pipe insulation, electrical controls and its accessories	Dismantle, Pack, Haul/Transport, Install, Cleaning/flushing	GENERAL WORKS GW-2.0 :Scope of Works GW-2.4: Mechanical Works	Lot	1	_____ (₱ _____)	₱ _____
MW-1.8	**Water Softening System (Skid Mounted)** a. Water Softening System complete with Booster Pressure Pump, centrifugal type complete with associated tanks, controls and instrumentation, anchor bolts, concrete foundation, pipeworks, associated valves,spare parts, associated valves,and other necessary accessories as described in the technical specifications and shown on the bid drawings.	Dismantle, Pack, Haul/Transport, Install, Cleaning/flushing		Set	1	_____ (₱ _____)	₱ _____
MW-1.9	Various sizes of pipes, valves, filters/strainers, pipe fittings, pipe supports, gauges or instruments and other pipe accessories for the above generating sets and auxiliary equipment	Dismantle, Pack, Haul/Transport, Install and Cleaning/flushing		Lot	1	_____ (₱ _____)	₱ _____
MW-1.10	Assistance to Test & Commissioning for the above equipment including relocated electrical equipment	Conduct & Perform		Lot	1	_____ (₱ _____)	₱ _____

*Note * - Includes the supply of foundation bolts (as applicable) and other components/parts and accessories that are lacking/missing and/or irretrievable from other/source DG Set/s and their auxiliaries which are necessary to complete the re-assembly and installation works of the above equipment and auxiliaries for the reliable and smooth operation of the DG Set and auxiliaries to be transferred.*

_____ Name of Firm

_____ Name and Signature of Authorized Representative

_____ Designation

MECHANICAL WORKS

TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS FROM BUSUANGA DPP TO RIZAL DPP

Item No.	Description of Work or Materials	Work to be Done	Reference	Unit	Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-2.0	**EQUIPMENT, AND MATERIALS TO BE SUPPLIED, INSTALLED AND TESTED BY THE CONTRACTOR***		GENERAL WORKS GW-2.0 :Scope of Works GW-2.4: Mechanical Works				
MW-2.1	Radiator Motor to be installed in the existing Radiator Assembly, 18 kW, 220V, 60Hz, 3-phase and TEFC as described in the technical specifications	Supply, Install and Test		Unit	1	(₱)	₱
MW-2.2	**Fuel Oil Storage and Transfer System and its Accessories** a. Leak Fuel Transfer Pump, 3 m³/hr capacity @ 30 meters head, gear type with built-in adjustable relief valve, designed for outdoor installation, complete with associated controls and instrumentation, associated valves, filter and other necessary accessories as described in the technical specifications and shown on the bid drawings.	Supply, Install and Test		Set	1	(₱)	₱
	b. Spare Parts for Leak Oil Pump for one (1) year operation per Manufacturer's recommendation and as specified in the technical specifications	Supply and Delivery		Set	1	(₱)	₱
	c. Leak Oil Tank 1.0 m³ capacity complete with necessary piping, four level point magnetic type level switch (very high, high, low and very low) for alarm and start/stop functions integrated with the leak fuel oil pump fittings and other accessories as described in the technical specifications and shown on the bid drawings.	Supply, Install and Test		Set	1	(₱)	₱
MW-2.3	**Compressed Air Starting System and its Accessories** a. Compressed Air Starting System (excluding air bottle) complete with Air Compressors (Electric-Driven @ 100% Capacity), 20m³/hr minimum capacity @ 30 bars, complete with associated valves, drain trap, relief valve, pressure gauges, controls and instrumentation, recommended spare parts & tools and accessories as described in the technical specifications and bid drawings.	Supply, Install and Test		Sets	2	(₱)	₱
	b. Spare Parts for Compressor for one (1) year operation per Manufacturer's recommendation and as specified in the technical specifications	Supply and Delivery		Lot	1	(₱)	₱

*Note * - Includes the supply of foundation bolts (as applicable) and other components/parts and accessories that are lacking/missing and/or irretrievable from other/source DG Set/s and their auxiliaries which are necessary to complete the re-assembly and installation works of the above equipment and auxiliaries for the reliable and smooth operation of the DG Set and auxiliaries to be transferred.*

Name of Firm

Name and Signature of Authorized Representative

Designation

MECHANICAL WORKS

TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS FROM BUSUANGA DPP TO RIZAL DPP

Item No.	Description of Work or Materials	Work to be Done	Reference	Unit	Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-2.4	**Piping System to compensate any shortages of transferred piping including pipe fittings, gaskets, valves, flanges, bolts and nuts, pipe supports and other incidentals to complete the piping systems of the Diesel Engines and its auxiliaries incl. support structure for interconnection to the supplied/transferred equipment:** a. Fuel Oil supply/filling to separate/elevated fuel day tank and leak oil tank and interconnection works with the existing fuel supply line from/to day tanks and to/from the DG Set including strainers, etc; b. Lube Oil supply/filling to DG Set; c. Cooling water supply to radiators and water softener with the existing water supply lines; d. Air Starting Piping System to DG Set; and e. Intake and exhaust pipe, insulation and associated structural steel supports (as applicable);	Supply, Excavate, Install, Backfill and Test	GENERAL WORKS GW-2.0 :Scope of Works GW-2.4: Mechanical Works	Lot	1	(₱)	₱
MW-3.0	**MISCELLANEOUS**						
MW-3.1	**Chemical Cleaning and Hot Oil Flushing** Chemical cleaning and Hot oil flushing for the transferred and newly installed fuel, cooling and lube oil piping system, which include degreasing, pickling, neutralizing, preservation and drying.	Supply and apply		Lot	1	(₱)	₱

*Note * - Includes the supply of foundation bolts (as applicable) and other components/parts and accessories that are lacking/missing and/or irretrievable from other/source DG Set/s and their auxiliaries which are necessary to complete the re-assembly and installation works of the above equipment and auxiliaries for the reliable and smooth operation of the DG Set and auxiliaries to be transferred.*

Name of Firm

Name and Signature of Authorized Representative

Designation

MECHANICAL WORKS

TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS FROM BUSUANGA DPP TO RIZAL DPP

Item No.	Description of Work or Materials	Work to be Done	Reference	Unit	Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-3.2	**Painting** a. Painting for the following piping systems and its associated equipment, valves, fittings, steel supports/structures and other accessories including touch-up of coating for all new equipment and materials which have been damaged during shipment, unpacking and installation. - Fuel Oil Unloading and Transfer Piping System - Engine Fuel Oil Piping System - Engine Cooling Water Piping System/Water Softening System - Engine Air Starting Piping System - Engine Lube Oil Piping System - Engine Air and Exhaust Piping System b. Touch-up painting for relocated DG Set and its associated components/parts and accessories	Supply and apply	GENERAL WORKS GW-2.0 :Scope of Works GW-2.4: Mechanical Works	Lot	1	(₱)	₱
MW-3.3	Tagging or labels for equipment, valves, piping, instruments and its fixing accessories	Supply and apply		Lot	1	(₱)	₱

*Note * . Includes the supply of foundation bolts (as applicable) and other components/parts and accessories that are lacking/missing and/or irretrievable from other/source DG Set/s and their auxiliaries which are necessary to complete the re-assembly and installation works of the above equipment and auxiliaries for the reliable and smooth operation of the DG Set and auxiliaries to be transferred.*

TOTAL MECHANICAL WORKS ₱

(₱)

Name of Firm

Name and Signature of Authorized Representative

Designation

ELECTRICAL WORKS

TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS FROM BUSUANGA DPP TO RIZAL DPP

Item No.	Description of Work or Materials	Work to be Done*	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
EW-1.0	**MAIN ELECTRICAL EQUIPMENT TO BE TRANSFERRED**						
EW-1.1	Generator Transformer and its Accessories including Draining and Storing of the existing Transformer Insulating Oil to the designated storage facility by plant head/personnel						
	a. 630 kVA (Total Wt.: 2.05 Tons | Insulating Oil Wt.: 0.49 Ton)	Dismantling, Packaging, Hauling/Transport, Installation, Filling of Insulating Oil and Test	EW-TS TDS & BD	sets	2	_____ (₱ _____)	₱ _____
EW-1.2	Auxiliary Transformer and its Accessories Storing of the existing Insulating Oil to the designated storage facility by plant head/personnel						
	a. 160 kVA (Total Wt.: 0.81 Ton | Insulating Oil Wt.: 0.20 Ton)	Dismantling, Packaging, Hauling/Transport, Installation, Filling of Insulating Oil and Test	EW-TS TDS & BD	set	1	_____ (₱ _____)	₱ _____
EW-1.3	Auxiliary Control and Monitoring Panel, complete with the required devices and accessories, consisting but not limited to metering, protection devices, combination motor starter, circuit breakers, power and control cables, grounding materials, etc.	Dismantling, Packaging, Hauling/Transport, Refurbishing, Installation and Test	EW-TS TDS & BD	set	1	_____ (₱ _____)	₱ _____
EW-2.0	**ELECTRICAL EQUIPMENT AND MATERIALS TO BE SUPPLIED, INSTALLED AND TESTED**						
EW-2.1	Insulating Oil for the Generator and Auxiliary Transformers to be transferred as specified in the Technical Specifications	Supply and Test	EW-TS & TDS	liters	1475	_____ (₱ _____)	₱ _____

Name of Firm

Name and Signature of Authorized Representative

Designation

ELECTRICAL WORKS

TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS FROM BUSUANGA DPP TO RIZAL DPP

Item No.	Description of Work or Materials	Work to be Done*	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
EW-2.2	Generator Control and Protection Panel complete with the required metering, monitoring, control and protection devices, synchronizing, spare circuit breaker, grounding materials and other appurtenances as described in the Technical Specifications, Technical Data Sheet and as shown on the Bid Drawings including installation works in the Control Room	Supply, Install and Test	EW-TS TDS & BD	sets	2	_____ (₱ _____)	₱ _____
EW-2.3	15kV, 100 A, 10kA, Fuse Disconnect Switch with Lightning Arrester Combination complete with the required fuse link (7A), brackets, and accessories in accordance with the Bid Drawings, Technical Specifications and Technical Data Sheets	Supply, Install and Test	EW-TS TDS & BD	sets	3	_____ (₱ _____)	₱ _____
EW-2.4	Power, Control & Instrumentation Cables complete with the required accessories for cabling works to interface the transferred/supplied equipment to the 13.8kV system as described in the Technical Specifications, Technical Data Sheet and as shown on the Bid Drawings including installation works	Supply, Lay and Test	EW-TS TDS & BD	lot	1	_____ (₱ _____)	₱ _____
EW-2.5	Bus Conductors and Line Hardwares	Supply, Install and Test	EW-TS TDS & BD	lot	1	_____ (₱ _____)	₱ _____
EW-2.6	Grounding System complete with the required bonding conductor, exothermic welding materials, ground rods, and other accessories as described in the Technical Specifications and Technical Data Sheets as shown on the Bid Drawings including installation works	Supply, Install and Test	EW-TS TDS & BD	lot	1	_____ (₱ _____)	₱ _____
EW-2.7	Conduits and Cable Tray System and other appurtenances required for cabling works as described in the Technical specifications and Technical Data Sheets and as shown on the bid drawings	Supply and Install	EW-TS TDS & BD	lot	1	_____ (₱ _____)	₱ _____

Name of Firm

Name and Signature of Authorized Representative

Designation

ELECTRICAL WORKS

TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS FROM BUSUANGA DPP TO RIZAL DPP

Item No.	Description of Work or Materials	Work to be Done*	Ref.	Unit	Total Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
EW-2.8	Motor Circuit Conductors complete with the required accessories for cabling works to interface the transferred auxiliary motors to the motor control center including counduit system	Supply, Install and Test	EW-TS TDS & BD	lot	1	_____ (₱ _____)	₱ _____
EW-3.0	**SPARE PARTS**	Furnish	EW-TS	lot	1	_____ (₱ _____)	₱ _____

*Note * - Includes the supply of foundation bolts, as applicable, and other accessories (irretrievable from Busuanga) which are necessary to complete the re-assembly and installation works of the above equipment and auxillaries.*

TOTAL ELECTRICAL WORKS _____ (₱ _____) ₱ _____

Name of Firm

Name and Signature of Authorized Representative

Designation

SECTION VIII

BIDDING FORMS

SECTION VIII – BIDDING FORMS

TABLE OF CONTENTS

Standard Form No: NPCSF-INFR-01

Checklist of Technical & Financial Envelope Requirements for Bidders

A. THE 1ST ENVELOPE (TECHNICAL COMPONENT) SHALL CONTAIN THE FOLLOWING:

1. ELIGIBILITY DOCUMENTS

a. (CLASS A)

➢ Any of the following:

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

OR:

- The following updated and valid Class "A" eligibility documents enumerated under "Annex A" of the Platinum Membership:
  - Registration Certificate from the Securities and Exchange Commission (SEC) for corporations, Department of Trade and Industry (DTI) for sole proprietorship, or Cooperative Development Authority (CDA) for cooperatives;
  - Mayor's/Business permit issued by the city or municipality where the principal place of business of the prospective bidder is located, or the equivalent document for Exclusive Economic Zones or Areas.

    In cases of recently expired Mayor's/Business permits, it shall be accepted together with the official receipt as proof that the bidder has applied for renewal within the period prescribed by the concerned local government unit, provided that the renewed permit shall be submitted as a post qualification requirement in accordance with Section 34.2 of the Revised IRR of RA 9184.
  - The prospective bidder's audited financial statements, showing, among others, the prospective bidder's total and current assets and liabilities, stamped "received" by the BIR or its duly accredited and authorized institutions, for the preceding calendar year which should not be earlier than two (2) years from the date of bid submission.
  - Tax clearance per Executive Order 398, Series of 2005, as finally reviewed and approved by the BIR;
  - Valid Philippine Contractors Accreditation Board (PCAB) license and registration for the type and cost of the contract for this Project or Special PCAB License in case of Joint Ventures.

OR:

- A combination thereof.

➢ Statement of all its ongoing government and private contracts if any, whether similar or not similar in nature and complexity to the contract to be bid *(NPCSF-INFR-02)*

➢ The Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid, and whose value, adjusted to current prices using the Philippine Statistics Authority (PSA) consumer price index, must be at least 50% of the ABC *(NPCSF-INFR-03)* complete with the following supporting documents:

- Contract
- Owner's Certificate of Final Acceptance issued by the project owner other than the contractor or a final rating of at least Satisfactory in the Constructors Performance Evaluation System (CPES). In case of contracts with the private sector, an equivalent document (Ex. Official Receipt or Sales Invoice) shall be submitted

(The Single Largest Completed Contract (SLCC) as declared by the bidder shall be verified and validated to ascertain such completed contract. Hence, bidders must ensure access to sites of such projects/equipment to NPC representatives for verification and validation purposes during post-qualification process.

It shall be a ground for disqualification, if verification and validation cannot be conducted due to inaccessibility of the site for whatever reason or fault of the bidder.)

- Special PCAB License in case of Joint Ventures
- Duly signed computation of its Net Financial Contracting Capacity (NFCC) at least equal to the ABC *(NPCSF-INFR-04)*;

b. (CLASS B)

- Valid Joint Venture Agreement, if applicable *(NPCSF-INFR-05)*

2. Technical Documents

- Bid Security, any one of the following:
  - Bid Securing Declaration (*NPCSF-INFR-06c*)

    OR
  - Cash or Cashier's/Manager's check issued by a Universal or Commercial Bank – 2% of ABC;

    OR
  - Bank draft/guarantee or irrevocable letter of credit issued by a Universal or Commercial Bank: *(NPCSF-INFR-06a) - 2% of ABC;*

    OR
  - Surety Bond callable upon demand issued by a reputable surety or insurance company *(NPCSF-INFR-06b) - 5% of ABC, with*
    - Certification from the Insurance Commission as authorized company to issue surety
- Omnibus Sworn statement using any of the following form:
  - *NPCSF-INFR-07a* - for Sole Proprietorship;

    OR
  - *NPCSF-INFR-07b* - for Partnership/Corporation/Cooperative/Joint Venture with the following supporting documents:
    - In the case of corporations, board/partnership resolution or secretary's certificate, granting full powers to the authorized signatory;
    - For Joint-Venture, a resolution, duly signed by all the joint-venture partners granting full powers to the authorized signatory
- Organization Chart for the project *(NPCSF-INFR-08)*
- Duly Signed List of Contractor's Key Personnel (based on the minimum key personnel) with complete supporting documents *(NPCSF-INFR-09,10a,10b & 11)*
- Duly Signed List of Contractor's Equipment (owned, leased or under purchase agreement *(NPCSF-INFR-12), with*
  - Proof of ownership and/or certificate of availability issued by Equipment Lessors

- Duly signed and completely filled up Technical Data Sheets for Mechanical Works (Section VI – Part II MW)
- Certificate of Site Inspection duly signed by authorized NPC official, Annex 1 of Section VI – General Works (GW)
- Complete eligibility documents of proposed sub-contractor, if applicable

B. THE 2ND ENVELOPE (FINANCIAL COMPONENT) SHALL CONTAIN THE FOLLOWING:

- Duly signed Bid Letter indicating the total bid amount in accordance with the prescribed form (*NPCSF-INFR-13)*
- Duly signed and completely filled-out Bill of Quantities *(Section VII)* indicating the unit and total prices per item and the total amount in the prescribed Bill of Quantities form.
- Duly Signed Detailed Estimates for each items of work showing the computations in arriving at each item's unit prices used in coming up with the bid (*NPCSF-INFR-14)*
- Summary sheets indicating the direct unit prices of construction materials, labor rates and equipment rental rates used in coming up with the bid (*NPCSF-INFR-15)*

CONDITIONS:

1. *Each Bidder shall submit one copy of the first and second components of its Bid. NPC may request additional hard copies and/or electronic copies of the Bid. However, failure of the Bidders to comply with the said request shall not be a ground for disqualification.*
2. *A Bidder not submitting bid for reason that his cost estimate is higher than the ABC, is required to submit his letter of non-participation/regret supported by corresponding detailed estimates. Failure to submit the two (2) documents shall be understood as acts that tend to defeat the purpose of public bidding without valid reason as stated under Section 69.1.(i) of the revised IRR of R.A. 9184.*

Standard Form Number: NPCSF-INFR-02

List of All Ongoing Government and Private Contracts Including Contract Awarded But Not Yet Started

Business Name : _____
Business Address : _____

Name of Contract/Location/ Project Cost	a. Owner's Name b. Address c. Telephone Nos.	Nature of Work	Contractor's Role		a. Date Awarded b. Date Started c. Date of Completion or Estimated Completion Time	Value of Outstanding Works
			Description	%		
Government						
Private						
					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.	₱
2.	₱

That both parties agree to be jointly and severally liable for their participation in the Bidding and Undertaking of the said contract.

That both parties agree that _____ and/or _____ shall be the Official Representative/s of the Joint Venture, and are granted full power and authority to do, execute and perform any and all acts necessary and/or to represent the Joint Venture in the Bidding and Undertaking of the said contract, as fully and effectively and the Joint Venture may do and if personally present with full power of substitution and revocation.

That this Joint Venture Agreement shall remain in effect only for the above stated Contract until terminated by both parties.

_____
Name & Signature of Authorized Representative

_____
Official Designation

_____
Name of Firm

_____
Name & Signature of Authorized Representative

_____
Official Designation

_____
Name of Firm

Witnesses

1. _____

2. _____

If the bidder is a joint venture, one of the requirements is the submission of a valid joint venture agreement.

Standard Form Number: NPCSF-INFR-05
Page 2 of 2

ACKNOWLEDGMENT

BEFORE ME, a Notary Public for and in _____, Philippines, this _____day of _____, 200__, personally appeared _____, authorized representative, of _____ with Community Tax Certificate No._____, issued at _____, on _____, AND _____ authorized representative, of _____ with Community Tax Certificate No._____, issued at _____, on _____ known to me to be the same person who executed the foregoing instrument consisting of two (2) pages, including the page whereon the acknowledgements are written, all pages signed by both parties and their instrumental witnesses and they acknowledged before me that the same are their free and voluntary acts and deeds and that of the Corporations they represents.

WITNESS MY HAND AND NOTARIAL SEAL, at the place and on the date first above written.

Notary Public
Until 31 December 20_____
PTR No. _____
Issued at:_____
Issued on:_____
TIN No. _____

Doc. No. _____
Page No. _____
Book No. _____
Series of _____.

If the bidder is a joint venture, one of the requirements is the submission of a valid joint venture agreement.

Standard Form Number: NPCSF-INFR-06a

FORM OF BID SECURITY (BANK GUARANTEE)

WHEREAS, *(Name of Bidder)* _____ (hereinafter called "the Bidder") has submitted his bid dated *(Date)* _____ for the *[name of project]* (hereinafter called "the Bid").

KNOW ALL MEN by these presents that We *(Name of Bank)* _____ of *(Name of Country)* _____ having our registered office at _____ (hereinafter called "the Bank" are bound unto National Power Corporation (hereinafter called "the Entity") in the sum of *[amount in words & figures as prescribed in the bidding documents]* for which payment well and truly to be made to the said Entity the Bank binds himself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _____ day of _____ 20___.

THE CONDITIONS of this obligation are that:

1) if the Bidder withdraws his Bid during the period of bid validity specified in the Bidding Documents; or

2) if the Bidder does not accept the correction of arithmetical errors of his bid price in accordance with the Instructions to Bidder; or

3) if the Bidder, having determined as the LCB, fails or refuses to submit the required tax clearance, latest income and business tax returns and PhilGEPs registration certificate within the prescribed period; or

4) if the Bidder having been notified of the acceptance of his bid and award of contract to him by the Entity during the period of bid validity:

   a) fails or refuses to execute the Contract; or

   b) fails or refuses to submit the required valid JVA, if applicable; or

   c) fails or refuses to furnish the Performance Security in accordance with the Instructions to Bidders;

we undertake to pay to the Entity up to the above amount upon receipt of his first written demand, without the Entity having to substantiate its demand, provided that in his demand the Entity will note that the amount claimed by it is due to the occurrence of any one or combination of the four (4) conditions stated above.

The Guarantee will remain in force up to 120 days after the opening of bids or as it may be extended by the Entity, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

DATE _____ SIGNATURE OF THE BANK _____

WITNESS _____ SEAL _____

_____

(Signature, Name and Address)

Standard Form Number: NPCSF-INFR-06b

FORM OF BID SECURITY (SURETY BOND)

BOND NO.: _____ DATE BOND EXECUTED: _____

By this bond, We (*Name of Bidder*) _____ (hereinafter called "the Principal") and (*Name of Surety*) _____ of (*Name of Country of Surety*) _____, authorized to transact business in the Philippines (hereinafter called "the Surety") are held and firmly bound unto National Power Corporation (hereinafter called "the Employer") as Obligee, in the sum of (*amount in words & figures as prescribed in the bidding documents*), callable on demand, for the payment of which sum, well and truly to be made, we, the said Principal and Surety bind ourselves, our successors and assigns, jointly and severally, firmly by these presents.

SEALED with our seals and dated this _____ day of _____ 20 _____

WHEREAS, the Principal has submitted a written Bid to the Employer dated the _____ day of _____ 20 _____, for the _____ (hereinafter called "the Bid").

NOW, THEREFORE, the conditions of this obligation are:

1) if the Bidder withdraws his Bid during the period of bid validity specified in the Bidding Documents; or

2) if the Bidder does not accept the correction of arithmetical errors of his bid price in accordance with the Instructions to Bidder; or

3) if the Bidder, having determined as the LCB, fails or refuses to submit the required tax clearance, latest income and business tax returns and PhilGEPs registration certificate within the prescribed period; or

4) if the Bidder having been notified of the acceptance of his bid and award of contract to him by the Entity during the period of bid validity:

   d) fails or refuses to execute the Contract; or

   e) fails or refuses to submit the required valid JVA, if applicable; or

   f) fails or refuses to furnish the Performance Security in accordance with the Instructions to Bidders;

then this obligation shall remain in full force and effect, otherwise it shall be null and void.

PROVIDED HOWEVER, that the Surety shall not be:

a) liable for a greater sum than the specified penalty of this bond, nor

b) liable for a greater sum that the difference between the amount of the said Principal's Bid and the amount of the Bid that is accepted by the Employer.

Standard Form Number: NPCSF-INFR-06b
Page 2 of 2

This Surety executing this instrument hereby agrees that its obligation shall be valid for 120 calendar days after the deadline for submission of Bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Surety is hereby waived.

PRINCIPAL _____ SURETY _____

SIGNATURE(S) _____ SIGNATURES(S) _____

NAME(S) AND TITLE(S) _____ NAME(S) _____

SEAL _____ SEAL _____

Standard Form No: NPCSF-INFR-06c

REPUBLIC OF THE PHILIPPINES)
CITY OF _____) S.S.

BID-SECURING DECLARATION
TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP
LuzP19Z1082Sx

TO: **National Power Corporation**
BIR Road cor. Quezon Ave.
Diliman, Quezon City

I/We[1], the undersigned, declare that:

1. *I/We* understand that, according to your conditions, bids must be supported by a Bid Security, which may be in the form of a Bid-Securing Declaration.

2. *I/We* accept that: (a) *I/we* will be automatically disqualified from bidding for any contract with any procuring entity for a period of two (2) years upon receipt of your Blacklisting Order; and, (b) *I/we* will pay the applicable fine provided under Section 6 of the Guidelines on the Use of Bid Securing Declaration, within fifteen (15) days from receipt of the written demand by the Procuring Entity for the commission of acts resulting to the enforcement of the Bid Securing Declaration under Sections 23.1 (b), 34.2, 40.1 and 69.1, except 69.1 (f) of the IRR of R.A. 9184; without prejudice to other legal action the government may undertake.

3. *I/We* understand that this Bid-Securing Declaration shall cease to be valid on the following circumstances:

   (a) Upon expiration of the bid validity period, or any extension thereof pursuant to your request;

   (b) *I am/we are* declared ineligible or post-disqualified upon receipt of your notice to such effect, and (i) *I/we* failed to timely file a request for reconsideration or (ii) *I/we* filed a waiver to avail of said right;

   (c) *I am/we are* declared as the bidder with the Lowest Calculated and Responsive Bid, and *I/we* have furnished the performance security and signed the Contract.

[1] *Select one and delete the other. Adopt same instruction for similar terms throughout the document.*

IN WITNESS WHEREOF, *I/we* have hereunto set my hand this ____ day of ____ 20____ at _____, Philippines.

_____

[Name and Signature of Bidder's Representative/ Authorized Signatory]
[Signatory's legal capacity]
Affiant

SUBSCRIBED AND SWORN to before me this _____ day of _____ 20____ at _____, Philippines. *Affiant/s is/are* personally known to me and *was/were* identified by me through competent evidence of identity as defined in the 2004 Rules on Notarial Practice (A.M. No. 02-8-13-SC). Affiant exhibited to me *his/her [insert type of government identification card used]*, with *his/her* photograph and signature appearing thereon, with no. _____ and *his/her* Community Tax Certificate No. _____ issued on _____ at _____.

Witness my hand and seal this _____ day of _____, 20___.

NAME OF NOTARY PUBLIC
Serial No. of Commission _____
Notary Public for _____ until _____
Roll of Attorneys No. _____
PTR No. __, *[date issued], [place issued]*
IBP No. __, *[date issued], [place issued]*

Doc. No. ___
Page No. ___
Book No. ___
Series of ____.

Standard Form No: NPCSF-INFR-07b

OMNIBUS SWORN STATEMENT
(PARTNERSHIP/CORP/COOP/JV)

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. I am the duly authorized and designated representative of *[Name of Bidder]*____ with office address at *[address of Bidder]*____;
2. I am granted full power and authority to do, execute and perform any and all acts necessary and/or to represent the *[Name of Bidder]*____ in the bidding as shown in the attached *[state title of attached document showing proof of authorization (e.g., duly notarized Special Power of Attorney, Board/Partnership Resolution, or Secretary's Certificate, 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. 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 with the eligibility requirements under ITB Clause 5 of the bidding documents;
8. *[Name of Bidder]*_____ will accept corrections made to our bid to consider computational errors, omissions and other bid modifications, which shall be calculated in monetary terms to determine the calculated prices;
9. *[Name of Bidder]*_____is free and clear of all tax liabilities to the government;
10. *[Name of Bidder]*_____is aware of and has undertaken the following responsibilities as a Bidder:
    a) Carefully examined and accepted all of the Terms and Conditions of the Bidding Documents;

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.

b) Conducted site inspection and acknowledged all conditions, local or otherwise, affecting the implementation of the Contract;
c) Made an estimate of the facilities available and needed for the contract to be bid, if any;
d) Inquired or secured Supplemental/Bid Bulletin(s) issued for the *[Name of the Project]*___; and

11. *[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.

12. 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.

_____
Name and Signature of
Bidder's Representative/Authorized Signatory

ACKNOWLEDGMENT

REPUBLIC OF THE PHILIPPINES)
QUEZON CITY)SS.

BEFORE ME, a Notary Public for and in Quezon City, Philippines, this _____ day of _____, 20_____, personally appeared:

NAME	CTC NO.	ISSUED AT/ON
_____	_____	_____

known to me and known to be the same person who executed the foregoing instrument consisting of _____ ( ) pages, including the page whereon the acknowledgments is written and acknowledged before me that the same is his free and voluntary act and deed and that of the Corporation he represents.

WITNESS MY HAND AND NOTARIAL SEAL, at the place and on the date first above written.

Notary Public
Until 31 December 20____
PTR No._____
Issued at:_____
Issued on:_____
TIN No. _____

Doc. No._____
Page No._____
Book No._____
Series of _____.

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.

Standard Form No: NPCSF-INFR-07a

OMNIBUS SWORN STATEMENT
(SOLE PROPRIETORSHIP)

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. I am the sole proprietor of *[Name of Bidder]*____ with office address at *[address of Bidder]*____;
2. As the owner and sole proprietor of *[Name of Bidder]*____, I have full power and authority to do, execute and perform any and all acts necessary to represent it in the bidding for _____*[name of project]*____of the **National Power Corporation.**
3. 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;
4. *[Name of Bidder]*____ is authorizing the President of NPC or its duly authorized representative(s) to verify all the documents submitted;
5. I am 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;
6. *[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;
7. *[Name of Bidder]*_____ complies with existing labor laws and standards and with the eligibility requirements under **ITB** Clause 5 of the bidding documents;
8. *[Name of Bidder]*_____ will accept corrections made to our bid to consider computational errors, omissions and other bid modifications, which shall be calculated in monetary terms to determine the calculated prices;
9. *[Name of Bidder]*_____is free and clear of all tax liabilities to the government;
10. *[Name of Bidder]*_____is aware of and has undertaken the following responsibilities as a Bidder:
    a) Carefully examined and accepted all of the Terms and Conditions of the Bidding Documents;
    b) Conducted site inspection and acknowledged all conditions, local or otherwise, affecting the implementation of the Contract;

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.

c) Made an estimate of the facilities available and needed for the contract to be bid, if any;

a) Inquired or secured Supplemental/Bid Bulletin(s) issued for the *[Name of the Project]*___; and

11. *[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.

12. 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.

_____

Name and Signature of
Bidder's Representative/Authorized Signatory

ACKNOWLEDGMENT

REPUBLIC OF THE PHILIPPINES)
QUEZON CITY)SS.

BEFORE ME, a Notary Public for and in Quezon City, Philippines, this _____ day of _____, 20_____, personally appeared:

NAME	CTC NO.	ISSUED AT/ON
_____	_____	_____

known to me and known to be the same person who executed the foregoing instrument consisting of _____ ( ) pages, including the page whereon the acknowledgments is written and acknowledged before me that the same is his free and voluntary act and deed and that of the Corporation he represents.

WITNESS MY HAND AND NOTARIAL SEAL, at the place and on the date first above written.

Notary Public
Until 31 December 20____
PTR No._____
Issued at:_____
Issued on:_____
TIN No. _____

Doc. No._____
Page No._____
Book No._____
Series of _____.

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.

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.

Standard Form Number: NPCSF-INFR-10a

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).

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

REPUBLIC OF THE PHILIPPINES)
CITY OF _____) S.S.

SUBSCRIBED AND SWORN TO before me this _____, day of _____ 200__, affiant exhibiting to me his/her Community Tax Certificate No. _____ issued on _____ at _____, Philippines.

Notary Public
Until 31 December 20____
PTR No._____
Issued at:_____
Issued on:_____
TIN No. _____

Doc. No. _____
Page No. _____
Book No. _____
Series of _____.

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).

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

REPUBLIC OF THE PHILIPPINES)
CITY OF _____) S.S.

SUBSCRIBED AND SWORN TO before me this _____, day of _____ 200__, affiant exhibiting to me his/her Community Tax Certificate No. _____ issued on _____ at _____, Philippines.

Notary Public
Until 31 December 20____
PTR No._____
Issued at:_____
Issued on:_____
TIN No. _____

Doc. No. _____
Page No. _____
Book No. _____
Series of _____.

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, 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).

1. Name : _____

2. Name and Address of Owner : _____

3. Name and Address of the Owner's Engineer (Consultant) : _____

4. Indicate the Features of Project (particulars of the project components and any other particular interest connected with the project): _____

5. Contract Amount Expressed in Philippine Currency : _____

6. Position : _____

7. Structures for which the employee was responsible : _____

8. Assignment Period : from _____ (months) _____ (years)
: to _____ (months) _____ (years)

_____
Name and Signature of Employee

It is hereby certified that the above personnel can be assigned to this project, if the contract is awarded to our company.

_____ _____
(Place and Date) (The Authorized Representative)

One of the requirements from the bidder to be included in its Technical Envelope is a list of contractor's key personnel (viz. Project Manager, Project Engineer, Construction Safety Officer, Foremen, etc), to be assigned to the contract to be bid, with their complete qualification and experience data (including the key personnel's signed written commitment to work for the project once awarded the contract).

Standard Form Number: NPCSF-INFR-12

LIST OF EQUIPMENT, OWNED OR LEASED AND/OR UNDER PURCHASE AGREEMENTS

(Based on the Minimum Equipment Required in the Bidding Documents)

Business Name: _____

Business: _____

_____

Description	Model/Year	Capacity / Performance / Size	Plate No.	Motor No. / Body No.	Location	Condition	Proof of Ownership / Lessor or Vendor
A. Owned							
i.							
ii.							
iii.							
iv.							
v.							
B. Leased							
i.							
ii.							
iii.							
iv.							
v.							
C. Under Purchase Agreements							
i.							
ii.							
iii.							
iv.							
v.							

Submitted by: _____

(Printed Name & Signature)

Designation: _____

Date: _____

One of the requirements from the bidder to be included in its Technical Envelope is the list of its equipment units pledged for the contract to be bid, based on minimum equipment required in the bidding docs. which are owned (supported by proof/s of ownership), leased, and/or under purchase agreements (with corresponding engine numbers, chassis numbers and/or serial numbers), supported by certification of availability of equipment from the equipment lessor/vendor for the duration of the project

Standard Form No. : NPCSF-INFR-13

BID LETTER

Date: _____

To: **THE PRESIDENT**
National Power Corporation
BIR Road cor. Quezon Ave.
Diliman, Quezon City

We, the undersigned, declare that:

(a) We have examined and have no reservation to the Bidding Documents, including Addenda, for the Contract **TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP (LuzP19Z1082Sx).**

(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 **TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP (LuzP19Z1082Sx)** 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-14

DETAILED COST ESTIMATE FORM

Name of Bidder : _____

Item No.	Item Description	Unit of Measure	Direct Cost			Mark-Up		VAT	Unit Cost	Total Price
			Materials	Labor	Equipment	OCM	Profit			

_____
Name, Signature of Authorized Representative

_____
Designation

Standard Form No. : NPCSF-INFR-15

SUMMARY SHEETS OF MATERIALS PRICES, LABOR RATES AND EQUIPMENT RENTAL RATES

Name of Bidder : _____

I. Unit Prices of Materials

Materials Description	Unit	Unit Price
1.		
2.		
3.		
4.		
5.		
6.		
7.		

II. Manpower Hourly Rates

Designation	Rate/Hr.
1.	
2.	
3.	
4.	
5.	
6.	
7.	

III. Equipment Hourly Rental Rates

Equipment Description	Rental Rate/Hr.
1.	
2.	
3.	
4.	
5.	
6.	
7.	

_____ Name, Signature of Authorized Representative

_____ Designation

SECTION IX

BID DRAWINGS

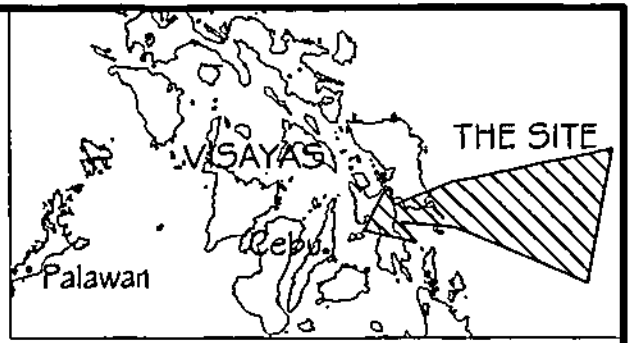
BID DRAWINGS

CIVIL DRAWINGS

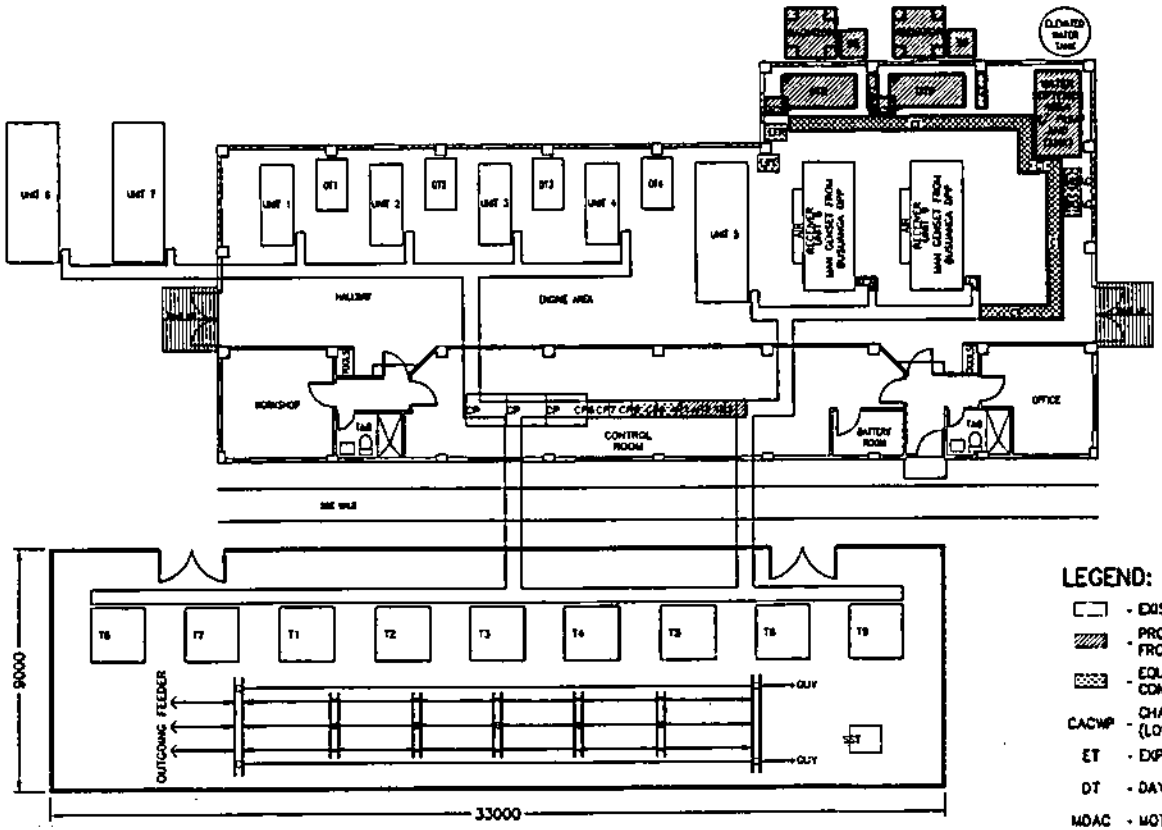
SECTION IX - BID DRAWINGS

CW - CIVIL DRAWINGS

DRAWING NO.	TITLE
RizDPP-BDC-17.001	PLANT LAYOUT
RizDPP-BDC-17.002	CABLE TRENCH (DETAILS)
RizDPP-BDC-17.003	EQUIPMENT FOUNDATION (DETAILS)
RizDPP-BDC-17.004	DAY TANK SUPPORT (DETAILS)



LOCATION MAP
NOT TO SCALE



PLANT LAYOUT
SCALE 1:200

NOTES

1. ALL DIMENSIONS AND ELEVATIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION. THE NPC SHALL BE NOTIFIED OF ANY DISCREPANCIES OR INCONSISTENCIES.
3. DIMENSION SHALL TAKE PRECEDENCE OVER SCALED DRAWINGS.
4. THIS DRAWING SHALL BE WORKED WITH ELECTRICAL AND MECHANICAL WORKS BID DRAWINGS.

LEGEND:

- - EXISTING EQUIPMENT/STRUCTURES
- - PROPOSED LOCATION OF EQUIPMENTS FROM BUSUANGA DPP
- - EQUIPMENT TO BE SUPPLIED BY THE CONTRACTOR

CACWP	- CHARGE AIR COOLING WATER PUMP (LOW TEMPERATURE COOLING WATER PUMP)
ET	- EXPANSION TANK
DT	- DAY TANK
MDAC	- MOTOR DRIVEN AIR COMPRESSOR
SS	- SMOKE STACK
AF	- AIR FILTER
LFP	- LEAK FUEL PUMP
LFT	- LEAK FUEL TANK
AP	- AUXILIARY PANEL
CP	- CONTROL PANEL
T	- TRANSFORMER
CT	- CABLE TRENCH

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN QUEZON CITY

PROJECT: TRANSFER OF 3 X 5.56 MW MAIN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUERTO ASHAM, RIZAL, PALAWAN

TITLE: **PLANT LAYOUT**

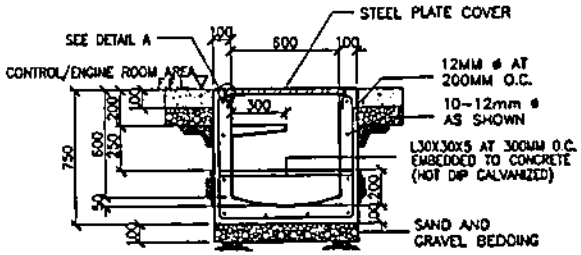
	BY	CHKD	DATE
DESIGNED			
DRAWN	C.B.S.		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

SUBMITTED: H. L. MENDOZA, Principal Engr. V, CEAD
RECOMMENDED: M. J. JORVINA, Manager, CEAD
APPROVED: C. B. MACEDO JR., Manager, DDO

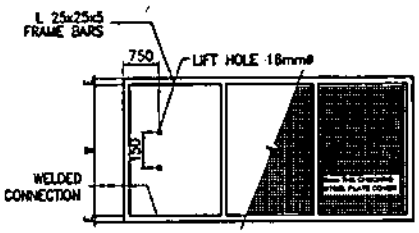
DWG NO. R1zDPP-SDC-17.0J1 | SPECS NO. L1zzP19Z1082Sx

SCALE 1:200 | BID DRAWING | REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



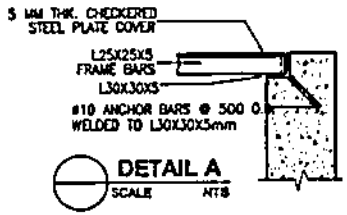
CABLE TRENCH (CT-1)
SCALE 1:30



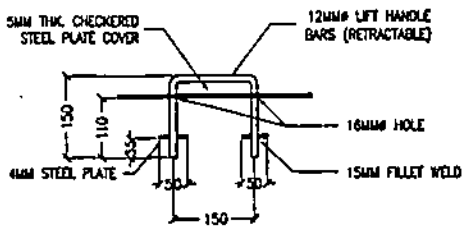
DETAIL OF STEEL PLATE COVER
NTS

TYPE OF CABLE TRENCH	DIMENSIONS (mm)	
	W	E
CT1	300	27
CT2	300	27
CT3	500	27
CT4	500	27
CT5	600	27
CT6	600	27
CT7	600	27
CT8	300	27

SCHEDULE OF STEEL PLATE COVER



DETAIL A
SCALE NTS



HANDLE BAR DETAIL
SCALE 1:10

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 PNS FOR DEFORMED STEEL BARS GRADE 275.
3. WORK THIS WITH ELECTRICAL DRAWINGS.

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO REAL DPP

LOCATION: PUNTA BARIA, REAL, PALAWAN

TITLE: **CABLE TRENCH (DETAILS)**

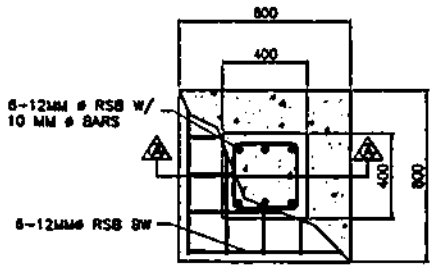
	BY	CHKD	DATE
DESIGNED			
DRAWN	C.S.S.		
REVIEWED	PRINCIPAL ENGR. I ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

SUBMITTED: H. L. MENDOZA, Principal Engineer A, CEAD
REVIEWED: R. D. JORVINA, Manager, CEAD
APPROVED: G. B. MAGPOC JR., Manager, CDO

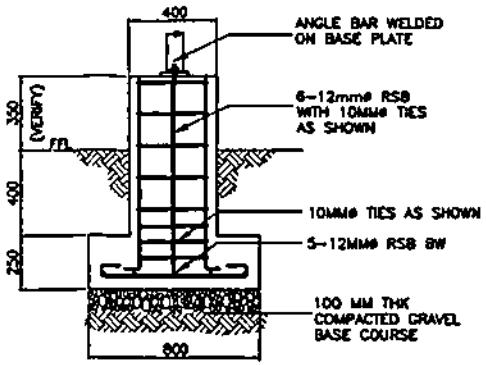
DWG. NO. RizDPP-BDC-17.002 SPECS. NO. LuzP19Z103CSx

SCALE: AS SHOWN BID DRAWING REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



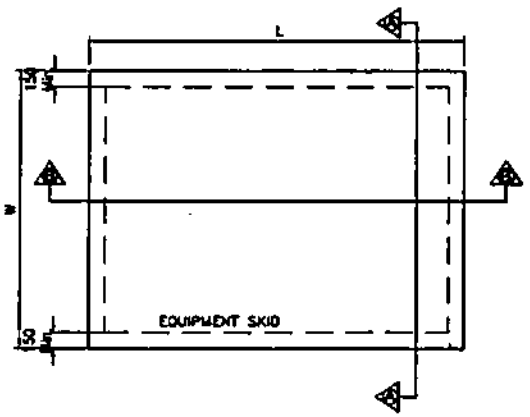
PLAN



SECTION A-A

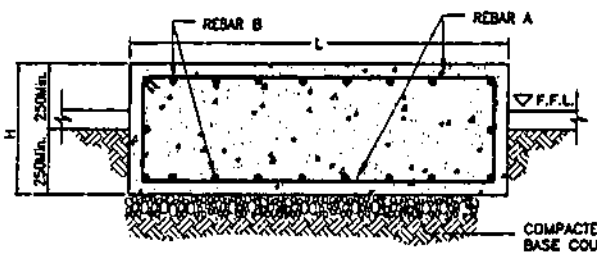
RADIATOR FOUNDATIONS

SCALE NTS

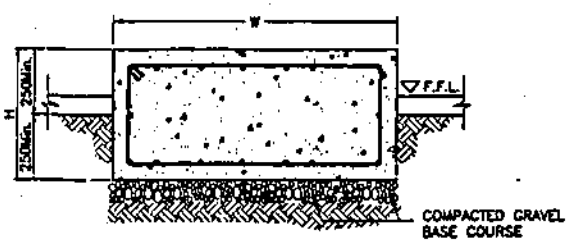


EQUIPMENT PAD FOUNDATIONS

SCALE NTS



SECTION B-B



SECTION A-A

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 PNS FOR DEFORMED STEEL BARS GRADE 275.
3. THE DESIGN OF THE EQUIPMENT FOUNDATION AND MOUNTING DETAILS SHALL BE PREPARED BY THE SUPPLIER/CONTRACTOR SUBJECT TO NPC'S REVIEW AND APPROVAL.
4. WORK THIS WITH MECHANICAL DRAWINGS.

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAIN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BARIA, RIZAL, PALAWAN

TITLE: EQUIPMENT FOUNDATION (DETAILS)

	BY	CHKD	DATE
DESIGNED			
DRAWN	C.S.S.		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

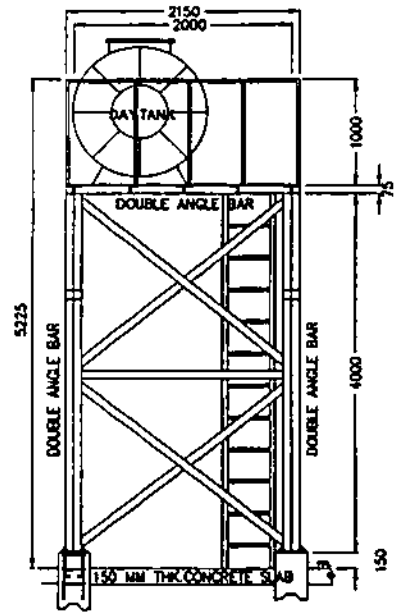
SUBMITTED: M. L. MENDOZA, Principal Engineer A, CEAD

REVIEWED: V.I. JORVINA, Manager, CEAD

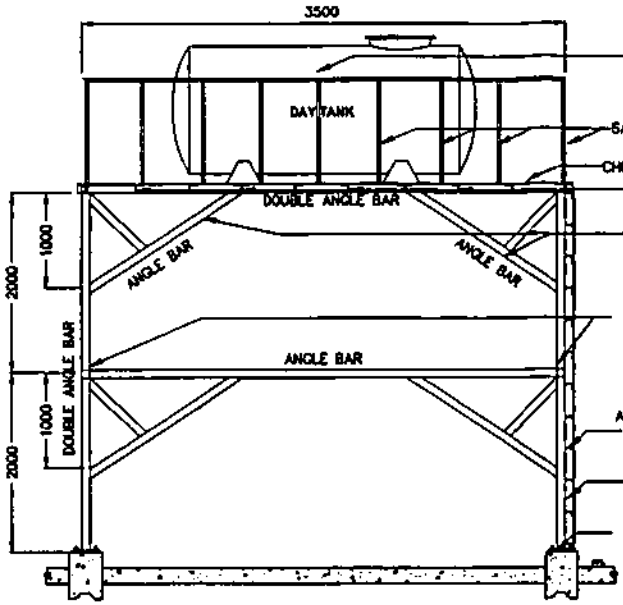
APPROVED: G. B. MACPOC JR., Manager, DDD

DWG. NO. RIzDPP-BDC-17.003 SPEC. NO. LuzP19Z1082Sx

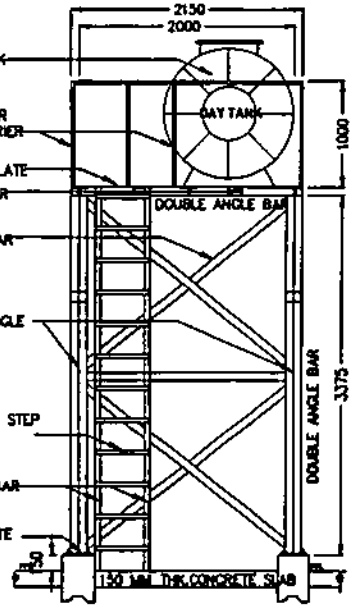
SCALE: NTS BID DRAWING REV. 0



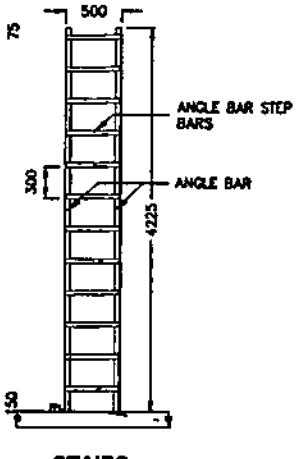
LEFT SIDE ELEVATION
TICDPP-BDC-17.040 SCALE 1:50



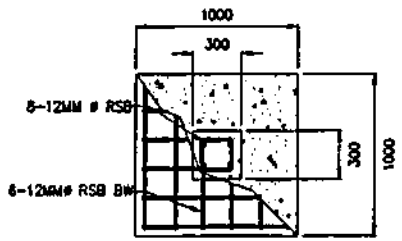
FRONT ELEVATION
TICDPP-BDC-17.040 SCALE 1:50



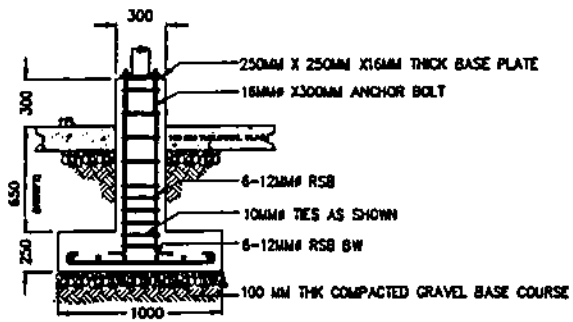
RIGHT SIDE ELEVATION
TICDPP-BDC-17.040 SCALE 1:50



STAIRS



PLAN



SECTION

DAY TANK FOUNDATION
TICDPP-BDC-17.040 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 PNS FOR DEFORMED STEEL BARS GRADE 275.
3. THE DESIGN OF THE DAY TANK STEEL SUPPORT AND MOUNTING DETAILS SHALL BE PREPARED BY THE SUPPLIER/CONTRACTOR SUBJECT TO NPC'S REVIEW AND APPROVAL.
4. WORK THIS WITH MECHANICAL DRAWINGS.

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN QUEZON CITY

PROJECT: TRANSFER OF 2 X 800 KW MAIN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO REAL DPP

LOCATION: PANTA BARAN, REAL, PALAWAN

TITLE: DAY TANK SUPPORT (DETAILS)

	BY	CHKD	DATE
DESIGNED			
DRAWN	C.S.S.		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

SUBMITTED: K.Z. MENDOZA, Principal Engineer A, CEAD
REVIEWED: V.J. JORVINA, Manager, CEAD
APPROVED: G. BOMAGPOC JR., Manager, DDD

DWG. NO. RIzDPP-BDC-17.004 SPECS. NO. LuzP19Z1082Sx

SCALE: AS SHOWN | BID DRAWING | REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

BID DRAWINGS

MECHANICAL DRAWINGS

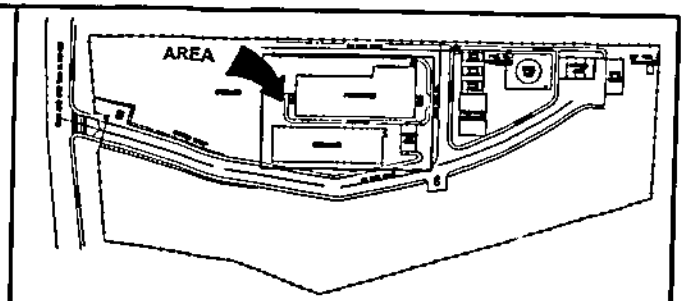
SECTION IX - BID DRAWINGS

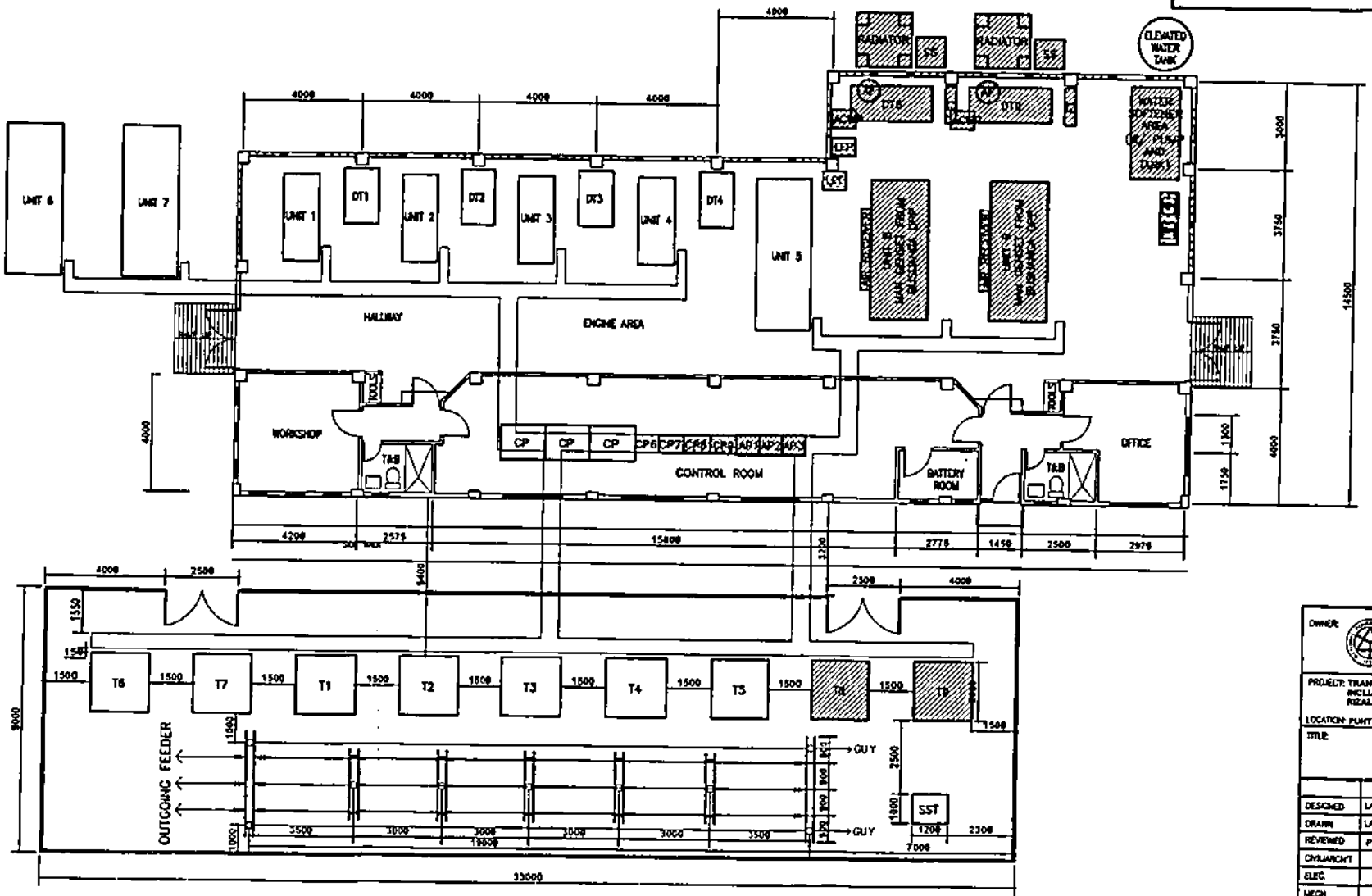
MW - MECHANICAL DRAWINGS

DRAWING NO.	TITLE
RizDPP-BDM-17.001	EQUIPMENT LAYOUT (2 x 500 kW Rizal DPP)
RizDPP-BDM-17.002	EQUIPMENT AND DOMESTIC/FUEL PIPING LAYOUT (2 x 500kW Rizal DPP)
RizDPP-BDM-17.003	FUEL STORAGE AND TRANSFER SYSTEM (P & I DIAGRAM) (2 x 500 kW Rizal DPP)
RizDPP-BDM-17.004	COMPRESSED AIR SYSTEM (P & I DIAGRAM) (2 x 500 kW Rizal DPP)
RizDPP-BDM-17.005	ELEVATION (2 x 500 kW Rizal DPP)
TFR-BDM-17.001	LIST OF SYMBOLS AND SPIN NUMBER

NOTES:

1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. THE ARRANGEMENT OF THE SUPPLIED AND TRANSFERRED EQUIPMENT AND ITS AUXILIARIES SHOWN ON THE DRAWINGS IS PRELIMINARY/INDICATIVE ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AT SITE THE MEASUREMENTS/INFORMATION OR DATA SHOWN ON THIS DRAWING INCLUDING AFFECTED CIVIL STRUCTURES/FACILITIES. FINAL ARRANGEMENT/LOCATION SHALL BE DETERMINED/FINALIZED BY THE CONTRACTOR TO SUIT THE ACTUAL FIELD CONDITIONS AND AS REQUIRED BY THE MANUFACTURER TO ENSURE SAFE AND EASY OPERATION AND MAINTAINABILITY OF EQUIPMENT/SYSTEM, SUBJECT TO REVIEW AND APPROVAL OF NPC.
4. WORK THIS DRAWING WITH APPLICABLE CIVIL AND ELECTRICAL DRAWINGS.





LEGEND:

- ▭ - EXISTING EQUIPMENT/STRUCTURES
- ▨ - PROPOSED LOCATION OF EQUIPMENTS FROM BUSUANGA DPP
- ▨ - EQUIPMENT TO BE SUPPLIED BY THE CONTRACTOR
- CACWP - CHARGE AIR COOLING WATER PUMP (LOW TEMPERATURE COOLING WATER PUMP)
- ET - EXPANSION TANK
- DT - DAY TANK
- MDAC - MOTOR DRIVEN AIR COMPRESSOR
- SS - SMOKE STACK
- AF - AIR FILTER
- LFP - LEAK FUEL PUMP
- LFT - LEAK FUEL TANK
- AP - AUXILIARY PANEL
- CP - CONTROL PANEL
- T - TRANSFORMER

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BAJA, RIZAL, PALAWAN

TITLE: **EQUIPMENT LAYOUT (2 X 500 KW RIZAL DPP)**

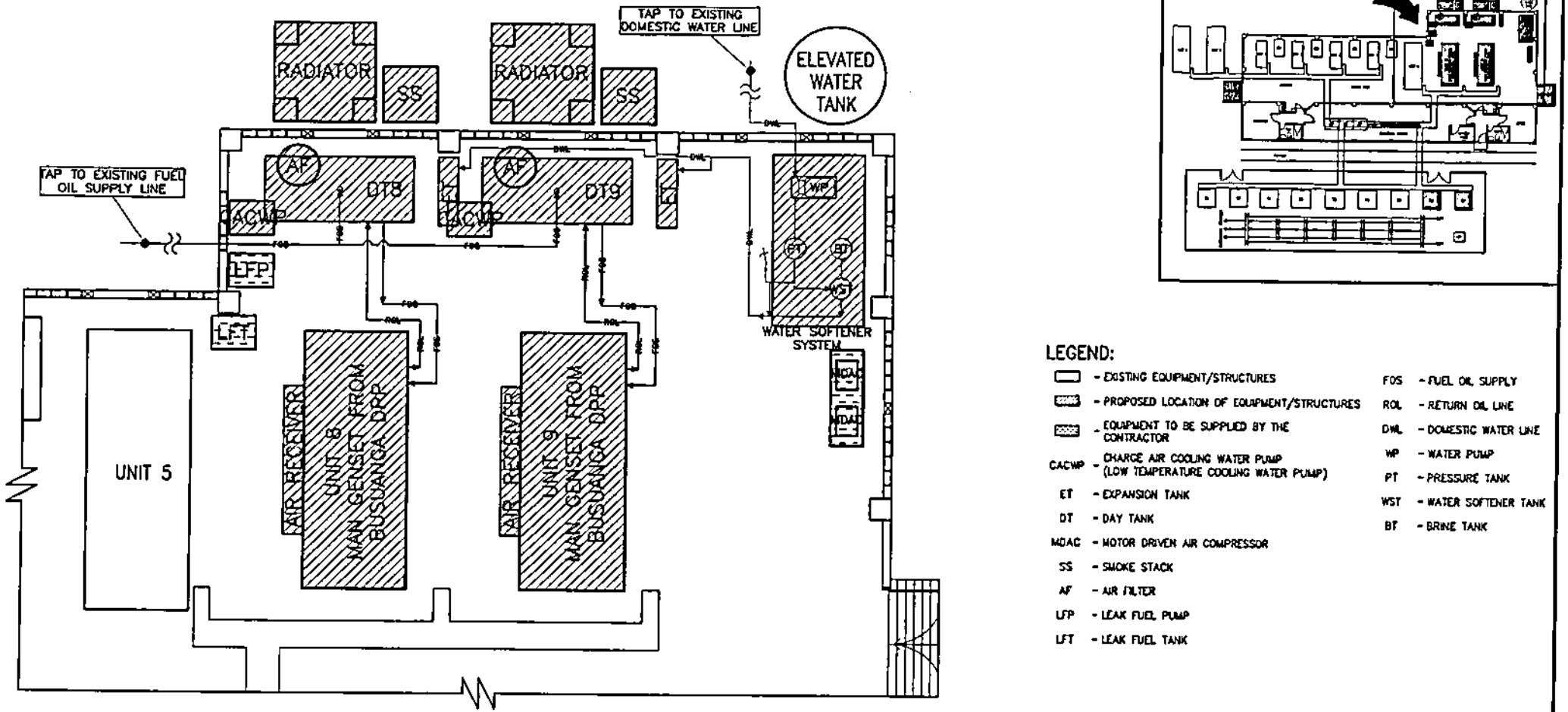
	BY	CHKD	DATE
DESIGNED	LAGR		
DRAWN	LAGR		
REVIEWED	PRINCIPAL ENGR./ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

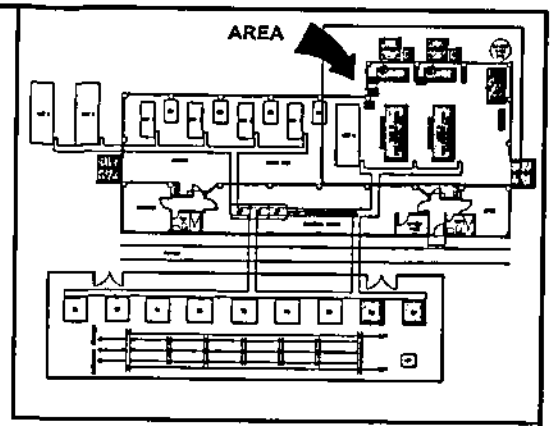
RECOMMENDED: R. M. CABOSAWAN, Project Manager, MLD

APPROVED: G. B. MAGPOC, JR., Manager, DDD

DWG NO. RizDPP-BDM-17.001 | SPEC NO. LuzP19Z1062Sx

SCALE: 1:200 | BID DRAWING | REV 0





LEGEND:

▭	- EXISTING EQUIPMENT/STRUCTURES	FOS	- FUEL OIL SUPPLY
▭	- PROPOSED LOCATION OF EQUIPMENT/STRUCTURES	ROL	- RETURN OIL LINE
▭	- EQUIPMENT TO BE SUPPLIED BY THE CONTRACTOR	DWL	- DOMESTIC WATER LINE
CACWP	- CHARGE AIR COOLING WATER PUMP (LOW TEMPERATURE COOLING WATER PUMP)	WP	- WATER PUMP
ET	- EXPANSION TANK	PT	- PRESSURE TANK
DT	- DAY TANK	WST	- WATER SOFTENER TANK
MDAC	- MOTOR DRIVEN AIR COMPRESSOR	BT	- BRINE TANK
SS	- SMOKE STACK		
AF	- AIR FILTER		
LFP	- LEAK FUEL PUMP		
LFT	- LEAK FUEL TANK		

NOTES:

1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. THE ARRANGEMENT OF THE SUPPLIED AND TRANSFERRED EQUIPMENT AND ITS AUXILIARIES SHOWN ON THE DRAWINGS IS PRELIMINARY/INDICATIVE ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AT SITE THE MEASUREMENTS/INFORMATION OR DATA SHOWN ON THIS DRAWING INCLUDING AFFECTED CIVIL STRUCTURES/FACILITIES. FINAL ARRANGEMENT/LOCATION SHALL BE DETERMINED/FINALIZED BY THE CONTRACTOR IN COORDINATION WITH END-USER TO SUIT THE ACTUAL FIELD CONDITIONS AND AS REQUIRED BY THE MANUFACTURER TO ENSURE SAFE AND EASY OPERATION AND MAINTAINABILITY OF EQUIPMENT/SYSTEM, SUBJECT TO REVIEW AND APPROVAL OF NPC.
4. ALL EQUIPMENT, VALVES AND INSTRUMENTS SHOWN IN THIS DRAWING INCLUDING PIPE, PIPE FITTINGS, PIPE SUPPORTS ETC. SHALL BE FROM BUSUANGA DPP, EXCEPT OTHERWISE SPECIFIED. IN CASE OF LACKING OF PIPING AND FITTINGS/ACCESSORIES IN THE NPC SCOPE OF SUPPLY, THE CONTRACTOR SHALL PROVIDE/SUPPLY THE NECESSARY PIPING AND FITTINGS/ACCESSORIES TO COMPLETE THE WORKS.
5. THE CONTRACTOR SHALL SUPPLY, DELIVER, INSTALL AND TEST THE FOLLOWING SYSTEM COMPLETE WITH CONTROLS & INSTRUMENTATION, PIPING, FITTINGS, SUPPORTS, VALVES AND OTHER ACCESSORIES TO COMPLETE THE SYSTEM;
   a. AIR COMPRESSOR SYSTEM
   b. LEAK FUEL TANK
   c. LEAK FUEL PUMP
6. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION AND TESTING OF ITEM 4.
7. F.O PIPES SHALL CONFORM TO ASTM A 53 GR. A SEAMLESS PIPE MATERIALS.
8. THE CONTRACTOR'S SCOPE OF WORK SHALL INCLUDE THE CONSTRUCTION OF EQUIPMENT FOUNDATIONS AND NEW TRENCHES AND/OR IF EXISTING TRENCH WILL BE UTILIZED, MODIFICATION WORKS SHALL BE CARRIED OUT AS REQUIRED TO ACCOMMODATE THE NEW POWER/CONTROL CABLES, MODIFICATION OF EXISTING CONTROL ROOM WHERE THE NEW CONTROL PANELS WILL BE LOCATED.
9. IRRETRIEVABLE ACCESSORIES SUCH AS FOUNDATION BOLTS, GASKET, BOLTS & NUTS & WASHER SHALL BE SUPPLIED BY THE CONTRACTOR.
10. THE CONTRACTOR SHALL SUBMIT BROCHURES/TECHNICAL DATA AND SPECIFICATIONS OF ALL EQUIPMENT AND AUXILIARIES TO BE SUPPLIED UNDER THIS CONTRACT FOR NPC REVIEW AND APPROVAL PRIOR TO PROCUREMENT/IMPLEMENTATION. ACCORDINGLY, FOUNDATION DETAILS AND DESIGN CALCULATIONS AS REQUIRED SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC APPROVAL.
11. WORK THIS DRAWING WITH APPLICABLE CIVIL AND ELECTRICAL DRAWINGS.
12. ALL OTHER WORKS, MATERIALS AND SERVICES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN THE TECHNICAL SPECIFICATIONS.
13. REFER TO DWG. NO. TFR-BDM-17.001 FOR OTHER DRAWING SYMBOLS AND LEGENDS.

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BARJA, RIZAL, PALAWAN

TITLE: **EQUIPMENT AND DOMESTIC/FUEL PIPING LAYOUT (2 X 500 KW RIZAL DPP)**

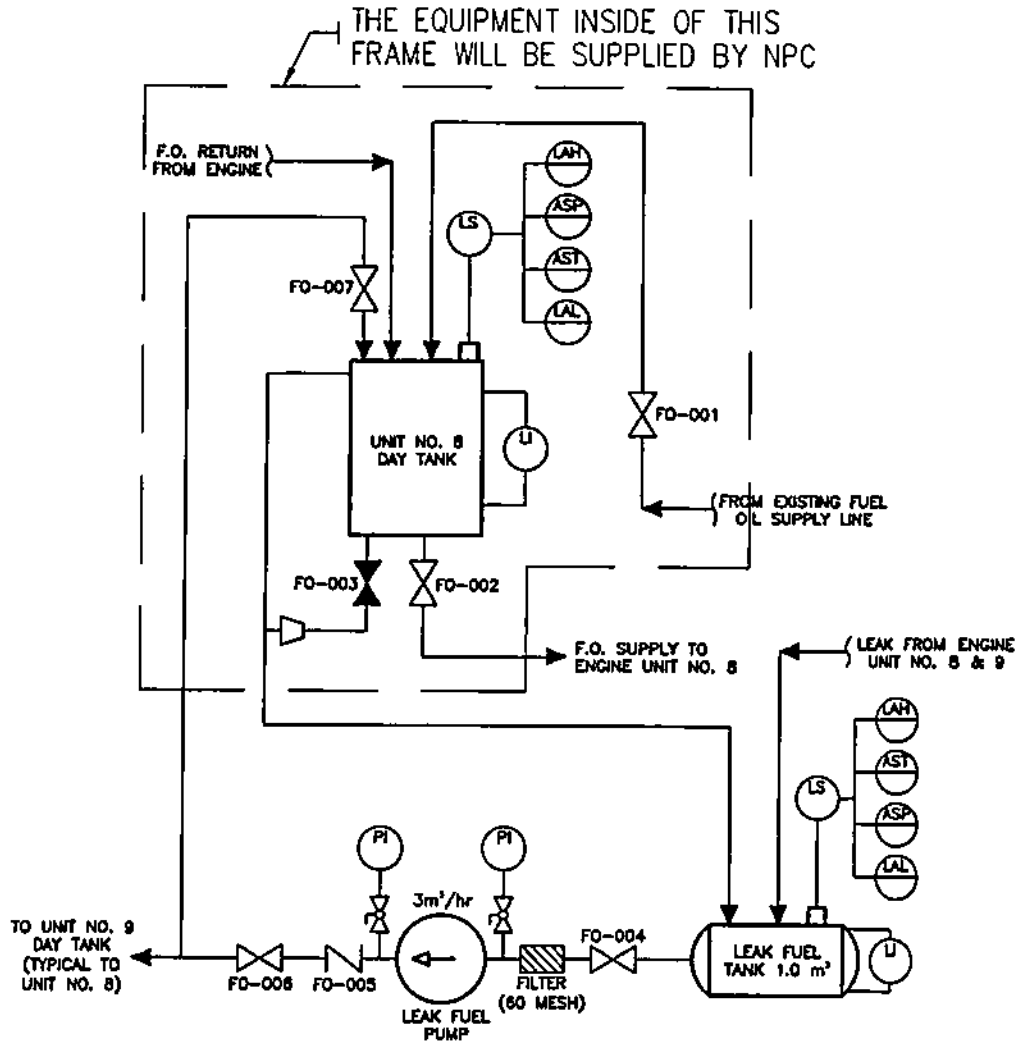
	BY	CHKD	DATE
DESIGNED	LACR		
DRAWN	LACR		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

RECOMMENDED: P.E. M. ADSAWAN, Acting Manager, NCD

APPROVED: G. B. MAGPOC, JR., Manager, LDD

DWG. NO. RizDPP-BDM-17.002 | SPEC. NO. LuzP19Z1082Sx

SCALE: 1:75 | **BID DRAWING** | REV. 0



NOTES:

1. THIS DRAWING IS FOR REFERENCE PURPOSES ONLY.
2. ALL EQUIPMENT, VALVES AND INSTRUMENTS SHOWN IN THIS DRAWING INCLUDING PIPE, PIPE FITTINGS, PIPE SUPPORTS ETC. SHALL BE FROM BUSUANGA DPP, EXCEPT OTHERWISE SPECIFIED. IN CASE OF LACKING OF PIPING AND FITTINGS/ACCESSORIES IN THE NPC SCOPE OF SUPPLY, THE CONTRACTOR SHALL PROVIDE/SUPPLY THE NECESSARY PIPING AND FITTINGS/ACCESSORIES TO COMPLETE THE WORKS.
3. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION AND TESTING OF ITEM 2.
4. TAG NUMBERS SHOWN FOR THE EQUIPMENT, INSTRUMENTS, VALVES AND PIPINGS ARE USED FOR REFERENCE ONLY.
5. F.O PIPES SHALL CONFORM TO ASTM A 53, GR. B, SEAMLESS AND SCHEDULE 40 PIPE MATERIALS.
6. THE CONTRACTOR SHALL VERIFY DURING SITE INSPECTION THE COMPLETENESS OF THE EXISTING OR NPC SUPPLIED VALVES AND INSTRUMENTS. ANY MISSING VALVES AND INSTRUMENTS SHALL BE REPLACED BY CONTRACTOR.
7. ALL FUEL PIPING SHALL GENERALLY BE INSTALLED ABOVE GROUND, EXCEPT PIPE FROM DRAIN PIT TO OIL-WATER SEPARATOR WHICH SHALL BE INSTALLED UNDERGROUND.
8. REFER TO DWG. NO. TFR-BDM-17.001 FOR DRAWING SYMBOLS AND LEGENDS.

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAIN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BARUA, RIZAL, PALAWAN

TITLE: FUEL STORAGE AND TRANSFER SYSTEM
(P & I DIAGRAM)
(2 X 500 KW RIZAL DPP)

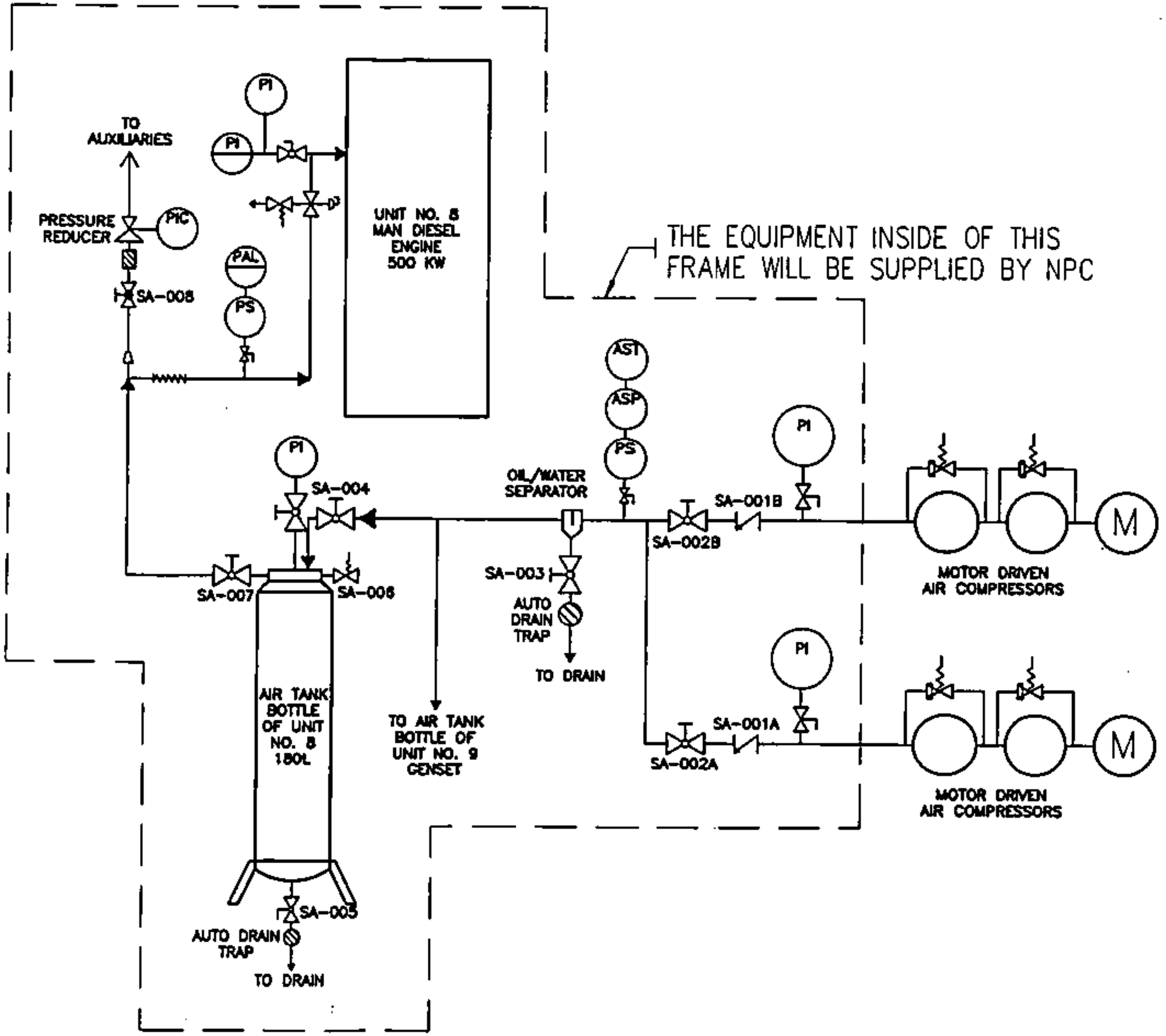
	BY	CHKD	DATE
DESIGNED	LACR		
DRAWN	LACR		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

RECOMMENDED: R. M. GUBAWAN, Acting Manager, MED

APPROVED: G. B. MAGPOC, JR., Manager, DDD

DWG. NO. RizDPP-BDM-17.003 SPECS. NO. LuzP19Z1082Sx

SCALE: NTS REFERENCE DRAWING REV. 3



NOTES:

1. THIS DRAWING IS FOR REFERENCE PURPOSES ONLY.
2. ALL EQUIPMENT, VALVES AND INSTRUMENTS SHOWN IN THIS DRAWING INCLUDING PIPE, PIPE FITTINGS, PIPE SUPPORTS ETC. SHALL BE FROM BUSUANGA DPP, EXCEPT OTHERWISE SPECIFIED. IN CASE OF LACKING OF PIPING AND FITTINGS/ACCESSORIES IN THE NPC SCOPE OF SUPPLY, THE CONTRACTOR SHALL PROVIDE/SUPPLY THE NECESSARY PIPING AND FITTINGS/ACCESSORIES TO COMPLETE THE WORKS.
3. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION AND TESTING OF ITEM 2.
4. TAG NUMBERS SHOWN FOR THE EQUIPMENT, INSTRUMENTS, VALVES AND PIPINGS ARE USED FOR REFERENCE ONLY.
5. F.O PIPES SHALL CONFORM TO ASTM A 53 GR. A SEAMLESS PIPE MATERIALS.
6. THE CONTRACTOR SHALL VERIFY DURING SITE INSPECTION THE COMPLETENESS OF THE EXISTING OR NPC SUPPLIED VALVES AND INSTRUMENTS. ANY MISSING VALVES AND INSTRUMENTS SHALL BE REPLACED BY CONTRACTOR.
7. REFER TO DWG. NO. TFR-BDM-17.001 FOR DRAWING SYMBOLS AND LEGENDS.

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: **NATIONAL POWER CORPORATION**
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BAOJA, RIZAL, PALAWAN

TITLE: **COMPRESSED AIR SYSTEM (P & I DIAGRAM) (2 X 500 KW RIZAL DPP)**

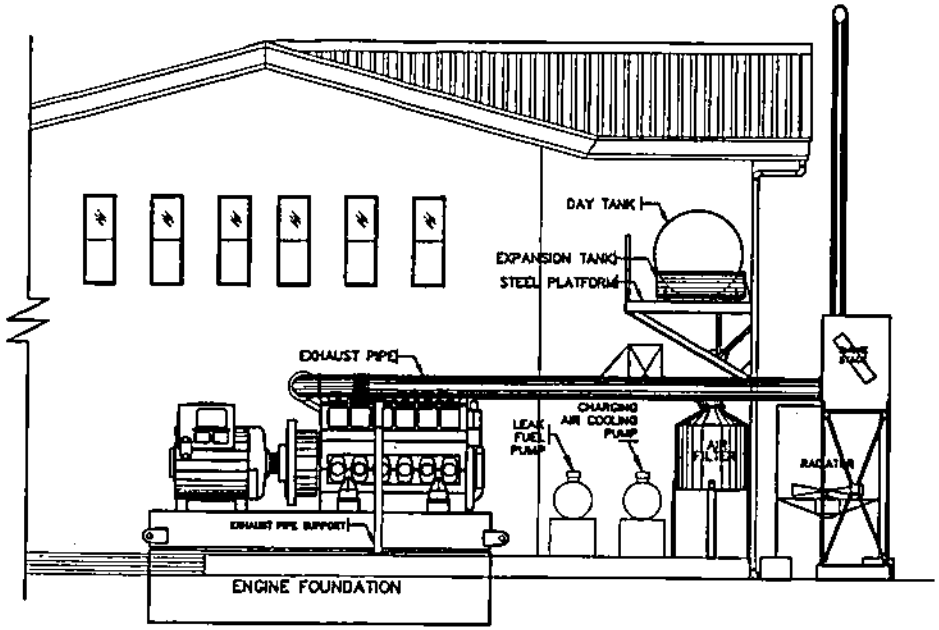
	BY	CHKD	DATE
DESIGNED	LACR		
DRAWN	LACR		
REVIEWED	PRINCIPAL ENG'R./ARCH'T.		
CIVIL/ARCH'T			
ELEC.			
MECH.			

RECOMMENDED: R. [illegible] SAWAN, Acting Manager, MED

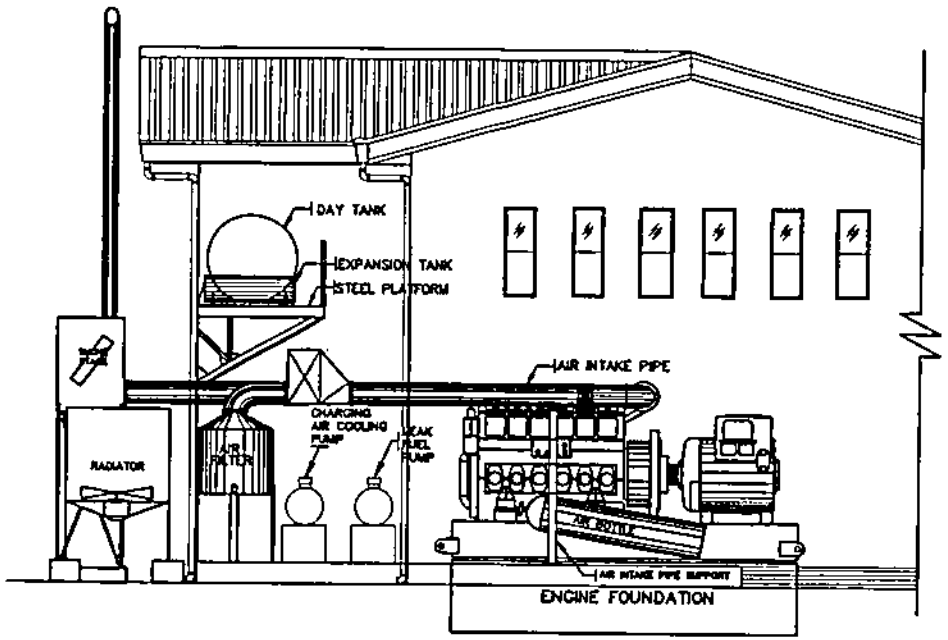
APPROVED: G. B. MAGPOC, JR., Manager, DDD

DWG. NO. RizDPP-BDM-17.004 | SPECS. NO. LuzP13Z10825x

SCALE: NTS | REFERENCE DRAWING | REV. 0



RIGHT SIDE ELEVATION



LEFT SIDE ELEVATION

NOTES:

1. THIS DRAWING IS FOR REFERENCE PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. WORK THIS DRAWING WITH APPLICABLE CIVIL AND ELECTRICAL DRAWINGS.
3. THE ARRANGEMENT OF THE SUPPLIED EQUIPMENT AND ITS AUXILIARIES SHOWN ON THE DRAWINGS IS PRELIMINARY/INDICATIVE ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AT SITE THE MEASUREMENTS/INFORMATION OR DATA SHOWN ON THIS DRAWING INCLUDING AFFECTED CIVIL STRUCTURES/FACILITIES. FINAL ARRANGEMENT/LOCATION SHALL BE DETERMINED/FINALIZED BY THE CONTRACTOR TO SUIT THE ACTUAL FIELD CONDITIONS AND AS REQUIRED BY THE MANUFACTURER TO ENSURE SAFE AND EASY OPERATION AND MAINTAINABILITY OF EQUIPMENT/SYSTEM, SUBJECT TO REVIEW AND APPROVAL OF NPC.
4. THE CONTRACTOR SHALL SUBMIT BROCHURES/TECHNICAL DATA, SPECIFICATIONS AND RELEVANT LAYOUT DRAWINGS WITH REFERENCE DIMENSIONS OF ALL EQUIPMENT AND ITS AUXILIARIES TO BE SUPPLIED UNDER THIS CONTRACT FOR NPC REVIEW AND APPROVAL PRIOR TO PROCUREMENT/IMPLEMENTATION. ACCORDINGLY, FOUNDATION DETAILS AND DESIGN CALCULATIONS AS REQUIRED SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC APPROVAL.
5. ALL OTHER WORKS, MATERIALS AND SERVICES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN THE TECHNICAL SPECIFICATIONS.

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BADJA, RIZAL, PALAWAN

TITLE: **ELEVATION (2 X 500 KW RIZAL DPP)**

	BY	CHKD	DATE
DESIGNED	LACR		
DRAWN	LACR		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT.			
ELEC.			
MECH.			

RECOMMENDED: [illegible] PALAWAN, Acting Manager, MED

APPROVED: G. B. MAGPOC, JR., Manager, DDD

DWG. NO. RizDPP-BDM-17.005 SPEC. NO. LuzP19Z1082Sx

SCALE: NTS REFERENCE DRAWING REV. 0

LIST OF SYMBOLS

—	MAJOR LINE		NON RETURN VALVE
—	EQUIPMENT		AUTO DRAIN TRAP
—	CONTROL AIR LINE		SOUNDING CAP (SELF CLOSING TYPE)
—	ELECTRIC CABLE		ORIFICE
	STOP CHECK VALVE		SOUNDING CAP (SELF CLOSING TYPE)
	BALL VALVE(COCK)		FLEXIBLE TUBE
	GLOBE VALVE		BALL JOINT
	GATE VALVE		VALVE WITH VALVE BOX
	BUTTERFLY VALVE		LOCALLY MOUNTED
	SAFETY & RELIEF VALVE		REMOTE PANEL CONTROL
	CONTROL VALVE		HOSE REEL
	ANGLE VALVE	PI	PRESSURE GAUGE
	SOLENOID VALVE	TI	TEMP. GAUGE
	PRESS. CONTROL VALVE (DIRECT TYPE)	LI	LEVEL GAUGE
	FILTER REGULATOR	FI	FLOW INDICATOR
	HOSE VALVE	LS	LEVEL SWITCH
	PISTON VALVE	PS	PRESSURE SWITCH
	THREE WAY VALVE	TS	TEMP. SWITCH
	DELUGE VALVE	HD	HEAT DETECTOR
		HS	PUSH BUTTON
	SPRAY NOZZLE	H/S	HORN AND STROBE COMBINATION
SL	SOLENOID VALVE	B/S	BELL AND STROBE COMBINATION

LIST OF SYMBOLS

	CHECK VALVE	FS	FLOW SWITCH
	COCK	PAL	PRESS. ALARM LOW
	CHAIN LOCKED VALVE	TAL	TEMP. ALARM LOW
	STEAM TRAP (WITH STRAINER)	TAH	TEMP. ALARM HIGH
	SIMPLEX FILTER	LAL	LEVEL ALARM LOW
	DUPLEX FILTER	PAH	PRESS. ALARM HIGH
	ROSE BOX, MUD BOX	LAH	LEVEL ALARM HIGH
	Y-TYPE FILTER	PDAH	PRESS DIFF. ALARM HIGH
	SIGHT GLASS	TDAH	TEMP. DIFF. ALARM HIGH
	BELL MOUTH	ASP	AUTO STOP
	STEEL HOPPER	AST	AUTO START
	BLIND FLANGE	ASTP	AUTO START/STOP
	REDUCER	ESD	EMERGENCY SHUTDOWN
	PUMP	TC	TEMPERATURE CONTROL
	CAP	SG	SIGHT GLASS
	SCREW ENDED	PDS	DIFFER. PRESS. SWITCH
	SELF-CLOSING VALVE	LmS	LIMIT SWITCH
EXISTING	EXISTING	X	POSITION, OTHER
SUPPLIER	SUPPLIER SCOPE	Z	TRIP OR TROUBLE
	FLEXIBLE TUBE		

1. EQUIPMENT IDENTIFICATION (TAG NO) LEGEND

EXAMPLE: DW20JPMP01

- SYSTEM CODE
- UNIT NO.
- SEQUENCE NO.
- EQUIPMENT CODE
- SUFFIX NO. (DUPLICATE/REDUNDANT)

2. PIPE IDENTIFICATION (TAG NO) LEGEND

EXAMPLE: 1-FD-32-013

- UNIT NO.
- SYSTEM CODE
- NOMINAL PIPE SIZE
- SEQUENCE NO.

3. VALVE IDENTIFICATION (TAG NO) LEGEND

EXAMPLE: 2FWD01A

- UNIT NO.
- SYSTEM CODE
- SEQUENCE NO.
- SUFFIX NO. (DUPLICATE/REDUNDANT)

NOTE:
UNIT NO. CAN BE OMITTED FOR COMMON SYSTEM OR EQUIPMENT

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: **NATIONAL POWER CORPORATION**
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 650 KW MAIN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BURIAWCA DPP TO REAL DPP

LOCATION: PINTA BAGUA, REAL, PALANAN

TITLE: **LIST OF SYMBOLS AND SPIN NUMBER**

	BY	CHKD	DATE
DESIGNED	LACR		
DRAWN	LACR		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

RECOMMENDED: P. L. GADSAWAN, Acting Manager, MED

APPROVED: G. B. MAGPOC, JR., Manager, GDD

DWG. NO. TFR-BDM-17.001 SPECS. NO. LuzP19Z103ZSx

SCALE: NTS BID DRAWING REV. 0

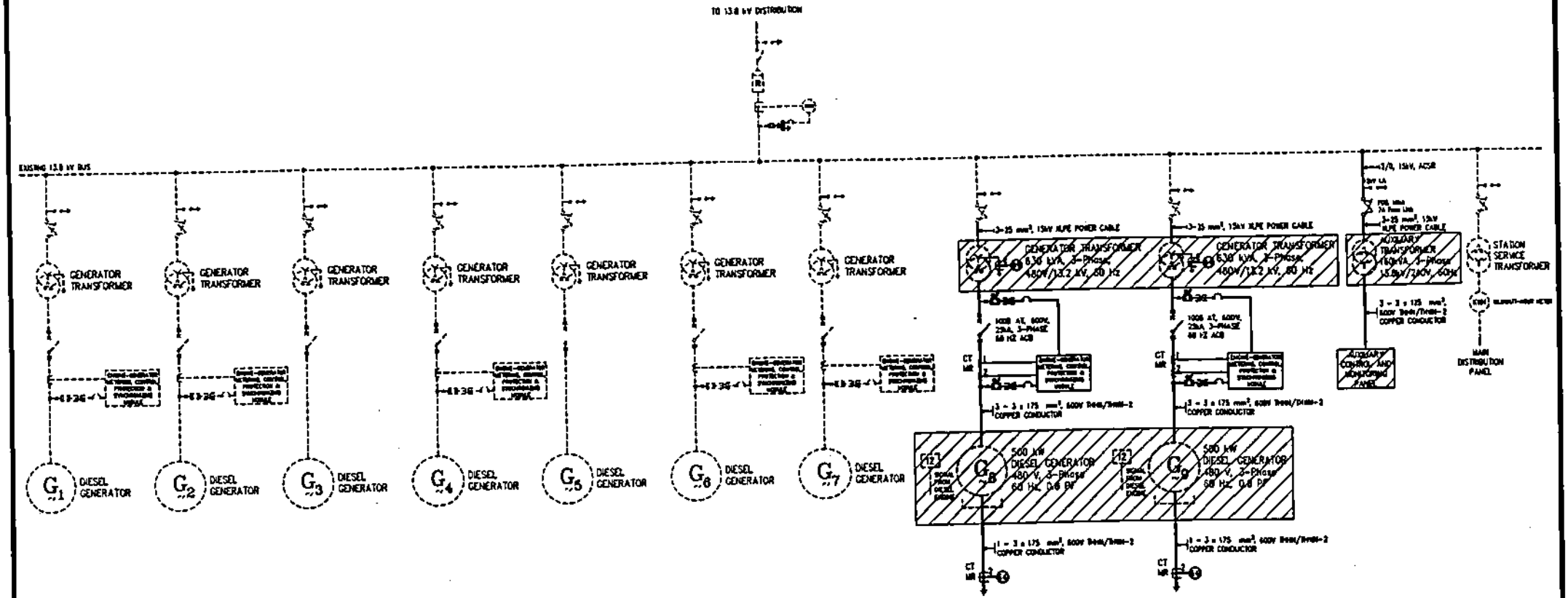
BID DRAWINGS

ELECTRICAL DRAWINGS

SECTION IX - BID DRAWINGS

EW - ELECTRICAL DRAWINGS

DRAWING NO.	TITLE
RizDPP-BDE-17.001	SINGLE LINE DIAGRAM (2 x 500 kW Rizal DPP)
RizDPP-BDE-17.002	EQUIPMENT LAYOUT (2 x 500kW Rizal DPP)
RizDPP-BDE-17.003	DETAILS OF TAKE-OFF STRUCTURE (1/2) (2 x 500 kW Rizal DPP)
RizDPP-BDE-17.004	DETAILS OF TAKE-OFF STRUCTURE (2/2) (2 x 500 kW Rizal DPP)
RizDPP-BDE-17.005	GROUNDING SYSTEM (2 x 500 kW Rizal DPP)
RizDPP-BDE-17.006	ROUTE OF CABLE TRENCH (2 x 500 kW Rizal DPP)
RizDPP-BDE-17.007	TYPES OF CABLE TRENCH AND DETAILS OF CABLE TRAY (2 x 500 kW Rizal DPP)
RizDPP-BDE-17.008	GROUNDING DETAILS (2 x 500 kW Rizal DPP)
RizDPP-BDE-17.009	DETAILS OF TRANSFORMER TERMINATION (2 x 500 kW Rizal DPP)
RizDPP-BDE-17.010	GENERATOR CONTROL AND PROTECTION PANEL LAYOUT (2 x 500 kW Rizal DPP)
RizDPP-BDE-17.011	SYSTEM CONFIGURATION (2 x 500 kW Rizal DPP)
RizDPP-BDE-17.012	AUXILIARY CONTROL AND MONITORING PANEL (2 x 500 kW Rizal DPP)
RizDPP-BDE-17.013	GENERAL NOTES (2 x 500 kW Rizal DPP)



NOTES:

1. THE CONTRACTOR SHALL PROVIDE PROTECTION MODULE EQUIPPED WITH THE ENGINE-GENERATOR PROTECTION AS SHOWN.
2. TRIP AND FAULT ALARM/SIGNAL FROM THE GENERATOR TRANSFORMER SHALL BE INCLUDED IN THE ENGINE-GENERATOR ANNUNCIATOR WINDOW.
3. BURDENS AND RATINGS INCLUDING CIRCUIT PROTECTIONS OF INSTRUMENT TRANSFORMER SHALL BE DETERMINED BY THE CONTRACTOR.
4. ALL THE EQUIPMENT TO BE SUPPLIED SHALL BE TESTED AND PROVEN PASSED IN ACCORDANCE TO THE REQUIREMENTS OF SECTION VI. – TECHNICAL SPECIFICATIONS.
5. ALL EQUIPMENT DRAWN IN HIDDEN LINES ARE EXISTING WHEREAS ALL EQUIPMENT IN THE SHADED AREA ▨ ARE EXISTING AND TO BE TRANSFERRED FROM BUSUANGA DPP TO RIZAL DPP. ALL OTHERS ARE TO BE FURNISHED BY THE CONTRACTOR.

LEGEND:

- DIESEL GENERATOR
- GENERATOR TRANSFORMER
- STATION SERVICE/AUXILIARY TRANSFORMER
- DISCONNECT SWITCH
- AUTOMATIC CIRCUIT RECLOSER
- FUSE DISCONNECT SWITCH
- LIGHTNING ARRESTER
- GENERATOR CIRCUIT BREAKER
- CURRENT LIMITING FUSE
- VOLTAGE TRANSFORMER
- CURRENT TRANSFORMER (METERING)
- CURRENT TRANSFORMER (RELAYING)
- KILOWATT-HOUR METER
- EARTHGROUND

PROTECTION & MONITORING DEVICES:

12	–	OVERSPEED RELAY
25	–	SYNCHRONISM CHECK RELAY
27/59	–	UNDER/OVER VOLTAGE RELAY
30	–	ANNUNCIATOR RELAY
32	–	DIRECTIONAL POWER RELAY
47	–	PHASE-SEQUENCE VOLTAGE RELAY
49	–	THERMAL RELAY
50/51	–	INSTANTANEOUS/AC TIME OVERCURRENT RELAY
50N/51N	–	RESIDUAL OVERCURRENT RELAY
64	–	GROUND PROTECTIVE RELAY
81	–	FREQUENCY RELAY
94	–	TRIPPING RELAY

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: **NATIONAL POWER CORPORATION**
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAIN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BARJA, RIZAL, PALAWAN

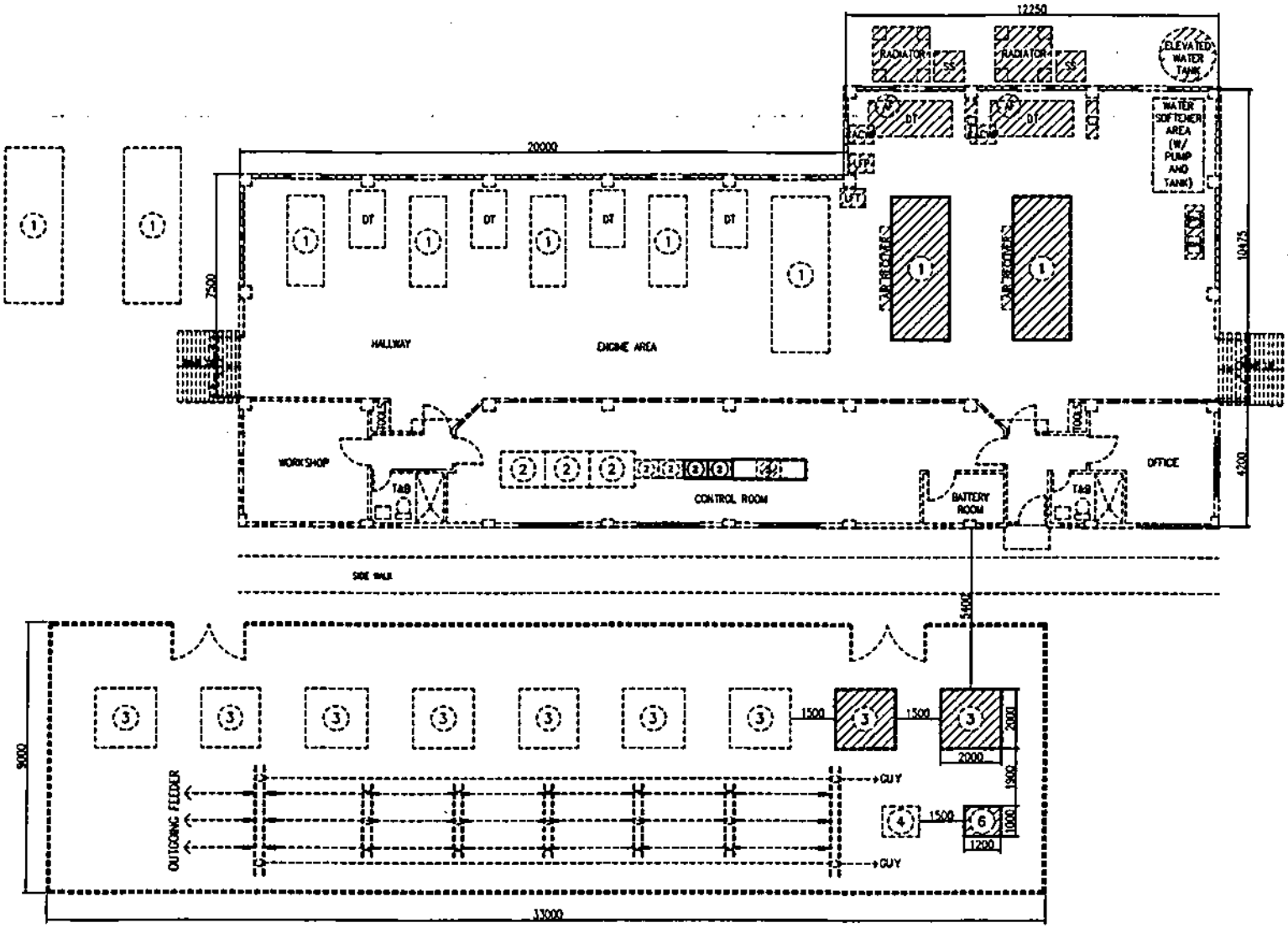
TITLE: **SINGLE LINE DIAGRAM (2 X 500 KW RIZAL DPP)**

	BY	CHKD	DATE
DESIGNED	ACLR		
DRAWN	ACLR		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT.			
ELEC.			
MECH.			

SUBMITTED: F. G. GABRIEL, Project Manager A
RECOMMENDED: A. S. DELARIA III, Manager, EEDD
APPROVED: G. B. MAGPOC, JR., Manager, EEDD

DWG. NO. RizDPP-BDE-17.001 | SPECS. NO. LuzP19Z1082Sx

SCALE: N.T.S. | **BID DRAWING** | REV. 0



NOTES:

1. ALL EQUIPMENT/STRUCTURES DRAWN IN HIDDEN LINES ARE EXISTING WHEREAS ALL SHADED EQUIPMENT ▨ ARE TO BE TRANSFERRED FROM BUSUANGA DPP TO RIZAL DPP. ALL OTHERS ARE TO BE SUPPLIED BY THE CONTRACTOR.
2. ALL NECESSARY MODIFICATIONS/ADJUSTMENTS AND FINAL LOCATIONS OF EQUIPMENT AND ACCESSORIES/APPURTENANCES TO BE SUPPLIED, TRANSFERRED, INSTALLED OR CONSTRUCTED BY THE CONTRACTOR SHALL BE CLOSELY COORDINATED WITH SPUG MANAGEMENT AND PLANT HEAD/PERSONNEL-IN-CHARGE TO SUIT ACTUAL SITE CONDITIONS PRIOR TO DELIVERY/ INSTALLATION/CONSTRUCTION FOR THE TIMELY AND EFFICIENT IMPLEMENTATION OF THE PROJECT.
3. ALL EQUIPMENT TO BE TRANSFERRED AND TO BE SUPPLIED SHALL BE PROPERLY GROUNDED. EQUIPMENT GROUNDING SHALL BE CONNECTED TO THE EXISTING GROUNDING SYSTEM. REFER TO RIZDPP-BDE-17.007 FOR GROUNDING CONNECTION DETAILS.
4. THIS DRAWING SHALL BE WORKED WITH CIVIL AND MECHANICAL BID DRAWINGS.
5. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

LEGEND:

① – DIESEL GENERATOR
② – GENERATOR CONTROL AND PROTECTION PANEL (GCPP)
③ – GENERATOR TRANSFORMER
④ – STATION SERVICE TRANSFORMER
⑤ – AUXILIARY CONTROL AND MONITORING PANEL
⑥ – AUXILIARY TRANSFORMER

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BARIA, RIZAL, PALAWAN

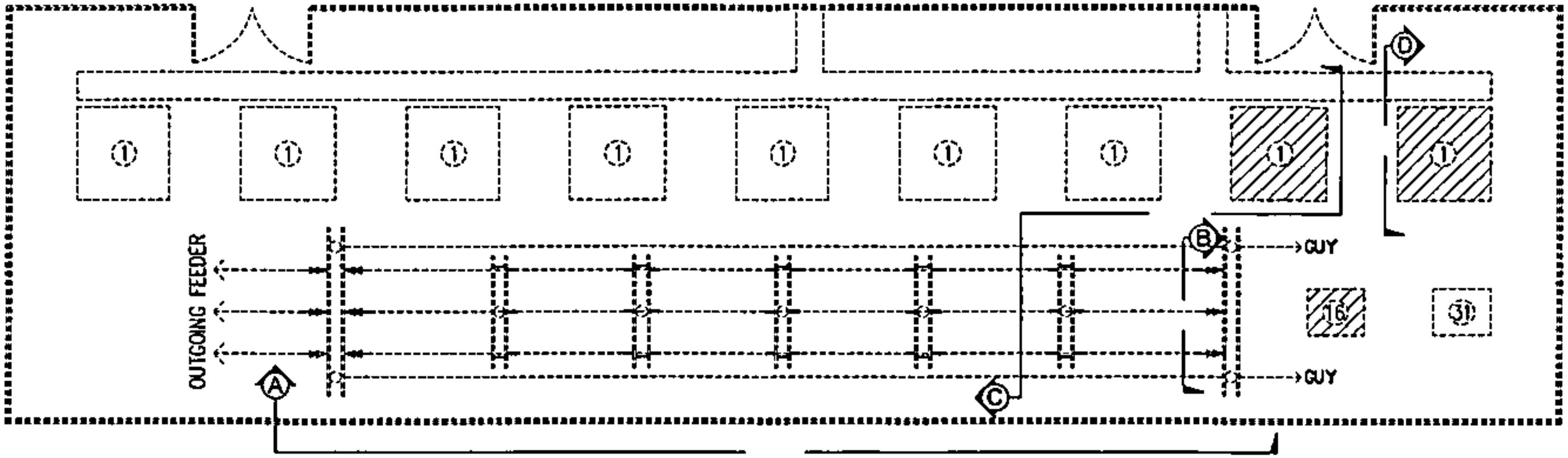
TITLE: EQUIPMENT LAYOUT (2 X 500 KW RIZAL DPP)

	BY	CHKD	DATE
DESIGNER	ACLL		
DRAWN	ACLL		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

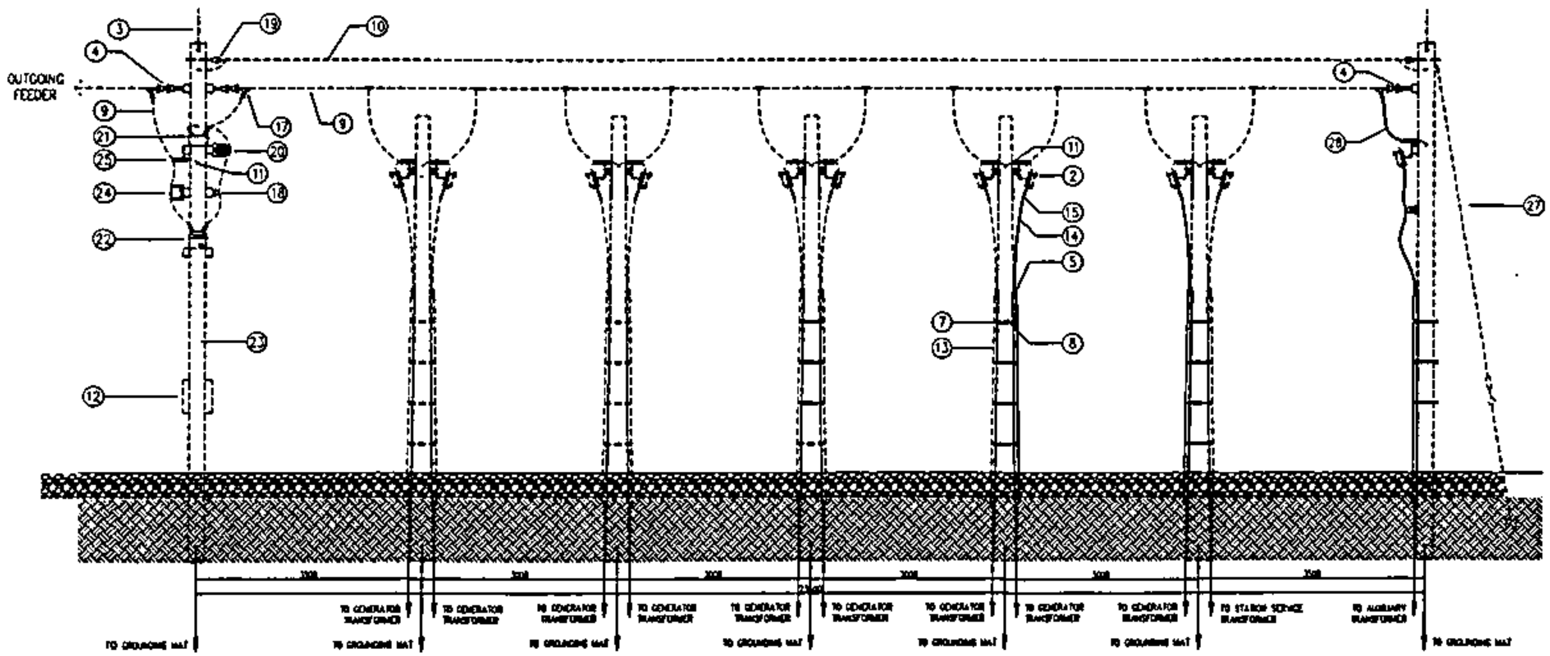
SUBMITTED: E. V. GABRIEL, Project Engineer A
RECOMMENDED: A. S. CANDELARIA III, Manager, GEDCO
APPROVED: G. B. MAGPOC, JR., Manager, DDD

DWG. NO. RizDPP-BDE-17.002 | SPECS. NO. LuzP19Z1082Sx

SCALE: 1:150 | BID DRAWING | REV. 0



TOP VIEW



SECTION A

NOTES:

1. ALL EQUIPMENT/STRUCTURES DRAWN IN HIDDEN LINES ARE EXISTING WHEREAS ALL SHADED EQUIPMENT ▨ ARE TO BE TRANSFERRED FROM BUSUANGA DPP TO RIZAL DPP. ALL OTHERS ARE TO BE SUPPLIED BY THE CONTRACTOR.
2. THIS DRAWING SHALL BE WORKED WITH DWG. NOS. RIzDPP-BDE-17.004, RIzDPP-BDE-17.008 AND RIzDPP-BDE-17.011.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: **NATIONAL POWER CORPORATION**
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BAOJA, RIZAL, PALAWAN

TITLE: **DETAILS OF TAKE-OFF STRUCTURE (1/2)**
(2 X 500 KW RIZAL DPP)

	BY	CHKD	DATE
DESIGNED	ACLB		
DRAWN	ACLB		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

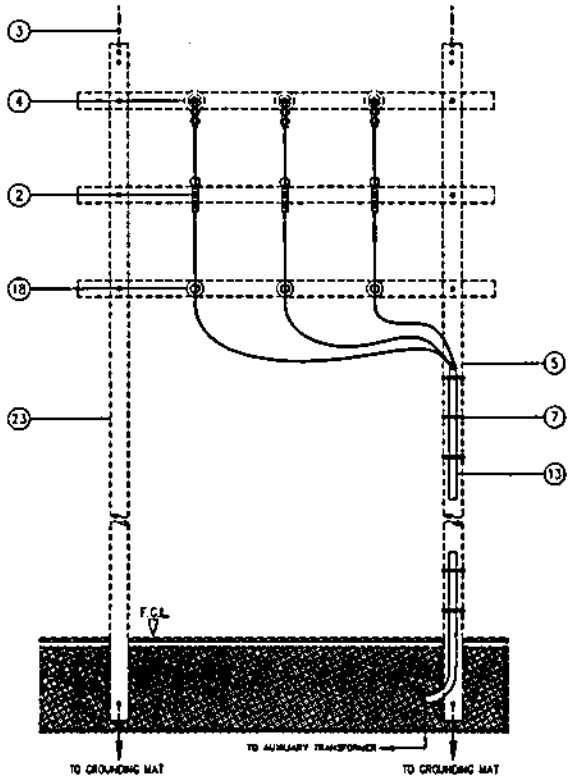
SUBMITTED: F. F. GABRIEL, Principal Engineer A

RECOMMENDED: A. S. CANDELARIA III, Manager, EEDD

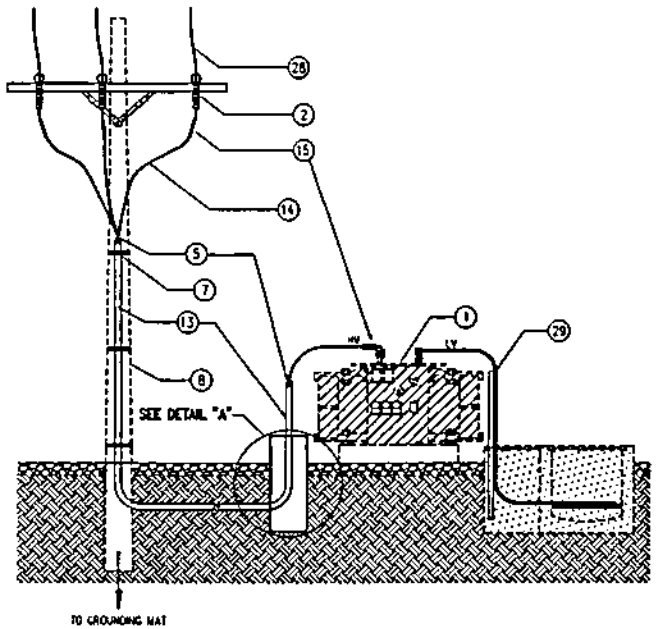
APPROVED: G. B. MAGPOC, JR., Manager, DDD

DWG. NO. RIzDPP-BDE-17.003 | SPECS. NO. LuzP19Z1082Sx

SCALE: N.T.S. | **BID DRAWING** | REV. 0



SECTION B



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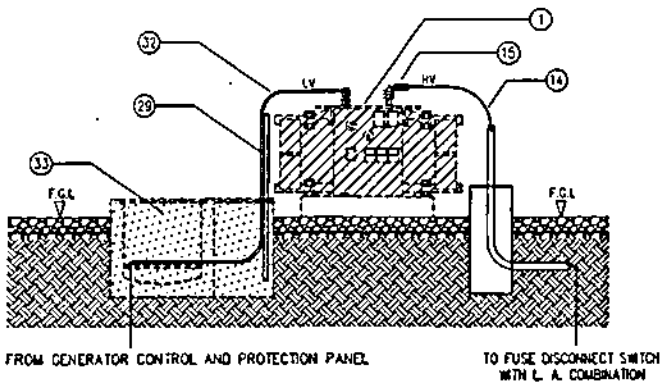
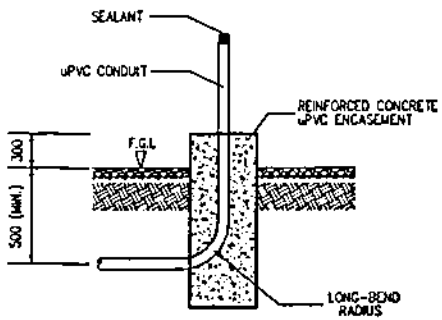


SECTION D



DETAIL "A"

NOTES:

1. ALL EQUIPMENT/STRUCTURES DRAWN IN HIDDEN LINES ARE EXISTING WHEREAS ALL SHADED EQUIPMENT ▨ ARE TO BE TRANSFERRED FROM BUSUANGA DPP TO RIZAL DPP. ALL OTHERS ARE TO BE SUPPLIED BY THE CONTRACTOR.
2. THIS DRAWING SHALL BE WORKED WITH DWG. NOS. RIzDPP-BDE-17.003, RIzDPP-BDE-17.008 AND RIzDPP-BDE-17.011.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

LEGEND:

(1) — GENERATOR TRANSFORMER
(2) — FUSE DISCONNECT SWITCH WITH LA COMBINATION
(3) — LIGHTNING ROD
(4) — TENSION INSULATOR
(5) — SEALANT
(6) — HOT LINE CLAMP
(7) — CONDUIT SUPPORT
(8) — 25H STEEL POLE
(9) — 4/0 AWG ACSR
(10) — OVERHEAD GROUND WIRE
(11) — GROUND CLAMP
(12) — BILLING METER
(13) — uPVC 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) — 30H STEEL POLE
(24) — DISCONNECT SWITCH
(25) — LIGHTNING ARRESTER
(26) — RECLOSER CONTROLLER
(27) — HIGH STRENGTH GRADE STEEL GALVANIZED GUY WIRE
(28) — 2/0 AWG ACSR
(29) — CABLE LADDER
(30) — CROSSARM, STEEL, HDG
(31) — AUXILIARY TRANSFORMER
(32) — COPPER CONDUCTOR, 600V THHN/THWN-2
(33) — CABLE TRENCH

OWNER: **NATIONAL POWER CORPORATION**
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAIN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BARIA, RIZAL, PALAWAN

TITLE: **DETAILS OF TAKE-OFF STRUCTURE (2/2) (2 X 500 KW RIZAL DPP)**

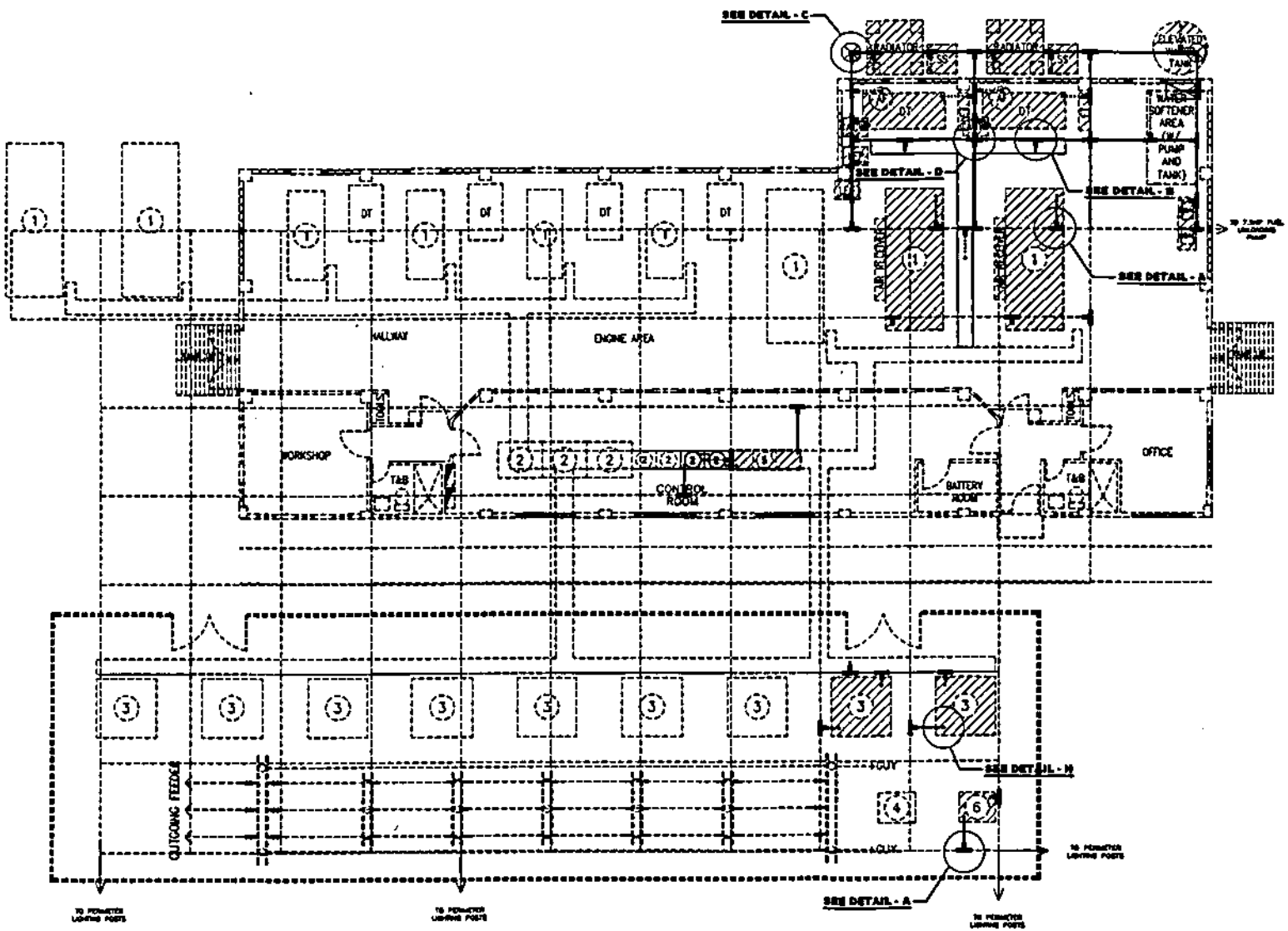
	BY	CHKD	DATE
DESIGNED	ACLB		
DRAWN	ACLB		
REVIEWED	PRINCIPAL ENGR. I ARCHT.		
OVERLARCHT			
ELEC.			
MECH.			

SUBMITTED: F. F. GABRIEL, Electrical Engineer A
RECOMMENDED: A. S. CANDELARIA III, Manager, EEGD
APPROVED: G. B. MAGPOC, JR., Manager, DDD

DWG. NO. RIzDPP-BDE-17.004 | SPEC. NO. LuzP19Z1082Sx

SCALE: N.T.S. | **BID DRAWING** | REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



NOTES:

1. ALL EQUIPMENT/STRUCTURES DRAWN IN HIDDEN LINES ARE EXISTING WHEREAS ALL SHADED EQUIPMENT ▨ ARE TO BE TRANSFERRED FROM BUSUANGA DPP TO RIZAL DPP. ALL OTHERS ARE TO BE SUPPLIED BY THE CONTRACTOR.
2. THE CONTRACTOR 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 AUXILIARY TRANSFORMER) AND SHALL BE CONNECTED TO THE EXISTING GROUNDING MAT USING 100mm² INSULATED COPPER CONDUCTOR AND EXOTHERMIC WELDING PROCESS.
3. FUSE DISCONNECT SWITCH WITH LIGHTNING ARRESTER COMBINATION SHALL BE PROPERLY GROUNDED WITH 50mm² INSULATED COPPER CONDUCTOR AND SHALL BE BONDED TO THE GROUND CLAMP OF THE STEEL POLE IT IS ATTACHED TO.
4. MOTORS/PUMPS RATED 30kW AND ABOVE SHALL BE PROPERLY GROUNDED WITH 50mm² INSULATED COPPER CONDUCTOR.
5. MOTORS/PUMPS RATED BELOW 10kW, TANKS AND CABLE TRAYS SHALL BE PROPERLY GROUNDED WITH 22mm² INSULATED COPPER CONDUCTOR.
6. ALL EQUIPMENT GROUNDING SHALL BE CONNECTED TO THE EXISTING GROUNDING MAT.
7. GROUNDING CONDUCTOR SHALL BE EMBEDDED AT LEAST 0.60m.
8. THIS DRAWING SHALL BE WORKED WITH DRAWING NO. RPDPP-BDE-17-008.
9. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

LEGEND:

① – DIESEL GENERATOR
② – GENERATOR CONTROL AND PROTECTION PANEL (GCPP)
③ – GENERATOR TRANSFORMER
④ – STATION SERVICE TRANSFORMER
⑤ – AUXILIARY CONTROL AND MONITORING PANEL
⑥ – AUXILIARY TRANSFORMER
—— – 100 mm² BARE STRANDED COPPER CONDUCTOR
—— – 50 mm² BARE STRANDED COPPER CONDUCTOR
····· – 22 mm² BARE STRANDED COPPER CONDUCTOR
⊗ – GROUND ROD

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAIN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BARIA, RIZAL, PALAWAN

TITLE: GROUNDING SYSTEM (2 X 500 KW RIZAL DPP)

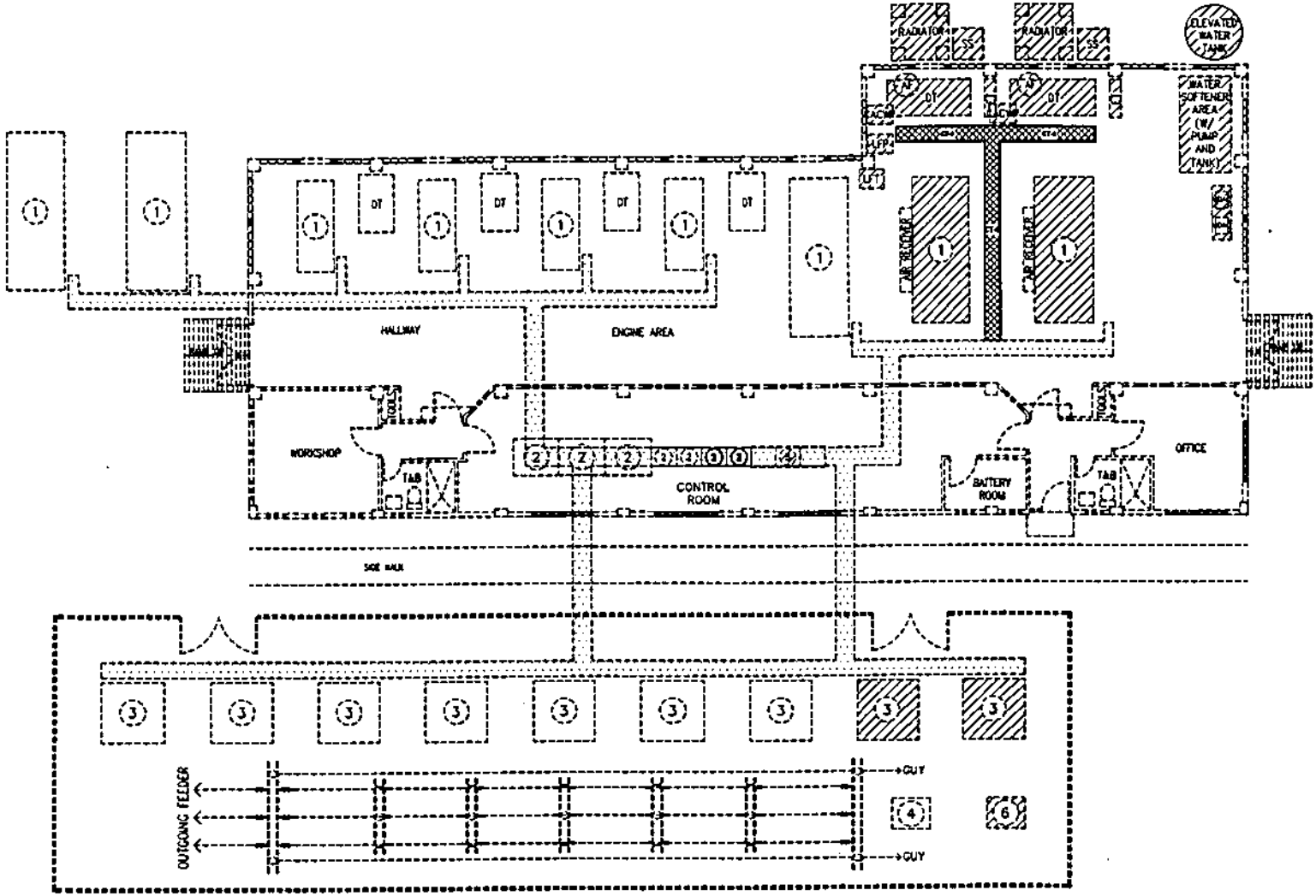
	BY	CHKD
DESIGNED	ACLB	
DRAWN	ACLB	
REVIEWED	PRINCIPAL ENGR. / ARCHT.	
CIVIL/ARCHT		
ELEC.		
MECH.		

SUBMITTED: P. F. GABRIEL, Project Engineer A
RECOMMENDED: A. S. CANDELARIA III, Manager, RBDD
APPROVED: G. B. MAGPOC, JR., Manager, DDB

DWG. NO. RizDPP-BDE-17.005 | SPECS. NO. LuzP19Z1082Sx

SCALE: 1:150 | BID DRAWING | REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



NOTES:

1. ALL EQUIPMENT/STRUCTURES DRAWN IN HIDDEN LINES ARE EXISTING WHEREAS ALL SHADED EQUIPMENT ▨ ARE TO BE TRANSFERRED FROM BUSUANGA DPP TO RIZAL DPP. ALL OTHERS ARE INCLUDED IN THE CONTRACT.
2. ALL CABLE TRAY SUPPORTS, BRACKETS AND ACCESSORIES SHALL BE HOT-DIPPED GALVANIZED STEEL.
3. ALL CABLE TRAY SUPPORTS, BRACKETS AND CONNECTORS SHALL HAVE A MINIMUM THICKNESS OF 3.0mm.
4. CABLE TRAY LADDER RUNGS, TEES, AND ELBOW SHALL HAVE A THICKNESS OF NOT LESS THAN 2.0mm.
5. OPEN HOLES SHALL BE 13mmø UNLESS OTHERWISE SPECIFIED.
6. THIS DRAWING SHALL BE WORKED WITH DRAWING NO. RIzDPP-BDE-17-007.
7. ALL DIMENSIONS ARE IN MILLIMETER UNLESS OTHERWISE SPECIFIED.

LEGEND:

① – DIESEL GENERATOR
② – GENERATOR CONTROL AND PROTECTION PANEL (GCPP)
③ – GENERATOR TRANSFORMER
④ – STATION SERVICE TRANSFORMER
⑤ – AUXILIARY CONTROL AND MONITORING PANEL
⑥ – AUXILIARY TRANSFORMER
▭ – EXISTING CABLE TRENCH
▨ – NEW CABLE TRENCH

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAIN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BAGUA, RIZAL, PALAWAN

TITLE: ROUTE OF CABLE TRENCH (2 X 500 KW RIZAL DPP)

	BY	CHKD	DATE
DESIGNED	ACLB		
DRAWN	ACLB		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

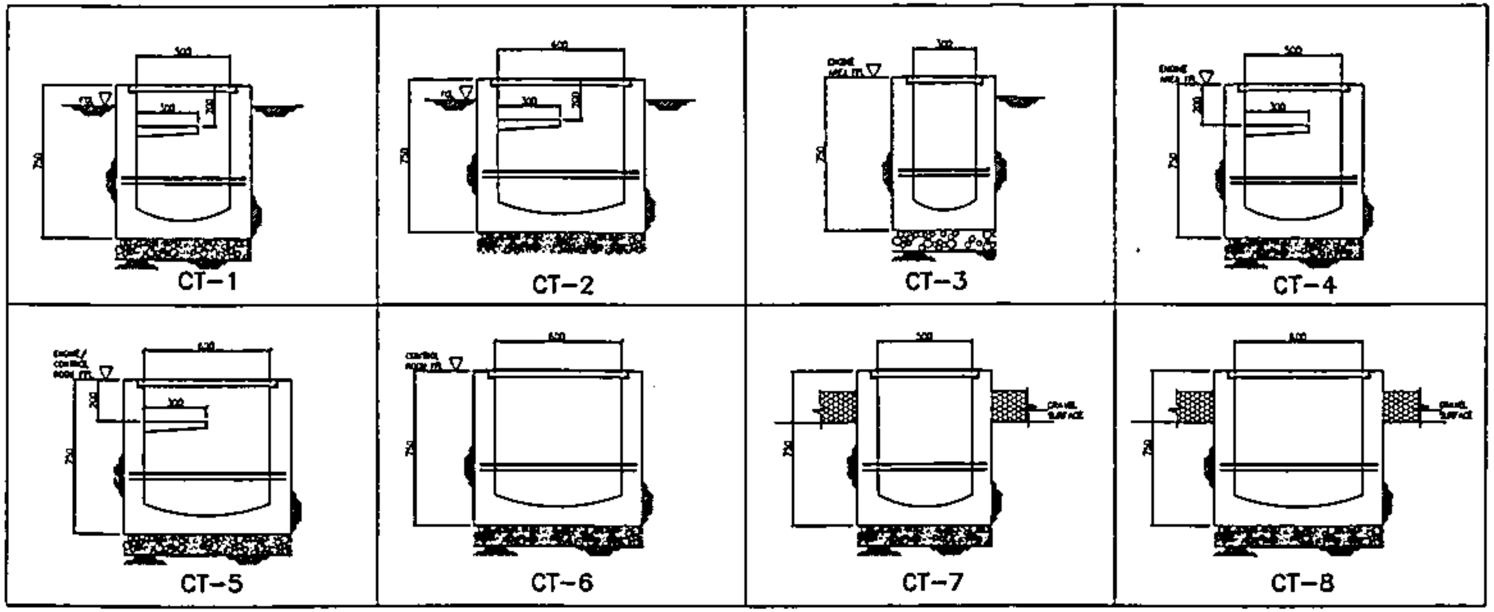
SUBMITTED: P. F. GABRIEL
RECOMMENDED: A. S. CANDELARIA III
APPROVED: G. B. MAGPOC, JR.

DWG. NO. RIzDPP-BDE-17.006 | SPECS NO. LuzP19Z1082Sx

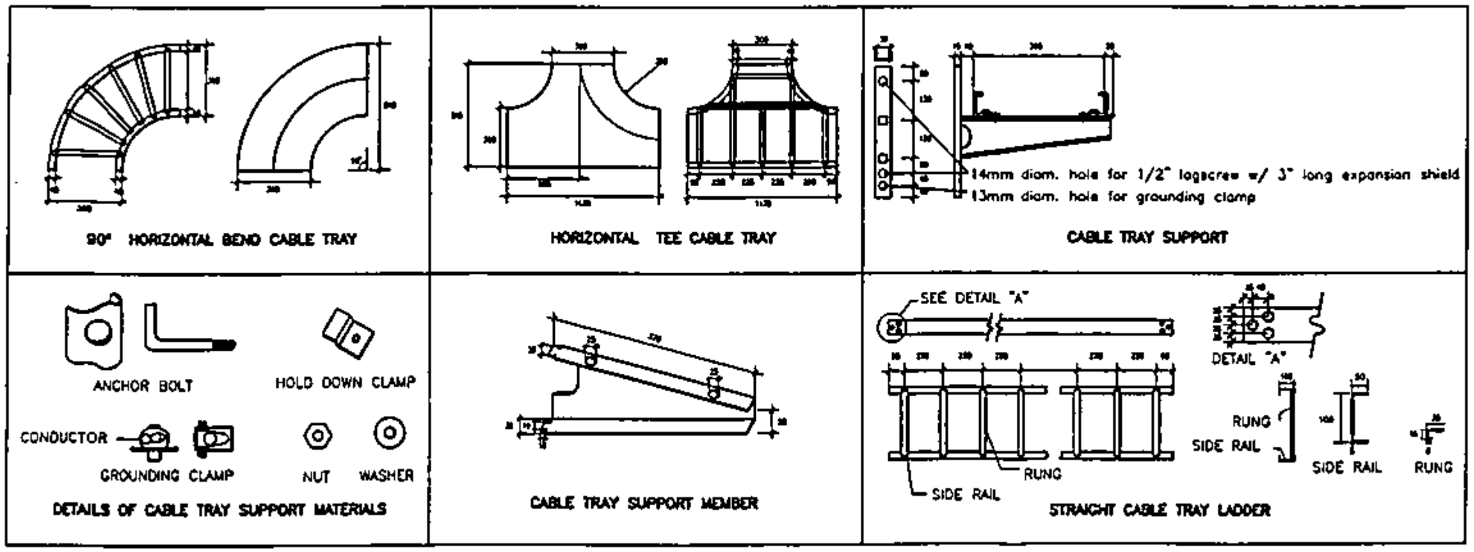
SCALE: 1:150 | BID DRAWING | REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APVD.

TYPES OF CABLE TRENCH



DETAILS OF CABLE TRAY



NOTES:

1. ALL CABLE TRAY SUPPORTS, BRACKETS AND ACCESSORIES SHALL BE HOT-DIPPED GALVANIZED STEEL.
2. ALL CABLE TRAY SUPPORTS, BRACKETS AND CONNECTORS SHALL HAVE A MINIMUM THICKNESS OF 3.0mm.
3. CABLE TRAY LADDER RUNGS, TEES, AND ELBOW SHALL HAVE A THICKNESS OF NOT LESS THAN 2.0mm.
4. OPEN HOLES SHALL BE 13mmø UNLESS OTHERWISE SPECIFIED.
5. DETAILS OF CABLE TRENCH SHALL BE REFERRED TO CIVIL WORKS BID DRAWINGS.
6. ALL DIMENSIONS ARE IN MILLIMETER UNLESS OTHERWISE SPECIFIED.

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BAJA, RIZAL, PALAWAN

TITLE: TYPES OF CABLE TRENCH AND DETAILS OF CABLE TRAY (2 X 500 KW RIZAL DPP)

	BY	CHKD	DATE
DESIGNED	ACLB		
DRAWN	ACLB		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

SUBMITTED: F. A. GABRIEL

RECOMMENDED: A. S. CANDELARIA III, Manager, EEDD

APPROVED: G. B. MACPOC, JR., Manager, DDD

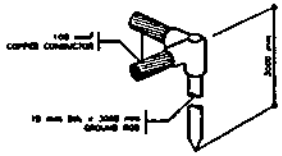
DWG. NO. RizDPP-BDE-17.007 SPECS. NO. LuzP19Z1082Sx

SCALE: N.T.S. BID DRAWING REV. 0

DETAILS OF EXOTHERMIC WELDING CONNECTION

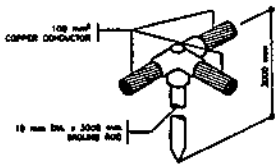
DETAIL-A

DETAIL-B

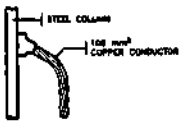


DETAIL-C

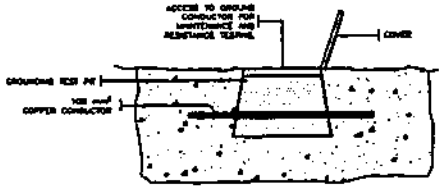
DETAIL-D



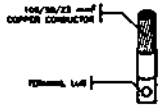
DETAIL-E



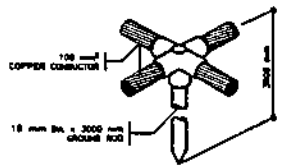
DETAIL-F



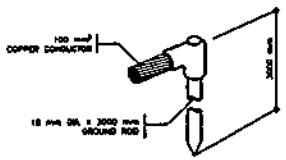
DETAIL-G



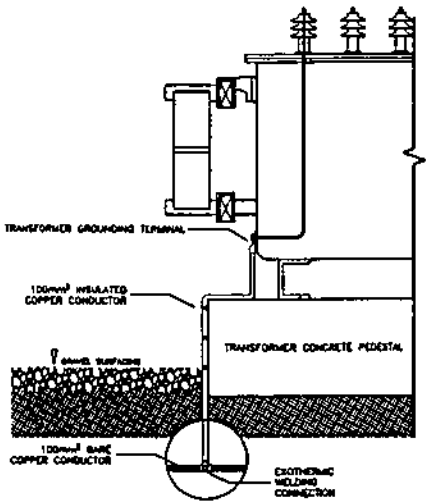
DETAIL-H



DETAIL-I



DETAIL-J



EQUIPMENT GROUNDING CONNECTION

NOTES:

1. GROUNDING CONDUCTOR SHALL BE EMBEDDED AT LEAST 0.60m.
2. THE CONTRACTOR 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 AUXILIARY TRANSFORMER) AND SHALL BE CONNECTED TO THE EXISTING GROUNDING MAT USING 100mm² INSULATED COPPER CONDUCTOR AND EXOTHERMIC WELDING PROCESS.
3. FUSE DISCONNECT SWITCH WITH LIGHTNING ARRESTER COMBINATION SHALL BE PROPERLY GROUNDED WITH 50mm² INSULATED COPPER CONDUCTOR AND SHALL BE BONDED TO THE GROUND CLAMP OF THE STEEL POLE IT IS ATTACHED TO.
4. MOTORS/PUMPS RATED 30kW AND ABOVE SHALL BE PROPERLY GROUNDED WITH 50mm² INSULATED COPPER CONDUCTOR.
5. MOTORS/PUMPS RATED BELOW 10kW, TANKS AND CABLE TRAYS SHALL BE PROPERLY GROUNDED WITH 22mm² INSULATED COPPER CONDUCTOR.
6. ALL EQUIPMENT GROUNDING SHALL BE CONNECTED TO THE EXISTING GROUNDING MAT.

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUBUANDA DPP TO RIZAL DPP

LOCATION: PUNTA BARJA, RIZAL, PALAWAN

TITLE: GROUNDING AND TERMINATION DETAILS (2 X 500 KW RIZAL DPP)

	BY	CHKD	DATE
DESIGNED	ACLS		
DRAWN	ACLS		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

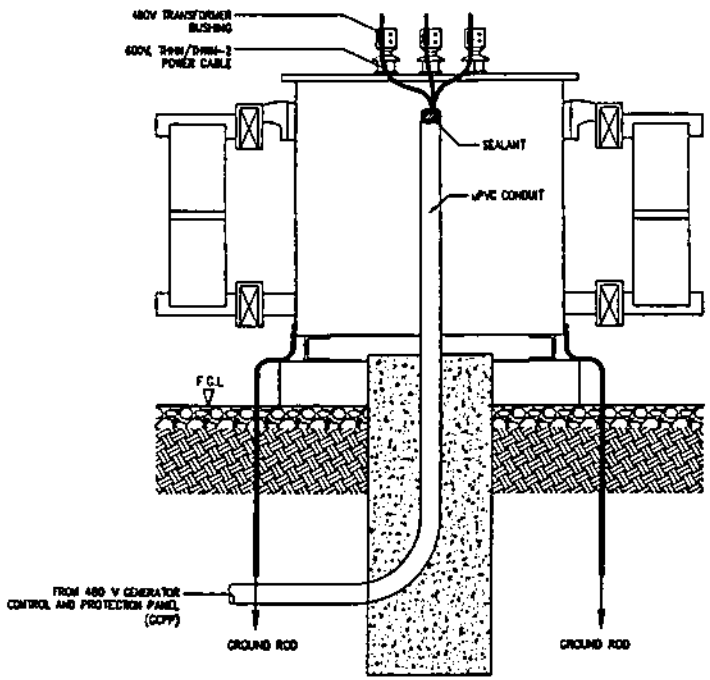
SUBMITTED: E. C. GABRIEL, Engineer A
RECOMMENDED: A. S. CANDELARIA III, Manager, RDDS
APPROVED: G. B. MAGPOC, JR., Manager, DDD

DWG. NO. RizDPP-BDE-17.008 | SPECS. NO. LuzP19Z1082Sx

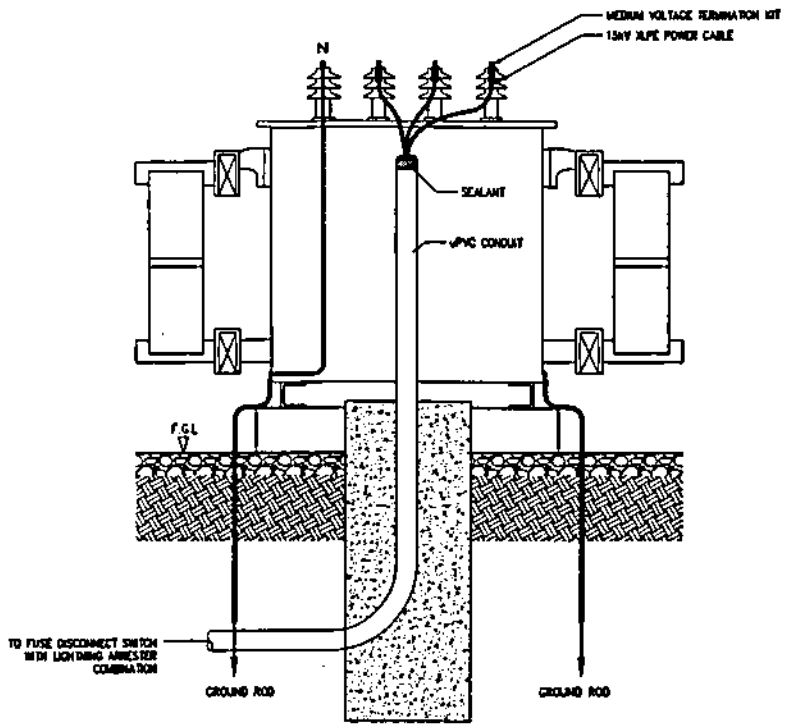
SCALE: N.T.S. | BID DRAWING | REV. 0

NOTES:

1. THE NUMBER OF FEEDERS AND CONDUITS IN THE DRAWING ARE FOR BIDDING PURPOSES ONLY. THE CONTRACTOR SHALL DESIGN THE APPROPRIATE CABLE ENTRY FOR ALL THE POWER, CONTROL AND INSTRUMENTATION CABLES TO BE USED.
2. THE CONTRACTOR SHALL DESIGN THE CABLE BOX WITH AT LEAST NEMA 3/IP54 PROTECTION CLASSIFICATION TO PROTECT AGAINST SUDDEN INGRESS PENETRATIONS AND CAN ACCOMMODATE MULTIPLE CABLES.
3. THE CONTRACTOR SHALL PROVIDE PROPER TERMINATION FOR THE NEUTRAL CABLE.



TRANSFORMER LOW VOLTAGE CABLE TERMINATION



TRANSFORMER HIGH VOLTAGE CABLE TERMINATION

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAIN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BARIA, RIZAL, PALAWAN

TITLE: DETAILS OF TRANSFORMER TERMINATION (2 X 500 KW RIZAL, DPP)

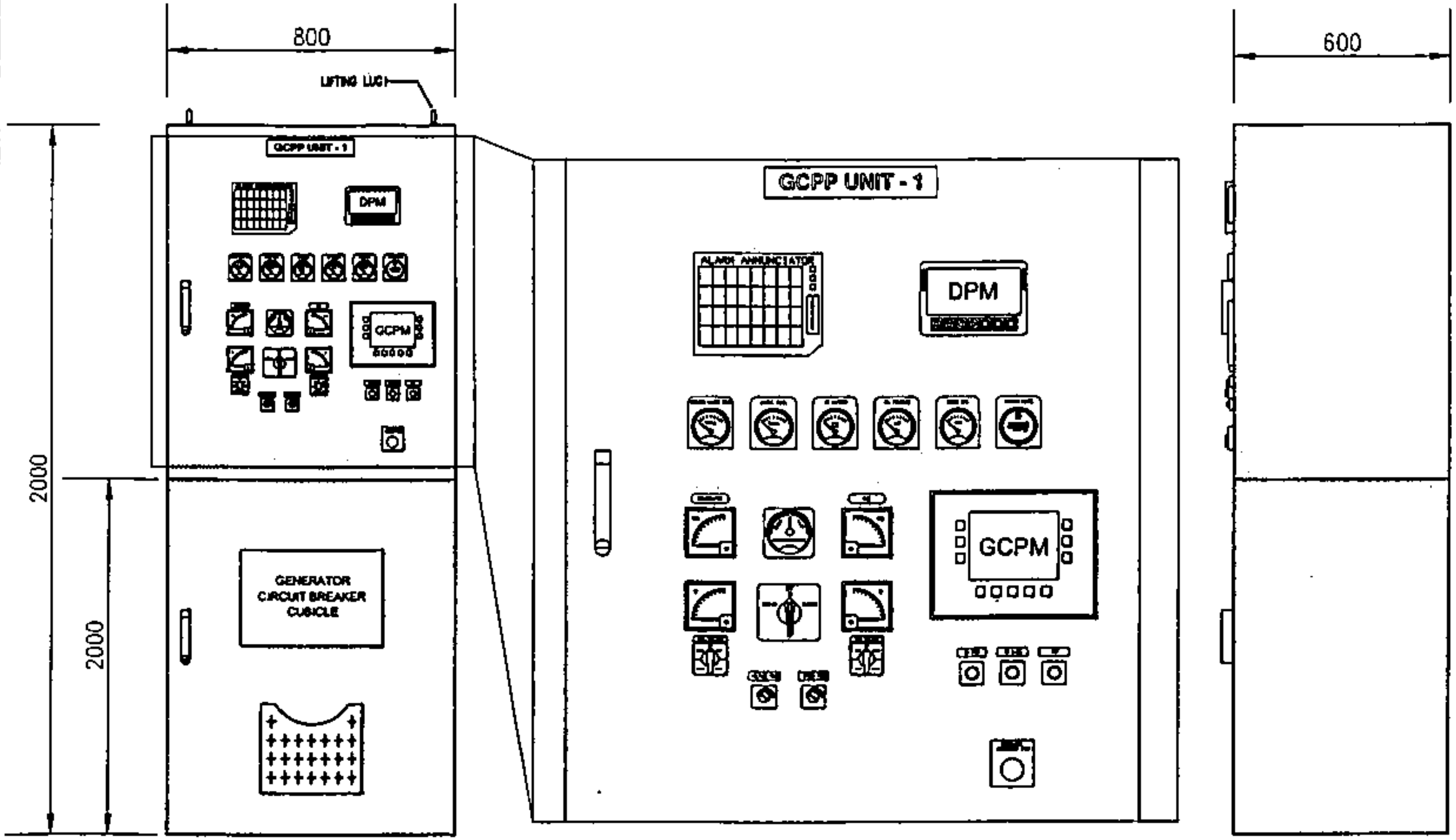
	BY	CHKD	DATE
DESIGNED	ACLS		
DRAWN	ACLS		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

SUBMITTED: F. G. GABRIEL, Supervising A.
RECOMMENDED: A. S. CANDELARIA III, Manager, EEDD
APPROVED: G. B. MAGPOC, JR., Manager, DDD

DWG. NO. RizDPP-BDE-17.009 | SPEC. NO. LuzP19Z10825x

SCALE: N.T.S. | BID DRAWING | REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



NOTES:

1. THE GENERATOR CONTROL AND PROTECTION PANEL ENCLOSURE SHALL BE COLORED RAL 7032 AND ITS STEEL SHEET THICKNESS SHALL BE AT LEAST 2.0 MILLIMETERS.
2. ALL PROTECTION AND METERING REQUIREMENTS OF ALL AUXILIARY MOTORS SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR. ALL THE EQUIPMENT TO BE USED SHALL BE SUBJECT FOR THE REVIEW AND APPROVAL OF NPC.
3. CABLE ENTRY FOR THE GCPP AND AUXILIARY CONTROL AND PROTECTION PANEL SHALL BE BOTTOM TYPE.
4. THE CONTRACTOR SHALL PROVIDE THE BROCHURES/ CATALOGUES OF THE GENERATOR CONTROL AND PROTECTION PANEL COMPONENTS FOR METERING, PROTECTION, CONTROL AND MONITORING PURPOSES FOR APPROVAL OF NPC.
5. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

LEGEND:

GCPM - GENERATOR CONTROL AND PROTECTION MODULE

DPM - DIGITAL POWER METER

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: NATIONAL POWER CORPORATION
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BAGUA, RIZAL, PALAWAN

TITLE: **GENERATOR CONTROL AND PROTECTION PANEL LAYOUT (2 X 500 KW RIZAL DPP)**

	BY	CHKD	DATE
DESIGNED	ACLB		
DRAWN	ACLB		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

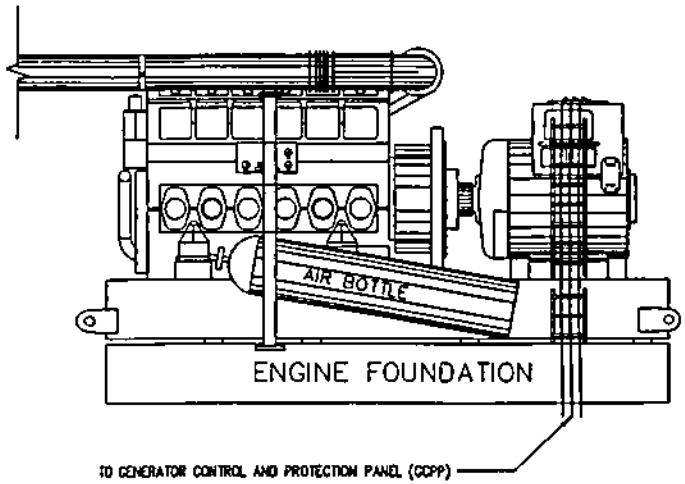
SUBMITTED: E. P. GABRIEL

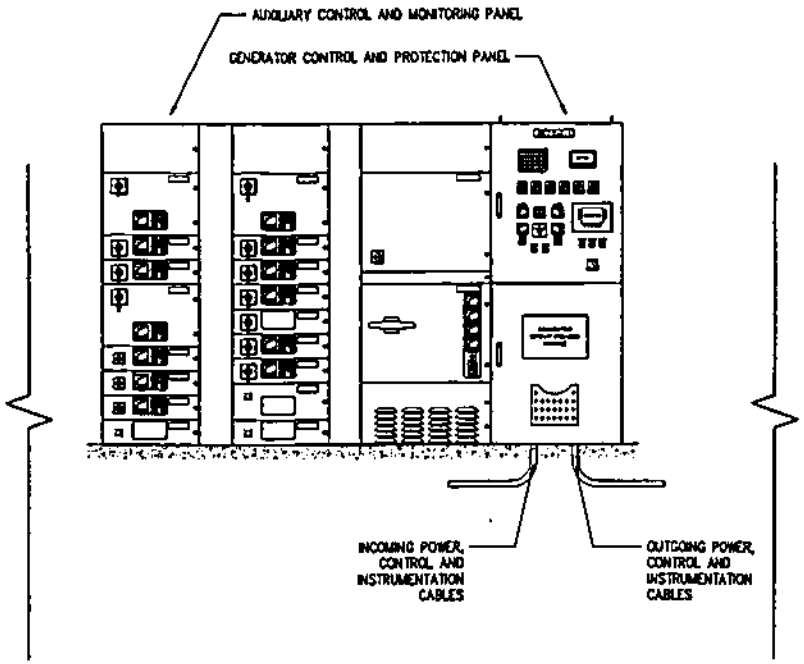
RECOMMENDED: A. S. CANDELARIA III

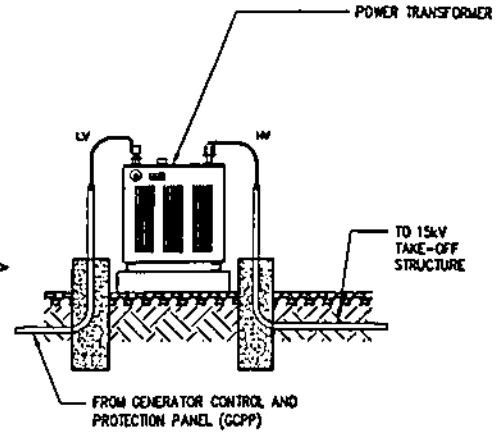
APPROVED: G. B. MAGPOC, JR.

DWG. NO. RizDPP-BDE-17.010 SPECS NO. LuzP19Z1082Sx

SCALE: N.T.S. **BID DRAWING** REV. 0







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:

GCPP	-	GENERATOR CONTROL AND PROTECTION PANEL
DPM	-	DIGITAL POWER METER
LV	-	LOW VOLTAGE
HV	-	HIGH VOLTAGE

OWNER: **NATIONAL POWER CORPORATION**
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAIN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BADJA, RIZAL, PALAWAN

TITLE: **SYSTEM CONFIGURATION (2 X 500 KW RIZAL DPP)**

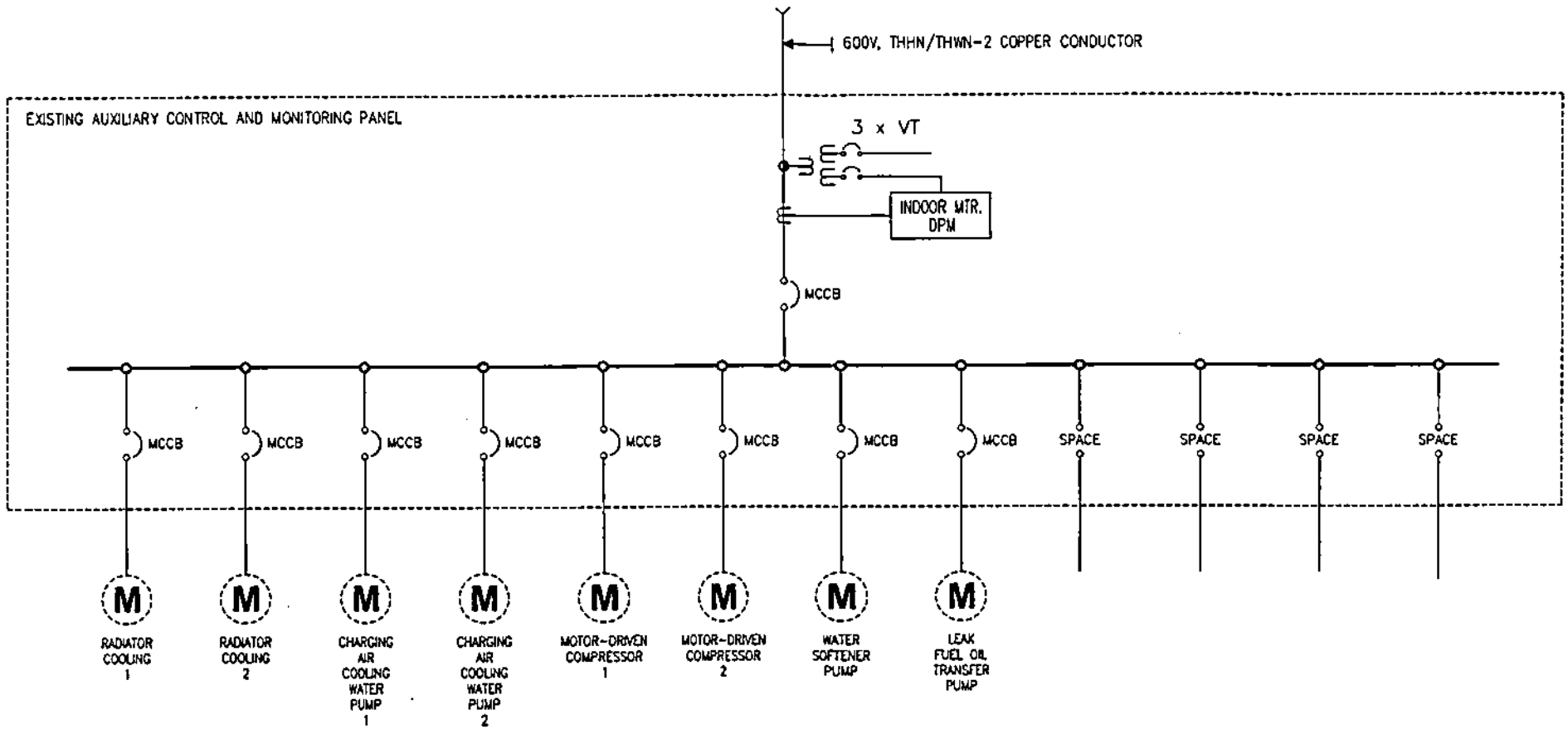
	BY	CHKD	DATE
DESIGNED	ACLB		
DRAWN	ACLB		
REVIEWED	PRINCIPAL ENGR. / MGMT.		
CM/ARCHT			
ELEC.			
MECH.			

SUBMITTED: E. J. GABRIEL
RECOMMENDED: A. S. CANDELARIA III, Manager, ESSCD
APPROVED: G. B. MAGPOC, JR., Manager, DED

DWG. NO. RizDPP-BDE-17.011 | SPEC'S NO. LuzP19Z1082Sx

SCALE: N.T.S. | **BID DRAWING** | REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



NOTES:

1. THE CONTRACTOR SHALL MAKE THE NECESSARY MODIFICATION(S)/ADJUSTMENT(S) IN THE EXISTING AUXILIARY CONTROL AND MONITORING PANEL FOR THE INTEGRATION OF ADDITIONAL AUXILIARY MOTOR/S REQUIRED FOR THE SECURE AND RELIABLE OPERATION OF THE 2 X 500 kW DIESEL GENERATING SETS TO BE TRANSFERRED FROM BUSUANGA DPP TO RIZAL DPP.
2. THE NUMBER OF FEEDERS ARE INDICATIVE AND FOR BIDDING PURPOSES ONLY. THE ACTUAL NUMBER AND RATING OF FEEDERS SHALL BE DETERMINED BY THE CONTRACTOR BASED ON THE AUXILIARY REQUIREMENTS WHICH SHALL BE INTEGRATED IN THE MAIN CONTROL PANEL FOR CONTROL, MONITORING AND SUPERVISION PURPOSES.
3. THE CONTRACTOR SHALL SUPPLY, INSTALL AND TEST POWER, CONTROL AND INSTRUMENTATION CABLES INCLUDING GROUND CONDUCTORS AND OTHER APPURTENANCES REQUIRED FOR THE INTERFACING OF THE AUXILIARIES WITH THE D/G SETS TO BE TRANSFERRED FROM BUSUANGA DPP TO RIZAL DPP. MOTOR CIRCUIT CONDUCTORS SHALL BE PROPERLY SIZED BY THE CONTRACTOR IN ACCORDANCE WITH ACCEPTED CODES AND STANDARDS MENTIONED IN THE TECHNICAL SPECIFICATIONS.
4. THE CONTRACTOR SHALL SUBMIT FOR APPROVAL THE ACTUAL DIAGRAM AND ALL THE AUXILIARY EQUIPMENT INCLUDING THE PROTECTION, METERING AND MONITORING EQUIPMENT TO BE SUPPLIED.

LEGEND:

- (M) – MOTOR LOAD
- – MOLDED CASE CIRCUIT BREAKER (MCCB)
- – CURRENT TRANSFORMER
- – VOLTAGE TRANSFORMER

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: **NATIONAL POWER CORPORATION**
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAIN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BARJA, RIZAL, PALAWAN

TITLE: **AUXILIARY CONTROL AND MONITORING PANEL DIAGRAM (2 X 500 KW RIZAL DPP)**

	BY	CHKD	QA/QC
DESIGNED	ACLE		
DRAWN	ACLE		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

SUBMITTED: F. B. GABRIEL, Engineer-A

RECOMMENDED: A. S. CANDELARIA III, Manager, EDCD

APPROVED: G. B. MAGPOC, JR., Manager, DDP

DWG. NO. RIzDPP-BDE-17.012 | SPECS. NO. LuzP19Z1082Sx

SCALE: N.T.S. | **BID DRAWING** | REV. 0

GENERAL NOTES:

I. ALL WORKS TO BE DONE AND EQUIPMENT TO BE SUPPLIED SHALL BE IN COMPLIANCE WITH THE LATEST PROVISIONS OF THE FOLLOWING STANDARDS:

1. ANSI/IEEE – American National Standards Institute and/or Institute of Electrical & Electronic Engineers

   C57.12.00 – General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

   C57.93 – Guide for Installation and Maintenance of Liquid-Immersed Power Transformers

   C57.106 – Guide for Acceptance and Maintenance of Insulating Mineral Oil in Electrical Equipment

2. 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 600 Volts

   ICS – General Standards for Industrial Control and Systems

   MG-1 – Motors and Generators

   MG-2 – Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators

3. 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

4. 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

   60502 – Power cables with extruded insulation and their accessories for rated voltages Parts 1 & 2

   60947 – Low Voltage Switchgear and Controlgear

5. NFPA – National Fire Protection Association

   272 – Standard Method of Test for Fire and Smoke Characteristics of Wires and Cables

6. ASTM – American Society for Testing and Materials

7. 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 and Servicing

8. PEC – Philippine Electrical Code

II. 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:

1. EW-2.9.2 Tests to be Performed for Generator Control and Protection Panel (GCPP)
2. EW-5.6 Tests to be Performed for Power, Control, and Instrumentation Cables

III. NON-COMPLIANCE TO THE REQUIREMENTS STATED IN THIS TENDER SHALL BE GROUNDS FOR DISQUALIFICATION.

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

OWNER: **NATIONAL POWER CORPORATION**
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: TRANSFER OF 2 X 500 KW MAIN DIESEL GENERATING SETS AND AUXILIARIES INCLUDING ASSOCIATED ELECTRICAL EQUIPMENT FROM BUSUANGA DPP TO RIZAL DPP

LOCATION: PUNTA BAGUA, RIZAL, PALAWAN

TITLE: **GENERAL NOTES (2 X 500 KW RIZAL DPP)**

	BY	CHKD	DATE
DESIGNED	ACLB		
DRAWN	ACLB		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			

SUBMITTED: E. V. GABRIEL, Project Manager
RECOMMENDED: A. S. CANDELARIA III, Manager, EDCD
APPROVED: G. B. MAGPOC, JR., Manager, DDD

DWG. NO. RizDPP-BDE-17.013 SPECS. NO. LuzP19Z1082Sx

SCALE: N.T.S. **BID DRAWING** REV. 0