



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

## **BID DOCUMENTS**

### **VOLUME 1**

**Name of Project :** CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR

**Location :** BAGACAY, CALBAYOG, SAMAR

**Specs No. :** VisP22Z1464Sc

**Contents:**

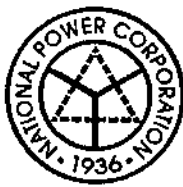
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Design and Development Department



## SECTION I

# INVITATION TO BID



# National Power Corporation

## INVITATION TO BID

### PUBLIC BIDDING – BCS 2023-0014

1. The NATIONAL POWER CORPORATION (NPC), through its approved Corporate Budget of CY 2023 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
<b>SO-OPD22-029 / PB230206-JL00006</b>  Construction of NPC Eastern Visayas Operation (EVO) Center at Calbayog City, Western Samar  • PCAB License: License Category of at least <b>"Category B – General Building"</b> and registration classification of at least <b>"Medium A – Building and Industrial Plant"</b> OR <b>"Category B – Specialty"</b> and registration classification of at least <b>"Medium A – Structural Steel Work"</b>	Construction of at least Two (2) storey concrete structure and construction of at least Two (2) storey structural steel structure	23 January 2023 9:30 A.M	06 February 2023 9:30 A.M	₱ 42,604,000.00 / ₱ 25,000.00
<b>S4-PIC22-070 / PB230206-CM00007</b>  Supply, Delivery, Installation, Test and Commissioning of 2 x 150kW Modular Diesel Generating Sets, Associated Electrical Equipment and Balance of Plant for Sikubong DPP under Electrification of New Areas in Tawi-Tawi	Supply, Delivery, Installation, Test and Commissioning or Construction of Power Facilities, Installation, Test and Commissioning of "Unit Diesel Generator – Transformer" with generator capacity of at least 150kW Prime or Continuous Power and its associated Power Transformer of at least 225kVA rating  For clarity, the Diesel Generator stated herein should be directly connected to the Power Transformer	23 January 2023 9:30 A.M	06 February 2023 9:30 A.M	₱ 29,939,100.00 / ₱ 25,000.00

**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
SO-OPD22-029	Two Hundred Seventy (270) Calendar Days	-
S4-PIC22-070	Two Hundred Forty (240) Calendar Days	Fifteen (15) 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:

- Only a maximum of two (2) representatives from each bidder / company shall be allowed to participate during the virtual pre-bid conference.
  - 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.
  - The requirements herein stated including the medium of submission shall be subject to GPPB Resolution No. 09-2020 dated 07 May 2020
  - 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 5564/5211

Fax No.: 8922-1622

Email: [bcsd@napocor.gov.ph](mailto:bcsd@napocor.gov.ph) /

12. You may visit the following websites:

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



**RENE B. BARRUELA**

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

## SECTION II

# INSTRUCTION TO BIDDERS

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## SECTION II - INSTRUCTIONS TO BIDDERS

### 1. Scope of Bid

NPC invites Bids for the **CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR**, with Project Identification Number **VisP22Z1464Sc**.

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 2022 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 criterion stated in **ITB** Clause 5 in accordance with Section 23.4 of the 2016 revised IRR of RA No. 9184 pursuant to Section 23.1 thereof.
- 7.2. Subcontracting of any portion of the Project does not relieve the Contractor of any liability or obligation under the Contract. The Supplier will be responsible for the acts, defaults, and negligence of any subcontractor, its agents, servants, or workmen as fully as if these were the Contractor's own acts, defaults, or negligence, or those of its agents, servants, or workmen.

## **8. Pre-Bid Conference**

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

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

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

## 10. Documents Comprising the Bid: Eligibility and Technical Components

- 10.1. The first envelope shall contain the eligibility and technical documents of the Bid as specified in **Form NPCSF-INFR-01 - Checklist of Technical and Financial Documents, Section VIII - Bidding Forms**.
- 10.2. If the eligibility requirements or statements, the bids, and all other documents for submission to the BAC are in foreign language other than English, it must be accompanied by a translation in English, which shall be authenticated by the appropriate Philippine foreign service establishment, post, or the equivalent office having jurisdiction over the foreign bidder's affairs in the Philippines. For Contracting Parties to the Apostille Convention, only the translated documents shall be authenticated through an apostille pursuant to GPPB Resolution No. 13-2019 dated 23 May 2019. The English translation shall govern, for purposes of interpretation of the bid.
- 10.3. A valid PCAB License is required, and in case of joint ventures, a valid special PCAB License, and registration for the type and cost of the contract for this Project. Any additional type of Contractor license or permit shall be indicated in the **BDS**.
- 10.4. A List of Contractor's key personnel (e.g., Project Manager, Project Engineers, Materials Engineers, and Foremen) assigned to the contract to be bid, with their complete qualification and experience data shall be provided. These key personnel must meet the required minimum years of experience set in the **BDS**.
- 10.5. A List of Contractor's major equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership, certification of availability of equipment from the equipment lessor/vendor for the duration of the project, as the case may be, must meet the minimum requirements for the contract set in the **BDS**.

## 11. Documents Comprising the Bid: Financial Component

- 11.1. The second bid envelope shall contain the financial documents for the Bid as specified in **Form NPCSF-INFR-01 - Checklist of Technical and Financial Documents, Section VIII - Bidding Forms**.
- 11.2. Any bid exceeding the ABC indicated in paragraph 1 of the **IB** shall not be accepted.
- 11.3. For Foreign-funded procurement, a ceiling may be applied to bid prices provided the conditions are met under Section 31.2 of the 2016 revised IRR of RA No. 9184.

## 12. Alternative Bids

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

**13. Bid Prices**

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

**14. Bid and Payment Currencies**

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

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

**15. Bid Security**

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

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

**16. Sealing and Marking of Bids**

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

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

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

**17. Deadline for Submission of Bids**

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

**18. Opening and Preliminary Examination of Bids**

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

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

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

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

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

- 19.1. The Procuring Entity's BAC shall immediately conduct a detailed evaluation of all Bids rated "passed" using non-discretionary pass/fail criteria. The BAC shall consider the conditions in the evaluation of Bids under Section 32.2 of 2016 revised IRR of RA No. 9184.
- 19.2. If the Project allows partial bids, all Bids and combinations of Bids as indicated in the **BDS** shall be received by the same deadline and opened and evaluated simultaneously so as to determine the Bid or combination of Bids offering the lowest calculated cost to the Procuring Entity. Bid Security as required by **ITB** Clause 15 shall be submitted for each contract (lot) separately.
- 19.3. In all cases, the NFCC computation pursuant to Section 23.4.2.6 of the 2016 revised IRR of RA No. 9184 must be sufficient for the total of the ABCs for all the lots participated in by the prospective Bidder.

## **20. Post Qualification**

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

## **21. Signing of the Contract**

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

## SECTION III

# BID DATA SHEET

**SECTION III - BID DATA SHEET**

ITB Clause	
5.2	<p>For this purpose, contracts similar to the Project refer to construction of at least two (2) storey concrete structure and construction of at least two (2) storey structural steel structure.</p> <p>The Single Largest Completed Contract (SLCC) as declared by the bidder shall be verified and validated to ascertain such completed contract. Hence, bidders must ensure access to sites of such projects/equipment to NPC representatives for verification and validation purposes during post-qualification process.</p> <p>It shall be a ground for disqualification, if verification and validation cannot be conducted for reasons attributable to the Bidder.</p>
7.1	<p>Only a maximum of fifty percent (50%) of the Works may be subcontracted. All Subcontractors must be approved by NPC.</p>
10.1	<p>The list of on-going contracts (Form No. NPCSF-INFR-02) shall be supported by the following documents for each on-going contract to be submitted during Post-Qualification:</p> <ol style="list-style-type: none"> <li>1. Contract/Purchase Order and/or Notice of Award</li> <li>2. Certification coming from the project owner/client that the performance is satisfactory as of the bidding date.</li> </ol> <p>The bidder shall declare in this form all his on-going government and private contracts including contracts where the bidder (either as individual or as a Joint Venture) is a partner in a Joint Venture agreement other than his current joint venture where he is a partner. Non declaration will be a ground for disqualification of bid.</p>
	<p>The Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid (Form No. NPCSF-INFR-03) shall be supported by the following documents to be submitted during Bid Opening:</p> <ol style="list-style-type: none"> <li>1. Contract/Purchase Order</li> <li>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.</li> </ol>
10.3	<p>The required License issued by the Philippine Contractors Accreditation Board (PCAB): License Category of at least <b>"CATEGORY B – GENERAL BUILDING"</b> and registration classification of at least <b>"MEDIUM A – BUILDING &amp; INDUSTRIAL PLANT"</b> OR <b>"CATEGORY B – SPECIALTY"</b> and registration classification of at least <b>"MEDIUM A – FOUNDATION WORK"</b> OR <b>"MEDIUM A – STRUCTURAL STEEL WORK"</b></p>

10.4	<p>The list of key personnel shall include the following minimum requirements:</p> <p><b>a. One (1) Project/Site Engineer</b></p> <p>Registered Civil Engineer who had supervised at least a project similar in nature as to the type and cost of the proposed project within the last 10 years. Must have at least 3 years professional experience as Civil Engineer on similar project.</p> <p><b>b. One (1) Materials Engineer</b></p> <p>Registered Civil Engineer with valid accreditation from the Department of Public Works and Highways (DPWH) as Materials Engineer I</p> <p><b>c. One (1) Safety Officer 2</b></p> <p>Construction Safety Officer who has completed at least forty (40) hours of Construction Safety and Health Training (COSH) from Occupational Safety and Health Center (OSHC) or Safety Training Organizations (STOs) accredited by the Department of Labor and Employment (DOLE)</p> <p>Valid Professional Regulations Commission (PRC) license for professional personnel, Construction Safety and Health Training Certificate from OSHC/STOs accredited by DOLE for the Safety Officer, certificate of accreditation including ID card issued by DPWH for Materials Engineer, shall be submitted and included as an attachment in the Standard Form NPCSF-INF-09: List of Key Personnel Proposed to be Assign to the Contract.</p> <p>The above key personnel must either be employed by the Bidder or contracted by the Bidder to be employed for the contract to be bid.</p>																								
10.5	<p>The list of construction equipment (owned or leased) shall include the following minimum requirements:</p> <table border="0"> <tr> <td>a. Service Vehicle</td> <td>-</td> <td>1 unit</td> </tr> <tr> <td>b. Concrete Vibrator</td> <td>-</td> <td>1 unit</td> </tr> <tr> <td>c. Concrete Mixer (at least 1 bagger)</td> <td>-</td> <td>1 unit</td> </tr> <tr> <td>d. Welding Machine (at least 300A)</td> <td>-</td> <td>1 unit</td> </tr> <tr> <td>e. OxyAcetylene Cutting Outfit</td> <td>-</td> <td>1 unit</td> </tr> <tr> <td>f. Bar Cutter (at least 25mm <math>\Phi</math> capable)</td> <td>-</td> <td>1 unit</td> </tr> <tr> <td>g. Air Compressor</td> <td>-</td> <td>1 unit</td> </tr> <tr> <td>h. Jack Hammer</td> <td>-</td> <td>1 unit</td> </tr> </table>	a. Service Vehicle	-	1 unit	b. Concrete Vibrator	-	1 unit	c. Concrete Mixer (at least 1 bagger)	-	1 unit	d. Welding Machine (at least 300A)	-	1 unit	e. OxyAcetylene Cutting Outfit	-	1 unit	f. Bar Cutter (at least 25mm $\Phi$ capable)	-	1 unit	g. Air Compressor	-	1 unit	h. Jack Hammer	-	1 unit
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h. Jack Hammer	-	1 unit																							
10.6	<p>Bidders shall also submit the following requirements in their first envelope, Eligibility and Technical Component of their bid:</p> <p>1. Completely filled out and duly signed Technical Data Sheets (MW), Section VI - Technical Specifications (Mechanical Works);</p> <p>Manufacturer's brochures, manuals and other supporting documents of equipment, materials, hardware and tools proposed by the bidders must comply with the technical specifications of such equipment, materials, hardware and tools. It shall be a ground for disqualification if the submitted brochures, manuals and other supporting documents are determined not complying with the specifications during technical evaluation and post-qualification process.</p>																								

	<p>Equipment, materials, hardware and tools proposed by the winning bidder to be supplied, which were evaluated to be complying with the technical specifications, shall not be replaced and must be the same items to be delivered/installed/used during the contract implementation. Any proposed changes/replacement of said items may be allowed on meritorious reasons subject to validation and prior approval by NPC.</p> <p>2. Complete eligibility documents of the proposed sub-contractor, if any</p>
10.7	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	<p>The bid security shall be in the form of a Bid Securing Declaration or any of the following forms and amounts:</p> <ol style="list-style-type: none"> <li>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;</li> <li>2. The amount of not less than 5% of ABC if bid security is in Surety Bond.</li> </ol>
19.2	Partial Bid is not allowed
20	<ol style="list-style-type: none"> <li>a. Contract/Purchase Order and/or Notice of Award for the contracts stated in the List of all Ongoing Government &amp; Private Contracts Including Contracts Awarded but not yet Started (NPCSF-INFR-02);</li> <li>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.</li> <li>c. The licenses and permits relevant to the Project and the corresponding law requiring it as specified in the Technical Specifications, if any.</li> </ol>
21	<p>The following documents shall form part of the contract:</p> <ol style="list-style-type: none"> <li>1. Notice to Proceed</li> <li>2. Construction schedule and S-curve</li> <li>3. Manpower Schedule</li> <li>4. Construction Methods</li> <li>5. Equipment Utilization Schedule</li> <li>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</li> <li>7. PERT/CPM.</li> </ol>

## SECTION IV

# GENERAL CONDITIONS OF CONTRACT

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## SECTION IV – GENERAL CONDITIONS OF CONTRACT

### 1. Scope of Contract

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

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

### 2. Sectional Completion of Works

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

### 3. Possession of Site

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

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

### 4. The Contractor's Obligations

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

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

## 5. Performance Security

- 5.1. Within ten (10) calendar days from receipt of the Notice of Award from the Procuring Entity but in no case later than the signing of the contract by both parties, the successful Bidder shall furnish the performance security in any of the forms prescribed in Section 39 of the 2016 revised IRR.
- 5.2. The Contractor, by entering into the Contract with the Procuring Entity, acknowledges the right of the Procuring Entity to institute action pursuant to RA No. 3688 against any subcontractor be they an individual, firm, partnership, corporation, or association supplying the Contractor with labor, materials and/or equipment for the performance of this Contract.

## 6. Site Investigation Reports

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

## 7. Warranty

- 7.1. In case the Contractor fails to undertake the repair works under Section 62.2.2 of the 2016 revised IRR, the Procuring Entity shall forfeit its performance security, subject its property(ies) to attachment or garnishment proceedings, and perpetually disqualify it from participating in any public bidding. All payables of the GOP in his favor shall be offset to recover the costs.
- 7.2. The warranty against Structural Defects/Failures, except that occasioned-on force majeure, shall cover the period from the date of issuance of the Certificate of Final Acceptance by the Procuring Entity. Specific duration of the warranty is found in the **SCC**.

## 8. Liability of the Contractor

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

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

## 9. Termination for Other Causes

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

## 10. Dayworks

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

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

## **11. Program of Work**

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

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

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

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

## **13. Advance Payment**

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

## **14. Progress Payments**

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

## **15. Operating and Maintenance Manuals**

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

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

## SECTION V

# SPECIAL CONDITIONS OF CONTRACT

**SECTION V – SPECIAL CONDITIONS OF CONTRACT**

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

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

	<p>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.</p> <p>4. Other required conditions in addition to the standard policy terms issued by the Bonding Company:</p> <ul style="list-style-type: none"> <li>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;</li> <li>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;</li> <li>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.</li> </ul>
6	No site investigation report.
7.2	<p>In case of permanent structures, such as buildings of types 4 and 5 as classified under the National Building Code of the Philippines and other structures made of steel, iron, or concrete which comply with relevant structural codes (e.g., DPWH Standard Specifications), such as, but not limited to, steel/concrete bridges, flyovers, aircraft movement areas, ports, dams, tunnels, filtration and treatment plants, sewerage systems, power plants, transmission and communication towers, railway system, and other similar permanent structures: Fifteen (15) years.</p> <p>In case of semi-permanent structures, such as buildings of types 1, 2, and 3 as classified under the National Building Code of the Philippines, concrete/asphalt roads, concrete river control, drainage, irrigation lined canals, river landing, deep wells, rock causeway, pedestrian overpass, and other similar semi-permanent structures: Five (5) years.</p> <p>In case of other structures, such as Bailey and wooden bridges, shallow wells, spring developments, and other similar structures: Two (2) years.</p>
10	No dayworks are applicable to the contract.
11.1	The Contractor shall submit the Program of Work to the Procuring Entity's Representative within Ten (10) calendar days of delivery of the Notice of Award/Letter of Acceptance.
11.2	<p>The period between Program of Work updates is Thirty (30) calendar days.</p> <p>The amount to be withheld for late submission of an updated Program of Work is One percent (1%) of contract amount.</p>

12	<p>During contract implementation, the Procuring Entity shall conduct Constructors Performance Evaluation in accordance with Section 12, Annex E of the Revised Implementing Rules and Regulation of R.A. 9184 using the NPC Constructors Performance Evaluation System (CPES) Guidelines.</p> <p>CPES ratings shall be used for the following purposes: a) eligibility screening/post-qualification; b) awarding of contracts; c) project monitoring &amp; control; d) issuance of Certificate of Completion; and in adopting measures to further improve performance of contractors in the prosecution of government projects.</p> <p>Qualified Constructors Performance Evaluators (CPE) shall conduct project evaluation as follows:</p> <p>(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.</p> <p>(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.</p>
13	The maximum amount of advance payment is fifteen percent (15%) of the Contract Price and paid in lump sum.
14	No further instructions.
15.1	The date by which "as built" drawings and operating and maintenance manuals are required is within thirty (30) calendar days after completion of contract.
15.2	The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals by the date required is Five percent (5%) of contract amount.

## SECTION VI

# TECHNICAL SPECIFICATIONS

## SECTION VI

# TECHNICAL SPECIFICATIONS GENERAL WORKS

**SECTION VI - TECHNICAL SPECIFICATIONS****GW – GENERAL WORKS****TABLE OF CONTENTS**

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**GW – GENERAL WORKS****GW-1.0 PROJECT HIGHLIGHTS****GW-1.1 General**

This section covers the general technical requirements for furnishing all supervision, labor, materials, supplies, tools and equipment in accordance with specifications contained herein and as shown on the accompanying drawings to complete the **CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR**

The proposed **NPC Eastern Visayas Operation Center at Calbayog City, Western Samar** is a three-storey building composed of reinforced concrete frame with metal roofing system. It will serve as operation center for NPC Eastern Visayas personnel. The building is primarily a warehouse to accommodate all spare parts, tools and equipment for the power plants in Eastern Visayas, as well as office area, dormitory and cashier located at upper ground, second and third floor.

The Contractor shall accept full responsibility for its work in the performance qualifications, specifications, documentation, reports, fabrication, corrosion protection, cleaning, shop testing, preparation for shipment, field testing, warranty provisions and compliance with the applicable codes and standards and the requirements of this specification.

The Contractor shall strictly observe the general requirements of this specification in conjunction with the specific requirements specified in the relevant specifications.

**GW-1.2 Project Location**

The project is located at Barangay Bagacay, Municipality of Calbayog, Province of Samar, Island of Samar (Coordinates: 1333941.79 m Northing and 675461.06 m Easting).

**GW-1.3 Scope of Work**

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

**I. Civil / Architectural**

- a. Moving-in including furnishing, superintendence, construction, operation and maintenance of general construction facilities and moving-out thereof after completion and acceptance;
- b. Structural excavation and backfilling works for all concrete footings, wall footings and columns;
- c. Complete construction of all structural components (i.e. footings, columns, beams, walls, floors, etc.), including fabrication, installation/erection and pre-painting of metal/steel structures;

- d. Furnishing and application of all architectural finishes for walls, ceilings, roofs and floors, including installation of doors and windows;
- e. Construction/Installation of sewerage system and drainage appurtenances;
- f. Complete construction of pump house with cistern.
- g. Complete construction of Gate and Perimeter fence including;
- h. Construction/installation of flagpole;

## II. Electrical Works

- a. Supply, installation and Test of lightning protection and grounding system;
- b. Supply and installation of conduit system;
- c. Supply, installation and test of complete lighting and power system;
- d. Supply, delivery, installation, configuration and testing of network switches and structured cabling system;
- e. Supply, delivery, installation, test and commissioning of complete CCTV surveillance system;

## III. Mechanical Works

- a. Domestic Water System complete with water pumps (with pumphouse) and spare parts (1 year), controller, cistern/water storage tank fitted with accessories, valves, pipe fittings, water meter, piping works, pipe supports excavation and backfilling of embedded pipes as required including disinfection of the system and other incidentals to complete the piping system;
- b. Air-conditioning (AC), Inverter, Split-Type Wall/Floor Mounted and Window Type; and Ventilation System Wall/Ceiling Mounted Exhaust Fans complete with necessary controls, mounting accessories and other appurtenances;
- c. Fire Fighting System (Fire Detection and Alarm, Fire Hydrant System, Automatic Fire Water Sprinklers and Potable Fire Extinguisher) complete fire with piping materials; valves; fittings and appurtenances; and
- d. All other works and services including those are not specifically detailed herein but are required to fully complete the project.

### GW-1.4 Contract Period

The Contractor shall complete the works as herein specified within Two Hundred Seventy (270) calendar days. The contract period is inclusive of Fifteen (15) unworkable days considered unfavorable for the execution of the works. The total contract duration shall be reckoned from the date of contract effectivity as specified in the **Notice to Proceed**.

**GW-1.5 Contractor's Classification**

The Contractor must have a valid Philippine Contractors Accreditation Board (PCAB) license of at least **"CATEGORY B – GENERAL BUILDING"** and registration classification of at least **"MEDIUM A – BUILDING & INDUSTRIAL PLANT"** OR **"CATEGORY B – SPECIALTY"** and registration classification of at least **"MEDIUM A – FOUNDATION WORK"** OR **"MEDIUM A – STRUCTURAL STEEL WORK"**

For this purpose, contracts similar to the Project refer to contracts which have the same major categories of work, which shall be construction of at least two (2) storey concrete structure and construction of at least two (2) storey structural steel structure.

**GW-1.6 Minimum Required Personnel**

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

a) One (1) Project Engineer/Site Engineer

Registered Civil Engineer who had supervised at least a project similar in nature as to the type and cost of the proposed project within the last 10 years. Must have at least 3 years professional experience as Civil Engineer on similar project.

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, shall be submitted and included as an attachment in the Standard Form NPCSF-INFR-09 List of Key Personnel Proposed to be Assign to the Contract.

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

**GW-1.7 Minimum Required Construction Equipment**

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

- |                                              |          |
|----------------------------------------------|----------|
| a. Service Vehicle                           | - 1 unit |
| b. Concrete Vibrator                         | - 1 unit |
| c. Bagger Concrete Mixer (at least 1 bagger) | - 1 unit |
| d. Welding Machine (at least 300 Amp)        | - 1 unit |
| e. OxyAcetylene Cutting Outfit               | - 1 unit |
| f. Bar Cutter (at least 25mm $\Phi$ capable) | - 1 unit |
| g. Air Compressor                            | - 1 unit |
| h. Jack Hammer                               | - 1 unit |

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

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

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

**GW-2.2 Correspondence**

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

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

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

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

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

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



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

#### **GW-2.3.2 Personnel/Key Positions**

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

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

#### **GW-2.4 Planning and Scheduling**

##### **GW-2.4.1 General**

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

Within fifteen (15) days from the effectivity of the Contract, the Contractor shall submit for NPC approval a detailed work schedule using applicable project management tool(s) for monitoring project activity progress, such as a Critical Path Method (CPM) network or Project Evaluation and Review Technique (PERT) diagram.

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

##### **GW-2.4.2 Format and Presentation**

The Contractor shall prepare an activity network with the activities listed in early start order and showing the following:

- (a) Activity code
- (b) Activity description
- (c) Duration in days
- (d) Early start and finish dates
- (e) Late start and finish dates

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

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

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



**GW-2.4.3 Progress Monitoring Principle and System**

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

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

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

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

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

**GW-2.4.4 Meetings****A. Progress Review Meetings**

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

**B. Interface Meetings**

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

**C. Design Review Meetings**

The Contractor may request for a design review meeting during the processing stage of seeking the approval of NPC to all design drawings to review, clarify and evaluate the design submitted with reference to the tender, the final design and the Contract Specification. The Contractor shall submit a meeting agenda seven (7) days prior to the meeting.

**D. Other Meetings**

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

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



**E. Call for Meetings**

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

**F. Minutes of Meetings**

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

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

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

**GW-2.4.5 Reports****A. Monthly Reports**

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

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

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

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

**B. Project Control Close-out Reports**

The Contractor shall submit to NPC a project control close-out report within ten (10) days after the issuance of the Completion Certificate, which shall at least contain the following:

- (a) Final as-is Contract Detail Schedule;
- (b) Final as-is cost report; and



- (c) Final as-is Contract amendment (if any) and Variation Order register, if any.

## **GW-2.5 Documents to be Prepared by the Contractor**

### **GW-2.5.1 General**

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

### **GW-2.5.2 Detailed Drawings, Design and Specifications**

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

The detailed drawings and specification shall include the following:

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

### **GW-2.5.3 Design Calculation and Final Design Data**

Upon the completion of the preliminary design, the Contractor shall submit the final design data, analysis and calculations (referred to as designs) – all type written and in book bound form, clearly laid out with all the design criteria and standards indicated, for NPC's review and approval.

### **GW-2.5.4 Critical Path Network and Time Bar Diagram**

Immediately upon effectivity of the Contract, NPC and the Contractor shall re-examine the Critical Path Network and Time Bar Diagram submitted with the Bid and determine by mutual agreement the "Agreed Critical Path Network" and "Agreed Time Bar Diagram. The "Agreed Critical Path Network" shall not be revised or modified without the prior approval of NPC or except where the extension of the contract period is approved in accordance with relevant provisions of the Specifications.

**GW-2.5.5 Catalogue Cuts, Illustrations, Etc.**

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

**GW-2.5.6 Final / As-Built Drawings**

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

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

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

**GW-2.5.7 Presentation/Submission of Documents**

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

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

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



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

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

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

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

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

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

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

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

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



not be relieved on its responsibility with regards to the reliability and integrity of the project concern.

### **GW-3.0 MATERIALS AND EQUIPMENT**

#### **GW-3.1 General**

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

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

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

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

#### **GW-3.2 Codes and Standards**

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

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

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



In the event of any conflict among the above listed or other applicable codes and this Specification, Appendices and Attachments, the Contractor shall refer the conflict to NPC for written resolution. Otherwise, the responsibility shall be on the Contractor to show the suitability of any alternative standards he may wish to use without NPC approval.

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

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

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

### **GW-3.3 Test of Materials**

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

### **GW-3.4 Tropical Serviceability**

#### **GW-3.4.1 General**

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

#### **GW-3.4.2 Metals**

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

### **GW-3.5 Workmanship**

Workmanship shall be of first-class quality and in accordance with the best modern engineering practice for construction of all civil works structures and the manufacture, assembly, test and commissioning of equipment and



other components, notwithstanding any omissions from the specifications and drawings. To ensure quality workmanship, only technicians and competent workers, skilled in their respective trades, shall be employed.

#### **GW-4.0 DESIGN AND CONSTRUCTION CONDITIONS**

##### **GW-4.1 Acknowledgement to Site Conditions**

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

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

##### **GW-4.2 Site Conditions**

The conditions enumerated below generally apply to the site under consideration in this contract, unless otherwise specifically indicated in relevant section(s) in the technical specification.

Elevation above sea level	: 0 to 500 m
Ambient temperature	: 25 – 40°C
Barometric pressure	: 760 mm Hg
% Relative humidity	: up to 100%
Design for seismic loads	: Seismic zone factor 0.4
Maximum wind velocity	: 240 km/hr

The prevailing atmospheric condition at site is generally warm and humid.

##### **GW-4.3 Earthquake and Wind Design Requirements**

The structures and equipment may be subjected to both horizontal and vertical seismically induced acceleration of 0.40 g or more, depending on:

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

The structures and equipment required under this contract shall meet the seismic design requirement for earthquake conditions.

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 structures and equipment which has modes of vibration or components 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 structures and equipment under this contract shall meet the requirements for a basic wind speed of not less than 240 km/hr gust, unless otherwise specifically indicated in relevant sections of the specifications.

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

#### **GW-4.4 Sound Control**

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

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

#### **GW-5.0 DRAWINGS**

##### **GW-5.1 Drawings Contained in the Tender Document**

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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

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



All approved drawings shall form part of the Contract.

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

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

#### **GW-5.2.2 As-Built Drawings**

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

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

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

Drawings and schedules shall be preferably submitted in standard A3 size. No separate payment will be made for furnishing of "As Built" drawings. Cost thereof shall be included in the various pay items in the Bill of Quantities.

#### **GW-5.2.3 Processing of Drawings**

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

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

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



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

#### **GW-5.2.4 Documents for NPC's Records**

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

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

### **GW-6.0 INSPECTION AND TESTS**

#### **GW-6.1 General**

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

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

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

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

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

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

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

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

#### **GW-6.2 Inspection/Tests at Contractor's Premises**

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

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

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

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

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

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

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

#### **GW-6.3 Tests Failures**

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

**GW-6.4 Test Reports/Certificates**

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

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

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

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

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

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

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

**GW-7.2 Quality Assurance Program**

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

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

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

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

**GW-7.3 Quality Plan**

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

**GW-7.4 Records**

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

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

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

**GW-7.5 Reporting and Corrective Action**

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

**GW-8.0 CERTIFICATE OF COMPLETION AND ACCEPTANCE**

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

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

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



the Certificate of Final Acceptance for the completed Works. Project warranty period shall start upon issuance of final acceptance.

#### **GW-9.0      GUARANTEE**

The Contractor guarantees that structural defects/failures shall comply with the provision stipulated in GCC 7.2. The Contractor also guarantees that when the equipment and/or material are placed in operation and/or use, it will perform in the manner as set forth in the Contract.

SECTION VI

**TECHNICAL  
SPECIFICATIONS**

**ARCHITECTURAL WORKS**

# **SECTION VI**

# **TECHNICAL**

# **SPECIFICATIONS**

# **FOR**

# **ARCHITECTURAL**

# **WORKS**

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## **SECTION VI - TECHNICAL SPECIFICATIONS**

### **AW-1.0 GENERAL ARCHITECTURAL REQUIREMENTS**

#### **AW-1.1 General**

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

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

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

#### **AW-1.2 Submission of Samples**

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

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

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

#### **AW-1.3 Substitution of Materials**

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

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



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

**AW-1.4 Certification of Materials**

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

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

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

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



**AW-1.6 Measurement and Payment**

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

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

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

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

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

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

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

**AW-2.2 Materials**

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

Unless otherwise shown on the drawings, concrete hollow blocks to be used shall conform to the requirements of ASTM Specification C-129-39 Minimum Compressive Strength of not less than 4.48MPa average of the fine specimens.

**Mortar Proportions**

- a) Cement mortar for laying concrete hollow blocks shall consist of one (1) part Portland cement, one-fourth (1/4) part lime and three (3) parts sand. Only sufficient water to make a workable mix will be permitted.
  - 1) Masonry grout for filling cells of concrete blocks shall consist of one (1) Portland cement, one-fourth (1/4) part lime, three (3) parts sand to which three (3) pea gravel is added by volume.



Mortar materials shall be accurately measured by volume and thoroughly mixed until evenly distributed throughout the batch mechanical mix. The actual mixing time shall not be less than two minutes.

- 2) Intersecting hollow blocks walls and partitions shall be bonded by overlapping units on alternative course or by the use of 6.3mm (1/4") diameter ties at 610mm (24") O. C. every second course (maximum) anchored in filled cells.
- b) Concrete lintel beams shall extend 305mm (12") beyond both sides of the opening and reinforced with four 12.7mm (1/2") bars placed over and below window openings.
- 1) Concrete studs, reinforced with one 12.7mm (1/2") diameter bar, shall be placed at both sides of all window and door openings.
  - 2) All horizontal reinforcement shall be tied to vertical reinforcement.
  - 3) Reinforcement shall be as specified in Section "Structural Steel".

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

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

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

Water for mixing shall be clean and potable.

### **AW-2.3 Installation**

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

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

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



**AW-2.4 Concrete Lintel**

Unless otherwise indicated, provide concrete lintels over all openings in concrete unit masonry walls. Lintels shall be cast-in-place and reinforced with longitudinal bars at the bottom, and of sizes as indicated on the plans. Concrete works shall conform to Concrete Works of these Specifications.

**AW-2.5 Testing of CHB**

Test samples from every 500 units shall be taken at random from the CHB to be used before installation. The testing shall be performed by a laboratory approved by the NPC Representative and the cost thereof shall be charged to the account of the Contractor. Concrete hollow blocks represented by such samples, failing to meet the requirements under the latest edition ASTM 6129-70 shall be rejected.

**AW-2.6 Measurement and Payment**

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

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

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

**AW-3.0 PRE-CAST CONCRETE LOUVERS****AW-3.1 General**

The work to be done under this section include the furnishing of materials tools and equipment and performing labor required to complete the pre-cast concrete louvers as shown on the drawings or as specified.

All accessories shall be in accordance with the applicable provisions in section AW 23.0 *Finishing Hardware*.

The Contractor shall furnish and install pre-cast concrete louvers as shown in with the applicable drawings and specification and manufacturer's standards.

**AW-3.2 Samples**

Samples of pre-cast concrete louvers shall be submitted by the Contractor to the NPC for approval before fabrication commences.

**AW-3.3 Workmanship**

The Contractor shall take special care in the manufacturing and assembly process of joint work. All joint works shall be done in accordance with



accepted practices and shall be accurate and clean so as the joined elements fit perfectly together.

#### **AW-3.4 Materials**

##### **1. Pre-cast Concrete Louver**

a) Warehouse Area and Engine Room – 0.25x0.25m pre-cast concrete louver window.

b) Pre-cast concrete louvers shall be products of reputable, national known manufacturers approved by the Contracting Office.

#### **AW-3.5 Installations**

- a) Louvers shall be accurately fitted to its frame and hardware.
- b) Allowance shall be given for painter's finish.
- c) All louvers shall operate freely and with all hardware properly adjusted and functioning.
- d) Louvers shall be installed complete with finishing hardware, etc.
- e) Louvers shall be installed in strict accordance with the accepted manufacturers' standards, set plumb, properly aligned and securely anchored.

#### **AW-3.6 Measurement and Payment**

Measurement and payment for pre-cast concrete louvers will be based on the area installed and accepted by the NPC. Payment will be made at the corresponding contract unit price per area for the pertinent item under Architectural Works in the Bill of Quantities. Payment shall constitute full compensation for all labor, materials, equipment, tools and incidentals necessary for the completion of this work.

#### **AW-4.0 PLASTERED PLAIN CEMENT FINISH**

##### **AW-4.1 General**

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

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



**AW-4.2 Materials**

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

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

**AW-4.3 Application**

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

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

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

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

Installation. For hollow wood doors and frame, uniform application regardless of function completely reversible for R.H. or L.H. doors.

NOTE: All cement plaster finish shall be painted.

**AW-4.4 Measurement and Payment**

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

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



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

## **AW-5.0 VITRIFIED TILE AND NATURAL STONE**

### **AW-5.1 General**

The work to be done under this section shall consist of furnishing all labor, materials and other facilities to complete all tile and natural stone works shown on the drawings and specified herein.

### **AW-5.2 Materials**

- Floor tiles shall be vitrified unglazed and glazed ceramic tiles (toilet) using white clay.
- Wall tiles shall be vitrified glazed ceramic tiles using white clay.
- Listel tiles shall be vitrified glazed ceramic tiles.
- Marble countertops, splashboards and floor slabs shall be 20mm, Cebu variety of the best quality conforming to samples approved by the NPC Representative.
- Granite countertops, splashboards and floor slabs shall be non-porous, dark shade color, has a 98% gloss recovery on edge glazing.
- Granite floor tiles shall be non-porous granite dark color as specified in the bill of quantities.

### **AW-5.3 Samples**

Sample of various types/kinds of tiles shall be submitted to the NPC Representative.

### **AW-5.4 Shop Drawings**

Contractor shall submit shop drawings of works to be done. Details shall show sizes, section joints and other required details for the approval of the NPC Representative.

### **AW-5.5 Execution**

All surfaces to receive tiles, shall be structurally sound, plumb level and true, free from dust, grease, calcimine water and other foreign matter.

Wall and floor surfaces with minor variations (1/8" or less) shall be true and smooth with a skim coat of adhesive applied with flat of trowel. Allow to dry before spreading more adhesive for setting the tile.



**AW-5.6 Tile Preparation**

Tiles - may be set dry or pre-soaked depending on grouting methods to be used. Wall tile may be prepared by soaking in clear water for not less than 15 minutes. If pre-soaked method is used, drain excess water on tile before setting.

Grouting - After floor on tile have been in place for not less than four hours, all joints shall be grouted and cleaned. Tile which becomes dry after setting shall be soaked at the joints with a wet sponge, or sprayed with water before grouting to prevent cracking of the grouting compound, grout used with floor tile must be kept moist until properly cured.

Caulking - At completion of tile work, clean out joints between tile and other built-in fixtures and apply this bead of caulking compound tooled slightly below tile surface.

Clearing - Upon completion, clean all tile surfaces with warm water and a good washing compound and stiff brushes as recommended by tile manufacturer.

Protection - Before traffic is permitted over finished tile floor, cover floors with building paper. Lay board walkways on floor that are to be continuously used as passageway by workmen. Tile floor areas to be trucked over have suitably constructed continuous plank runways of required width installed over building paper. Remove cracked, broken or damage tile and replace with new one.

**AW-5.7 Measurement and Payment**

Measurement for payment for **Vitrified Tile and Natural Stones** will be based on what is required on the Bill of Quantities.

**AW-6.0 VINYL QUARTZ TILES****AW-6.1 General**

The work to be done under this section shall consist of furnishing all labor, materials, equipment, tools and the satisfactory performance of all work necessary to complete vinyl quartz tile work shown and indicated in the drawings or herein specified.

**AW-6.2 Materials**

Vinyl Quartz Tiles shall be 300mm x 300mm (12" x 12") and 3mm thick. Tiles shall have a smooth surface, containing no sand or grit and shall be free from the lumps and unmixed coloring pigments. Materials shall consist of only the highest grade laboratory approved uPVC resin, plasticizer and stabilizers, pigments and quartz filler, which is used to insure abrasion resistance and dimensional stability.



Tiles must be equal or better than "British Standard 3250" in terms of squareness, gauge, stability, abrasion and indentation resistance. It must be fire-resistant.

Adhesive shall be water-resistant type and recommended by the tile manufacturer to be the best suited for tropical installation and for use with the particular type of floor. Adhesive shall be applied in accordance with the adhesive manufacturer's printed instructions unless directed otherwise by the NPC Representative.

Plastic emulsion (seal polish) shall be best suited for the particular type of floor as recommended by the tile manufacturer.

Metal edge strips shall be provided at all exposed edges of vinyl quartz tiles. Metal strips shall be extruded aluminum or brass, butt type and beveled at exposed edges. Top surface metal strips shall be finished flush with the tiles. Strips shall be secured at the ends and between at about 200mm apart with screws. Where two different floor finishes meet on the same level of the surface, the vinyl tile shall be provided with a metal edge strip. Brass metal strip edge nosing shall be provided between vinyl tile floor finish and ceramic tile floor finish.

#### **AW-6.3      Sample**

Samples must be submitted to the NPC Representative for approval as to color and quality.

#### **AW-6.4      Installation**

All concrete floors must be checked for even level and finish. All cracks, holes, depression, etc. must be filled or leveled with suitable fillers. They must also be free from dirt, dust, wax, oil, grease, or foreign matter that may affect properties of adhesive.

Preparation – Concrete sub-floors to receive the tile shall be clean, thoroughly dry, smooth, firm and sound; and they shall be free from oil, dirt, curing compounds, or other deleterious materials. Sub-floors shall be swept, vacuumed and damp-mopped when necessary to remove dust and oil. It shall be scrubbed with a strong detergent solution, thoroughly rinsed, and spot primed, when necessary to remove oil or grease stains. All edges shall be ground smooth and all holes and cracks less than 1.6mm shall be filled with an approved plastic emulsion. Large holes and depressions, if any, shall be filled and treated with underlayment mortar troweled on to smooth surface and shall be completely dried before the application of adhesive.

Tile-laying Design – Floor covering shall be applied in patterns selected by the NPC Representative for each area. Joint lines shall be parallel to wall lines. Where line patterns of tiles run perpendicular to lines of other tiles, they shall be laid truly at right angles. Tiles shall be neatly cut as required to form neat edges around permanent fixtures, built-in furniture and cabinets, pipes and other items attached to the floor or wall.

Adhesive – Recommended adhesives are neoprene, rubber based contact adhesive, rugby-type adhesive. The adhesive shall be applied in a thin film



while it is still tacky and spread evenly both on floor and tile, allowing ten (10) minutes drying time prior to installation.

**Application of Tiles** – Tiles shall be laid cut from midpoint of the long axis of the area to be tiled so that opposite borders will be of equal width. Starting at established guidelines, the approved adhesive shall be spread over and under floor with a fine notched trowel covering approximately 4.0sq.m. per liter and immediately the tiles shall be embedded into the adhesive. Tiles shall be rolled in both directions with a 70kg roller to assure contact of tiles and adhesive and to bring edges of the tiles flush.

All junctions with vertical surfaces, tiles shall be carefully scribed so as to form a neat joint at this point. Tile shall never be placed or laid under pressure.

**Cleaning and Waxing** - Not earlier than five days after installation, floors shall be washed with an approved cleaning solution and rinsed thoroughly with clean cold water. Vinyl tiles shall be waxed with two coats of water emulsion wax, buffed to an even luster with an approved emulsion.

#### **AW-6.5 Measurement and Payment**

Measurement and payment for **Vinyl Quartz Tiles** will be based on the area installed and accepted by the NPC Representative.

#### **AW-7.0 PEBBLE WASHOUT FLOOR FINISH**

##### **AW-7.1 General**

The work to be done under this section shall consist of furnishing all labor, materials, equipment, plant and other facilities and the satisfactory performance of all work necessary to complete all pebble washouts shown on the drawings and specified herein.

##### **AW-7.2 Materials**

- a) Portland Cement and Sand shall be used for scratch coat.
- b) Pebble size and color shall be determined by the NPC Representative.
- c) White Cement. - as approved by the NPC Representative.

##### **AW-7.3 Samples**

Samples of washouts in tile form shall be submitted to the NPC Representative. No washout work shall be done until after samples are approved by the NPC Representative in writing. All work must strictly conform to approved samples as to texture, color and finish.



**AW-7.4 Application**

Before commencement of the work, desired pitch for drainage should be provided in the concrete slab. Concrete must be rough and all loose particle or anything which would prevent bond should be thoroughly cleaned off with water. The concrete surfaces must be kept wet for at least four (4) hours before scratch coat is applied. The required scratch coat of cement mortar in the proportion of one (1) part Portland cement of two (2) sand, by volume, shall not be more than 19mm (3/4") in thickness.

Washout finish shall be applied with pressure to obtain solid adhesion to the concrete which shall not be more than 10mm (3/8") thick, composed of one (1) part Portland or white cement, and three (3) parts pebbles, troweled to a hard, smooth even plain, rodded, and floated to a uniform surface with clean water evenly with a spray machine to wash out all cement on the surface so that the pebble quarts shall be partly exposed, and by means of soft brush and water to remove and wash down the remaining cement paste, leaving the pebble in their natural textures and appearances.

**AW-7.5 Cleaning**

After all trades have completed their work, wash the surface with clean water and brush thoroughly to produce a clean and sparkling appearance.

**AW-7.6 Measurement and Payment**

Measurement for payment for **Pebble Washout Finish** will be based on the area in place and accepted by the NPC Representative.

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

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

**AW-8.0 ACOUSTIC CEILING BOARD****AW-8.1 General**

Acoustic units shall be provided in rooms and spaces where indicated or specified. On areas where suspended ceiling is to be provided, all piping, ducts, electrical and other works that is to be concealed by the ceiling shall be completed, tested, inspected and the proper height and level established, before acoustical work is started. The units shall be applied in any room or space before completion of all wet works and building humidity is reduced to minimum. Ceiling shall be symmetrically installed as indicated.

Acoustical units shall be delivered to the site in the manufacturer's original unopened containers with the brand name, type, sound reduction and wire absorption grades clearly marked thereon.



**AW-8.2 Materials**

Acoustic ceiling board shall be 16mm x 600mm x 600mm, non-metallic mineral fiber, fissured finish, on anodized aluminum T-runners.

**AW-8.3 Installation**

Acoustical board shall be installed true to line and in even plane according to ceiling pattern shown on the drawings.

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

**AW-8.4 Measurement and Payment**

Measurement for payment for **Acoustic Ceiling Board** will be based on what is required on the Bill of Quantities.

**AW-9.0 FIBER CEMENT CEILING BOARD****AW-9.1 General**

Consist of furnishing of all, materials and other facilities for the satisfactory of all work necessary to complete the fiber cement ceiling board.

**AW-9.2 Materials**

Thickness of Fiber cement ceiling board shall be as indicated on the drawings, rotary cut. Sheets shall be riveted to the metal framing/joist at 150mm (6") on center.

**AW-9.3 Sample**

Samples must be submitted to the Contracting Officer for approval as to quality.

**AW-9.4 Metal Framing**

Metal furring shall be 0.5mm thick, 19mm x 25mm x 5mm spaced at 400mm O.C.B.W. with 0.5mm thick wall angle and 0.6mm thick carrying channel, including hardware's and accessories or as indicated on the drawings.

**AW-9.5 Miscellaneous**

Fasteners shall be rust resistance, common riveters of local manufacturer. Glue shall be resorcinol formaldehyde synthetic resin.

Putty shall be of the color to match wood finish where exposed and shall be subject to approval of the Contracting Officer.



**AW-9.6 Installation**

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

**AW-9.7 Protection**

The Contractor shall be held accountable from the damaged materials caused by negligence mishandling.

**AW-9.8 Measurement and Payment**

Measurement for payment for **Fiber Cement Ceiling Board** will be based on the area installed and accepted by the NPC Representative.

Payment will be made at the corresponding contract until price per square meter for the pertinent item under Architectural Works in the Bid Schedule.

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

**AW-10.0 SPANFLEX RIB CEILING OR APPROVED EQUAL****AW-10.1 General**

Spanflex Rib Ceiling or approved equal shall be provided in rooms and spaces where indicated or specified. On areas where suspended ceiling is to be provided, all piping, ducts, electrical and other works that is to be concealed by the ceiling shall be completed, tested, inspected and the proper height and level established, before acoustical work is started. The units shall be applied in any room or space before completion of all wet works and building humidity is reduced to minimum. Ceiling shall be symmetrically installed.

Spanflex Rib Ceiling or approved equal shall be delivered to the site in the manufacturer's original unopened containers.

**AW-10.2 Materials**

Spanflex Rib Ceiling or approved equal (0.6mm thick).

**AW-10.3 Installation**

Installation of Spanflex Rib Ceiling or approved equal shall be done by the manufacturer or his authorized installer in strict accordance with the specification of the manufacturer.

**AW-10.4 Measurement and Payment**

Measurement for payment for Spanflex Rib Ceiling or approved equal will be based on what is required on the Bill of Quantities.



**AW-11.0 SUSPENSION SYSTEM****AW-11.1 General**

The Contractor shall furnish all materials, labor and equipment necessary to install complete suspension system for plaster ceiling, acoustic board, perimeter for light diffuser and necessary anchorage.

The Contractor shall submit to the NPC Representative for approval, samples and shop drawings illustrating fully the construction and methods of installation. Work shall be performed only upon written approval of the samples and drawings by the NPC Representative.

**AW-11.2 Materials**

Components shall be manufactured from prime quality hot-dipped galvanized steel according to BS 2989 and JIS G3302 Standards with Z18 zero spangle zinc coating (180/m<sup>2</sup>). The exposed flange is capped with pre-coated metal strip with polyester coating of 20-25 microns dry film thickness.

Main (1-1/4" x 1") and intermediate (1") runners for all suspension system, unless otherwise required, shall be galvanized steel Snap-On T-runners, satin silver color. The runner shall be installed 600mm on centers supported at every 1200mm by wire or steel strap hangers. The grid shall be leveled to within 1/500.

**AW-11.3 Workmanship**

The installation and workmanship shall be in full accordance with manufacturer's specifications and shall be made by workmen experienced in this kind of work. Acoustical tiles shall be clipped to the ceiling suspension system with galvanized spring clips. Tile shall fit closely to adjoining walled beams, columns, pilasters and cut neatly around all openings in the ceiling.

**AW-11.4 Measurement and Payment**

Measurement for payment for **Suspension System** will be based on what is required on the Bill of Quantities.

**AW-12.0 ROOFING AND SIDING SHEETS****AW-12.1 General**

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

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

Shop drawings and manufacturer's catalogue showing product standards and



technical data will be provided by the Contractor to the NPC Representative for approval.

**AW-12.2 Materials**

Material for roofing shall be UPR-250 pre-insulated composite roofing panel (25mm thick) or approved equal. Effective width is 1m and with base metal of 0.60mm thick for Top Metal Skin and 0.40mm thick for Bottom Metal Skin. Bended sheets such as flat barge caps, flashings, ridge rolls, capping, moldings and gutter must be 0.6mm thick.

**AW-12.3 Workmanship**

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

**AW-12.4 Measurement and Payment**

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

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

**AW-13.0 DOWNSPOUTS AND ROOF DRAINS**

**AW-13.1 Scope of Works**

a) Downspouts

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

b) Roof Drain

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

**AW-13.2 Measurement and Payment**

a) Downspouts

Measurement for payment will be based on the length installed and accepted.



**b) Roof Drains**

Measurement for payment for Roof Drain will be based on the number of set installed and accepted.

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

**AW-14.0 MOISTURE VAPOR BARRIER****AW-14.1 General**

The work to be done under this section includes the furnishing of all labor, materials, equipment, and other facilities required to complete all moisture vapor barrier work as shown in the drawings and as specified.

All concrete floor slabs in direct contact with the ground shall be provided with moisture vapor barrier to stop movement of moisture from the ground through capillary action or osmotic pressure.

**AW-14.2 Materials**

- a) Vapor Barrier – Vapor barrier shall be polyethylene sheeting with thickness as recommended by the manufacturers and as approved by the NPC Representative.
- b) Adhesive and/or Tape – Adhesive or tape shall be as recommended by the manufacturers as approved by the NPC Representative.

**AW-14.3 Physical Properties**

- a) Tensile strength (lb/2" width) is 260.
- b) Moisture and vapor transmission (ASTM F. 96, Procedure E) Ungreased gm/sq.m/225 hours is 25. Perms shall be 0.125.
- c) Greased (ASTM D1027) 6M/sq. meter/24hours is 8. Perms shall be 0.27.

**AW-14.4 Application**

Prior to placing the concrete, the hard core fill should be compacted to a smooth even surface, eliminating all sharp projections or irregularities which may puncture the moisture and vapor barrier. It is preferable in most cases to bring the fill to grade with a stiff mix of one part Portland cement and three parts sand so placed as to provide a smooth even surface for installing the membrane, or to blind the hard core with a layer of consolidated sand. The net thickness of consolidated sand above the gravel fill shall not be less than 6.3mm. Cover the entire area with a layer of moisture and vapor barrier extending past the perimeter of the slab and turning up against walls for the depth of the concrete. The moisture and vapor barrier shall be



lapped and the exposed edges of polyethylene shall be sealed by either of the sealing set out below. Where pipes and conduits must pass through the barrier, the material should be carefully cross slit so that it fits tightly around the pipe, and then taped to the pipe with pressure sensitive tape.

### Sealing

- a) **Tape Sealing** - To obtain an effective seal, moisture and vapor barrier should be lapped 25mm (1") at all joints and sealed with 50 mm (2") pressure sensitive tape. A 50mm (2") width of polyethylene film is left exposed on both edges for joining and it is important to ensure that both surfaces are free from moisture and dust, and that the tape is in contact with the polyethylene film on both sheets. If necessary, a firm base such as board can be placed under the joint and the tape applied with firm pressure by hand or by mechanical applicator.
- b) **Adhesive Sealing** - Where adhesive sealing to be used, each alternate sheet must be inverted so that the exposed polyethylene strips of the alternate sheets of the barrier face downwards, ensuring that both surfaces are free from moisture and dust. The sheets shall be lapped 50mm (2") to ensure good adhesion and both surfaces shall then be coated with adhesive and the joint made in accordance with the manufacturer's instructions.
- c) **End Joint Sealing** - End joint sealing should be effected by cutting the ends square, forming a continuous single interlocking fold and sealing on both sides with adhesives.

### **AW-14.5 Vapor Barriers Under Concrete Slab on the Ground Level**

After consolidating the sand bed under concrete floors and edge beams and before placing the reinforcement, the whole of the sand bed shall be covered with a layer of vapor barrier laid in the longest lengths and widest available widths, lapped 25mm at all joints and intersections and sealed with the pressure sensitive tape. A 50mm width of polyethylene film shall be exposed on both edges of the moisture vapor barrier where sealed joints are to be made and the contractor shall ensure that the tape is in contact with a film on both sheets, all in accordance with the manufacturer's instructions. Alternatively, adhesive sealing may be used in which case each alternate sheet shall be inverted, so that the exposed strips of the sheets are in contact. The sheets shall be lapped 50mm and both polyethylene surfaces coated with the contact adhesive and firmly pressed together to form a moisture proof sealed joint. The moisture vapor barrier shall be carried down into trenches, turned up at the side edge and after concrete has set, turned across on top of concrete slab under cavity flashing.

### **AW-14.6 Measurement and Payment**

Measurement and payment for **Vapor Barrier** shall be based on the area of material installed and accepted by the NPC Representative.



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

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

## **AW-15.0 GLASS AND GLAZING**

### **AW-15.1 General**

The work includes the furnishing of all labor and materials required to complete all glass and glazing as shown on the drawings and/or herein specified. Mirrors shall be provided and installed where indicated in plans.

The Contractor is responsible for the correct sizes and grades of glass to be used. Improperly set glass or glasses which does not meet the requirements of its grade and size will not be accepted. Such glass must be replaced to the satisfaction of the NPC Representative.

The size of glass indicated is approximate only and the actual size shall be determined by measuring the frame to receive the glass. Glazing rabbets shall be rigid true, plumb, square, properly primed, clean, dry and dust free, before glazing work is started.

Each piece of glass shall have the manufacturer's label showing the type, thickness and quality of the glass. Putty and glazing compound shall be delivered to the site in unopened containers, plainly labeled with the manufacturer's name and brand.

### **AW-15.2 Materials**

- a) Glass of all windows, doors, transoms shall be of the best quality of its respective kind and free from internal or surface defects. Thickness of glass shall be as mentioned in the plans. For other qualities and thickness refer to recognized standards.
- b) Mirror. Where required on the drawings for various purposes, public spaces, etc., glass to be selected shall be 6.3mm (1/4") thick, polished plate glass with right of rejection. Silver to be deposited evenly on selected quality polished plate and protected with electro-copper backing, shellac, varnish and paint in an approved standard method.

Each mirror shall bear manufacturer's label guaranteeing quality and compliance with specifications guaranteed for ten (10) years to be free from any defects that impair full and complete reflection or that present on unsightly appearance. Upon receipt of notice from NPC Representative, Contractors shall repair and/or replace without cost to the NPC all defective material and workmanship.

All labor and other incidental materials such as glazing compound, shims, glazing clips, securement devices, felt, etc., not specifically referenced above but required to provide a complete satisfactory and



approved installation. Prior to setting of any mirror on masonry or plastered wall surfaces, all such surfaces shall be damp-proofed. Mirror with frames (in toilet rooms) with kinds, quality and finish as specified complete with “theft proof” frames shall be furnished and installed in all toilet rooms as indicated in the drawings. Mirror shall be 6.3mm (1/4”) thick with aluminum or stainless steel frame on a 6.3mm (1/4”) thick plywood backing. Space behind walls shall be insulated and damp-proofed. Check “flatness of wall plan” prior to setting. Perimeter for frame shall be set closely against wall surface in all cases. Renew plastering or surface back mirrors and report any irregularities to NPC Representative that will prevent mirror frames fitting closely to wall surface.

Note: Guarantee is required for all mirrors.

#### **AW-15.3 Installation**

- a) The glass shall be prevented from all contact with metal or any hard or sharp metals by using resilient shims placed at quarter points.
- b) Resilient sealant shall be used.
- c) Use stops in size permitting a “good grip” on the glass.
- d) Glass shall be installed only in openings that are rigid, plumb and square.
- e) Allow sufficient clearance at edges of glass to compensate for some settlement of the building. Clearance shall be 6.3mm (1/4”) from edge to frame and 3.2mm (1/8”) for face.
- f) Marking, banners, posters and other decor shall not be applied directly to glass surface as these could cause thermal stress.
- g) Removal of putty or glazing compound smears from glass shall be performed by the glazing Contractor during the metal work life. Failure to do so may result in damage to the glass.

#### **AW-15.4 Measurement and Payment**

No measurement for payment for **Glass and Glazing** of doors and windows, the relevant cost being included in the contract unit price for the pertinent items for Doors and Windows under Architectural Works in the Bill of Quantities.



**AW-16.0 GLAZING SEALANT****AW-16.1 General**

The work to be done shall consist of furnishing all labor, materials and other facilities for the satisfactory performance of all work necessary to complete all glazing sealant work as shown on the drawings and specified herein.

**AW-16.2 Materials**

- a) Silicone Rubber should comply with Federal Specifications for silicone building sealant and Federal Specifications for one (1) component building sealant. Packaging shall be supplied at least in fl. oz. (325 ml) cartridges and two (2) gallons (7.5 liters), bulk pails, net weight. The joint width shall not be less than 3.2mm. (1/8"). The joint depths shall allow a sealant depth of 3.2mm (1/8") to a maximum of 12.7mm. (1/2"). The silicone sealant bead depth shall be less than the joint width which is about 2.1mm.
- b) Masking Tape. Areas adjacent to joint shall be masked to a sure line. Do not allow masking tape to attach clean surface to which the silicone sealant is to be adhere. Tooling shall be completed in one (1) continuous stroke immediately after sealant application and before a skin forms. Masking shall be removed immediately after tooling.

**AW-16.3 Method of Application**

Sealant shall be applied in a continuous operation. A positive pressure adequate to properly fill and seal the joints width shall be employed. Tool or strike the building sealant with light pressure to spread the material against the back-up material and the joint surfaces such as aluminum (sealant shall be applied above 40 °F). A tool with a concave profile is recommended to keep the building sealant with the joint. The sealant can be applied at outdoor temperature as low as 35 °F provided that surface is clean and dry. Excess sealant shall be cleaned from non-porous surfaces, before curing, before using a commercial solvent. On porous surfaces, excess sealant shall be allowed to cure and then be removed by abrasion or other mechanical means. The sealant shall not be disturbed for at least 48 hours.

**AW-16.4 Guarantee**

The Contractor shall guarantee the caulking work to be free from defects of materials and workmanship for a period of ten (10 years).

**AW-16.5 Measurement and Payment**

No measurement for payment will be made for **Glazing Sealant**, the cost of which shall be included in the contract unit price for the pertinent items where Glazing Sealant is required under Architectural Works in the Bill of Quantities.



**AW-17.0 WEATHERSTRIPPING****AW-17.1 General**

The work to be done shall consist of furnishing materials tools and equipment and perform labor required to complete all types of weather-stripping for all exterior doors and doors noted on the drawings to be light-proof, soundproof or dust-proof, install weather stripping in accordance with manufacturer's instructions. Fit tightly at corners to maintain continuity around periphery of doors.

**AW-17.2 Samples**

Sample of strips of weather-stripping elements shall be submitted.

**AW-17.3 Materials**

- a) Extruded products shall be of aluminium alloy 6063 T5.
- b) Extruded architectural bronze.
- c) Flexible metal products shall be of (zinc, aluminium/bronze/ stainless steel).
- d) Inserts shall be of vinyl and/or felt.

**AW-17.4 Fasteners**

All extruded weather-stripping and saddles shall be furnished complete with screws, color-matched to the items.

- a) For fastening to wood, screws shall be of aluminium or bronze.
- b) For fastening to metal, screws shall be of self- tapping plated steel.
- c) For exterior applications to metal, stainless steel self-tapping screws, plated to match the items are recommended.

**AW-17.5 Installation**

Included products shall be installed level, square and in proper alignment and relationship to work of other trades. Attachments shall be by means of appropriate nails, screws, bolts, and/or anchors of corresponding materials.



**AW-17.6 Measurement and Payment**

No measurement for payment will be made for **Weather-stripping**, the cost of which shall be included in the contract unit price for the pertinent items for Doors and Windows where weather-stripping is required under Architectural Works in the Bill of Quantities.

**AW-18.0 JOINERY AND CARPENTRY WORKS****AW-18.1 General**

These regulations shall apply to all parts of work in which joinery (carpentry for permanent features, i.e. excluding formwork or shuttering, wood scaffolding, etc.) will be used.

All services shall comprise labor, equipment and the supply of the appurtenant materials and structural components including off-loading and storage at the site unless otherwise specified.

All materials and structural components to be supplied, erected or installed by the Contractor, and therefore, ultimately incorporated in the structure shall be new and unused unless otherwise specified. They shall be suitable for their intended purpose and appropriately matched to each other.

All materials and structural components covered by standards shall meet the quality and dimensional requirements thereof.

Early enough before the beginning of fabrication, the dimension of non-standardized structural components shall be checked by Contractor on the structure unless it is established, for instance, in the Specifications or by mutual agreement, that such checking can be dispensed with or will be replaced by the statement of specific dimensions, e.g., in drawings explicitly mentioned.

In particular, the Contractor shall verify that such conditions as the following do not exist:

- undue humidity of the structure
- Inadequate painting of the structural components intended to be installed.
- Lack of possibilities for fixing the structural components and sealing them against the respective part of the structure.

Other works which even if not specifically mentioned in the Bill of Quantities or Schedule of Price shall be included in the Contractual Works.

- Protecting the executed Works and the items handed over execution of same from damage and theft up to the time of acceptance.
- Providing small tackle and tools.



- Supplying consumable stores
- Transporting all materials and structural components, from the storing places at the Site to the points of destinations, and return transport if necessary.
- Removal of all contamination (refuse, building, rubbish and the like) arising from or in connection with the Contractor's work.
- Installing and dismantling as well as providing all false work and scaffolds.
- Making holes in masonry and light weight concrete.
- Supplying and fitting dowels.
- Chemical preservation of timber.

Prior to the start of his operations under this item, the Contractor shall verify that all conditions are suitable for the timely and effective carrying out of his work. Where unsuitable conditions are found, they shall be reported in writing to the NPC Representative and under the NPC Representative's direction immediately corrected.

#### **AW-18.2      Quality of Lumber**

Lumber indicated and required for various parts of the work shall be of the best grade available. It must be straight, sound, bright, of nature growth, well - seasoned and conditioned to suit the particular purpose for which it is to be used. The material shall be cleanly sawn, square edged, and free from injurious shakes, splits, warps, waness and knots, soft spots and rot, incipient, decay and all other defects or imperfections impairing its strength, durability or appearance. All structural components shall be made so that when properly treated and used they will not warp or crack under any circumstances including stresses due to temperature humidity that will have to be expected. Their general conditions on lumber when not mentioned in the succeeding particulars are carried and shall apply.

#### **AW-18.3      Fastening**

Joints for cabinet work shall be glued aside from nails or other fastening device required. The type and strength of gluing shall suit the site of installation and intended application (of glues) must not cause any discoloration or other damage. Sealing compounds shall be resistant to atmospheric influences, shall not harden, and shall not be aggressive.

All nails on surfaces exposed to view shall have flush heads. They shall be countersunk. The use of nails with notched heads and screw nails in lieu of wood screws shall not be allowed.



All door frames shall be rabbeted and molded. Frames which are in contact with concrete shall be anchored by means of 102 mm (4") common wire nails spaced not more than 204 mm (8") apart the contact surfaces.

Anchors, connectors, fastenings, and any rough hardware necessary for the completion of the work but is not shown or indicated on the drawings and/or specified shall be provided. Such rough hardware shall be of the size and type to suit the conditions encountered. Bolts, nuts, washers, hangers, straps and other rough hardware is embedded in or in contact with exterior wall of concrete masonry or slab or exposed to weather shall be zinc coated unless otherwise specified. Bolts head and nut bearing on wood shall be provided with standard steel washers.

#### **AW-18.4 Wood Preservatives**

All lumbers ultimately in contact with the outside air or permanently with particular humid air or connecting to masonry or concrete e.g. windows and doors, including lining and casing, shall before being inserted be treated on all sides with a suitable wood preservative, in the case of lumber sensitive to blue stain, also with a blue stain preventive agent, unless adequately protected in manufacture already, e.g. wood work items.

The Contractor shall in the choice and use of the wood preservative exercise the care required in the handling of poisonous substances. The wood preservative shall also be compatible with the paint and in interior applications the wood preservative shall be colorless.

If the NPC Representative has not specified the wood preservative to be used, the Contractor may make his own choice of a suitable preservative, subject to the NPC Representative's approval. Before leaving the workshop, the lumber components shall receive a coat of paint.

Lumber surfaces in contact with masonry shall be given two (2) brush coats of bituminous paint before installation.

#### **AW-18.5 Materials**

Materials for carpentry works shall conform to the following specifications and shall be used whenever indicated in the plans or noted in the Bill of Quantities:

- a) Kinds of Lumber
  - 1) S4S Yacal, Molave Guijo or approved equal
    - i) Door and window jambs, sills and mullions
    - ii) Any lumber in contact with concrete or masonry, such lumber mentioned above shall be treated with wood preservative treating solution.
  - 2) Apitong or approved equal



- i) Ceiling frames and hangers
- ii) Wooden frames and shelves, cabinets and closet
- 3) Tanguile, Red Lauan or approved equal
  - i) Cabinet and closet framing, kiln-dried with moisture content not more than 10% when tested
  - ii) All mouldings, base boards and wood slats.
  - iii) Vertical and horizontal studs for interior partitions
  - iv) All T & G board, fascia boards, louvers shall be kiln-dried with moisture content not more than 10% when tested.
  - v) Door and window sash frames
- 4) Kiln-dried Narra
  - i) Mouldings and lattice works and base boards.
  - ii) Wood handrails, door panels and frames with moisture content not more than 10% when treated.
  - iii) All structural lumber to be used for truss members, purlins, cleats, wood plates, girder and rafters shall be as indicated in the Civil Design drawings.

**AW-18.6 Shop Drawings**

Shop drawings with essential dimensions and details for construction may be required by the NPC Representative in connection with carpentry and joinery work which will be submitted for approval before proceeding with the work.

**AW-18.7 Measurement and Payment**

Refer to Bill of Quantities for the pertinent items where required.

**AW-19.0 MILLWORK AND CABINET WORK****AW-19.1 General**

The work to be done under this section shall consist of furnishing all labor and materials, and performing all operations temporary and permanent woodworks, finished treatment and building-in of all cabinet type items, complete in every respect, and incidental associated woodwork appurtenances, the application of all finish hardware in connection with finished woodwork in strict accordance with requirements of drawing and is specified herein subject to the terms and conditions of the Contract Documents.



All woodwork required to be furnished and installed in connection with finish treatment of exposed interior surfaces or spaces, that is cut, fitted, built-in and finished structure is hereby subject to the terms and conditions of the Contract Documents.

All finished millwork that is constructed, assembled and provided with surface finish treatments in a shop outside building structure is hereby classified as "Cabinet Work". Reference to "surface finish treatment" including the filling, staining, shellacking or waxing of all cabinet type woodwork unless noted to contrary.

**AW-19.2 Work not Included**

Woodwork and equipment items specifically indicated on drawing as being furnished by the Contractor.

**AW-19.3 Materials and Workmanship**

- a) Lumber and Wood (Rough Carpentry Work) shall, unless approved otherwise, be new lumber, well-seasoned, air-dried, first quality or other specie conforming to requirements thereof of equivalent kind and quality. Wood for blocking, grounds nailing strips, and/or other woodwork incident to carpentry and joinery and/or for use of other trades unless specified otherwise, shall be second quality Apitong or approved equal perfectly sound and free from loose knots, cluster knots to surface knots that would interfere with or preclude the sound attachment thereof and/or securement to other work.
- b) Wood for shelves and shelving in coat closets, supply closets, etc., shall be of K.D. Tanguile suitable for painting and varnishing, as approved by the NPC Representative.
- c) Mill and Cabinet Work  
Specie of wood shall be K.D. Tanguile for all items of finished wood and cabinet work required to have a natural wood finish, unless otherwise specified.

Quality and Workmanship. All wood for interior finished mill and cabinet work shall be thoroughly air-cured, kiln-dried stock, satisfactory to NPC Representative. All materials specified herein shall be product of one mill in so far as practicable. Contractor shall submit for approval the name of subcontractor for mill and cabinet work called for on scale drawings. Only first-class cabinet type workmanship will be admissible an execution of this work, performed by artisans skilled in this trade so as to provide cabinet work of the highest trade, finish and installation as specified and required.

Care shall be exercised by careful screening to avoid strong contrast in color and graining of finished woods for all wood surfaces or trim, paneling, wall facing, etc., so that any one room or wall surface will present a reasonably uniform appearance. All cutting, framing and



fitting shall be done as required for accommodation of work of other trades. Use of wood chips, shims or other shrinkable materials for leveling of plumbing will not be permitted in any form. Mortise and tendon joints set in an approved type of water and moisture proof glue with wedges and/or pinned. Shop mitres, 102mm (4") or more to be glued and doweled and/or locked with a metal ring. Mitres less than 102mm (4") shall have concealed spline.

No woodwork shall be installed until such time as plastering is entirely dry.

In so far as practicable, all millwork, panelling etc. assembled in shop shall be back-painted and finished throughout before delivery to building.

Running trim (chair rail), etc. of wood shall have minimum number of splices and in each instance bevelled and jointed over a solid bearing ground.

In addition to machine sanding, all interior trim, panelling and woodwork shall be smoothed by hand using "00" sandpaper to give all woodwork the required smooth surface for exposed finished treatment and free from machine and tool marks, abrasion, raised grain and other undesirable defects. All woodwork shall be fitted to plaster or other finished work in careful manner so as not to injure these surfaces in any way. Where plaster or other work is damaged or disturbed, it shall be restored to its original state and/or make good without cost to the NPC at the Contractor's expense.

- d) Laminated Plastic Plywood or Particle Board. All horizontal surfaces where laminated plastic covered wood are indicated on drawings shall be cigarette-proof grade. Seconds of the laminate shall be used as a "backing veneer" where concealed.
- e) Centring Blocking, Grounds and Furring. Furnished and installed for all above items of woodwork as specified.
- f) Wood Finish Materials. In general, conform to minimum standard requirements for kind, quality, functions and characteristics of local standards specifications as approved for use and specified herein.
  - 1) Stains, if required, shall be those approved by NPC Representative for various types of finishes.
  - 2) Linseed Oil shall be pure, thoroughly settled and either raw or boiled as required.
  - 3) White Lead shall be white carbonate of lead ground in pure linseed oil.
  - 4) Beeswax shall be pure, unadulterated and of the highest quality product of approved manufacturers.



**AW-19.4 General Construction, Workmanship, etc.**

General. Provide all rough carpentry required and/or necessary for any construction works, ladders, staging, scaffolds, and the like. Provide the temporary protection for all masonry and other related items during period of construction, including temporary centres, stairs treads, etc.

Grounds, blocking, cants, nailing strips and other rough woodwork shall be provided for sheet metal work, fabric flashing, and interior woodworks required by drawings.

- a) Cutting, Patching and Fitting. Perform all cutting and fitting or work of other trades as required to secure work herein specified including that for any plumbing, heating and electrical work and do all required patching after other trades.
- b) Grounds and Blocking. All wood grounds, blocking, centres nailing strips, cants, all wood grids for framing, etc., provided as required to secure carpentry, millwork, acoustical and insulation work and of sizes required.

Grounds shall be sized and dressed to proper dimensions. Ground against masonry units shall be secured in place with expansion bolts. Grounds that are not satisfactory shall be taken down and approved grounds reset at Contractor's expense. Grounds shall be provided behind all wood trim in every instance.

- c) Rough Hardware. All nails, bolts, screws and any other rough builder's hardware or securement devices required to securely fasten all work in place shall be furnished and installed for any work herein.
- d) Miscellaneous Millwork

The foregoing items are only intended to represent the principal items under this section. The Contractor shall include and furnish all items of Carpentry and Millwork. These are generally indicated on the drawings and shop drawings of all items and shall be prepared and submitted for the NPC Representative's approval as previously specified.

- 1) Shelving. Generally, 19mm (3/4") plywood with solid stock tongued front edges, all edges, and supported on cleats, of some material secured to walls with expansion bolts in lead sleeves. Where hook strips are required, they shall be of similar materials and as detailed on drawings, with double pronged hooks secured in place by the Contractor.
- 2) Countertops. Except where metal countertops are required, 19mm (3/4") laminated plywood with 3.32mm (1/8") standard grade linoleum of approved color, cemented down with approved type of linoleum adhesive. Where metal edging is



required, furnished smooth roll edge white metal alloy edging strips secured with oval header non-ferrous screws.

- 3) Drawers. Shall have metal slides with roller bearings, particle board or plywood bottoms, solid hard wood boxing, dove-tailed and glued. Drawer fronts of solid stock, of selected birch and/or as detailed otherwise on drawings and dove-tailed to slides and bottoms.
- 4) Cases and cabinet doors. Unless scheduled otherwise, or detailed on drawings, hinged doors for cases and cabinets required under work of this section included and provided with suitable and/or appropriate hardware supplied by the Contractor. Sliding door hardware shall be furnished and installed by the Contractor.
- 5) Miscellaneous interior cabinet work (cases, counters, equipment fixtures, and the like. The work included herein comprises all items of interior wood cabinet works indicated or required by drawings, including all miscellaneous metal supports, located throughout all public spaces where interior woodwork shall be supplied and built. These shall include all the equipment accessories, supports, draw slides, glass and glazing, shelves, counters, drawers, etc. complete in every respect, provided with beeswax finish and ready to operate.

General construction and quality of workmanship and materials is as specified herein. Office racks, interior cases and/or fixtures, supplied by NPC to be fitted into or between "built-in" case works shall be delivered to Cabinet Carpenter Contractor for in NPC and assembled with his work. In all instances, over-all length of such cabinets, cases, fixtures, shall be verified so as to fit in an approved manner when installed and/or assembled without disfigurement or cutting at job site.

Contractor shall thoroughly examine drawings and Schedules of Work and Finishes and shall be responsible for furnishing, installing and the surface treatment/finishing of all wood items.

#### **AW-19.5 Wood Finish Treatment**

The wood finish treatment for all exposed wood surfaces shall conform to the following, except where or when approved otherwise by NPC Representative. Finish treatment in general applies to the finishing of Narra or Tanguile plywood panels. The intent of the surface finish requirements specified hereinafter are to simulate the best grade quality of workmanship and materials in local use, applied by skilled and experienced wood finishers and painters.



All exposed interior woodwork throughout building structure except laminated plastic covered plywood and woodwork specified to be painted shall be carefully prepared to receive the following finish treatments.

**Preparation of wood surfaces**

Prior to application of any finish treatment, all wood surfaces shall be thoroughly cleaned of all foreign matter, dirt, oil, grease, cement plaster stains, finger marks, and the like. Should badly disfigured or damaged surfaces be encountered that are unsuitable to receive finish treatment, attention shall be called to NPC Representative before proceeding and await his conclusion.

All exposed surfaces of any woodwork, either mill or cabinet shall be entirely smooth and unblemished when erected.

Smooth thoroughly using a fine grade of waterproof sandpaper. Sand a second time with sandpaper moistened with best quality refined linseed oil.

Where crevices, deep open wood pores and any other defective surfaces are present, that are "re-faceable", they shall be filled with "stopping wax", prepared as follows:

- i) In an iron pot, put one cupful of common shellac, one teaspoonful of powder resin, one piece of base wax the size of half and average size walnut and a teaspoonful of powdered lemon chrome or other coloring matter to match color of wood.
- ii) Heat and stir thoroughly until prepared compound is fully melted and mixed so as to be uniform in texture. Turn portions of melted compound out between two flat boards and roll to form cylindrical sticks while still plastic.
- iii) As previously specified, thoroughly and tightly fill all holes, crevices, open pores in wood and minor defective areas in wood surface by first melting sticks on a hot iron or small benzene lamp, as if it were solder.
- iv) Defective surfaces, where certain type of natural defects occur in wood that do not provide good seats to receive "stopping wax" shall be enlarged and slightly under-cut around edges so as to assure the forming of a solid key when crevice is filled.
- v) To finish surface after stopping, strike off protruding stopping and smooth with glass paper, so as to leave all surface clean, perfectly smooth and ready for final finish treatment.



**AW-19.6 Finish Hardware and Show Case Lighting**

These items as they relate to all cabinet work, furnished and installed complete by this Contractor. Finish hardware for cabinet work and show case lighting fixtures shall be of the highest quality product as selected by NPC Representative. Contractor shall examine same, determining before application that items will perform the function and purpose for which they are intended and apply them in an acceptable manner.

When cabinet work shop drawings are submitted for approval by the Contractor, a detailed cabinet hardware schedule will be prepared by the NPC Representative.

**AW-19.7 Prime Painting and/or Finishing**

Contractor shall have option of finishing any portion of this work either on site and/or on a shop. All priming and back-painting shall be completed by the Contractor.

**AW-19.8 Refitting and Checking**

Immediately before building is occupied, the Contractor shall examine all doors and other movable part of all case and cabinet work to see that all are in perfect operating condition. Before and after refitting, all edges of doors shall be sealed with approved water resistant materials.

**AW-19.9 Protection of Finish Products / Interior Woodwork, etc.**

The Contractor shall be held responsible and accountable for the explicit protection of all finish cabinet work, interior trim and decorative treatment until Final Inspection and Acceptance. NPC Representative reserves the right to order replacement at no additional cost to contract sum, for any and all work so injured, and/or damaged as to be unsightly after repairing and/or refinishing. Authorization to repair and/or refinish shall not constitute a waiver of NPC Representative's right to require replacement of any item or work if unsatisfactory to him after such repairing and/or refinishing.

**AW-19.10 Measurement and Payment**

Refer to Bill of Quantities for the pertinent items where required.

**AW-20.0 WOOD DOORS****AW-20.1 General**

The work to be done under this section include the furnishing of materials tools and equipment and performing labor required to complete flush type hollow core doors and other wood doors as shown on the drawings or as specified.



Doors shall be thoroughly seasoned, kiln-dried wood and pressure preservative treated. Wood doors shall be products of reputable, nationally known manufacturers approved by the NPC Representative.

All doors shall be of the type and size indicated in the drawings and as specified herein. The top and bottom edges of all wood doors shall be given a coat of water resistant coating after cutting and fittings, and prior to installation.

**AW-20.2 Samples**

Sample shall be submitted showing the corner sections of wood doors and jambs.

**AW-20.3 Workmanship**

The Contractor shall take special care in the manufacturing and assembly process of joint work. All joint works shall be done in accordance with accepted practices and shall be accurate and clean so as the joined elements fit perfectly together.

**AW-20.4 Materials**

Flush Type - Hollow Core Plywood shall be of first class quality marine plywood and the color shall be approved by the NPC Representative.

Framing shall be kiln-dried treated Tanguile for exterior framing and kiln-dried Tanguile for exposed edge framing.

Panel Type Tanguile, KD shall be used for panel doors, stiles and rails; grain and color suitable for natural finish.

Jambs shall be S4S Yakal, common to all doors.

**AW-20.5 Installation**

- a) Each door shall be accurately cut, trimmed and fitted to its frame and hardware.
- b) Allowance shall be given for painter's finish and possible swelling or shrinkage.
- c) Clearance shall not exceed 3.2mm (1/8") at lock and hanging stiles and at top; and, 6.3mm (1/4") at bottom.



- d) All corners shall be rounded to 0.07mm (1/26") radius. Lock and rail edges shall be slightly bevelled.
- e) The screws for hardware shall not be driven, but merely started by driving and then screwed home.
- f) All doors shall operate freely and with all hardware properly adjusted and functioning.
- g) Doors shall be installed complete with finishing hardware, e.g. doorknob with key, hinges, doorstop, etc.

**AW-20.6 Measurement and Payment**

Measurement and payment for Wood Doors will be based on the number of sets installed and accepted by the NPC Representative. Payment will be made at the corresponding contract unit price per set for the pertinent item under Architectural Works in the Bill of Quantities.

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

No measurement of payment for door jambs, payment being included in set.

**AW-21.0 ALUMINUM DOORS AND WINDOWS****AW-21.1 General**

The contractor shall furnish and install all aluminum doors and windows in accordance with the applicable drawings specification and manufacture's standards. Samples of aluminum sections shall be submitted by the Contractor to the Contracting Offices for approval before fabrication commences.

**AW-21.2 Materials****Aluminum Glass Door**

Aluminum glass doors shall be double swing, full glass and floor hinge type complete with transom; hardware and accessories as indicated in the drawings.

**Aluminum Glass Windows**

Aluminum glass windows shall be a combination of mixed and slide type or as indicated in the drawings.

Color for both doors and windows frames and accessories shall be anodized olive brown, preferably "Analok", "KalcOLOR" or approved equal.



Members, sizes, extrusion processes and other characteristics of aluminum shall be referred to “ALUMINUM WORKS” and/or Drawings.

Glass Panels shall be (.006m-0.008mm) thick tinted bronze or as indicated on the drawing.

Aluminum glass doors and windows shall be products of reputable, national known manufacturers approved by the Contracting Officer preferably manufactured by “Hooven Philippines”, “Permaline” or approved equal.

**AW-21.3 Installation**

Doors and windows shall be installed in strict accordance with the accepted manufacturer.

**AW-21.4 Measurement and Payment**

Measurement and payment for **Aluminum Doors and Windows** will be based on the number of sets installed and accepted by the NPC Representative.

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

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

**AW-22.0 METAL DOORS**

**AW-22.1 General**

The work to be done shall consist of furnishing all labor, materials, equipment, tools and other accessories for the complete installation of metal doors as shown on the drawings or as specified.

**AW-22.2 Material**

Steel doors shall be light-weight metal flush door

- Upper and vertical frame shall be special galvanized steel sheets 1.6mm thick.
- Lower frame (for rest room requirement only) shall be special galvanized steel sheets, 2.3mm thick or stainless steel sheet, 2.0mm thick.
- Rib shall be special galvanized steel sheet 1.6mm thick.
- Insulation shall be asbestos core PD-1, paper core (incombustible) PD-2, paper core, PD-3.
- Door edge shall be stainless sheet, 0.8mm thick.
- Hinge shall be stainless metal, loose pin.
- Height of the door knob with lock shall be 1000mm from the lower edge of the door.
- Anchor mounting position 150mm from both ends; pitch: within 500mm.



- Frame painting shall be anti-corrosive paint, baking finish.
- Door painting shall be standard color and pattern of dressed steel sheet or anti-corrosive paint, baked finish. Wood grain, beige or ivory depending on samples approved by NPC Representative.
- For sizes of door panels refer to Door Schedules and drawings.

**AW-22.3 Measurement and Payment**

Measurement and payment for **Metal Doors** will be based on the number of sets installed and accepted by the NPC Representative.

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

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

**AW-23.0 FINISHING HARDWARE****AW-23.1 General**

This section includes furnishing and installing all finishing hardware, complete. The schedules in this section are intended to indicate the various hardware's but are not guaranteed as to quantity. The Contractor shall check the schedule and drawings for count and any item similar location elsewhere in the building.

In order to identify and establish each kind of hardware, genuine American, Japanese & European products shall be used.

**AW-23.2 Packaging and Marking**

Each item of finishing hardware shall be individually packed and delivered in the manufacturer's original container. Each package or box shall be clearly marked with the manufacturer's name, catalogue number and other markings required for easy identification of the hardware.

A packaging list should be furnished to clearly identify the quantity and type of hardware in every box numbered in accordance with this list.

All hardware shall have the required screws, bolts and fastening necessary for installation packed in the same package with hardware. All packages shall be legibly and adequately labeled indicating the part of the work for which it is intended.

**AW-23.3 Qualified Supervision**

Materials shall be procured from a source of supply approved by the NPC Representative as competent to correctly evaluate the plans, details, and specifications and be prepared at all times to promptly and satisfactorily service the hardware on the job. This supplier must be an established



Contractor for builder's hardware who meets all above requirements and who operates an office in this field.

**AW-23.4****Material Specification**

- a) Butt Hinges shall conform to U.S. Federal Specifications unless otherwise specified.
  - 1) For doors up to 914mm (3' - 0") wide or less, 90mm x 90mm (3-1/2" x 3-1/2") hinges shall be used.
  - 2) For closet doors, use long span hinges.
  - 3) Where the jamb trim projects to such an extent that the width of the leaf of butt hinges will not allow the door (in normal opening) to clear such trim, butt hinges with leaves of sufficient width shall be provided.
  - 4) Finish and Material
    - i) Hinges used for doors to receive point shall be Bonderized and prime coating for painting.
    - ii) Hinges used for doors to receive natural finish shall be wrought steel highly finished, polished and plated.
    - iii) Use only non-ferrous material butt hinges for doors exposed to the weather.
- b) Lock-sets shall conform to U.S. Federal Specifications.
- c) Hardware Selection and Door Control. To obtain satisfaction and maximum services, consideration should be given to all of the following basic factors:
  - i) Proper lock selection. Depends on expected usage (lock, series, function), climatic conditions.
  - ii) Proper installation. The use of right installation tools is recommended.
  - iii) Proper door control. To protect locks and other hardware items, the use of door closers and other control devices is vital under certain conditions.
- d) Keying and Key. Locks shall be keyed in sets and sub-sets to provide maximum expansion. All sets shall be grand master keyed, and all entrance locks shall be great-master keyed. Designation shall be by the NPC Representative.

Permanent cylinders with construction inserts are to be assembled with all locksets. Change keys are to be packed in cartons marked



“packing list”. On completion of the job, the NPC Representative will collect all construction keys, remove the construction inserts from the lock cylinders and distribute the lock change keys as directed. Retain Contractor and construction keys for future key system control.

#### Construction

- a) Mechanism. Wrought steel zinc plated and dischromated with coil compression springs.
- b) Exposed trim and parts. Wrought brass, bronze, aluminium or stainless.

Installation. For hollow wood doors and frame, uniform application regardless of function completely reversible for R.H. or L.H. doors.

Warranty. Locksets are engineered to meet or exceed applicable government and industry standards for strength, durability and performance. They are fully guaranteed against defects in materials for workmanship.

- Door Closers
- Push/Pull Handles
- Door Stops
- Door Catches

#### **AW-23.5 Installation and Hardware**

All hardware shall be installed in a neat, crafts manlike manner following the manufacturer's instruction. Fasteners supplied together with the hardware, shall be used to secure the hardware in place. Wood screws set in expansion shields, shall be used for securing hardware to concrete or masonry surfaces. Through-bolts shall be used where specified or necessary for satisfactory installation. After installation, hardware shall be protected from paint, stains, blemishes and damage until acceptance of the work. All hardware shall be properly adjusted and checked out in the presence of the NPC Representative to see that the hinges, locks, bolts and closers operate properly. Any error in cutting or fitting, or any damage to the adjoining work shall be replaced as directed.

#### **AW-23.6 Measurement and Payment**

No measurement for payment will be made for **Hardware**, the cost of which shall be included in the contract unit price for the pertinent items where hardware is required under Architectural Works in the Bill of Quantities.



**AW-24.0 PAINTING AND VARNISHING****AW-24.1 General**

The work to be executed under this section shall include the furnishing of all materials, labor, tools and ladders, scaffolding and other facilities necessary for the satisfactory performance of all work necessary to complete all painting and finishing of all surfaces throughout the interior and exterior of the building, except as otherwise specified.

The Contractors, providing the labor, materials or both for this project are specifically referred to the General Contract plans, to the General Conditions of the specifications, to all the Sections of the Specifications and to the various other sub-contract documents which may affect the completion of any sub- contract work. In the absence of a complete agreement between sub-contractors, supply dealers or others affected by the construction of this project, the General Contractor shall be held responsible for the co-ordination of all the work.

The Contractor shall examine all sections of this specification and perform all paintings called for therein.

All wood work in ceiling, partitions, handrails, cabinet work, grill work, mouldings and others as specified by the NPC Representative shall be painted/varnished.

**AW-24.2 Inspection of Surfaces**

Before starting the work, the Contractor shall inspect all surfaces to be painted. If the surfaces cannot be put in proper condition to receive paint by customary cleaning methods or sanding or sparkling, the Contractor shall notify the NPC Representative in writing. The NPC Representative will cause these defects to be reminded. The commencing of the work by the Contractor indicates his acceptance of the surfaces to be painted and assumes responsibility for the rectification of any unsatisfactory finishing, resulting from his negligence.

**AW-24.3 Materials**

All paint materials shall meet the requirements of the Philippine National Standard Specifications for Paintings.

Paints shall be brought to the Site in tightly closable, convenient, original containers, if nothing to the contrary is stipulated in the Specifications. The containers shall be marked in a durable manner with the following particulars:

- Maker
- Paint and relevant thinner
- Gross and net weights
- Date of supply by the maker's factory



The openings of the containers shall leave enough room for a stirring appliance.

All containers shall be kept tightly closed until the contents are to be used. Immediately prior to use of the contents and before pouring into smaller containers for working purposes, any skin shall be removed and the contents stirred thoroughly, if necessary with a stirring appliance.

Paints, thinners and filling cements which are not required for immediate use shall be protected against the action of frost and heat.

Only thinners supplied by the makers of the paint or those described by them as suitable shall be use for adjusting paints to working consistency. The instructions of the maker shall be followed in this respect.

Paint and filling cements shall be used in accordance with the maker's instructions.

The Contractor shall obtain from the manufacturer and shall submit to the NPC Representative a paint manufacturer's guarantee for the quality of each painting material and that each coat of paint is compatible with previous and subsequent coats.

Paints which do not have to be prepared by mixing several constituents just prior to use shall be brought to the Site in such a state of readiness that they need only be adjusted to brushing or spraying consistency to meet the relevant working conditions (e.g., temperature), by adding the particular thinners in accordance with the maker's instructions.

With the exceptions of ready-mixed materials in original containers, all mixing shall be done at the job site. No materials are to be reduced or changed except as specified by the Manufacturer of said materials.

The quality of the paints shall be such that they form no solid sediment and at most a slight skin in unopened original containers within 6 months - calculated from the marker's delivery date. A paint which has formed a solid sediment or more than just a slight skin in the unopened original containers by the time of use or which cannot be processed satisfactorily shall not be used. A sediment shall be regarded as solid if it cannot be dispelled quickly and completely by stirring.

The use of white zinc (lithophones) will not be allowed.

A place will be designated by the NPC Representative for the storage of paint materials and tools. Whenever it may be necessary to change the location of this storage place, the Contractor shall promptly move to the newly designated place. The storage space floor shall be adequately protected from damage and from paint. Paint shall be covered at all times, safeguards taken to prevent fire.

#### **AW-24.4 Colors and Samples**

All colors shall be subjected to the approval of the NPC Representative. Tinting of matching colors shall be done under the supervision of the NPC Representative. In all cases, a sample shall be applied on the job and the



NPC Representative must give his approval before work is commenced. If required, three panels, 200 mm x 250 mm (8" x 10") of each color and finish shall be prepared in advance, with the NPC Representative. "Of color selected" shall be understood as all coats specified herein.

#### **AW-24.5 Workmanship**

All work shall be done by skilled mechanics with high quality workmanship. All paints shall be evenly applied so as to be free from sags, runs, crawls or other defects. All painting materials shall be meet the requirements of stress and shall be in accordance with the relevant standards. All coatings shall be of proper consistency and well brushed out so as to show the minimum of brush marks, except varnish and enamel which shall be uniformly flowed on. All brushes shall be clean and in good condition, with heavy brushes preferred. Light brushes shall not be permitted.

Paint shall be thoroughly stirred so as to keep the pigment evenly in suspension when paint is being applied.

No painting shall be done under conditions that are unsuitable for the production of good results. No oil painting shall be done in damp weather.

Application of succeeding coats shall strictly follow the over-coating times specified by the paint manufacturer. If no specific data are available, all coats shall be thoroughly dry before painting shall be applied. At least twenty-four (24) hours shall be allowed between coats. Exterior painting under damp/wet conditions is not allowed.

Painting coat as specified are intended to cover the surfaces perfectly, if surfaces are not fully covered, further coat shall be applied to attain the desired evenness of the paint application.

All parts of moldings and ornament shall be left clean and true to details. All finish shall be uniform as to sheen, color and texture, except when glazing is required.

#### **AW-24.6 Protection**

The Contractor shall protect the work of all other trades against damage or injury by his employees, or by his materials, tools or utensils used in connection with this contract. Any damage done by him shall be repaired at his own expense, without additional compensation beyond the contract price.

The Contractor shall note that some damage to paint-work during shipment, storage, and building-in and particularly during grouting of the steel lining is unavoidable and the application of all protective treatment shall be programmed accordingly. Care shall be taken to remove salt crystal liable to become deposited during the sea transport and/or storage at seaport by thorough washing with clean fresh water. Before any coat of paint is applied, the surface shall be prepared as hereunder described, so that it is clean and free from all deleterious matter and completely dry.



The Contractor shall be responsible for the complete shop and field coats. Shop coats shall be checked for good quality and where necessary, before proceeding with the painting or coating operations at Site, the Contractor shall clean and repair, including smooth trowel, all shop coats which are defective or damaged.

Protect all parts of the building from paint drops by using clean drop cloths and remove all paint inadvertently placed or dropped on exposed surfaces without damage to same. Close various spaces while painting and exclude dust until finish is dry.

Plumbing systems shall not be used to wash paint brushes or containers.

Temporary or permanent welding shall not be permitted on areas where the welding will damage paint or other protective coatings, unless the areas of coatings which would be damaged thereby are accessible for repairing and inspection. Materials which have been painted shall be handled with care and protected as necessary to preserve the coating in good conditions.

#### **AW-24.7 Paint Application**

Materials, which are subject to working instructions, shall be treated according to these instructions, unless stipulated differently by the relevant paint manufacturer:

Paint, gloss and coating may be worked manually or by machines, unless a particular execution has been stipulated in the Specifications.

Paint, gloss and coat shall be bond firmly and be of even surface without scars and strips.

The surface shall be smooth, if not otherwise stipulated in the Specifications, such as finely or coarsely granulated.

Any paint, gloss or coating shall be applied without filling to create a uniform surface or, when gloss is being applied, a flowing surface with the required materials according to instruction manuals, of white or light shade, unless otherwise stated in the Specifications.

Top finish shall be high-gloss, unless otherwise stated in the Specifications.

If flat levels are to be formed, the prime coated surfaces shall be completely being covered with suitable undercoat filler ribbed and smoothed.

Primer protective coating shall be applied on woodwork according to manufacturer's instruction. If several coats are requested, the preceding coat shall need to be dried before applying the subsequent one. This does not apply for wet-on-wet techniques.

Drying periods prescribed by the manufacturer shall be observed, for open surfaces, as well as for edges or irregular surfaces. All edges at doors, windows, skirting, sockets, etc., shall be of sharp and straight line.



New concrete and masonry surfaces must be thoroughly naturalized either by brush or spray with a solution of 2 kg. of zinc sulfate to each gallon of water.

Surfaces so treated shall be tested to ascertain that alkalinity is removed; otherwise a second treatment with the same solution shall be applied. Within 24 hours after drying, all crystals on the surface must be brushed off applying the prime coat.

Metal works shall be kept clean and free from corrosion following installation. Abraded surfaces shall be retouched prior to finish painting, using the same type of paint as prime coat. Galvanized metals shall be weathered or pickled with the approved metal primer in accordance with printed instruction of the manufacturer.

Where components parts of steel or aluminum alloys meet, joints shall be sealed so that no moisture can penetrate between the contact surfaces.

Rivet and bolt heads, protruding corners, sharp section edges and places of difficult access shall be pre-treated.

The paint shall be applied in coats which are as uniform as possible.

The first priming coat shall be applied by brush. Further coats shall be applied by brush if nothing to the contrary is stipulated in the Specifications.

Smaller and specially shaped brushes shall be used for rivet and bolt heads, protruding corners, sharp section edges and places of difficult access.

When applying paints by spray-gun, the object to be sprayed shall not be contaminated by water or oil in the compressed air.

In paint systems involving coats, the various coats of paints shall be distinguishable from each other by their shade.

All coats of paint shall be applied only to clean, dry and non-greasy surfaces. In multi-coat paint systems, the coat last applied shall always be sufficient dry, free from any superficial moisture and from dust and dirt before applying the next text coat; only when using the moist oil type of paints may it be necessary for the previous coat to be hard dry.

The Contractor shall inform the NPC Representative in good time before starting to apply the next coat so that the NPC Representative shall have the opportunity of approving the previous coat.

Painting work shall not be carried out at a temperature below +5 °C and above 50 °C. In addition, painting work shall not be carried out on surface affected by the action of rain, fog and moisture or water of condensation; work started on such surfaces may not be continued until the surfaces to be painted are completely dry.



**AW-24.8      Painting Systems**

All surfaces which are required by the Finish Schedules or specifications to be painted, or otherwise finished, shall be given coats of paints or varnish as specified herein. Individual directions printed on the label of the approved paint and varnish shall be strictly followed. Paint thinner or linseed oil of the same brand as the paint to be thinned shall be used.

All materials, supplies and articles furnished shall be the standard products of superior quality. All constituent materials shall conform to the applicable provisions of the latest edition of ASTM Specifications.

The following list indicates painting materials of special compositions considered suitable for various parts of the works.

*Concrete and Plastered Surface*

Any concrete, cement plaster exposed to high humidity 3 coats of a highly weather-resistant synthetic resin-based paint. The first coat shall contain from 5% to 20% thinner as the surface requires.

All concrete (walls, foundations, etc.) backfilled with soil or submerged.

- 1 coat of coal-tar epoxy.
- 2 coats of a mineral-filled water resistant coat-tar epoxy.

Concrete, cement plaster, etc. exposed to oil, surface shall be dry, if possible sandblasted, clean and slightly roughened.

- 1 coat with a plastic-modified hydraulic mortar.
- 2 coats of an oil-resistant synthetic resin based paint.

Concrete exposed to Mechanical and Chemical attack.

- 1 coat of colorless 2- pack epoxy based paint; this shall contain from 10% to 20% thinner as the surface requires.
- 2 coats of 2-pack epoxy-based paint.

Concrete flooring exposed to mechanical wear and oil.

- 3 coats of chlorinated rubber-based paint. The first coat shall contain 15% thinner.

Internal concrete, plastered walls exposed to abrasion.



- 3 coats of an oil-free, synthetic resin-based, dust-binding paint.

Concrete flooring subject to minor mechanical wall.

- 2 coats of an oil-free, synthetic resin-based, dust-binding paint.

Internal plastered ceilings and walls.

- 2 coats of a polyvinyl-acetate dispersion type, non-chalking paint. First coat shall contain up to 30% thinner of clean, fresh water as the surface requires.

#### Wooden Surfaces

##### a) Exterior Parts –

- b) Surface shall be smoothed down with adhesive; if machine sanding is involved, a sanding sealer to bind the fibres shall be applied; the surface shall also be dry and free from dust.

- 1 coat of fungicide and bactericide ingredients after first coat.
- 2 coats of synthetic resin-based lacquer with white active pigments.

##### c) Interior Parts - Application of varnish on wooden interior walls, partitions, T&G ceiling panelling and closets/cabinets.

All materials, supplies and articles furnished shall be the standard products of a known manufacturer approved by the NPC Representative.

- 1) First Coat. Fill open grained wood with natural wood paste fillers, as is, or mixed with oil-wood stain to obtain desired shade. Apply along the grain within 30 minutes. Let dry overnight and sand lightly.
- 2) Second Coat. Apply any one (1) of the colors of oil-wood stain: oak, walnut, marble, and mahogany. Dry overnight and sand lightly.
- 3) Third Coat. Spray required coats of lacquer sanding sealer. Let dry for 30 minutes and sand to smooth.
- 4) Choice of any of the following topcoats:
  - CLEAR FLAT LACQUER - FOR STANDARD FLAT EFFECT.
  - CLEAR DEAD FLAT LACQUER - FOR COMPLETE FLAT LACQUER.
  - SUPER DEAD FLAT LACQUER - FOR COMPLETE FLAT LACQUER.
  - CLEAR GLOSS LACQUER - FOR STANDARD GLOSS EFFECT.



- WATER WHITE GLOSS LACQUER - FOR BRILLIANT CRYSTAL CLEAR EFFECT.
- VERSATILE SPAR VARNISH - FOR GLOSSY THICK COATING ALSO APPLICABLE FOR EXTERIOR WOOD SURFACES.

When spraying under high humid conditions, add up to ten per cent (10%) by volume of lacquer thinner retarder to prevent blushing of lacquer products.

#### Steel Surfaces

Details are given in General Technical Requirements.

#### **AW-24.9 Measurement and Payment**

Payment shall be based on what is called for in the Bidding Form.

#### **AW-25.0 CONCRETE FLOOR HARDENER**

##### **AW-25.1 General**

The work under this section shall be undertaken by skilled tradesmen experienced with this kind of work. The work to be done shall consist of furnishing all labor, materials and provision of tools and equipment necessary to complete the application of Floor Hardener.

##### **AW-25.2 Materials**

Floor hardener shall be non-metallic a mixture of especially graded mineral aggregates crushed and sieved to produce sharp granules. It should be extremely hard and must be highly resistant to abrasion, impact, chemical and acid, attack and will not oxidize under any circumstances. It should be non-metallic and must be a mixture of graded Silicon Carbide and Aluminum Oxide Aggregates.

##### **AW-25.3 Measurement and Payment**

Measurement and payment for **Concrete Floor Hardener** will be based on the area placed and accepted by the Owner.

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

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



**AW-26.0 FIBER CEMENT BOARD****AW-26.1 General**

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

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

**AW-26.2 Materials**

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

**AW-26.3 Handling and Storage**

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

**AW-26.4 Installation**

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

**AW-26.5 Framing**

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

**AW-26.6 Measurement and Payment**

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

**AW-27.0 SOIL TREATMENT****AW-27.1 General**

The work to be done under this Section shall include all labor, materials, tools and equipment necessary for soil treatment.

The Contractor shall treat the soil under the building and immediate surroundings to make it impervious and toxic to subterranean termites, often referred to as white ants or "anay" by application of soil poison solutions.



**AW-27.2 Material**

Material to be used shall be a solution commonly used by licensed companies or entities engaged in pest control or pest eradication. Banned solutions must not be applied.

**AW-27.3 Application**

The application of solutions follows the sequence of construction and the following are the order treatment:

- a) Thoroughly saturate every linear meter of excavation for footings and other cement work.
- b) After grading and leveling the soil in the ground and layers of gravel laid preparatory to the pouring of concrete, flood or soak every square floor area.
- c) As soon as the building is constructed, just prior to the landscaping of the lawn and garden, saturate every linear meter perimeter of the building, about three (3) meters wide, with the termite proofing solution.
- d) Treat earth fills thoroughly as they may carry termite colonies. As soon as the fill is packed and leveled, saturate every one square meter area with 4 liters of the termite-proofing solution.

An ordinary watering can (sprinkling can) can be used to saturate or saturate areas with the termite-proofing solution. However, for convenience and thorough and faster application, use a power sprayer with 3 to 5 gallons per minute capacity.

**AW-27.4 Measurement and Payment**

Measurement for payment for Soil Treatment will be based on what is required on the Bill of Quantities.

**AW-28.0 PLUMBING FIXTURES AND FITTINGS****AW-28.1 General**

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

**AW-28.2 Make**

The model numbers herein given are intended to illustrate the quality and design of fixtures that will be required. American standard fixtures specified



herein and any substitution made to any item of fixtures specified must first be approved by the NPC Representative.

#### **AW-28.3 Trade Marks**

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

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

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

#### **AW-28.4 Fixtures**

- a) Water Closet – as shown in the drawings or as specified in the Bill of Quantities
- b) Lavatory – as shown in the drawings or as specified in the Bill of Quantities
- c) Urinal – as specified in the Bill of Quantities
- d) Double Tub – Stainless steel sink
- e) Bibbs – Nickel Plated Copper or Brass Alloy
- f) Shower Heads – Nickel Plated Copper
- g) Plated clips and 19mm (3/4") caps on wall or as indicated on the drawings.
- h) Floor Drain – Stainless or Brass Alloy
- i) Clean-outs – Brass alloy

#### **AW-28.5 Installation**

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

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

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



All flush valves shall be equipped with vacuum breaking devices.

#### **AW-28.6 Toilet Accessories**

- a) Soap Holders – white, vitreous China to match fixtures quality, brand and wainscoting color.
- b) Tissue/Toilet Paper Holder - colored, to follow Water Closet brand and quality. Provide and fit, ready for use, on most convenient side of wall inside each water closet compartment, 750mm (30") above the finish floor.
- c) Urinal and Toilet Partition and Cubicle Doors- Hard wood laminate phenolic boards. Provide polyester coated extruded aluminium framing, non-rusting connection accessories, door hinges and lock sets, toilet paper holder, grab handle and accessory hook, signage.
- d) Towel Holder-stainless
- e) Liquid Soap Dispenser

#### **AW-28.7 Measurement and Payment**

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

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

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

#### **AW-29.0 WATERPROOFING**

##### **AW-29.1 General**

The work includes the laying/ installation of waterproofing membrane at the roof deck of the building.

Waterproofing materials shall be delivered to the site in their original sealed containers or packages bearing manufacturer's name and brand designation.

The work shall be performed by the manufacturer's certified applicators and only the best quality of materials and workmanship shall be used in strict accordance with the standard practice for this type of work.

##### **AW-29.2 Materials**

The waterproofing material shall be a complete system of bitumen layers supplied by a manufacturer of reputable corporate existence.

Waterproofing materials shall be heat resistant preformed reinforced bituminous membrane which has good elongation and recovery characteristic when subjected to expansion and contraction movements.



**AW-29.3 Surface Preparation**

All concrete or masonry surfaces shall be cured for minimum of seven (7) days. It must be wood-trawled, smooth, firm, dry, clean and free from rubbish, loose or foreign materials and imperfections.

Installation of metal fittings and similar works shall be completed before application of waterproofing is done.

Surfaces shall be properly graded to drain water freely into drain lines. Drainage connections shall be set up to permit free flow of water. There shall be provisions for mortar cants in the angle formed by the area. If required, reglets of about 40mm deep and 40mm wide at 250mm above floor finish shall be provided along walls or parapet walls for the waterproofing system.

**AW-29.4 Execution of Work**

The waterproofing membrane shall be installed according to the manufacturer's instruction. Apply material "patching compound" reinforced with "patching fabric" on cracks and other surface imperfections.

The membrane application shall be commenced from the lowest point when applied on a surface to fall line to ensure weathered overlaps.

After installation of membrane, careful inspection shall be made for accidental damage. Damaged area shall be cleaned and patched with fresh membrane waterproofing (minimum patching material of 152mm x 152mm).

Prior to acceptance of the job, all waterproofed surfaces shall be given a 48-hour flooding and the Contractor shall remedy at once any evidence of leakage. Flooding test shall be done by plugging all drains, building temporary dams at opening so that water will be 25.4mm (1") deep at high point of waterproofing.

Concrete topping to be used shall be 20.70MPa as per ACI specifications and 50mm (2") thick (minimum) excluding the finish and reinforced with welded steel wire fabric as per ASTM A185-73 specifications.

In particular, the Contractor shall verify conditions such as the following do not exist:

- extensive unevenness of the bed
- too rough, too porous, too smooth surfaces
- sharp edges of boarding and ridges
- variation from the horizontal or fall stipulated in the Specifications or dictated by circumstances
- incorrect level of the surface of the bed
- non-rounded corners, edges and channeling
- stress and settlement cracks, holes
- too moist surface



- non-sealing of voids (e.g. in concrete)
- inadequate firmness of the bed
- oily surface
- unsuitable type or portion of penetrating structural members
- lack of parts for connecting structural members which penetrate the waterproofing

**AW-29.5 Guarantee**

The Contractor shall guaranty that the work specified in this section will be free from defects of materials, workmanship and leakage for a period of five (5) years from the date of final acceptance. This obliges the Contractor to make good the defective work.

**AW-29.6 Measurement and Payment**

Measurement of payment for Membrane Waterproofing will be based on the area applied and accepted by the NPC Representative.

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

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



**SECTION VI**

**TECHNICAL  
SPECIFICATIONS**

**CIVIL WORKS**

**SECTION VI – TECHNICAL SPECIFICATIONS****CW – CIVILWORKS****TABLE OF CONTENTS**

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## **TECHNICAL SPECIFICATIONS**

### **CW – CIVILWORKS**

#### **CW-1.0 GENERAL CONSTRUCTION FACILITIES**

##### **CW-1.1 Scope**

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

##### **CW-1.2 Moving-in**

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

##### **CW-1.3 Contractor's Camp Facilities**

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

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

##### **CW-1.4 Water Supply**

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

**CW-1.5 Sewerage Disposal and Sanitation**

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

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

**CW-1.6 Fire Protection**

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

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

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

**CW-1.7 Construction Power**

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

**CW-1.8 Camp Security**

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

**CW-1.9 Construction Material Storage**

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

**CW-1.10 Removal of Camp and Construction Facilities**

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

**CW-1.11 Measurement and Payment**

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

**CW-2.0 CARE OF WATER DURING CONSTRUCTION****CW-2.1 Scope**

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

**CW-2.2 Drainage and Dewatering**

The Contractor shall be responsible for dewatering foundation areas so that work can be carried out on a suitably dry condition. The Contractor shall construct drainage ditches, holes, culverts, furnish, maintain and operate at his own expense all necessary pumps and other dewatering devices to keep all work areas free from water.

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

**CW-2.3 Measurement and Payment**

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

**CW-3.0 ENVIRONMENTAL REQUIREMENTS FOR CIVIL WORKS****CW-3.1 Scope**

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

**CW-3.2 General Conditions**

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

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

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

**CW-3.3 Measurement and Payment**

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

**CW-4.0 SITE GRADING****CW-4.1 Scope**

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

**CW-4.2 Clearing, Grubbing and Miscellaneous Work****CW-4.2.1 Clearing and Grubbing**

The Contractor shall perform clearing and grubbing on the project site. The site shall be cleared and grubbed of all trees and brush except particular

trees, which may be retained by the NPC for preservation. Particular trees to be left in place shall be protected from scarring and/or other injuries during clearing and grubbing work and other construction operations.

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

#### **CW-4.2.2      Miscellaneous Works**

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

#### **CW-4.3        Grading**

##### **CW-4.3.1      General**

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

##### **CW-4.3.2      Classification of Materials**

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

##### **CW-4.3.4      Excavation and Fill**

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

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

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

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

accordingly replaced with suitable materials approved by the NPC. The removal and proper disposal of such unsuitable materials shall be paid for at the contract unit price for the item, Grading Excavation, and payment for placing and compacting suitable material be made at the contract unit price for the item, Grading Fill, in the bill of quantity.

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

In the event that construction of concrete footing or other concrete foundations is on fill, the fill shall be compacted efficiently and thoroughly so that when the fill is tested for compaction at the required foundation elevation for the structure, the required bearing capacity is attained but in no case less than 200 KPa. In no case shall filling and compaction work to be done without the presence of NPC's inspectors. The Contractor shall be held liable for any structural instability or damage that might result in consequence to non-compliance of this requirement. The Contractor shall institute corrective measures to bring the foundation base to a condition or state that will conform to the required bearing capacity; and also to repair and make good any damage on the structure to the satisfaction and at no cost to NPC.

#### **CW-4.3.5 Slides**

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

#### **CW-4.3.6 Slip-Outs**

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

#### **CW-4.4 Disposal**

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

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

**CW-4.5 Sources of Fill Materials**

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

**CW-4.6 Environmental Requirements**

All construction activities to be performed by the Contractor shall be in accordance with the restrictions stated in the approved Environmental Clearance Certificate (ECC).

**CW-4.7 Measurement and Payment**

**CW-4.7.1 Clearing and Grubbing**

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

**CW-4.7.2 Miscellaneous Works**

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

**CW-4.7.3 Stripping**

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

**CW-4.7.4 Grading Excavation**

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

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

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

#### **CW-4.7.5 Grading Fill**

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

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

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

#### **CW-5.1 Scope**

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

#### **CW-5.2 Materials**

##### **CW-5.2.1 Structural Excavation**

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

##### **CW-5.2.2 Structural Fill**

###### **a. Sand and Gravel Fill**

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

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

b. Structural Earth Fill

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

**CW-5.2.3 Special Foundation, if any**

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

a. Lean Concrete

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

b. Selected Materials

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

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

**CW-5.2.4 Structural Backfill**

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

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

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

**CW-5.3 Construction****CW-5.3.1 Excavation****a. General**

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

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

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

**b. Structural Excavation, Structure Other Than Pipes**

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

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

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

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

**d. Water Supply Pipes**

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

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

**CW-5.3.2      Structural Foundation Fill**

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

**CW-5.3.3      Special Foundations**

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

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

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

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

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

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

**2. Drainage and Sewerage Pipes**

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

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

### 3. Water Supply Pipes

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

## **CW-5.4 Measurement and Payment**

### **CW-5.4.1 Structural Excavation**

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

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

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

### **CW-5.4.2 Structural Foundation Fill**

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

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

### **CW-5.4.3 Special Foundations**

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

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

**CW-5.4.4 Structural Backfill**

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

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

**CW-5.4.5 Trench Excavation and Backfill for Sewerage, Drainage and Water Supply Pipes and Cable Trench**

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

**CW-6.0 CONCRETE****CW-6.1 Scope**

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

**CW-6.2 Class of Concrete**

Class of concrete or strength shall be as indicated on the drawings, which shall conform to the minimum requirement for compressive strength indicated on the provision of NSCP for Concrete.

**CW-6.3 Materials****CW-6.3.1 Cement**

Cement for concrete works shall be furnished by the Contractor and shall conform to the requirements of the latest edition of the Standard Specifications for Portland Cement (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-6.3.2 Reinforcing Steel**

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

**CW-6.3.3 Water**

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

**CW-6.3.4 Aggregates**

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

**CW-6.3.5 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-6.4 Storage of Materials****CW-6.4.1 Cement and Aggregates**

All cement shall be stored, immediately upon delivery at the Site, in weatherproof building that will protect the cement from dampness. The floor shall be adequately raised from the ground and in buildings placed in the locations approved by NPC. Provisions for storage shall be ample, and the shipments of cement as received shall be separately stored in such a manner that allows the earliest deliveries to be used first and to provide easy access for identification and inspection of each shipment. Storage buildings shall have capacity for storage of sufficient quantity of cement to allow sampling at

least twelve (12) days before the cement is to be used. Bulk cement, if used, shall be transferred to elevated air tight and weatherproof bins. Stored cement shall meet the test requirements at any time after storage when NPC orders retest. At the time of use, all cement shall be free flowing and free of lumps.

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

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

#### **CW-6.4.2 Reinforcing Steel**

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

#### **CW-6.5 Concreting**

##### **CW-6.5.1 General**

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

##### **CW-6.5.2 Formwork Construction**

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

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

Formwork for concrete placed underwater shall be watertight.

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

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

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

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

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

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

### **CW-6.5.3 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-6.5.4      Mixing Concrete**

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

**CW-6.5.5      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-6.5.6      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-6.5.7      Removal of Forms**

Formwork shall not be removed without the permission of NPC; where such permission, however, shall not relieve the 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-6.5.8 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-6.5.9 Sampling and Testing of Concrete**

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

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

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

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 average of the two strength test results is equal to or exceeds the specified strength and no individual test falls below the specified strength by more than 3.50 MPa.

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

#### **CW-6.5.10 Tolerances and Repair for Concrete Construction**

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

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

#### **CW-6.5.11 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-6.6 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 quantity 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 quantity. 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-7.0 REINFORCING STEEL****CW-7.1 Description**

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

**CW-7.2 Material Requirement**

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

**CW-7.2.1 Bar Reinforcement**

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

**CW-7.2.2 Sampling**

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

**CW-7.3 Construction Requirement****CW-7.3.1 Order List for Bent Bars**

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

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

**CW-7.3.2 Fabrication**

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

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

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

**CW-7.3.3 Protection of Material**

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

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

**CW-7.3.4 Placing and Fastening Reinforcement & Miscellaneous Material (ACI-301)**

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

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

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

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

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

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

The minimum concrete cover for reinforcement specified in the bid documents shall 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-7.3.5 Splicing**

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

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

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

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

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

**CW-7.4 Measurement and Payment**

The quantity to be paid for shall be the calculated theoretical number of kilograms of reinforcement steel bars as determined from the net length of the steel shown on the drawings, incorporated in the concrete and accepted. The weight of deformed bars will be computed from the theoretical weight of the same nominal size as shown in the following tabulation:

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

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

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

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

**CW-8.0 STRUCTURAL STEEL****CW-8.1 General**

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

**CW-8.1.1 Submittals**

Shop Drawings of all structural steel (including all connection details) 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, 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 bolts and nuts, the Contractor shall also submit chemical analysis, including tensile strength and hardness tests as required by ASTM A325.

#### **CW-8.1.2 Delivery and Storage**

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

#### **CW-8.2 Materials**

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

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

##### **CW-8.2.1 Steel**

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

Structural Steel:	ASTM A992 or ASTM A36
Steel Pipe:	ASTM A53, Type E or S, Grade B, ASTM A501
Steel W-Shape Piles (Soldier Piles):	ASTM A328

**CW-8.2.2 Bolts, Nuts and Washers:**

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

Bolts:	ASTM A325
Nuts:	ASTM A563, Grade A, heavy hex style, except nuts less than 38mm may be provided in hex style
Washers:	ANSI B18.22.1, Type B

**CW-8.2.3 Accessories:**

Welding electrodes and steel structural members shall use:

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

**CW-8.3 Execution****CW-8.3.1 Fabrication**

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

**CW-8.3.2 Welding of Structural 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-8.3.3 Shop Painting / Field Painting**

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

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

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

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

**CW-8.3.4 Erection**

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

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

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

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

Connections: Connections shall be executed as shown on drawing. In case, connections are not detailed, it shall be designed in accordance with AISC

"Manual of Steel Construction". Build connections into the existing work. Punch, sub-punch and ream, or drill bolt holes.

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

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

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

#### **CW-8.3.5 Tests and Inspections**

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

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

#### **CW-8.4 Measurement and Payment**

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

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

#### **CW-9.0 CONCRETEWALK / SIDEWALK**

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

In accordance with the plans and these specifications, the Contractor shall furnish all materials; labor, equipment, tools and construct complete the combination concrete walk.

**CW-9.2 Materials****CW-9.2.1 Bedding**

Aggregate bedding material for the concretewalk shall consist of pitrun gravel, talus rock, disintegrated granite, sand, shale, cinders, coral or other similar materials, including additional filler for blending, selected under the direction of the NPC. The maximum dimensions of any particles shall not be greater than two thirds of the required thickness of the layer in which it is to be placed.

Oversized material, if present, shall be removed at the pit by screens, grizzlies, or by handpicking. When necessary to obtain proper uniformity, additional filler shall be blended by mixing on the roadway. The fraction of the aggregate bedding material, including any additional filler passing the No. 40 sieve, shall not be more than two-thirds (2/3) of that passing the No. 40, sieve shall have a liquid limit not greater than 25 and a plasticity index of not more than 6.

**CW-9.2.2 Concrete**

Concrete shall be 20.70 MPa or as indicated on the drawings.

**CW-9.2.3 Reinforcing Steel**

Reinforcing Steel Bars shall conform to the requirements of PNS 49:2002 for Grade 40 rebar minimum.

**CW-9.3 Construction****CW-9.3.1 Foundation Preparation**

Prior to placing the bedding for the concrete curb, gutter and sidewalk, the foundation shall be prepared by compacting and bringing it to unyielding or firm surface. Compaction shall be attended by either wetting or drying, as the case may be, to attain satisfactory compaction of the foundation.

**CW-9.3.2 Bedding**

The bedding upon which the concrete walk rest, shall be compacted to a firm, even surface.

**CW-9.3.3 Placing Concrete**

Mixing, placing, finishing and curing concrete shall conform to the requirements of ACI Code for Concrete Construction.

The concretewalk shall be constructed to the section and dimensions shown on the drawings. The concretewalk shall be constructed in uniform sections and, unless otherwise directed, each section shall not be more than five (5) meters in length except where shorter sections are required for closure, but no section shall be less than two (2) meters long. The sections shall be separated by sheet templates set perpendicular to the face and top of the

concretewalk. The templates shall be approximately 3 mm in thickness, of the same.

**CW-9.4 Measurement and Payment**

**CW-9.4.1 Concrete**

Measurement for payment will be based on the cubic meters of sidewalk, completed and accepted. Payment will be made at the contract unit price for the item, sidewalk, in the bill of quantity.

**CW-9.4.2 Bedding**

Measurement for payment will be based on the number of cubic meters of bedding materials, placed, compacted and accepted. Payment will be made at the contract unit price for the item, Aggregate Sub-base, in the bill of quantity.

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

**CW-10.1 Scope**

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

**CW-10.2 Materials**

**CW-10.2.1 Reinforced Concrete Drainage Pipes**

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

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

**CW-10.2.2 PVC Pipes**

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

**CW-10.2.3 Bedding Material****A. For Stable Soil and Rock Foundation**

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

**B. For Unstable Foundation**

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

**C. Foundation under Roadways and Parking Areas**

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

**CW-10.3 Construction****CW-10.3.1 Appurtenant Structures**

Appurtenant structures like street inlet, street inlet-catch basin combination, manhole, catch basin for downspouts, catch basin for intersecting perforated PVC pipes, septic tank, drainage outlets, etc. shall be constructed at locations indicated on the plans or at the other convenient locations designated by the NPC. All appurtenant structures shall be of 20.7 MPa concrete unless otherwise shown on the drawings.

**CW-10.4 Pipe Installation****CW-10.4.1 General**

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

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

#### **CW-10.4.2 Non-Reinforced and Reinforced Concrete Drainage Pipes**

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

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

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

#### **CW-10.5 Measurement and Payment**

##### **CW-10.5.1 Concrete Drainage Pipes and PVC Pipes**

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

The quantities measured as provided above, completely installed and accepted, will be paid at the contract unit price for each size and kind of pipe shown in the bill of quantity. Payment shall constitute full compensation for furnishing all labor, material, equipment and tools for fabricating, hauling, installing and jointing of pipes. Payment shall also include the cost of attendant excavation, bedding and backfilling.

##### **CW-10.5.3 Appurtenant Structures**

Measurement for payment of appurtenant structures like street inlet, street inlet-catch basin combination, manhole, catch basin for downspouts, catch

basin for intersecting perforated PVC pipes, septic tank, drainage outlets, etc. will be based on the number of structures constructed/installed and accepted.

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

#### **CW-10.5.4 Bedding**

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

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

SECTION VI

**TECHNICAL  
SPECIFICATIONS**

**ELECTRICAL WORKS**

**PART I - TECHNICAL SPECIFICATION****EW-ELECTRICAL WORKS****TABLE OF CONTENTS**

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## **PART I – TECHNICAL SPECIFICATIONS**

### **EW – ELECTRICAL WORKS**

#### **EW-1.0 GENERAL**

This section covers the technical and associated requirements for the Construction of NPC Eastern Visayas Operation Center at Calbayog City, Western Samar.

All equipment shall be installed in accordance with the relevant sections of this specification. The Contractor shall submit all related drawings and document deemed necessary, prior to the execution of the work, subject to the approval of NPC.

The works shall be performed and completed in a workmanlike manner in accordance with generally accepted modern engineering practice.

#### **EW-2.0 SCOPE OF WORK**

The scope of electrical work covers the furnishing of all labor, materials, equipment, tools and other necessary incidentals required which shall essentially consist of all equipment and materials enumerated herein:

The works to be done shall cover but not limited to the following:

1. Supply, Installation and Test of Lightning Protection and Grounding System;
2. Supply and Installation of Conduit System;
3. Supply, Installation and Test of Complete Lighting and Power system.
4. Supply, Delivery, Installation, Configuration and Testing of Network Switches and Structured Cabling System;
5. Supply, Delivery, Installation, Test and Commissioning of Complete CCTV Surveillance System; and
6. All other works and services including those not specifically detailed herein but are required to fully complete the project.

#### **EW-3.0 STANDARD OF MATERIALS**

All materials to be used in the work shall be new, of high quality, free from all defects and of proven acceptability for the purpose of intended. Unless otherwise specified, materials shall conform to the latest applicable standard issued by the following authorities:

1. American National Standards Institute (ANSI)
2. Institute of Electrical and Electronic Engineers (IEEE)

3. Underwriter's Laboratory (UL)
4. National Electrical Manufacturer's Association (NEMA)
5. National Electrical Code (NEC)
6. Philippine Electrical Code (PEC)

Other recognized national standards maybe accepted if, in the opinion of NPC representatives, such will guarantee a quality not inferior to that guaranteed by the above standards.

In case of conflicting requirements between authorities cited above and those specified, such disagreement shall be resolved by representative of which his decision shall be final.

#### **EW-4.0 LIGHTING SYSTEM**

The lighting system covered by this specification shall include all indoor and outdoor lighting system for the Construction of NPC Eastern Visayas Operation Center at Calbayog City, Western Samar. Lighting system includes outlets (convenience and power), switches, associated conduits and cables, lighting fixtures (indoor, outdoor and emergency), fittings, distribution panelboards, lighting transformers, contactors, timers, etc.

All materials and parts which are not specifically mentioned herein but are necessary for the proper installation, assembly and safe operation of the lighting system shall be identified by the Contractor and furnished by the Contractor at no cost to the NPC. Any cost involve are deemed to be included in the price for the Lighting System.

##### **EW-4.1 Power Source**

The power source for the AC system shall be taken from the nearest 240V, 3-phase, Power Supply to be coordinated with the End-user.

##### **EW-4.2 Lighting and Power Panelboard**

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

##### **EW-4.2.1 Circuit Breaker**

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

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

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

**EW-4.2.2 Grounding Electrode**

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

**EW-4.2.3 Nameplates**

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

**EW-4.3 Lighting Fixtures, Luminaires and Accessories****EW-4.3.1 Lighting Fixtures**

All lighting fixtures when installed shall be free of leaks, warps, dents and other irregularities.

The hangers and brackets of all kinds for safety and proper installation of lighting fixtures shall be furnished and installed by the Contractor at his own expense.

The housing of lighting fixture shall be fabricated of steel sheet, corrosion resistant, good ventilation and easy installation.

All lighting fixtures, samples and catalogues shall be submitted for NPC's review and approval prior to the order. No lighting fixtures shall be installed without approval of NPC.

Lighting fixtures shall be wired with approved fixture wire, 90°C insulation. Each fixture shall be wired to a single point with an adequate slack for proper connection. All lighting fixtures shall be protected from damage during installation. Any broken lighting fixtures, receptacles, stems and the like, shall be replaced with new parts, at no cost to NPC.

**EW-4.3.2 Lighting Luminaires****a. Surface Mounted Type Lighting Fixture**

a.1 IP20 Round Ceiling Luminaire, Surface Mounted, 350mm Diameter, White Steel Base, White Opal Glass Diffuser and Complete with 18 Watts, Led COB Lamp.

a.2 IP20 Surface Mounted Downlight shall be 230V, 60Hz, White Powder Coat Housing, Diamond Design Reflector, and complete with 1x12W Compact LED Lamp.

**b. Recessed Type Lighting Fixture**

b.1 IP20 Recessed Type Lighting Fixture, With Mirror Finish Aluminum Reflector, 1200mm X 600mm Zinc Phosphate

Steel Sheet Housing, 2 X 18 Watts, Cool White, High Output  
Led Lamp Tube Luminaires.

- b.2 IP20 Recess Mounted Vertical Profile Downlight with Aluminum Reflector and Powder Coated Rim Fitted with Vertically Placed E27 Base 1 x 12 Watts and 1 x 5Watts Compact Led Light.

- c. Emergency Lighting Fixture

- c.1 Portable Emergency Lighting Fixture, 2 X 2 Watts Led Warm White with Built-In Sealed Lead Acid Battery; Charging Time < 20 Hrs; Usage Time <= 4 Hrs

- c.2 IP30 Wall Mounted Led Emergency Exit Sign Light, 2 Watts.

- d. Box Type Lighting Fixture

- d.1 Box Type Lighting Fixture with Hpf (>95%) Ballast and Starter, 1200mm, 1 X 18 Watts, Cool White, High Output Led Lamp Tube Luminaires.

- e. Wall Mounted Lighting Fixtures

- e.1 IP44 Wall Mounted Luminaire, Steel Base, White Satinated Glass Diffuser with 1 X 12 Watts Compact Led Lamp.

- f. High Bay Lighting Fixtures

- f.1 IP40 110W Led High Bay Fixture with High Specular Aluminum and Prismatic Reflector, Built-In Heat Pipe and Fold-Fin Heat Sink.

#### **EW-4.4 Switches and Single Phase Outlets**

##### **EW-4.4.1 General**

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

##### **EW-4.4.2 Switches**

Switches for lighting fixtures shall be of the toggle quiet and flush mounted and fixed to the wall 1.37 m above the finished floor level. The rating of the switches shall be 10A, 230VAC, single-phase.

##### **EW-4.4.3 Single Phase Outlets**

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

**EW-4.5 Outlet Boxes and Pulling Boxes****EW-4.5.1 Outlet Boxes**

All outlet boxes for concealed work shall be of hot-dipped galvanized steel. Outlet boxes shall be firmly anchored in place and where required provided with fixture supports. The Contractor shall provide special supports for recessed lighting fixtures, etc. Suitable expansion screws shall be used for securing boxes to solid masonry and approved type toggles for securing to hollow masonry units.

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

**EW-4.5.2 Pulling Boxes**

Pull boxes shall be installed at all necessary points, to prevent damage to the insulation or other damage that might result from pulling resistance or for other reasons related to improper installation. All pulling boxes shall be made of galvanized sheet steel not less than 2mm. Where pulling boxes are used in connection with exposed conduits, plain covers attached to the pulling box with a suitable number of countersunk flathead machine screws may be used.

**EW-4.6 Power Cables****EW-4.6.1 Technical Requirement**

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

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

**EW-4.6.2 Cable Installation**

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

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

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

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

The pull shall be applied to cables only by means of approved grips and the end portion of the cable, which has been marked or deformed by the grip, shall be cut-off by the Contractor.

All cable runs shall be continuous and all termination shall be at the terminal boards, equipment, etc. No splices are allowed in conduit or cable tray.

Prior to installation of cables, conduits shall be thoroughly cleaned to prevent damage to cables during installation. After cables have been installed, cables shall be tested for continuity and insulation, and shall be tagged with respective cable number.

## **EW-5.0      GROUNDING SYSTEM**

This specification covers the technical and associated requirements for the entire grounding system of 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 transformer, panelboards, motors, pumps, etc. and connections.

All materials which are not specifically mentioned herein but are necessary to have an effective grounding system for the building shall be furnished and determined by the Contractor at no additional cost to NPC.

### **EW-5.1      Equipment and Materials Requirements**

#### **EW-5.1.1      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-5.1.2      Ground Rods**

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

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

#### **EW-5.1.3      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-5.1.4      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-5.1.5      Steel Structure Grounding**

All metal parts such as equipment, cable trays, etc. shall be connected to the ground connection.

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

**EW-5.1.6      Equipment Earthing****Transformer Earthing**

The transformer shall be connected to the earthing connection.

**Power Cables**

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

**Lighting Poles**

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

**Other Metallic Structures**

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

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-5.1.7      Building Earthing**

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

Control panels and desks, switchboards, etc. consisting of several individual sections or compartments shall each be connected to a common tinned copper earth bar unless all panels are solidly welded together, or other

approved means are applied ensuring solid earthing connections. In such a case, provisions for earthing must be made at one end at least.

#### **EW-5.1.8 Pipe Earthing**

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

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

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

#### **EW-5.1.9 Cable Tray Earthing**

Cable trays and ladders shall be connected to the earthing system at every ten (10) meters interval.

#### **EW-5.1.10 Ground Rods**

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

### **EW-6.0 LIGHTNING PROTECTION SYSTEM**

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

The materials furnished shall be in accordance with, but not limited to, the latest issues of the Applicable Codes and Standards, including all addenda, in effect at time of purchase order unless otherwise stated in this specification

#### **EW-6.1 Technical Requirements and Characteristics**

##### **EW-6.1.1 Air Terminal and Support**

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

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

**EW-6.1.2 Down Conductor**

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

The main copper conductor shall be made of electrical grade copper, with a minimum cross sectional equivalent to 55 mm<sup>2</sup>. The main conductor shall consist of copper strands helically bound by a copper tape conductor designed to evenly distribute the lightning currents concentrically along the conductor length.

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

**EW-7.0 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 complex, including associated fittings, accessories (elbows, tees, steps, crossings etc.), supporting racks and brackets and all hardware.

Included in the scope is the supply and embedment of concrete inserts for supporting cable tray brackets on walls and provision of openings and recesses in walls and floor concrete inserts.

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-7.1 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 checked to be free from obstructions by pulling a wooden mandrel of appropriate size through the conduit.

Conduits running in floors and terminating at motors or other equipment mounted on concrete bases shall be brought up to the equipment within the concrete bases, wherever possible.

All joints between lengths of conduits and threaded connection to boxes, fittings and equipment enclosures shall be made watertight.

Conduits installed outdoors running underground shall be buried to a minimum of 0.457 m.

**Metallic Conduits (If specified)**

Rigid metallic conduits shall be hot-dipped galvanized. The inside of the conduit shall have stove enameled 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, colored red-orange, schedule 40.

The uPVC conduits shall be non-corrosive and weatherproof, resistant to the attacks of acids and alkalis and must have a self-extinguishing property, hence shall not support combustion. It shall resist corrosion, rust and scale.

**Cable Trays**

The Contractor shall furnish and install cable trays, supports and accessories for the use of power and control cables as shown on the bid drawing. 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 and 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 ground grid.

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.

The steel channel inside the cable trench where power cables will be laid shall be installed at every three (3) meters interval.

**EW-8.0 STRUCTURED CABLING SYSTEM**

This specification covers the technical and associated requirements for the supply, installation and test of the structured cabling system as required including cables, fittings, supporting racks, brackets, etc.

Included in the scope is the supply and embedment of concrete inserts for supporting cable ducts if used on walls and provision of openings and recesses in walls concrete inserts.

The materials furnished shall be in accordance with, but not limited to, the latest issues of the Applicable Codes and Standards, including all addenda, in effect at time of purchase order unless otherwise stated in this specification.

All materials, related parts, and accessories, which are not specifically mentioned herein but are necessary for the proper installation and safe operation of the system shall be identified by the Contractor and shall be furnished at no additional cost to NPC.

All materials to be supplied shall be new and in accordance with the governing standards.

**EW-8.1 Technical Requirements and Characteristics**

The Contractor shall ensure that all equipment supplies function correctly and safely.

The characteristics and ratings of the equipment and devices given in the applicable sections are not necessarily the standards of any manufacturer, but they are the minimum requirements that must be satisfied by the Contractor.

The construction must be as standard as possible in order to reduce to a minimum the spare parts and to make the maintenance and replacement operation easy. All similar parts must be interchangeable.

**EW-8.2 Private Automatic Branch Exchange (PABX)**

The PABX shall be a core telephony server of advanced design and construction using modern electronic switching system based on the required multiplex switching network.

The process shall operate under the control of a program stored in a Programmable Read Only Memory (PROM) and consist of a set of integrated modules, forming a complete telephony solution for an enterprise.

The equipment shall be compact and modular and shall provide easily accessible test points to permit the connection of testing and measuring equipment.

It shall be designed to operate with real time, multi-tasking, multi-processor operating systems. It shall perform call controls, call-signaling, media transcoding and conversion functions. All call routing parameters can be stored.

It shall have the scalability and flexibility architecture that supports the provision of multiple servers and multiple gateways systems, rather than having a singular network for every location. This ensures accommodation of any dialing plan-local, and/or network.

It should be compatible and equipped with functionalities that will seamlessly integrate with the dialing plan and calling policies.

And it shall support a specified number of telephone switching management.

It shall have the accessories and licenses of analog harmonica telco cable and extension-only licenses.

### **EW-8.3 Main Distribution Frame (MDF)**

The MDF shall be furnished in a baked enamel-finished, wall mounted enclosure for mounting the equipment hardware. It shall have a perforated front door with detachable and/or removable side panels, and side locks.

Status of the system shall be readable through shatterproof glass or plastic windows. The cable entry shall have on both top cover and bottom panel with powder coated finish and black. All data communication equipment shall be terminated and interconnected on this frame.

The adjustable square holed mounting rail with cage nuts and bolts shall be provided. It shall be possible to easily perform modifications to and extensions of connected equipment without interfering with the operation of other parts of the installation.

Lines shall be “plugged-in” to the distribution frame separately by way of physical interface terminals. The MDF shall have enough cable entry/ exit connection to accommodate all lines of the data communication equipment up to its ultimate capacity.

The distribution frame shall link the horizontal system and backbone system together. Shall be composed of floor mounted rack, patch panels, terminal block, cross connection wires, patch cord and cable management system.

### **EW-8.4 Intermediate Distribution Frame (IDF)**

The Contractor shall provide a standardized frame or enclosure for mounting the equipment hardware. The rack shall be provided with front and back door with spring lock, detachable side panel and lock. Status of the system shall be readable through shatterproof glass or plastic windows.

The mounting rack shall be capable to provide ease of access for the standard telecommunication practices. Adjustable square holed mounting rail with cage nuts and bolts shall be provided and the shortest possible connectivity link routes shall be striven for.

The mounting rack shall be a standard powder coated finish and black. Racks shall include vertical cable managers mounted on the channels with removable covers that can handle large quantities of cables and patch cords.

**EW-8.5 Core Switch and Network Distribution Switches**

The core switch shall support connection to all the network switches that can accommodate several small form-factor pluggable (SFP) modules.

The network distribution switches to be supplied in the work shall be new, of high quality, free from all defects and of proven acceptability for the purpose intended that acts like a distribution switch that will handle the aggregate traffic if there will be too many end-devices for several locations. Unless otherwise specified, materials shall conform to the latest applicable standard issued and provides ports for the transferring and routing of information.

It must be complete with software, accessories, and connectors for seamless integration with the NPC's data communication equipment and future new equipment. It shall also have SFP and stacking capabilities.

The Contractor shall be responsible for taking reference to its accessibility, means of transportation, cabling, configuration, end to end testing and commissioning of all installed equipment and components to conform to the network topology.

**EW-8.6 Patch Panels**

The patch panels to be provided shall be a cross connect section that will convert communication media from analog-to-digital and vice versa. It shall avoid messy connections for loaded unshielded voice and data patch panels with color universal labels on the network. It shall also aid for ease of maintenance and increase in the life span of the data communication equipment since the switch will not be accessed directly whenever there are faults. It shall have fixed connections with the panel.

Patch panels shall have Category 6A electrical performance. It shall be made of black anodized aluminum or steel 48-port in one rack space configuration, T568A/T568B universally wiring support configuration, with usable bandwidth transmission performance integrated grounding support.

Patch cords are cross connection wire and shall meet or exceed the same category rating of connecting hardware. It shall be assembled with RH45 plugs to enable high levels of performance and 100% transmission tested. It shall be utilized stranded for optimal transmission performance to eliminate Alien Crosstalk with round low smoke zero halogen jacket.

Patch panels shall be certified by Underwriters Laboratories (UL).

**EW-8.7 Structured Cabling System Distribution**

The distribution shall be enclosed in cable ducts and configurable, i.e. adapts modifications without any assistance. The distribution within the buildings will permit a highly available organization of all the applications.

It shall be wired separately installed from power outlets on the cable ducts to be provided. It shall further be suitably protected on both ends to prevent damage to cables and/or equipment as well as to avoid possible electrical shocks.

The Contractor shall perform at his own expense all the inspection to ensure the adequacy of design, materials, satisfactory, and conformance of the supplied equipment to the requirements of the specifications and standards.

#### **EW-8.7.1 Installation Requirements**

The Contractor shall carry out all the installation works as directed by NPC, by furnishing all labor, materials, equipment, and all other supplies necessary to complete the installation works in accordance with the specification and as per industry standards.

The Contractor shall provide complete details of proper handling and storage, installation, print out testing, performance guarantees, etc. to be submitted for NPC's review and approval.

All components and associated accessories for the structured cabling system shall be assembled, installed, tested and commissioned in accordance with the manufacturer's drawings and instruction manual.

Materials and equipment shall be handled with care at all times to prevent damage and defects during handling, transportation, assembly, installation and any damage and defects shall be repaired, replaced or otherwise make good by the Contractor to the satisfaction of and no cost to NPC.

The Contractor shall ensure that the equipment and materials are installed in accordance with manufacturer's standards/recommendations, check hardware configuration, perform adjustments necessary to place the system in trouble free operation. Instruct the operating personnel in the proper operation and maintenance of the equipment, testing instruments and software furnished, perform hardware troubleshooting and/or installation.

Assembly, installation, interfacing, test and commissioning of the system shall be carried out by skilled and qualified personnel. An experienced engineer/service technician, as a minimum, is required for this task.

#### **EW-8.8 Unshielded Twisted Pair Cables and Telephone Wires**

The cables shall be twisted pairs with high immunity to cross talk and electromagnetic interference for voice connectivity distribution of the building.

Insulation shall be suitable for wet and dry location, fungi resistant and ultraviolet stable. All cables shall be moisture and heat resistant, flame retardant polyvinyl chloride insulation, chemical and abrasion resistant nylon sheath. The conductor specification shall meet ASTM specification, and requirements of PEC.

The Contractor shall submit catalogues and/or brochures showing details of insulation of cables to be supplied.

##### **EW-8.8.1 UTP Cables and Telephone Wires Installation**

The cable pulled through cable ducts shall be supported in an approved manner to avoid damage to the insulation. Grease or oily substances shall not be used to facilitate the passage of the conductor in cable ducts.

The pull shall be applied to only by means of approved grips and the end portion of the cables, which has been marked or deformed by the grip, shall be cut-off by the Contractor.

Prior to installation, the cable ducts shall be thoroughly cleaned to prevent damage to cables during installation.

After cables have been installed, it shall be tested for continuity and insulation resistance and shall be tagged with respective wire number.

#### **EW-8.9 Information Outlets**

Information outlets shall be wired separately from lighting and power outlets. Data and telephone outlets shall be based on the number and type furnished, installed and tested in accordance with the bid drawing.

#### **EW-8.10 Grounding System**

All equipment to be used shall be properly grounded in accordance with the latest electrical and electronics industry standards.

#### **EW-9.0 CCTV SURVEILLANCE SYSTEM**

This specification covers the technical and associated requirements for the CCTV surveillance system.

All equipment furnished shall be in accordance with, but not limited to, the latest issues of the Applicable Codes and Standards, including all addenda, in effect at time of purchase order unless otherwise stated in this specification.

All materials, related parts, cables and accessories, which are not specifically mentioned herein but are necessary and/or needed for the proper installation and safe operation of the system shall be identified by the Contractor and shall be furnished at no additional cost to NPC.

#### **EW-9.1 Camera and Lenses**

The cameras shall be IP-based. The operator who will monitor the buildings shall use the whole set of systems. The cameras to be supplied shall be able to cover the area to be viewed, including any person or object required to be identified.

In this project, two (2) types of cameras are to be used:

1. Bullet-type camera
  - a. At least 2MP Resolution
  - b. Supports Full HD
  - c. 25 fps Frame Rate
  - d. H.264 Video Compression
  - e. Starlight Illumination
  - f. IP 66
  - g. Enhanced Digital Image Stabilization
  - h. Long IR Range
  - i. Wide Dynamic Range

The bullet-type camera shall have wide dynamic range, infrared range, and digital noise reduction and on-screen display. It shall be without spotlight.

All equipment to be used shall be properly grounded in accordance with the latest electrical and electronics industry standards.

## 2. Dome-type camera

- a. At least 2MP Resolution
- b. Supports Full HD
- c. 25 fps Frame Rate
- d. H.264 Video Compression
- e. Starlight Illumination
- f. IP 66
- g. Optical and digital zoom
- h. Bi-directional video support

The dome-type camera shall have 360-degree range that can capture videos in all directions with high-resolution performance.

The cameras shall be able to operate without regulation, i.e. the said system shall be put into operation with switches without any adjustment. Any data captured by the camera is to be reserved for 10 hours or more during equipment outages when the normal power supply may be off.

The Contractor shall define the focusing ranges and allowable minimum distance between camera head and objects in accordance with the bid drawings. Every camera shall be connected in the switches.

Each camera shall have proven high voltage induction protection features and failure of the camera shall not cause loss of control of more than one component and must not cause a total system failure.

## **EW-9.2 Network Ethernet Switches**

The network Ethernet switch acts like a terminal of all system's equipment and components. For the system, these switches shall be capable of handling Power-Over-Ethernet (POE) that are needed for the cameras with Gigabit POE ports, 10/100/1000 Mbps (RJ-45) and IEEE 802.3at compliant.

## **EW-9.3 Digital Video Recorder**

The video recorder should be able to record and playback the displayed channel pictures with considerable size storage capacity (including split screen and full picture) on the monitors. The playback speed shall be selected on normal speed (forward), time lapse mode, playback frame by frame, and playback still frame. In addition, using the control keyboards of the system shall be possible to remotely control the cameras.

The video recorder shall have an event processor utilizing the recorded video in digital format to a disk drive as the recording media. The recorder/playback equipment shall be a complete unit. Digital type, solid state and microprocessor based, capable for automatic/remote/manual

operation. It should be robust, secure operation – instant real time access to video with at least 60 days of video recording.

#### **EW-9.4 PC Assembly**

The assembly is composed of control keyboards and/or remote control that shall be an industrial-grade desktop.

The PC assembly shall have the following functions:

1. To Control Video Switch-over

Video recorder sets shall be assigned to control cameras in one monitor with the specified number of channels.

Circuit connectivity shall be adopted in video recorders. There shall be no picture flicker or other effects during switch-over displays.

Anyone of the foreseen pictures shall be randomly switched and the entire picture taken by any of the cameras shall also be shown when the monitor displays pictures.

The switch-over of pictures shall be realized automatically on a set time basis or manually on request. Video signals from various cameras shall display pictures on the same monitor automatically and sequentially during auto-cycle switch-over. The manual model changeover shall be made by keyboard operation.

Recording and Playback shall be done at any time.

2. To Control Video Pick-up System

Video pick-up system control includes remote control of the cameras, and protective cover.

Either of the remote control if required, or any camera shall do control from keyboards. Priority between the following remote-control operations shall be realized on each of the keyboards.

The remote operation of the camera shall be smooth and continuous. Stepped operation will not be accepted.

To ensure reliable control, the Contractor shall select the control mode for the cameras according to their location as specified in the bid drawings or as directed by NPC personnel.

An indicating light shall be provided on the keyboard to warn the operator when the tape in the recorder has come to an end.

#### **EW-9.5 Video Monitor**

An industrial type unit of monitors with different communication interfaces shall be provided for the system. The monitors shall be a high-resolution color video monitor that can be used in desktop applications and/or rack mounted using easy to assemble mounting kits and is required.

**EW-9.6 Uninterruptible Power Supply (UPS)**

The Contractor shall install a UPS that will continuously provide the power supply requirement for the system. The UPS to be supplied shall provide continuous, regulated power under normal and on the abnormal conditions. There shall be no interruption of power to the load when the UPS transfers to and from battery operation.

**EW-9.7 Unshielded Twisted Pair Cat6 Cables**

The cables shall be twisted pairs with high immunity to cross talk and electromagnetic interference for voice connectivity distribution of the building.

Insulation shall be suitable for wet and dry location, fungi resistant and ultraviolet stable. All cables shall be moisture and heat resistant, flame retardant polyvinyl chloride insulation, chemical and abrasion resistant nylon sheath. The conductor specification shall meet ASTM specification, and requirements of PEC.

The Contractor shall submit catalogues and/or brochures showing details of insulation of cables to be supplied.

**EW-9.8.1 Cable Installation**

The cable pulled through cable ducts shall be supported in an approved manner to avoid damage to the insulation. Grease or oily substances shall not be used to facilitate the passage of the cables.

The pull shall be applied only by means of approved grips and the end portion of the cables, which has been marked or deformed by the grip, shall be cut-off by the Contractor.

Prior to installation, the cable ducts shall be thoroughly cleaned to prevent damage to cables during installation.

After cables have been installed, it shall be tested for continuity and insulation resistance and shall be tagged with respective wire number.

**EW-9.9 Grounding System**

All equipment to be used shall be properly grounded in accordance with the latest electrical and electronics industry standards.

**EW-10.0 MEASUREMENT OF PAYMENT****a) Electrical System**

Measurement of payment for the supply, installation and test of Lighting and Power Panelboard, lighting fixtures, Outlets and Switches, Conductors, Lightning Protection and Grounding System, Conduits, Embedded and/or Non-Embedded Conduits, shall be based on the number of sets furnished, installed and tested in accordance with the bid drawing. Payment will be made at the contract unit price for the corresponding item in the Bill of Quantities.

Payment thereof shall constitute the full compensation for furnishing the corresponding item and labor necessary to complete the work including testing.

b) Telecommunication Facilities

Measurement of payment for the supply, installation and test of Complete Structured Cabling System and CCTV Surveillance System shall be on the number of sets furnished, installed and tested in conformity with the Bid Drawing. Payment shall be made at the contract unit price for the corresponding item in the Bill of Quantities.

Payment thereof shall constitute the full compensation for furnishing all materials and labor necessary to complete the work including testing.

SECTION VI

**TECHNICAL  
SPECIFICATIONS**

**MECHANICAL WORKS**

**PART I – TECHNICAL SPECIFICATIONS****MW – MECHANICAL WORKS****TABLE OF CONTENTS**

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## **MW – MECHANICAL WORKS**

### **MW-1.0 GENERAL**

The Work to be done under this section shall include the furnishing of all labor, materials, equipment, tools, transport, installation, test and other incidentals for all mechanical works enumerated hereunder or as shown on the accompanying drawings and installation manuals or as otherwise directed by NPC.

The work shall be performed and completed with high proficiency, in accordance with generally accepted modern practice in the supply, installation/erection and test of Mechanical Equipment for the **Construction of NPC Eastern Visayas Operation Center at Calbayog City, Western Samar.**

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

The Contractor shall closely coordinate with other disciplines to avoid interference with other works specified in the relevant sections of this specification.

### **MW-2.0 SCOPE OF WORK**

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

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

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

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

- a. Domestic Water System complete with water pumps (with pumphouse) and spare parts (1 year), controller, cistern/water storage tank fitted with accessories, valves, pipe fittings, water meter, piping works, pipe supports excavation and backfilling of embedded pipes as required including disinfection of the system and other incidentals to complete the piping system;
- b. Air-conditioning (AC), Inverter, Split-Type Wall/Floor Mounted and Window Type; and Ventilation System Wall/Ceiling Mounted Exhaust Fans complete with necessary controls, mounting accessories and other appurtenances;
- c. Fire Fighting System (Fire Detection and Alarm, Fire Hydrant System, Automatic Fire Water Sprinklers and Potable Fire Extinguisher) complete fire with piping materials; valves; fittings and appurtenances; and
- d. All other works and services including those are not specifically detailed herein but are required to fully complete the project.

### **MW-3.0 GENERAL MECHANICAL REQUIREMENTS**

#### **MW-3.1 General**

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

The Contractor shall provide the services of qualified engineers who shall be responsible for the installation and test, of all equipment to be supplied by the Contractor.

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

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

**MW-3.2 Materials and Equipment**

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

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

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

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

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

**MW-3.4 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 the latest edition of all applicable codes and standards, national and local laws, codes and regulations, statutes and ordinances.

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

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

**MW-3.5 Equipment Foundation**

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

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

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

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

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

### **MW-3.6 Piping System**

#### **MW-3.6.1 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 equipment. All required piping shall be furnished complete with flanges, joints, gaskets, packing, drains, vents, insulation if required, hangers, guides, and all auxiliary steel and anchors required to complete the pipe supports.

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

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

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

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

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

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

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

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

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

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

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

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

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

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 facilities 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-3.6.2 Pipe and fittings**

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

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

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

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

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

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

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

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

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

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

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

**MW-3.6.3 Piping Accessories**

Strainers shall be of basket type with body cast iron material and flanged ends. Body drain and vent connections shall be included. Drain plugs shall be threaded. Screen elements shall be of stainless steel construction with minimum 32-mesh size or shown on the drawings. Magnets shall be included to trap small iron and steel particles for use in fuel oil lines.

Pressure gauges for fuel oil system shall be provided with dampener. Each pressure gauge shall be provided with isolation valve. Pressure gauge shall be of bourdon tube type with solid front case, and minimum size of dial gauge shall be of 100 mm Ø.

**MW-3.6.4 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-3.6.5 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 no longer than the length of the riser supplemented by the nearest support. Bends shall have the supports no further away from the riser than the radius. Where two rods are used in a solid rod riser hanger, each rod shall be capable of taking the entire load.

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

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

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

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

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

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

#### **MW-3.6.6 Welding**

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

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

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

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

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

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

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

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

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

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

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

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

**MW-3.7 Valves and Accessories**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

#### **MW-3.8 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-3.9 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-3.10 Corrosion Protection and Painting**

#### **MW-3.10.1 General**

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

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

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

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

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

#### **MW-3.10.2 Treatment for Shipping**

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

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

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

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

All internal surfaces of 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.

#### **MW-3.10.3 Application of Paint**

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

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

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

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

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

For non-insulated surfaces exposed to high temperature, two (2) coats of Aluminum modified silicone with volume solids of 42%  $\pm$  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.

#### **MW-3.10.4 Hot Dipped Galvanizing**

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

The thickness of applied layer shall correspond to a minimum rate of 550 gm/m<sup>2</sup>.

#### **MW-3.11 Equipment Marking, Labeling and Miscellaneous Requirements**

##### **MW-3.11.1 Identification System**

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

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

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

Nameplates, labels and warning plates shall be in English.

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

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

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

#### **MW-3.11.2 Nameplates**

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

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

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

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

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

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

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

#### **MW-3.11.3 Labels**

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

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

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

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

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

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

#### **MW-3.11.4 Tag Numbers/Standard Plant Identification Number (SPIN)**

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

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

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

**MW-3.11.5 Erection Marks**

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

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

**MW-3.12 Drawings and Instruction Manuals****MW-3.12.1 Drawings Contained in the Tender Document**

The drawings called for in this section shall be the Bid Drawings and/or Reference Drawings attached in the Tender Document. They are considered as defining the minimum requirements for the design of the equipment to be furnished and to show the general layout and equipment arrangement which indicate limiting or mandatory dimensions and elevations. However, if such indicated dimensions are found deemed inadequate during the implementation stage, changes or adjustments may be made subject to NPC's review and approval.

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

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.

The drawings and the specifications are complimentary to each other and what is called for in one shall be as binding as if called for both. Likewise, anything mentioned in the specifications and not shown on the drawings, or shown in the drawings but not mentioned in the specifications but which are obviously necessary to make a complete installation shall be considered under the Contractor's Scope of Works.

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

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

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

#### **MW-3.12.2 Contractor/Manufacturer Drawings and Instruction Manuals**

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

To provide the basis for programming the checking of the Contractor's drawings, the Contractor shall, within one (1) month from effectivity date of the contract, prepare and submit to NPC for approval a drawing and document lists summarizing the drawings he proposes to submit in accordance with the requirements specified herein, together with the dates on which he proposes to submit such drawings.

These lists shall be updated monthly to show the status of the drawings and documents submitted and any additional proposed drawings. NPC shall have the right to require the 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.

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

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

The Contractor shall be responsible for any discrepancies, errors or omissions in the drawings and other particulars supplied by him whether such drawings and particulars have been approved by NPC or not, provided that such discrepancies, errors or omissions are not due to inaccurate information or particulars furnished in writing to the Contractor by NPC.

NPC shall have the right to require the Contractor to make any changes to the drawings which may necessary, in the opinion of NPC, to make the works conform to the intent of the Contract.

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

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

### **MW-3.12.3 Critical Path Network and Time Bar Diagram**

Immediately upon effectivity of the Contract, NPC and the Contractor shall re-examine the Critical Path Network and Time Bar Diagram submitted with the Bid and determine by mutual agreement the "Agreed Critical Path Network" and "Agreed Time Bar Diagram". The "Agreed Critical Path Network" shall not be revised or modified without the prior approval of NPC or except where extension of the contract period is approved in accordance with relevant provisions of the specifications.

Every month thereafter, during the Contract period, the Contractor shall furnish NPC with the revised "Agreed Critical Path Network" and "Agreed Time Bar Diagram" and bring them up-to-date such that the "Agreed Critical Path Network" and "Agreed Time Bar Diagram" are still in effect. In all cases the "Agreed Critical Path Network" and "Agreed Time Bar Diagram" or subsequent approved revisions thereof, shall be prepared based only on the previous "Agreed Critical Path Network" and "Agreed Time Bar Diagram". If in the opinion of NPC, the Works is not being adequately or properly prosecuted in any respect, NPC shall require the Contractor to submit a new "Agreed Critical Path Network" and "Agreed Time Bar Diagram" providing for the proper and timely completion of the Works covered by this Contract.

The Contractor shall see to it that the "Agreed Critical Path Network" and "Agreed Time Bar Diagram" are followed as much as possible. No activity in the Network shall be started ahead of time at the expense of another unless it can be shown that the change in the sequence of operations is beneficial to the NPC, in which case, the prior approval of NPC shall be secured.

The percentage which will be the basis for judgment of the progress of the Works shall be computed in percent of progress in each different item of work and integrated on the "Agreed Critical Path Network" and "Agreed Time Bar Diagram" (with approved modification or revision, if any). The actual value or quantity of work done divided by the value or quantity of the total work, respectively, and multiplied by 100 shall be the Contractor's percentage of accomplishment.

The percentage of accomplishment subtracted from anticipated percentage on the "Agreed Critical Path Network" and "Agreed Time Bar Diagram" is the percentage the Contractor is behind or ahead in his work.

None of the statements contained herein shall relieve the Contractor of the obligation to prosecute and complete the Works.

#### **MW-3.12.4 As-Built Drawings**

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

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

The complete and duly checked and approved "As-Built" 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 write-once recordable CDs. Such CDs shall be suitable for CD ROM/WRITE drive of computer system.

#### **MW-3.12.5 Instruction Manuals**

The Contractor shall furnish three (3) copies of the Instruction Manuals/Operation & Maintenance Manuals for all his supplied equipment under this Contract, at least one (1) month prior to the conduct of site testing for NPC review and approval.

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

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

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

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

**MW-3.12.6 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  
Agham 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. However, if the Supplier/Contractor has not received any reply from NPC within the twenty (20) calendar days, said drawings and documents are deemed approved and the Supplier/Contractor may proceed with the design and manufacture of equipment or materials. The Supplier/Contractor however, shall not be relieved to meet all the requirements of this specification nor of the responsibility for the correctness of the Supplier's/Contractor's drawings/documents.

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.

Failure of the Supplier to submit the approved "As-Built" Drawings and "Operation and Maintenance" Manuals to NPC on the respective dates specified in this section, NPC shall withhold Five percent (5%) of contract amount from payments due to the Supplier.

**MW-4.0 DOMESTIC WATER SUPPLY SYSTEM****MW-4.1 General**

This section provides the essential information for the design, supply, installation, construction, test and commissioning of the complete Domestic Water Supply System to provide the water requirements of the Calbayog Operation Center including the required excavation and backfilling of pipe trenches.

The work includes the interconnection with the existing water supply line installed along the public access road. Necessary permit for interconnection shall be secured by the Contractor with the assistance of NPC. Corresponding fees for such interconnection shall be borne by the Contractor.

The work shall include, but not limited to the following:

- a) One (1) lot of Water Storage Tanks (Cistern and Elevated tank) and associated structural supports and concrete foundations complete with accessories as described in the specifications and shown on the drawings;
- b) Two (2) sets of self-priming centrifugal pump complete with controls and other accessories including spare parts for one (1) year operation;
- c) One (1) lot of piping works, valves, instrumentation and necessary accessories including the required excavation and backfilling works for embedded pipes.

**MW-4.2 Elevated Water Storage Tank**

The Contractor shall supply, deliver, install and test one (1) set of Elevated Water Storage Tank. The water storage tank shall have a minimum capacity of 10,000 liters and shall be of horizontal cylindrical stainless steel type to be installed on the roof deck of Calbayog Operation Center building. The water storage tank shall be complete with manhole, inlet and outlet nozzles with applicable valves, overflow and drain nozzles with applicable valves and pipe, 20mm level gauge glass with glass guard rods and level switch, pipe supports, access ladder and supporting steel structures.

Tank foundation and/or supporting steel structures shall be in accordance with requirements of relevant Civil Works specifications and drawings.

The supply shall include but not limited to the following:

- a) One (1) unit of 40mm Ø Globe Valve at tank's outlet;
- b) One (1) unit of 32mm Ø Gate Valve @ tank's drain;
- c) One (1) level switch, 4-level set points, magnetic float level type, stainless steel chamber

**MW-4.3 Self-Priming Centrifugal Pump**

The scope of work shall cover the supply, delivery, installation and test of two (2) units of self-priming centrifugal pump, complete with flanges, bolts, nuts and other accessories necessary for the safe and reliable operation of the domestic water supply system.

The supply shall include but not limited to the following:

- a) Five (5) units of 50mm Ø Gate Valve @ pump's suction & discharge, bypass, cistern inlet and water source isolation;
- b) Three (3) units of 50mm Ø Check Valve @ pump's discharge & bypass;
- c) One (1) unit of Pressure Gauge @ pump's discharge;
- d) One (1) unit of 50mm Ø Float Valve for cistern, bronze material;
- e) One (1) level switch, 1-level set point, magnetic float level type, stainless steel chamber @ cistern; and
- f) One (1) lot of Standard Spare Parts for self-priming centrifugal pumps as recommended by the manufacturer for one (1) year operation and as specified in the technical specifications.

**MW-4.3.1 Materials and Construction**

The centrifugal pumps shall be designed to have continuous flow rate of not less than 13.64 m<sup>3</sup>/hr at total head of not less than 35m.

The pump shall be designed to operate continuously or intermittently with no fear of damage to the motor. The pump shall be centrifugal type, self-priming, horizontal, made of bronze or stainless steel impeller, stainless steel shaft and cast iron body. The pump shall preferably be of the horizontal shaft type. The pump casing shall be split type for ease of maintenance such that the impeller and shaft are capable of being withdrawn without disturbing any of the main pipework and valves carrying the pumped fluid.

The horizontal pump shall be mounted with its driving motor on a common bedplate of rigid construction. The bed plate shall be complete with drip tray fitted with a conveniently located drain plug.

Pump shall be directly coupled to the electric motor which complies with the latest NEMA standards.

The motor shall be operated on 230V, single phase, 60 hz suitable for continuous and intermittent operation. The motor shall be equipped with built-in overload protection and automatic reset to assure safe motor operation under normal field conditions.

Motor shall be provided with suitable electrical control and complete protective devices. The control relays of the motor starter shall be contained in the steel metal enclosures or control panel installed in the pumphouse.

**MW-4.3.2 Power Cable**

Power supply and control cables shall be included in the supply. Power supply shall be sourced from the Power Panel Board and terminated in the pump's local control panel installed in the pump house. The cables shall be sized suitably for the proper pump operation conforming to the requirements specified in the relevant Electrical Specifications.

**MW-4.3.3 Controls**

Motor shall be provided with suitable electrical controls and complete protective devices. The control equipment shall be of switch actuated control type. The control relays shall be contained in the steel metal enclosures/control panel of the motor starter. The pump controls shall be designed such that it can be operated either automatically in conjunction with a level switch in the water storage tank or manually through a manual-local control push buttons provided at the pump's local control panel installed in the pump house.

The control for the two water pumps shall be designed such that when one running pump trips, the non-running pump shall start automatically. Control switch to start and stop the pump shall be done in the local panel installed within the pumphouse. Sufficient status indications and alarm signal is initiated upon loss of pump operation. Pump operation shall be as follows:

- |                                                          |                                                                                  |
|----------------------------------------------------------|----------------------------------------------------------------------------------|
| a) Water storage tank level high:                        | Pump stops                                                                       |
| b) Water storage tank level high high:                   | Annunciate high level alarm and simultaneously trips the running pump            |
| c) Water storage tank level low:                         | Pump starts                                                                      |
| d) Water storage tank level low low:                     | Annunciate low level alarm and simultaneously triggers the standby pump to start |
| e) Cistern water level low:<br>(maintaining level @ 50%) | Pump to stop or pump will not start                                              |

The local control panel shall include pump starter, circuit breaker, motor overload protection, pump control relay, internal 230-240volt control transformer for supplying power to the instruments and control system, start/stop push buttons with indicating lights, power supply indicating light, level alarms, failure or trouble alarm and other components required for the proper operation of the pump. The change over switch for AUTO-LOCAL operation shall be provided in the local control panel.

**MW-4.3.4 Pipe, Pipe Fittings and Accessories**

Domestic water supply and distribution piping shall generally be constructed from Polypropylene (PP-R) pipe, conforming to ISO, DIN standard and/or approved equivalent with a rating of 20 bars PN, unless otherwise shown on the drawing.

Polypropylene pipe connection joints shall be by heat fusion in accordance with the manufacturer's recommendation.

Flanged connections may be used for connecting to flanged surfaces and shall be of the same material with the connected pipe with a rating of class 150 or ANSI 150 as minimum.

Flanged joints may use flat gaskets with serrated flange faces or O-rings with corresponding grooves. Gaskets and O-rings shall not be fabricated from polypropylene material.

Union joints shall not be used with pipe diameters of more than 63 mm O.D. (2"), except otherwise commercially available per manufacturer's standard. Joints between metal pipes and PP-R pipes should be flanged type using a PP-R flange on the PPR pipe and full face gasket.

Flange bolts shall be hexagonal head machine bolts with heavy semi-finished head nuts having dimensions in accordance with ANSI B18.2.

#### **MW-4.3.5 Valves and Accessories**

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

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

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

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

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

Strainers, if required, shall be of Y-type with cast iron or PP-R body material and flanged or screwed ends. Screen elements shall be of stainless steel construction with minimum of 40-mesh size.

#### **MW-4.4 Installation**

The Contractor shall install the piping system in a thorough manner and with high quality workmanship in accordance with the construction drawings and specification or as directed by NPC. No installation work for underground pipe shall commence unless trench excavation has been approved by NPC.

The domestic water system piping shall generally be laid underground. All trenches shall be provided with a cushion pad of at least 150mm sand and sandy soil bedding materials. All pipeline excavations shall be backfilled up to the level of the finished grade surface in layers of 150 and each layer shall be thoroughly compacted. Backfill materials shall be compatible soil taken from trench excavation and approved by NPC.

All trench excavation and backfill works shall be done in accordance with pertinent provisions specified in the Civil Works Specifications.

All pipes that cross roadways shall be provided with pipe sleeve made of steel material or RCP pipe to protect the pipe from various loads imposed by vehicles and shall extend 600mm beyond shoulder of each pavement side. Embedded water supply pipes in open areas shall be laid not less than 300mm from the ground surface to the bottom of pipe.

PP-R pipe installed aboveground shall be properly supported to avoid pipe sagging. Pipe covering made of steel or metal shall be provided in case there is high risk of damaging the pipe during normal operation and maintenance.

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

Special care shall be taken in carrying out the installation of joints, branches, valves and other fittings.

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

Embedded water supply pipes in open areas shall be laid not less than 300mm from the ground surface to the bottom of pipe.

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

Transportation, storage and erection shall be in strict accordance with manufacturer's recommendations. Erection shall be such as to prevent stress in the piping.

#### **MW-4.5      Testing**

The piping system shall be hydrostatically tested at a pressure 1.5 times the design pressure or maximum working pressure of the system for a period of not less than 30 minutes.

Before any test is made, the Contractor shall notify NPC in advance so that such test may be witnessed. All expenses that may be incurred during the tests shall be borne by the Contractor.

If applicable, test shall also include visual check on joints or welded parts, as applicable, during actual operation of each system to ensure that no leakage is observed on the joints.

Before starting the test procedure, the piping shall be flushed and cleaned thoroughly. When filling the line with water, all air shall be removed.

Tests may be applied to sections or the entire system. The test shall be made between valves and sections of not more than 305m (1000 ft) in accordance with the American Water Works Association (AWWA).

There shall be no leakage whatsoever from the pipes, fittings and connections for each section tested while the system is under the test pressure for the period of not less than thirty (30) minutes of the total time to inspect all portions of the waterline under test, whichever is longer.

During the test, valves shall be opened and closed. Any leakage or any defect disclosed by the tests prior to the acceptance shall be corrected and repaired by the Contractor at his own expense to the satisfaction of NPC.

The Contractor shall submit the following for review and/or approval by NPC:

- a. Test procedures prior to test; and
- b. Test and inspection reports.

#### **MW-4.6 Disinfecting of the Domestic Water Piping System**

The domestic water piping system shall be disinfected after testing and before being put into use. Before disinfection, piping should be drained, flushed, re-drained and refilled. In refilling, care must be taken to avoid entraining or entrapping air in the pipe. The Contractor may use any of the methods of disinfection as recommended by the American Water Works Association (AWWA) or any of the following kinds of treatment:

- a. Chlorine Gas-Water Mixture;
- b. Calcium-Hypochlorite or equal; or
- c. Dry Calcium Hypochlorite or Chlorinated Lime and Water Mixture.

Retention period shall be at least 24 hours and shall produce not less than 10 ppm at extreme end of the lines at the end of the retention period. After flushing, residual chlorine must be reduced to less than 1 ppm.

**MW-4.7 Submittal**

The following documents shall be submitted by the Contractor for NPC's review and approval prior to procurement and installation.

- a. Complete data, specifications and catalogues;
- b. Outline and assembly drawings;
- c. Test procedures;
- d. Field test reports; and
- e. Operation and Maintenance Manuals.

**MW-5.0 AIRCONDITIONING AND VENTILATION SYSTEM****MW-5.1 General**

This section provides the essential information for the Air Conditioning and Ventilation System equipment to be supplied, installed and tested by the Contractor.

All Ventilation and Air Conditioning equipment shall preferably have one Brand name and shall be the standard product of a reputable A/C manufacturer. In case other brand of A/C and Ventilation equipment are to be used to meet with the specific requirements in the bid document, catalogues and other supporting documents shall be submitted for NPC's review and approval.

Power supply for the ventilation and air-conditioning equipment shall be 230V, single phase, 60 Hz, except otherwise specified.

Refrigerant to be used shall be environment-friendly.

All necessary transformers and electrical materials shall be included in the Contractor's supply if power ratings provided are other than the one's specified above.

**MW-5.2 Design Conditions****MW-5.2.1 Outdoor Conditions**

Dry Bulb Temperature	:	35°C
Wet Bulb Temperature	:	27°C
Relative Humidity	:	80% to 100%

**MW-5.2.2 Indoor Conditions (Air-Conditioned Areas)**

Wet Bulb Temperature	:	24°C ± 3°C
Relative Humidity	:	50% ± 5%

**MW-5.2.3 Area to be air-conditioned shall be:**

Ground Floor	:	One (1) Room/Area
Mezzanine	:	One (1) Room/Area
2 <sup>nd</sup> Floor	:	Two (2) Rooms/Areas
3 <sup>rd</sup> Floor	:	Six (6) Rooms/Areas

**MW-5.2.4 Areas to be Ventilated @ 10 Air Changes per hour**

Ground Floor	:	Two (2) Rooms/Areas
2 <sup>nd</sup> Floor	:	Two (2) Rooms/Areas
3 <sup>rd</sup> Floor	:	Five (5) Rooms/Areas

**MW-5.3 Schedule of Equipment****MW-5.3.1 Air-Conditioning Units**

Location	No. of Unit/s	Cooling Capacity/Unit	Type
<b>a. Ground Floor (1 Unit)</b>			
1. Warehouse Office	One (1)	8,500 kJ/hr	Inverter Window Type
<b>b. Mezzanine (1 Unit)</b>			
2. Cashier	One (1)	8,500 kJ/hr	Inverter Window Type
<b>c. 2nd Floor (5 Units)</b>			
3. Office Area	Four (4)	38,000 kJ/hr	Inverter-Split Type Floor Mounted
4. Visitors Lounge	One (1)	8,500 kJ/hr	Inverter Window Type
<b>d. 3rd Floor (6 Units)</b>			
5. Bedroom 1	One (1)	20,000 kJ/hr	Inverter-Split Type Wall Mounted
6. Bedroom 2	One (1)	20,000 kJ/hr	
7. Bedroom 3	One (1)	13,000 kJ/hr	
8. Bedroom 4	One (1)	13,000 kJ/hr	
9. Bedroom 5	One (1)	13,000 kJ/hr	
10. Dormitory Office	One (1)	8,500 kJ/hr	Inverter Window Type
<b>Total Air Conditioning Units</b>	<b>13</b>		

**MW-5.3.2 Ventilation/Exhaust Fans Units**

Location	No. of Unit/s	Flow Rate	Type Exhaust Fan
a. Ground Floor (3 Units)			
1. Warehouse	Two (2)	4,700 m³/hr	Wall Mounted
2. PWD CR	One (1)	150 m³/hr	
b. 2 <sup>nd</sup> Floor (2 Units)			
3. Men's CR	One (1)	250 m³/hr	Ceiling Mounted
4. Women's CR	One (1)	250 m³/hr	
c. 3 <sup>rd</sup> Floor (5 Units)			
5. Bedroom 3 CR	One (1)	100 m³/hr	Ceiling Mounted
6. Bedroom 4 CR	One (1)	100 m³/hr	
7. Bedroom 5 CR	One (1)	100 m³/hr	
8. Men's CR	One (1)	250 m³/hr	
9. Women's CR	One (1)	250 m³/hr	
Total Exhaust Fan Units	10		

**MW-5.4 Air-conditioning System****MW-5.4.1 Scope of Works**

The Work called for in this specification includes the design, furnishing, delivering, installing and testing of window type and split type air conditioners (inverter type) including refrigerant pipes, insulation, mounting brackets and concrete pads to provide a fully ventilated and air-conditioned rooms. The following works shall include other accessories even though not specifically mentioned in this specification but are necessary to obtain a complete set for the safe and reliable operation of the system as a whole.

All installation works shall include provision of opening on concrete walls, boring through walls, construction of concrete foundations for outdoor units as required, structural supports for indoor and outdoor units, layout of insulated refrigerant piping, piping supports including excavation and backfilling for embedded refrigerant piping as required, cables/wiring and other necessary accessories to complete the system.

All electrical materials such as circuit breakers, automatic controls, including all power and control wires, supervision, electrical outlets, fittings and conduits for interlocking the operation of the indoor units and outdoor units shall be included and provided by the Contractor including complete system of automatic temperature controls.

All air conditioning units to be supplied and installed shall have the following features/accessories but not limited to:

- With Remote Controller and Holder
- With automatic and manual swing louver control
- With control switch
- Cool Mode
- Fan Mode
- Automatic Mode

The type and quantity of air conditioning equipment to be supplied shall be as specified in Clause 5.3 (Schedule of Equipment) or shown on the drawings.

#### **MW-5.4.2 Window Type Air- conditioning Systems**

The Window Type Air Conditioning Units to be supplied and installed for specific areas in the building are as specified in the schedule of equipment or shown on the drawings.

The units shall be wall mounted room air conditioner and shall be provided with a room thermostat and sensing element which detect changes in room temperature and adjust it to desired cooling by automatic actuation of the compressor. Compressor shall be provided with thermal overload device that automatically shuts off the compressor during overheating.

Fan motor shall be permanently lubricated. The unit shall operate on a 230 V AC, single phase and 60 Hz power supply.

Mounting brackets which are properly fixed on the concrete wall or structure shall be provided to support the suspended portion of the air conditioner unit. Weather seals shall be provided on the area between the air conditioner and wall opening.

Provision of wall opening for the installation of the window type air conditioning units shall be closely coordinated with the civil works.

#### **MW-5.4.3 Split-Inverter Type Air- conditioning Systems**

##### **MW-5.4.3.1 Fan Coil Unit (Indoor Unit)**

The fan coil units shall be factory-built, factory-tested, and installed in accordance with the manufacturer's recommendations. The unit shall be complete with motor/blower assembly, evaporator coil, low voltage components, frame, cabinet, cleanable air filters, condensate drain, etc.

Unit casing shall be fabricated of heavy-gauge galvanized steel or other approved corrosion-resistant materials reinforced with steel angle framework and shall be insulated with fiberglass or other approved insulated materials for excellent thermal and acoustic insulation.

The centrifugal blower wheels shall be statically and dynamically balanced for smooth and quiet operation. Fan housing and motors shall be designed to minimize vibration inside the unit. Fan and motor bearings shall be easily accessible for maintenance and lubrication.

The evaporator coil shall be factory tested under pressure for leaks and completely dehydrated under vacuum.

Refrigerant control shall utilize thermostatic expansion valve.

Air filters shall be cleanable and removable type.

Condensate drain pan shall be of heavy gauge galvanized steel or other approved corrosion-resistant material. Condensate from FCU shall be drained to the nearest drain line using Polyvinyl Chloride (PVC) material of approved class piping or other approved corrosive-resistant material.

The cooling system shall be provided with safety devices to protect the system against damage from unusual operating conditions.

The Contractor shall provide other accessories such as discharge grilles, return grilles, etc.

Types of indoor units (wall mounted) shall be as specified in the schedule of equipment or shown on the drawings.

#### **MW-5.4.3.2 Condensing Unit (Outdoor Unit)**

The condensing units shall be weatherproof, factory built and tested; and installed in accordance with manufacturer's recommendations. The unit shall be air-cooled type, complete with compressor/motor, condenser coils, condenser fan/motor, safety devices, controls, etc.

The unit casing shall be weatherproof constructed of heavy gauge galvanized steel topped with two (2) coats of baked enamel for durability and protection against corrosion or other approved corrosive-resistant material.

Condenser fans shall be direct-driven dynamically balanced propeller type. Fans/motors shall be designed to minimize vibration inside the unit. Fan and motor bearings shall be easily accessible for maintenance and lubrication.

Type of compressor depends on the capacity of the system (see schedule of equipment) or manufacturer's standard. Safety devices shall be provided to protect the system against damage from unusual operating conditions.

#### **MW-5.4.3.3 Refrigerant and Piping System**

The Contractor shall design, furnish and install the refrigerant piping from fan coil unit to the condensing unit. Exact location of equipment and piping route shall be coordinated with NPC prior to installation.

Refrigerant to be used shall be environment-friendly.

Refrigerant piping shall be seamless hard drawn copper preferably single piping connection from the indoor unit to the outdoor unit for simple installation.

All parts in contact with copper piping shall be copper plated. Hangers and supports for all piping shall be selected as applicable to suit actual condition of the existing structures.

All suction piping to compressor shall be insulated with pre-sized fiberglass insulation covered with aluminum vapor barrier or other approved insulation per manufacturer's standard. Insulation should be installed on clean and dry surfaces. All insulation shall be continuous through walls, ceilings and sleeves.

#### **MW-5.5 Ventilation Units**

##### **MW-5.5.1 General**

The Contractor shall furnish, deliver, install and test the ventilation system equipment complete with all the necessary appurtenances for its efficient operation. The scope of supply shall include all mounting supports and fixing materials required to complete the installation and ready for operation.

The unit shall be properly sized to conform to the required air changes per hour at free air for this particular application but in no case be less than those specified elsewhere in this specification. It shall be designed to continuously or intermittently operate on a 230 V, single phase, 60 Hz power supply, unless otherwise specified.

##### **MW-5.5.2 Wall Mounted Exhaust Fans**

Thru the wall propeller exhaust fans shall be provided at the area as specified in the schedule of equipment and shown on the drawing.

Each unit shall be properly sized to conform with the required air changes per hour at free air for this particular application but in no case be less than those specified elsewhere in this specification. Unit installed/mounted on the wall and directly discharges exhaust outside the building shall be provided with automatic shutter. It shall be of the direct driven type, rain proof, wind resistible and corrosion resistant.

##### **MW-5.5.3 Ceiling Mounted Exhaust Fans**

Ceiling type exhaust fans shall be provided at the area as specified in the schedule of equipment.

Discharged air from Ceiling type exhaust fans shall be directed outside the building through flexible hoses or ducts complete with accessories. Fans on ceiling shall be provided with grilles or louvers both on the inlet and outlet opening. Outlet flanges installed vertically shall be provided with gravity shutters. Exhaust air shall not be discharged within the enclosed ceiling particularly those installed in the kitchen and toilet.

**MW-5.6 Installation and Painting**

The Air-Conditioning Unit and Exhaust Fans shall be installed as indicated in the drawings or as directed by NPC. After installation, all exposed and unfinished surfaces shall be thoroughly cleaned and washed possibly by chemical of all rust, oil and other foreign matters and shall be repainted in accordance with the manufacturer's standard or as approved by NPC.

Likewise, all surfaces and supports shall be thoroughly cleaned of rust, oil and other foreign matters and shall be painted with epoxy primer and two (2) coats of finish paint.

Painted surfaces which are damaged during installation shall be repaired or touched-up as necessary to prevent rusting, corrosion, etc. until the final finish painting application is made.

**MW-5.7 Equipment Marking and Labeling**

Equipment marking and labeling shall generally conform to the requirements specified in Clause MW-3.11, unless otherwise specified herein.

**MW-5.8 Spare Parts and Tools**

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

Special tools for normal operation and maintenance and are not usually available in a standard machine shop or retailing store shall also be provided as recommended by the manufacturer.

**MW-5.9 Acceptance Test**

Prior to acceptance of the Works, the equipment shall be tested in the presence of NPC to determine whether the requirements of the specifications have been met. Any defects found that are inherent in the equipment shall be remedied at the expense of the Contractor.

**MW-5.10 Submittals**

Prior to purchase and implementation of the works, the Contractor shall prepare and submit five (5) copies of the following drawings/documents for review/approval of NPC:

- a. Dimensional layout drawings of mechanical equipment and associated devices.
- b. Manufacturer's catalog sheets, marked as necessary, to indicate materials or equipment being furnished including instruments for control system;
- c. Complete control schematic and wiring diagrams for all equipment to be furnished;

- d. List of recommended Spare Parts and Special Tools; and
- e. Operation and Maintenance Manuals.

## **MW-6.0 FIRE FIGHTING SYSTEM**

### **MW-6.1 General**

This section provides the essential information for the design, manufacture, fabrication, supply, delivery, installation, test and commissioning of the complete Fire Fighting System including all the required excavation and backfilling.

All equipment and materials necessary for the complete installation shall be furnished complete, even though not specifically mentioned in this specification and shown on the drawings but are necessary for the safe and reliable operation of the Fire Fighting System.

All the Fire Fighting System equipment shall be supplied by the Contractor complete with their corresponding technical brochures written in English that would aid in the installation, operation and maintenance of the equipment.

The Fire Fighting System shall be designed, installed and tested in accordance with the requirements of National Fire Protection Association (NFPA) Standards. The Contractor shall be responsible for the preparation of detailed design and drawings subject to NPC's review and approval.

Drawings contained in this tender document show the general layout, equipment arrangement which indicate limiting or mandatory dimensions and elevations, including system diagrams which indicate the minimum requirements of various components and devices/instruments that comprise the respective systems. However, if such indicated dimensions and equipment/components are found deemed inadequate during the implementation stage, changes or adjustments may be made subject to NPC's review and approval and at no cost NPC.

### **MW-6.2 Scope of Work**

The Contractor shall design, furnish, install and test all the equipment specified below:

- a. One (1) set of Diesel Driven Fire Pump, UL listed and/or FM approved with a rated capacity of 34.09 m<sup>3</sup>/hr (150 gpm) at a total dynamic head of 35m complete with controller and accessories;
- b. One (1) set of Jockey Pump, UL listed and/or FM approved with a rated capacity of 3.18 m<sup>3</sup>/hr (14 gpm) at a total dynamic head of 40m complete with controller and accessories;
- c. One (1) lot of Automatic Wet Pipe Sprinkler Systems for Calbayog Operation Center and Fire Pump house;

- d. Four (4) sets of Indoor Fire Hose Racks/Cabinets including appurtenances;
- e. One (1) lot of Fire Detection and Alarm System for Calbayog Operation Center and Fire Pump house;
- f. One (1) set of 29.5 kg (65 lbs) capacity, wheeled type clean agent (HCFC or Halotron I Type) Fire Extinguisher, UL/FM approved;
- g. Twenty Six (26) units of Portable Type Fire Extinguisher, Clean Agent (HCFC or Halotron I Type), 7.1 kg (15.5 lbs), wall-hung type and UL/FM approved; and
- h. One (1) lot of Fire Fighting Piping, Valves, Strainers, Gauges, Instruments, pipe supports and fittings, gaskets, flanges, bolts and nuts, and other incidentals to complete the fire fighting system including all the required excavation and backfill of pipe trenches and interconnection works with the existing.

### **MW-6.3 Fire Pumping System**

#### **MW-6.3.1 General**

This Section provides the essential information for the complete design, delivery, installation and testing of the Fire Pumping System.

The system shall consist of one (1) unit Diesel driven Fire Pump and one (1) unit Motor Driven Jockey Pump including its pump house complete with all its amenities and devices as described in this specification and/or shown on the attached drawings.

Water supply shall be sourced from the stored water in the cistern.

Pressure switch shall be provided at the discharge line of the pumps to actuate the automatic operation of the jockey pump and the diesel driven fire pump at their designed pressure settings. Design of the system shall take into consideration that a minimum pressure shall be maintained in the main pipeline at all times to enable the whole fire protection system reliable and dependable.

The Fire Pumps shall also be able to operate manually either from start/stop push buttons at respective local controllers located in the Fire Pump house and the Main Fire Control Panel located at the lobby of the Calbayog Operation Center.

Facilities for testing the operation of the system shall be provided.

Pump and driver shall be mounted on a common base plate and connected by a flexible coupling.

The Pumping system shall include isolation valve, relief valve, pressure gauges at discharge of each pump, pressure switch, and two-way hose valve with cap and shall conform with the requirements of the relevant section of this specification.

**MW-6.3.2 Diesel Driven Fire Pump**

This particular fire pump shall have a rated capacity of 34.09 m<sup>3</sup>/hr (150 gpm) with a Total Dynamic Head (TDH) of 35m and shall be of vertical turbine type. The diesel engine and Fire Pump shall be UL listed and/or FM approved. The scope of supply shall include but not less than the following:

- a. Four (4) units of 100 mm Ø Gate Valve;
- b. Two (2) units of 100 mm Ø Check Valve @ Fire Pump's Discharge;
- c. One (1) unit Relief Valve @ Fire Pump's Discharge;
- d. One (1) set of 65 mm Hose Valve with Cap & Chain;
- e. One (1) set of 40 mm Hose Valve with Cap & Chain;
- f. One (1) set of test line complete with flow indicator and valves;
- g. One (1) set of Fuel Oil Day Tank for Diesel Engine Fire Pump;
- h. One (1) unit of 100 mm Ø dial Pressure Gauge @ Pump's Discharge;
- i. One (1) unit of Pressure Switch @ Pump's discharge;
- j. One (1) set of Alarm Check Valve;
- k. One (1) set of Water Strainer; and
- l. One (1) lot of other equipment/accessories per Manufacturer's standard design.

Diesel engine shall also be equipped with manual push button electric starter, powered by 12V or 24V storage battery units. Battery charging shall be by an automatic controlled charger furnished with the Fire Pump Controller.

Diesel engine shall be provided with a residential grade or equivalent steel exhaust silencer/muffler for indoor location and a male threaded flexible steel connector for the engine exhaust outlet.

Suction line of this pump shall be tapped from the cistern. Pump casing shall be of cast iron free from blowholes and other detrimental defects. Casing shall be capable of withstanding a hydrostatic pressure of 1.5 times the design pressure or maximum operating pressure.

Impellers shall be of cast bronze and coupled to a Diesel Engine suitably rated to enable the pump to achieve designed capacity. Impellers shall be statically and dynamically balanced.

Pump shaft shall be made with precision high tensile stainless steel and shall be protected through the stuffing box by means of bronze shaft sleeve.

Heavy ball bearings of the manufacturer's standard shall be provided and are to be mounted in housing that are dust tight rubber seal.

Pump shall be provided with the necessary protection in case there are no water supplies in the suction line.

Diesel Oil Storage Tank shall be sized for not less than eight (8) hours operation of the Diesel driven fire pump but not less than 1 m<sup>3</sup> capacity and shall be installed inside the fire pump house.

Both pump and diesel engine shall be mounted on a common steel base. The basic engine shall be provided with all the necessary accessories and instrument panel which shall indicate but not limited to the following:

- a. Start/Stop push buttons with indicating lamps
- b. Cooling water temperature gauge
- c. Lube oil pressure gauge
- d. Ammeter
- e. Hour meter
- f. Tachometer

#### **MW-6.3.3 Jockey Pump (Electric Motor Driven)**

The jockey pump shall be submersible, stainless steel casing, with a rated capacity of 3.18 m<sup>3</sup>/hr (14 gpm) at a head higher than the fire pumps or an approximate of 40m. This shall automatically maintain the pressure in the fire protection main pipeline through actuation at the designed pressure setting of the pressure switch installed at the discharge line of the pump.

Automatic on-off setting of this pump shall be included in the design and should automatically start and stop the pump at designed pressure setting. Pump shall also be provided with manual push-button control in the control panel located at the pump house.

Both pump and motor shall be mounted on a common steel base plate and complete accessories for its proper and efficient operation shall be included in the supply even though not specifically mentioned in this specification but not limited to the following:

- a. One (1) unit of 25 mm Gate Valve @ Jockey Pump's Discharge;
- b. One (1) unit of 25 mm Check Valve @ Jockey Pump's Discharge; and
- c. One (1) unit of 100 mm (dial Ø) Press Gauge @ Jockey Pump's Discharge.

#### **MW-6.3.4 Pump Characteristics**

Above fire pumps shall be designed with head capacity characteristics which rise steadily from the rated capacity to shut off. The Contractor shall indicate minimum and maximum flow and the maximum required NPSH at which each pump can operate continuously without causing damage.

The Contractor shall submit catalogues and pump performance characteristics curve for the particular model of pump to be supplied and shall be reviewed and approved by the NPC.

Pump casing shall be of stainless steel and impeller shall be of corrosion resistant material. Pump shaft and motor shaft of stainless steel construction shall be directly close coupled. Mechanical seal shall of type for easy maintenance.

Pump shall be guaranteed to operate satisfactorily without pitting, cavitation, excessive vibration or excessive noise during operation when pumping against system head and when starting up or shutting down. Pump and driver shall be Underwriters Laboratories (UL) listed and/or Factory Mutual (FM) approved.

#### **MW-6.3.5 Motor**

Motor for jockey pump shall be selected so that pump brake Horsepower (Hp) requirement throughout the entire capacity range shall be within the nameplate rating of the motor.

Motor enclosure shall be drip-proof and fully guarded. Motor shall operate successfully under running condition at  $\pm 10\%$  of rated voltage with rated frequency. AC motors shall be squirrel cage induction type.

The motor shall be furnished with a ground connector inside the main lead housing. Motor of the jockey pump shall be mounted directly to the top of the pump.

Motor shall be equipped with anti-reverse ratchet and shall be rated 220 V, 1-phase, 60 Hz. and shall be designed for across the line full voltage starting.

#### **MW-6.3.6 Controller**

Controllers shall be in accordance with NFPA 20 and shall be UL listed and/or FM approved. Controllers shall be completely assembled, wired and tested prior to shipment from the factory in NEMA 4 cabinets. Controllers shall be fabricated to allow all servicing from the front access.

The Contractor shall provide and install all wiring and conduit leading from each controller to the jockey pump motor and diesel drive controller, respectively. Wiring and cable shall conform to the requirements specified in the pertinent Electrical Works Technical Specifications.

Controller shall be provided with variety of alarm and safety measure and shall be designed for automatic and manual push button control operation embodied in the local control panel. Monitoring device for its operation shall also be included and installed in the Main Fire Control Panel at the Control Room such as "Pump Running" and "Common Trouble" alarm.

#### **MW-6.3.7 Pipes, Valves, Fittings and Instruments**

All pipes to be used in the system shall be welded or seamless carbon steel ASTM A53 Grade B, Schedule 40, seamless and hot dipped galvanized.

All piping, 65 mm and above shall be butt welded. All piping, 50 mm and under shall be screwed fittings, conforming to ANSI B16.11 or socket welded to ASTM A105.

Screwed fitting shall be malleable iron (hot dipped galvanized), and in accordance with ANSI B16.3 (Malleable Iron threaded fittings, Class 150).

Union fittings shall be installed at appropriate locations for pipe connections using screwed fittings for ease of disassembly and/or any repair works to be undertaken.

Gaskets shall be of sheet rubber composition. Flange bolts shall be hexagonal head machine bolts with heavy semi-finished head nuts having dimensions in accordance with ANSI B18.2.

Gate and globe valves 65 mm and above shall be Outside Screw & Yoke (OS&Y), flanged type with cast iron body, rating shall be 150 psi. Valves 50 mm and under shall be threaded (unless otherwise specified), bronze body with rising stem.

Check valves shall be of a swing disc type, cast iron material, flanged type, 150 psi. rating. Screwed fittings may be used for sizes 50 mm and below.

Butterfly valves shall be of wafer type, with cast iron body, 150 psi. rating.

Ball valves 50 mm and below shall be of bronze material, unless otherwise specified.

Relief valves shall be sized to open at full discharge capacity at 10% above the actual opening pressure. Relief valves shall be stainless steel.

Strainers shall be of Y-type with body cast iron material and flanged ends. Screens shall be made of stainless steel construction with mesh size suitable for the system.

Pressure gauges shall be of bourdon tube type (liquid-filled case) with all stainless steel construction. Each pressure gauge shall be provided with isolation valve with dial gauge size of at least 100 mm Ø. The pressure gauge installed for measurement of steady pressure shall normally operate at 75% of its maximum range. When used for measurement of varying pressure it shall operate at 60% of its maximum range.

Isolation valves laid underground shall be provided with valve boxes. All valve boxes covered under this section shall be as shown on the drawings and shall be provided with steel plate covers on steel angle supports. Cover shall be hinged type and shall be painted with one (1) coat of red lead primer and two (2) coats of black rust resisting paint.

Pipes to be placed underground shall not be covered prior to the approval of NPC. Firefighting pipes shall be embedded at least 800 mm from the ground surface to the top of the pipe, unless otherwise specified. Where pipeline are laid, the trench shall be provided with a cushion pad of at least 150 mm sand and sandy soil bedding materials.

All pipeline excavation shall be backfilled up to the level of the finished grade surface in layers of 150 mm and thoroughly compacted. Backfill materials shall be compactable soil taken from trench excavation and approved by NPC. Trench excavation and backfilling works shall be done in accordance with the pertinent provisions of the Civil Works Technical Specifications.

All underground pipe joints such as bends or elbows, tees, base of hydrants or standpipes as applicable, shall be provided with concrete thrust blocks to resist significant forces or lateral movement.

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 tape wrapping with minimum finished thickness of 1 mm and shall be applied spirally with overlap of 50% in all parts of the pipe and fittings.

All pipes that cross roadways shall be provided with pipe sleeve of steel material or reinforced concrete pipe for the purpose of easy replacement in case of pipe breakdown and to protect the pipe from various load imposed by passing vehicles. The pipe sleeves shall extend 600 mm beyond shoulder of each pavement side.

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

#### **MW-6.3.8 Pump House**

The Contractor shall construct the Pump House which will house the Diesel Engine Driven Fire Pump, Diesel Fuel Day Tank, Jockey Pump, Controllers, Battery System, Local Fire Control Panel, Pipeworks and other accessories in accordance with the attached drawings. The pump house shall be provided with lighting, ventilation, sprinkler system, electrical power supply panel and drainage system which shall be determined/designed by the Contractor in accordance with the applicable codes and standards.

The associated Electrical and Civil Requirements shall be in accordance with the provisions specified in the Electrical and Civil Works Technical Specifications, respectively.

#### **MW-6.4 Automatic Fire Water Sprinkler System**

This section covers the design, supply, installation and test of the Automatic Fire Water Sprinkler Systems for Calbayog Operation Center and Fire Pump house.

##### **MW-6.4.1 General**

The automatic fire water sprinkler system shall be designed to give complete surface wetting (total flooding) of the equipment or area to be protected with a pre-selected water density, taking into consideration the nozzle types, sizes, spacing and the water supply pressure. The design criteria shall be established on the basis of the size (rate of discharge) of nozzles used, angle of the nozzle discharge core and the water pressure needed to cover the area to be protected.

The water sprinkler system shall consist of fixed piping and supports (riser and main) spray nozzles, detection and signaling system and other accessories applicable to the system.

The Contractor shall submit the layout and hydraulic calculations based on the desired surface wetting, type of nozzles and heat or smoke detectors, appropriate pipe sizes and water supply requires for approval of the NPC.

Drawings contained in this tender document show the general layout, equipment arrangement which indicate limiting or mandatory dimensions and elevations, including system diagrams which indicate the minimum requirements of various components and devices/instruments that comprise the respective systems. The Contractor shall be responsible for the preparation of detailed design and drawings subject to NPC's review and approval complete with all the equipment and accessories though not shown on the bid drawings or specifically stated in this specification but are necessary or required for the safe and reliable operation of the fire water sprinkler system.

#### **MW-6.4.2 Isolation Valve and Y-Strainer**

Shut-off gate valve and one (1) Y-strainer shall be provided at the main water supply line of the sprinkler system to isolate the water supply requirements as well as to prevent clogging of the nozzles. Valves shall be made of bronze material with rising stem and screwed ends. Y-strainer shall have cast iron body with stainless steel screen and screwed ends. Flanged ends for valves and strainer may be used for ease of maintenance and installation.

#### **MW-6.4.3 Alarm Check Valve**

The alarm check valve shall be provided as shown on the drawing and shall annunciate an alarm on falling pressure and/or sprinkler heads are activated. The pressure switch shall activate annunciation to the Main Fire Control Panel located at the Entrance lobby and the respective Local Fire Control Panel. Pressure switch assembly and any other devices requiring external wiring connections shall be in a NEMA type 4 watertight enclosure. The Contractor shall determine the electrical requirement of the device.

#### **MW-6.4.4 Glass Bulb Sprinkler Heads**

Sprinkler heads to be used in the system shall be ½ in. dia., standard orifice, with k-factor of 5.6.

Sprinkler heads shall be UL/FM approved and shall be of the upright, pendent, and horizontal sidewall type with a temperature rating of 68°C (155°F).

Sprinklers shall be chrome with chrome plated escutcheons.

A steel box containing at least twelve (12) spare heads of the same type and rating complete with sprinkler wrench to be used in the removal and installation of sprinklers shall also be provided.

The Calbayog Operation Center and Fire Pump House shall be provided with a minimum of glass bulb type sprinkler heads and shall be side wall or pendent type as required. A cabinet shall be provided at any appropriate place, containing a complete set of sprinkler heads of the same type, quantity and rating as installed and one sprinkler wrench per NFPA 13. Spray nozzles shall be of bronze or brass material, UL listed and/or FM approved

#### **MW-6.4.5 Pipe, Valves and Fittings**

Specifications of pipe, valves and fittings shall generally conform to the requirements specified in Clause MW-3.7 or MW-3.6.2, unless otherwise specified herein.

#### **MW-6.4.6 Heat Detectors**

Heat detectors shall be of rate compensation/fixed temperature thermal detectors and shall transmit alarm signal to the Main Fire Control Panel and respective Local Fire Control Panel upon reaching the temperature setting. Heat detectors shall be addressable or conventional thermal fire detector type, twist/lock design, and directly interchangeable with smoke detectors and other compatible plug-in detectors. Detectors shall operate from a normal 24V DC source or per Manufacturer's standard derived and continuously supervised from the Main Fire Control Panel.

#### **MW-6.4.7 Fire Alarm Horn/Strobe**

Fire alarm horn/strobe shall be visibly located at the Pump House Front Section. The alarm horn shall be activated by a signal transmitted from heat detectors or pressure switch. Alarm Horn including Manual Pull Station shall be of weatherproof or outdoor type, UL listed and/or FM approved.

### **MW-6.5 Fire Hydrant System and Associated Piping System**

#### **MW-6.5.1 General**

This section covers the design, supply, delivery, installation and testing of indoor hydrants (fire hose rack with cabinet), complete in every respect and suitable for reliable and satisfactory operation in accordance with applicable NFPA standards.

The indoor hydrant system shall be Underwriter Laboratories and/or Factory Mutual approved. The equipment to be supplied shall be capable of supply and attack application and reliable in the event of fire.

The equipment to be furnished shall be in accordance with, but not limited to, the latest issues of the Applicable Codes and Standards, including all addenda, in effect at time of purchase order unless otherwise stated in this specification.

All material and equipment which are not specifically mentioned herein but are necessary for the proper installation and operation of the indoor hydrant system shall be furnished at no additional cost to NPC.

Location of the indoor fire hose cabinets shall be as shown on the drawings.

**MW-6.5.2 Indoor Fire Hose Racks/Cabinets**

Four (4) sets of fire hose cabinet within the building shall be provided at appropriate location or as shown on the drawing and shall be of wall mounted, recessed type, complete with steel enclosure made of galvanized steel gauge 16 standard thickness, with aluminum frame and door, one (1) breakable glass panel doors properly labeled "FIRE HYDRANTS" and suitably sized to accommodate the specified accessories.

The fire hose cabinet shall be provided with one (1) 40 mm Ø (1 1/2" Ø) fire nozzle of the spray and straight stream type and two (2) sets of 40 mm Ø (1 1/2" Ø) x 15 m long fire hoses of the double jacketed rubber lined type, one (1) 40 mm Ø (1 1/2" Ø) bronze angle valve and one (1) Fire Axe with wooden handle and steel head. All screw threads shall conform to ANSI fire hose coupling screw threads.

The above accessories shall be UL listed and/or FM approved.

All screw threads shall conform to ANSI fire hose coupling screw threads.

Preliminary locations of the fire hose racks/cabinets are shown on the bid drawings. Final location shall be determined during project implementation.

**MW-6.6 Fire Detection and Alarm System****MW-6.6.1 General**

This section covers the design, supply, deliver, installation, test and commissioning of the fire detection, alarm, actuation, signaling, monitoring and control systems, complete in every respect and suitable for reliable and satisfactory operation in accordance with NFPA 70 and NFPA 72, latest edition.

The equipment furnished shall be in accordance with, but not limited to, the latest issues of the Applicable Codes and Standards, including all addenda, in effect at time of purchase order unless otherwise stated in this specification.

All material and parts which are not specifically mentioned herein but are necessary for the proper installation and operation of the fire detection and alarm system shall be furnished at no additional cost to NPC.

The fire alarm, detection and monitoring system shall guarantee a reliable and fault-free system in the event of fire.

The fire alarm system shall provide the means for early detection of fire, provide audible alarm, visual annunciation and actuate fire extinguishing systems. Plug-in units using electronic modules must be used.

The alarm and signal receiving units must be designed such that by the use of standardized alarm unit socket, any of the following types of detectors may be used with equal facility to any of the following fire alarm circuits:

- a. Photoelectric detector for the detection of visible smoke formation and burning gas
- b. Thermal heat detector for detecting a rate of rise in temperature

Power supply for the fire alarm system must come from the 240 V AC of adequate capacity, which shall be electrically supervised. Transfer from normal to emergency power or restoration to normal power shall be fully automatic and shall not cause transmission of false alarm.

#### **MW-6.6.2 Scope of Work**

The whole system shall be provided with the following fire alarm, detection and monitoring equipment and devices in sufficient numbers:

- a. One (1) Main Fire Alarm Control Panel (MFCP) complete with modules, chargers and battery, trouble/fault audible alarm with flashing light which shall be installed as shown on the drawings and other appurtenances;
- b. Four (4) Local Fire Alarm Control Panel (LFCP) complete with accessories;
- c. One (1) lot of Thermal Heat Detectors;
- d. One (1) lot of Smoke Detectors;
- e. One (1) lot of Manual Station Alarm Lines;
- f. One (1) lot of Alarm bells, Horn for local annunciation; and
- g. One (1) lot of Wiring and Accessories.

#### **MW-6.6.3 Main Fire Control Panel (MFCP)**

The Main Fire Control Panel shall be provided to supervise and monitor all fire protection and detection systems including LFCP's, status of fire pumps and capable of operating addressable and non-addressable initiating devices (detectors and pull stations). The MFCP shall be located inside the Entrance Lobby.

The MFCP shall be of UL listed and/or FM approved, suitable for wall mounting and have NEMA 4 enclosure designed to operate on 220 VAC, 60 hertz, 1-phase.

The detection system shall remain 100% operational and capable of responding to an alarm condition while in the routine maintenance mode. Addressable detection devices shall be individually identified by the system, and any quantity of addressable detection devices shall be in alarm at any time up to the total number connected to the system.

Supervision of system hardware and software, wiring and detection devices shall be provided in the control system. Failure of system hardware or wiring shall be indicated by type and location of the alpha-numeric annunciator. The system shall provide fail-safe operation, i.e., incoming alarms shall automatically override all other modes of operation, and the panel shall automatically return to normal operating mode for any operator initiated mode.

Ground fault detection shall be provided for all initiating and audible circuits. Lamp test capability shall be provided to test all visual panel indicators and associated hardware. The MFACP shall be equipped with a silence before reset feature, designed to prevent accidental system reset during an alarm condition.

The system alarm lamp shall flash upon receipt of any alarm condition. Acknowledgment of the alarm by operation of the silence switch shall silence the audible alarm and cause the trouble lamp to light steadily. Receipt of subsequent alarm shall cause the audible devices to resound and the alarm lamp to flash.

The system trouble lamp shall flash and trouble audible alarm shall sound upon the occurrence of any trouble condition. Acknowledgment of the trouble condition by operation of the silence switch shall silence the audible alarm and cause the trouble lamp to light steadily. Receipt of subsequent troubles shall cause the trouble horn to resound and the trouble lamp to flash.

Individual input and output device addressability shall be performed on the same pair of wires with no special wiring sequence be required on addressable device circuits, and unlimited number of wiring branches shall be permitted with no loss of supervision. The system shall be capable of having all addressable devices in alarm simultaneously.

Light emitting diodes (LED's) shall be included to indicate (green) system power, (yellow) trouble, and (red) alarm; trouble and alarm shall also be annunciated on an alpha numeric display which will give zone number, device number and location plus diagnosis of trouble. An audible device shall sound within the control for alarm or trouble. This device shall have two (2) distinct sounds, and shall be silenceable by the acknowledge/silence switch. Alarms shall override any trouble condition.

The control power supply shall be capable of powering detectors and audible/visual signal circuits. All system expansion modules shall interconnect through a card edge connector and shall require no inter-module wiring.

The control shall allow for expansion and shall also be configurable without system interwiring.

New unacknowledged alarms and troubles shall be distinctively displayed on both the visual display and the printer and differentiated from previous alarm and troubles.

No alarm or trouble indication shall be resettable until it has been acknowledged. It shall not be possible to reset the system until all alarms have been acknowledged.

A fire alarm bell or horn of audible rating shall be furnished and installed by the Contractor on the MFACP and shall be of NEMA 4 operating on 24 V DC.

The following color coding shall be used for indicating lamps on the MFACP and the LFACP:

- a. Green : System Normal
- b. Red : Fire
- c. Amber : Trouble
- d. Red : Pump Running

The following visual "fire" alarms shall be provided for the Automatic Wet Pipe Sprinkler fire protection system:

- a. System Normal
- b. "Fire" Alarm
- c. System Activated

A continuous supervisory system shall be provided for each detection, actuation, alarm and signaling circuit. The supervisory system shall be designed to actuate an audible trouble alarm distinct from the fire alarm and an amber light to appear on the occurrence of any of the following:

- a. Loss of electrical integrity in any detection unit
- b. Loss of electrical integrity in any actuation unit
- c. Loss of electrical integrity in any alarm and signaling circuit
- d. Loss of AC power or power supply
- e. Short circuits, open circuits
- f. Ground Faults

The system shall be capable of:

- a. Counting the number of addressable detectors within a "Zone" or "System" which are in alarm.
- b. Differentiating among types of addressable detectors such as smoke detectors, manual stations, heat detectors and interfacing modules.

The fire and trouble alarms shall be displayed on the MFACP in the event of any fire suppression or detection system actuation stated above. In addition the following pump status lights shall be provided on the MFACP:

- a. "Pump Running" (Jockey Pump)
- b. "Engine Running" (Engine Driven Fire Pump)
- c. "Common Trouble" alarm (Engine Driven Fire Pump)
- d. "Controller Main Switch not in Auto Position" alarm (Engine Driven Fire Pump)
- e. Loss of Power alarm (Motor Driven Pump)

MFACP shall also be provided with guarded pushbuttons for manual start of the diesel driven pump.

It shall be provided with back-up battery and battery charger of adequate ampere rating complete with charge/float-charge monitoring, protection and metering devices. The battery system must be capable of powering the system for not less than 24 hours in the "powerless condition." Transfer to the secondary power supply shall be done automatically.

**MW-6.6.4 Local Fire Control Panel (LFCP)**

Local Fire Alarm Control Panel shall be provided to supervise automatic wet pipe sprinkler system, detection system zones, status of fire pumps and capable of operating addressable and non-addressable initiating devices (detectors and pull stations). The LFCP shall be located at appropriate area as shown on the drawings.

The LFCP shall be UL listed and/or FM approved and shall be suitable for surface mounting, have NEMA 4 enclosure and designed to operate on 220 VAC, 60 hertz, 1-phase. All internal devices shall be factory wired to terminal blocks located on the interior of the panels.

Battery backup shall be provided for the LFCP. The backup system shall include a battery charger and shall be designed such that, upon main power failure, backup power automatically supplies the system with no delay or interruption of any kind. The battery system must be capable of powering the system for not less than 24 hours in the "power loss" trouble condition. At the end of this time, the battery system shall be capable of operating the entire system in full alarm condition for a period of not less than 10 minutes. The "battery system in use" annunciator light shall be lit to indicate that the system is operating on battery power.

The LFCP shall include contacts for local audible and visual annunciation of the fire alarm and trouble signals as required by each fire protection system being monitored. Visual annunciation of alarm and trouble signals shall be integral with the cabinet.

The LFCP shall be furnished with permanently attached nameplates which indicate the appropriate system and/or zone designation and identify the equipment served.

The LFAP shall include contacts for remote annunciation each of alarm or trouble conditions via data communication lines to Main Fire Control Panel (MFCP). The alarm and trouble conditions annunciated remotely by these controls shall include the conditions as listed in this section.

Indicating lights and switches shall be furnished on the local panels for each alarm condition. Each light shall be clearly labeled. All devices mounted on the panel shall have nameplates with white lettering on the black background. (All system status is indicated by approximately 80 character LCD display. Switches are of key-member type).

Fire alarm bells or horns for the panels shall be NEMA 4 rated and shall operate on 24 volts DC. A separate fire alarm bell or trouble horn shall be furnished and installed by the Contractor for each panel. The minimum sound output for the fire alarm bells or horn shall exceed 90 dBA at 10 feet from the device.

An acknowledge push button shall be provided on each LFCP to silence audible annunciation of fire and trouble alarms. The circuit for this push button shall permit audible annunciation of additional incoming alarms. This push button shall test sound the audible device when in the depressed position and all alarm conditions have been cleared.

The color coding shall be used for indicating lamps on the LFCP shall be the same as on the MFCP (All system status events are indicated preferably by 80 character LCD display).

Provisions shall be made to show that each condition of alarm has been restored to normal.

The following visual "fire" alarms as applicable shall be provided for Automatic Fire Sprinkler system (@ each fire exits for every floor of Calbayog Operation Center and Fire Pump House), Independent Detection Systems and Manual Pull Station:

- a. System Normal
- b. "Fire" Alarm
- c. System Activated

A continuous supervisory system shall be provided for each detection, actuation, alarm and signaling circuit similar to the MFCP.

The following visual "trouble" alarms shall be provided on the LFCP for each type of system: Circuit Trouble indicating lights may be combined into a single common system trouble indicating light: (All system status events are indicated by approximately 80-character LCD display).

System Type	Trouble Alarm
Wet Pipe Sprinkler System	Water Flow Circuit Trouble High/Low Water Pressure Bell/Strobe/Circuit Trouble
Independent Detection System	Detection System Circuit Trouble
Manual Pull Station	Manual Pull Station Circuit Trouble

#### **MW-6.6.5 Storage Batteries and Battery Charger**

Back-up batteries for MFCP and LFCP of lead-acid type with adequate ampere-hour rating shall be provided to operate the system under supervisory condition for at least 24 hours. At the end of this time, it shall still be capable of operating the entire system with all audible/visual signals devices under alarm conditions for a period of not less than 30 minutes. Reliable separation cells shall be provided to prevent contact between terminals of adjacent cells and between battery terminals and other metal parts. Batteries shall be located preferably inside each of the control panel or if it cannot be accommodated shall be installed at the appropriate location to be designated by NPC personnel.

Back-up battery and battery charger shall have adequate ampere rating complete with charge/float-charge monitoring, protection and metering devices. The battery system must be capable of powering the system for not less than 24 hours in the "powerless condition." Transfer to the secondary power supply shall be done automatically.

Battery chargers that can completely provide an automatic high/low charging rate and shall be capable of recovery of the batteries from full discharge to full charge in 6 hours or less. Ammeter for recording rate of charge and voltmeter to indicate the state of battery charge including the necessary protections shall be provided. Red pilot light to indicate when batteries are manually placed on a high rate of charge shall be provided as part of the unit assembly if a high rate switch is provided. The power supply for the charger at 220 VAC could be sourced from the low voltage distribution board of the building or as directed by NPC. The charger shall be located preferably in the control panel or if it cannot be accommodated shall be installed at the same location of the storage batteries or as designated by NPC representative.

#### **MW-6.6.6 Heat Detectors**

The heat detectors to be supplied shall be UL listed and/or FM approved designed to provide high quality and reliability. It shall be designed to meet the performance requirement of an industrial alarm system. It shall contain a unique dual transistor sensing circuit to provide both maximum performance and solid state reliability.

The heat detector shall be addressable or conventional thermal fire detector of fixed temperature type. Detector shall be twist/lock design and shall be directly interchangeable with smoke detectors and other compatible plug-in detectors. Detectors shall continuously be supervised from MFCP.

#### **MW-6.6.7 Photoelectric Smoke Detectors**

The Contractor shall supply smoke detectors of photoelectric type which shall either be **addressable or conventional type as indicated on the drawings**. The addressable smoke detectors shall operate using a light source, a light beam collimating system and a photoelectric sensor. They shall be directly interchangeable with other comparable plug-in detectors. Both types of Detectors shall be UL listed and/or FM approved and shall operate from a nominal 24V DC source from MFCP and shall be continuously supervised from the MFCP.

The smoke detectors shall be designed to sense both visible and invisible products of combustion. They shall incorporate advanced solid-state, low-voltage circuitry featuring a Surface Mount Technology. The 360 degree smoke entry characteristic permits maximum smoke response from any direction. To assure that the detector is functioning, a pulsing LED allows for visual supervision of the detector. Under alarm condition, the LED lights continuously at full brilliance.

**MW-6.6.8 Manual Fire Alarm Stations**

Manual fire alarm stations shall be addressable manual station and shall be operated by pulling down on the lever. When operated, the lever shall remain down with the alarm contacts closed until the station is reset. The manual station shall be reset by opening the front and resetting the switch. The station shall close only after the switch is reset. It shall not be possible to open the station without special tools or keys. The manual station shall be tested by opening the station and operating the toggle switch. Stations shall flush or surface mounted and shall be UL listed and/or FM Approved. Stations shall be red with the word "FIRE" in raised lettering. The manual fire alarm stations shall be electrically supervised from the MFCP. Manual Fire Alarm Stations installed outdoor shall be of weatherproof.

**MW-6.6.9 Alarm Bells-Strobe**

Bells shall be of the vibrating type suitable for use in an electrically supervised circuit and in combination with flashing light. The gongs shall be made of selected alloy steel to give loud, resonant tones necessary in fire alarm system. Alarm bells shall be 200mm in diameter and of the underdome type with heavy-duty mechanism and equipped with NEMA-4 housing. Bells shall have an internal loudness adjustment and produce a sound output rating of at least ninety decibels (90 dBA) at 3 meters from the device. The alarm bells shall be UL listed and/or FM approved and shall be electrically supervised by the MFCP and capable of parallel operation.

**MW-6.6.10 Alarm Horns-Strobe**

Alarm horns for general alarm shall be modular type suitable for surface mountings in combination with flashing light. All alarm horns installed outdoor shall also be equipped with a weatherproof housing. The alarm horn circuit is required to be electrically supervised by the LFCP. Alarm horns shall be UL listed and/or FM approved and shall be capable of parallel operation. The horns shall have an internal loudness adjustment and shall be painted red.

**MW-6.7 Fire Extinguishers****MW-6.7.1 Scope of Work**

The Contractor shall supply the specified number of Underwriter Laboratories/Factory Mutual approved Portable Type Fire Extinguishers complete and ready for operation and shall be installed at their corresponding place of use as specified in the particular specifications and as shown on the drawings.

- a. Twenty Six (26) units of Portable Type Fire Extinguisher, Clean Agent (HCFC or Halotron I Type), 7.1 kg. (15.5 lbs), wall-hung type and UL/FM approved; and
- b. One (1) unit of 29.5 kg (65lbs) capacity, wheeled type Clean Agent (HCFC or Halotron I Type) Fire Extinguisher, UL/FM approved.

**MW-6.7.2 Fire Extinguisher**

Fire extinguishers shall be Underwriter Laboratories and/or Factory Mutual approved and of rechargeable cylinder with five (5) years guarantee against leak. Each fire extinguisher cylinder shall be complete with release valve, dial gauge indicator, appropriate length of hose with nozzle and locking pin.

The 7.1 kg (15.5 lbs.) capacity wall-hung type fire extinguishers shall be complete with carrying handle and wall-mounting bracket and shall be installed at respective areas as shown on the bid drawings or as directed by NPC.

Portable fire extinguishers shall be suitable for the protection against class ABC fires using Clean Agent (HydroChloroFluoroCarbon or Halotron I Type) that is environmentally safe and leaves no residue.

The wheeled type fire extinguisher units using Clean Agent (Halotron I) shall be cylinder mounted on a frame with handle, floorstand and steel or rubberized wheels for 29.5 kgs (65 lbs) capacity complete with release valve, dial gauge indicator, appropriate size of 15 m length of hose with nozzle and locking pin. The wheeled extinguisher is intended to be stationed within the warehouse.

The fire extinguishers shall be check-weighed at interval of six (6) months from the date of delivery for a period of one (1) year and if found to be undercharged (unless used by an NPC personnel) shall be filled and recharged by the Contractor at no expense to NPC.

**MW-6.7.3 Painting**

Painting of Fire Fighting Equipment and applicable piping shall be in accordance with the requirements of Section MW-3.10. Final color to be used for all firefighting equipment shall be Munsell No. 7.5 R 4/14.

**MW-6.8 Installation Requirements**

Sprinkler system shall be installed in accordance with NFPA 13, NFPA 15 and NFPA 11, respectively.

Fire pumps shall be installed and tested in accordance with NFPA 20.

Electrical installation of fire detection and alarm system shall be in accordance with NFPA 70 and 72 and all applicable local codes and regulations.

Materials and equipment to be furnished under this specification shall be essentially the current design products of one manufacturer regularly engaged in the production of such equipment and shall be listed under the Underwriter's Laboratories, Inc. (UL) or approved by Associated Factory Manual Laboratories (FM) or its approved equivalent.

**MW-6.8.1 Wiring**

The scope of work shall include the supply and installation of all interconnecting raceways and wiring, including supports for interfacing all his supplied equipment and devices.

Electrical installation of fire detection and alarm system shall be in accordance with NFPA 70 and 72 and all applicable local codes and regulations.

All wiring shall be fully segregated from other wiring system and run in dedicated raceways. Indoor cables shall run in Electrical Metallic Tubing (EMT) conduits and outdoors in Rigid Galvanized Conduits (RGC). Cables shall be XLPE insulated with Thermoset Jacket. PVC insulation shall not be used.

Wire for 220volts circuit shall be 3.5mm<sup>2</sup> minimum. All voltage wiring shall be color coded in conduit or electrical metallic tubing. All circuit conductors shall be identified within each enclosure where a tap, splice or termination is made. Conductor identification shall be by plastic coated self-sticking printed markers or by heat-shrink type sleeves. The markers shall be attached in a manner that will not permit accidental detachment. Control circuit terminations shall be properly identified. No "T" wiring or pigtail connectors shall be permitted.

#### **MW-6.8.2      Grounding**

All terminals requiring grounding connection shall be grounded to the grounding system or as per manufacturer's recommended standard.

#### **MW-6.9        Testing**

##### **MW-6.9.1      General**

Fire fighting system components shall be given requisite factory tests as necessary to determine that the materials and equipment are free from defects and ensure that system design, construction, installation and test shall meet the requirements of this specification.

Fire pumps shall be tested in accordance with NFPA 20.

Sprinkler system shall be tested for acceptance in accordance with requirements of NFPA 13, NFPA 15, and NFPA 11 respectively.

The Fire Alarm and Detection System shall be tested for acceptance in accordance with requirements of NFPA 14, NFPA 15, and NFPA 20 respectively.

Test procedure for testing and commissioning of the fire fighting system shall be prepared by the Contractor/Manufacturer in accordance with NFPA 72 which shall be submitted to NPC for review and approval. The Contractor/Manufacturer shall be responsible for the performance of the test, demonstrating the function of the system and verifying the correct operation of all systems components, circuits, and programming.

**MW-6.9.2 Fire Pumps**

Pump test headers shall be provided by the Contractor at the discharge line of the Diesel Engine Driven Fire Pump and Jockey Pump to allow the pump to be tested without using the actual piping system and shall be equipped with proper pressure gauges and hose valve connections. All equipment and materials required in carrying out the test shall be provided by the Contractor at no cost to NPC.

The Contractor shall furnish a certificate of test or manufacturer's certified pump test characteristic curve prior to the start of the fire pump field acceptance test. The fire pump as installed shall equal the performance as indicated on the manufacturer's certified shop test characteristic curve within the accuracy limits of the test equipment.

Fire pump and Jockey Pump shall perform at minimum rated and peak loads without objectionable overheating of any component and vibrations shall not be of magnitude such that there is a potential for damage to any fire pump component and shall meet the standards criteria for alignment and balancing.

**MW-6.9.3 Fire Fighting Piping System**

Piping systems shall be examined visually to determine that they have been properly installed in conformity with the approved drawings. Equipment and devices shall be checked for proper identification and operating instructions.

Flushing to remove foreign materials shall be made after installation and prior to hydrostatic testing. Disposal of flushing water must be suitably arranged and coordinated with the plant management. For foam system, flushing shall be done after foam actual discharge testing.

Piping system shall be hydrostatically tested at a pressure of 1.5 times the design pressure for a period of not less than two (2) hours. Test may be applied to sections of the entire system in accordance with approved procedure. There shall be no leakage or whatsoever from the pipes, fittings and connections for each section tested while the system is under test pressure.

Any leakage or any defect disclosed by the test prior to the acceptance shall be corrected and repaired by the Contractor at his own expense and to the satisfaction of NPC.

Before any test is made, the Contractor shall notify NPC so that such test may be witnessed by him or his duly authorized representative. All expenses incurred during the test shall be borne by the Contractor.

Test shall also include the following:

- a. Visual equipment check to insure compliance with approved design and shop drawings;
- b. Diesel driven fire pump start run to insure proper operation and to detect piping leakage valves and fitting connections;
- c. Verification that all pump accessories has been provided including that of the outdoor hydrant components; and

- d. All additional inspection and test necessary to insure that the entire fire protection system is correct and ready for operation.

A duly authorized representative of the fire pump Contractor shall be present during testing and inspection.

#### **MW-6.9.4 Fire Detection, Alarm and Control System**

The fire detection and alarm system shall be tested in accordance with NFPA 72 and the test procedure submitted by the Contractor and approved by NPC.

The Contractor shall demonstrate all input and output functions of the system and verify the correct operation of all systems components, circuits and programming which shall include but not limited to the following:

- a. System wiring to demonstrate correct system response and subsequent operation;
- b. System audible and visible alarms including system indications; and
- c. System power capabilities including back-up battery and charger.

Testing shall include verification that the releasing circuits and components energized or actuated by the fire alarm system are electrically supervised and operate as intended on alarm.

Suppression systems and releasing components shall be returned to their functional operating condition upon completion of system testing.

#### **MW-6.9.5 Test Failures**

If any equipment or component fails to pass any test, NPC may, at his own judgment, 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, i.e. failure to meet the guarantees and other requirements of the specification, shall be borne by the Contractor.

#### **MW-6.10 Spare Parts**

The Contractor shall supply the standard and recommended spare parts for use during the warranty period including spare parts specified in this section.

Any parts found to be incorrect or damaged during testing and commissioning shall be replaced by the Contractor at his own cost.

The spare parts shall be supplied complete with markings showing the description or code numbers and the name of the equipment or device to which the parts are a component therein.

All spare parts shall be delivered into storage areas designated by NPC and the delivery will be deemed complete when the packages have been opened by Contractor, their contents checked by NPC and articles reprotected and replaced by Contractor to the satisfaction of such representatives or assembled into units at NPC's option and stored as directed by NPC. Damaged or incorrect item shall be replaced by the Contractor at his own cost.

All bidders are required to submit in their proposal the detailed list of spare parts to be supplied. This list is preliminary and subject to changes in order to conform with 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 delivery of 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, 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 Contractor, and approximate lead time required for delivery of materials.

The Contractor shall include in their supply the following spare parts for regular maintenance and smooth operation of the fire pump and jockey pump including spare parts recommended by the Manufacturer during the warranty period:

- a. Packing rings - two (2) sets
- b. Casing gasket - one (1) set
- c. Shaft sleeve O-ring - two (2) sets
- d. Diesel engine - one (1) set per manufacturer's recommendation

Spare parts for the automatic fire water sprinkler system shall be provided which consist of a cabinet containing 12 spare glass bulb sprinkler heads and 1 sprinkler wrench.

#### **MW-6.11 Submittal**

The Contractor shall submit the following documents for review and approval prior to the purchase, installation and implementation of the works:

- a. General arrangement of all fire fighting and alarm/detection equipment, electrical power supply panels, wiring counts, and conduit runs from the control panel to all associated equipment and devices;
- b. Schematic diagram of fire alarm circuit;
- c. Brochures and catalogues containing guaranteed technical data, characteristic curve for pumps, fire alarm and detection control panels, detectors, manual pull stations, alarm horn and bell with flashing light, fire extinguishers;
- d. Assembly/outline dimensional drawing of equipment, e.g. pumps, diesel day tank, pump's controller, fire alarm and detection control panels, etc.;

- e. Operation and Maintenance Manuals; and
- f. Spare Parts and Tools Lists

**MW-8.0 GUARANTEE**

The Contractor/Contractor shall guarantee to replace/repair/restore the supplied equipment/components/parts at his own expense against defect in design, workmanship and materials for a period of one (1) year after acceptance by NPC.

The Contractor/Contractor shall submit a Warranty Certificate (at least 1 year) effective from the date of acceptance by NPC.

After the lapse of the warranty period, provided that there are no defects found, NPC shall release the warranty security/certificate.

**MW-9.0 MEASUREMENT OF PAYMENT**

Measurement of payment for all Mechanical Works shall be based on the bid price of each item in the Bill of Quantities. The cost shall cover all works required and described in the pertinent provisions of the specifications.

Measurement of payment for pipes shall be based on the bid price of actual length of pipe installed as shown in the Bill of Quantities. The cost shall cover all works required including excavation, sand bedding, backfilling, testing, painting and other works and services described in the pertinent provisions of the specifications.

SECTION VI

**TECHNICAL  
SPECIFICATIONS**

PART II

**TECHNICAL DATA SHEETS**

**PART II – TECHNICAL DATA SHEETS****MW – MECHANICAL WORKS****TABLE OF CONTENTS**

<b>SECTION</b>	<b>DESCRIPTION</b>	<b>PAGE</b>
M-1.0	Domestic Water System	VI-TDS(MW)-1
M-2.0	Air-Conditioning and Ventilation Systems	VI-TDS(MW)-2
M-3.0	Fire Protection System	VI TDS(MW)-4

**PART II – TECHNICAL DATA SHEETS****MW – MECHANICAL WORKS****NOTES**

1. The Bidder shall complete this technical data sheet and submit the filled-up forms with the technical proposal. The Bidder shall use continuation sheets as necessary for any other additional information keeping to the format shown herein or by reproducing the same.
2. NPC reserves the right to reject Bids without proper and/or specific data and information as required herein.
3. The data required are technical features and characteristics of the Equipment to be provided by the bidder. Bidder's proposal shall at least be equal or superior to the requirements specified by NPC.

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Name of Firm

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Name & Signature of Representative

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Designation

**M-1.0 DOMESTIC WATER SUPPLY**

ITEM	DESCRIPTION	UNIT	NPC REQUIREMENT	CONTRACTOR'S DATA
<b>M-1.1</b>	<b>Water Storage Tank</b>			
M-1.1.1	Manufacturer/Fabricator		By Contractor	
M-1.1.2	Place of Manufacture		By Contractor	
M-1.1.3	Capacity (Nominal)	Liters	10,000	
M-1.1.4	Design Code		By Contractor	
M-1.1.5	Quantity		1	
M-1.1.6	Empty Weight	kg	By Contractor	
M-1.1.7	Operating Weight	kg	By Contractor	
M-1.1.8	Size (diameter x length)	m x m	By Contractor	
M-1.1.9	Thickness of Plate	mm	By Contractor	
M-1.1.10	Materials of Construction:		Horizontal cylindrical Stainless steel	
M-1.1.11	Paint Specifications (on steel support and/or as applicable):		By Contractor	
<b>M-1.2</b>	<b>Self-Priming Centrifugal Pump</b>			
M-1.2.1	Manufacturer		By Contractor	
M-1.2.2	Place of Manufacture		By Contractor	
M-1.2.3	Quantity	Sets	2	
M-1.2.4	Type		Self-priming, centrifugal, horizontal	
M-1.2.5	Capacity	m <sup>3</sup> /hr	13.64 minimum	
M-1.2.6	Total Head	m	35 minimum	
M-1.2.7	Lifting Head	m	1.9 minimum	
M-1.2.8	Speed	rpm	By Contractor	
M-1.2.9	Efficiency	%	By Contractor	
M-1.2.10	Power Required	kW	By Contractor	
M-1.2.11	Material:			
	Impeller		Bronze/Stainless steel	
	Shaft		Stainless steel	
	Body		Cast iron	
M-1.2.12	Weight	kg	By Contractor	

Name of Firm

Name &amp; Signature of Representative

Designation

**M-2.0 AIR-CONDITIONING AND VENTILATION SYSTEM**

ITEM	DESCRIPTION	UNIT	NPC REQUIREMENT	CONTRACTOR'S DATA
<b>M-2.1</b>	<b>Air-Conditioning System</b>			
M-2.1.1	Manufacturer		By Contractor	
M-2.1.2a	Model		By Contractor	
	a.1) Cooling Capacity	kJ/hr	38,000 minimum	
	a.2) Quantity	sets	4	
	a.3) Type		Split Type, Floor-Mounted (Inverter)	
	a.4) Dimensions (W x D x H): Indoor	mm	By Contractor	
	a.5) Dimensions (W x D x H): Outdoor	mm	By Contractor	
	a.6) Total Power Consumption (Indoor and Outdoor Unit)	kW	By Contractor	
	a.7) Refrigerant type		By Contractor	
	a.8) Weight (Indoor / Outdoor)	kg / kg	By Contractor	
M-2.1.2b	Model		By Contractor	
	b.1) Cooling Capacity	kJ/hr	20,000 minimum	
	b.2) Quantity	sets	2	
	b.3) Type		Split Type, Wall-Mounted (Inverter)	
	b.4) Dimensions (W x D x H): Indoor	mm	By Contractor	
	b.5) Dimensions (W x D x H): Outdoor	mm	By Contractor	
	b.6) Total Power Consumption (Indoor and Outdoor Unit)	kW	By Contractor	
	b.7) Refrigerant type		By Contractor	
	b.8) Weight (Indoor / Outdoor)	kg / kg	By Contractor	
M-2.1.2c	Model		By Contractor	
	c.1) Cooling Capacity	kJ/hr	13,000 minimum	
	c.2) Quantity	sets	3	
	c.3) Type		Split Type, Wall-Mounted (Inverter)	
	c.4) Dimensions (W x D x H): Indoor	mm	By Contractor	
	c.5) Dimensions (W x D x H): Outdoor	mm	By Contractor	
	c.6) Total Power Consumption (Indoor and Outdoor Unit)	kW	By Contractor	
	c.7) Refrigerant type		By Contractor	
	c.8) Weight (Indoor / Outdoor)	kg / kg	By Contractor	
M-2.1.2d	Model		By Contractor	
	d.1) Cooling Capacity	kJ/hr	8,500 minimum	
	d.2) Quantity	sets	4	
	d.3) Type		Window Type (Inverter)	
	d.4) Dimensions (W x D x H)	mm	By Contractor	
	d.5) Power Consumption	kW	By Contractor	
	d.6) Refrigerant type		By Contractor	
	d.7) Weight	kg	By Contractor	
M-2.1.3	Electrical Supply (V/Ph/Hz)		230, 1Ø, 60	
M-2.1.4	Control System (with Remote Control Unit) – All A/C units		Included	

Name of Firm

Name &amp; Signature of Representative

Designation

NATIONAL POWER CORPORATION



VI-TDS (MW)-2

## SECTION VI – TECHNICAL SPECIFICATIONS

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**M-2.0 AIR-CONDITIONING AND VENTILATION SYSTEM (Cont'd.....)**

ITEM	DESCRIPTION	UNIT	NPC REQUIREMENT	CONTRACTOR'S DATA
<b>M-2.2</b>	<b>Ventilation System</b>			
M-2.2.1	Manufacturer		By Contractor	
M-2.2.2a	Model		By Contractor	
	a.1) Air Flow	m <sup>3</sup> /hr	4,700 (minimum)	
	a.2) Quantity	sets	2	
	a.3) Type		Wall Mounted	
	a.4) Dimensions (W x D x H)	mm	By Contractor	
	a.5) Power Consumption	kW	By Contractor	
M-2.2.2b	Model		By Contractor	
	b.1) Air Flow	m <sup>3</sup> /hr	150 (minimum)	
	b.2) Quantity	set	1	
	b.3) Type		Wall Mounted	
	b.4) Dimensions (W x D x H)	mm	By Contractor	
	b.5) Power Consumption	kW	By Contractor	
M-2.2.2c	Model		By Contractor	
	c.1) Air Flow	m <sup>3</sup> /hr	250 (minimum)	
	c.2) Quantity	sets	4	
	c.3) Type		Ceiling Mounted	
	c.4) Dimensions (W x D x H)	mm	By Contractor	
	c.5) Power Consumption	kW	By Contractor	
M-2.2.2d	Model		By Contractor	
	d.1) Air Flow	m <sup>3</sup> /hr	100 (minimum)	
	d.2) Quantity	sets	3	
	d.3) Type		Ceiling Mounted	
	d.4) Dimensions (W x D x H)	mm	By Contractor	
	d.5) Power Consumption	kW	By Contractor	
M-2.2.3	Electrical Supply (V/Ph/Hz)		230, 1Ø, 60	

Name of Firm

Name &amp; Signature of Representative

Designation

**M-3.0 FIRE PROTECTION SYSTEM**

ITEM	DESCRIPTION	UNIT	NPC REQUIREMENT	CONTRACTOR'S DATA
<b>M-3.1</b>	<b>Diesel Engine-Driven Fire Pump</b>			
<b>M-3.1.1</b>	<b>Pump</b>			
M-3.1.1a	Manufacturer		By Contractor	
M-3.1.1b	Place of Manufacture		By Contractor	
M-3.1.1c	Brand/Model		By Contractor	
M-3.1.1d	Type		Vertical, Turbine	
M-3.1.1e	Quantity	set	1	
M-3.1.1f	Capacity	m <sup>3</sup> /h	34.09 (minimum)	
M-3.1.1g	Total Dynamic Head (TDH)	m	35 (minimum)	
M-3.1.1h	Suction Lift	m	1.9 (minimum)	
M-3.1.1i	Speed	rpm	By Contractor	
M-3.1.1j	Efficiency	%	By Contractor	
M-3.1.1k	NPSH Required	m	By Contractor	
M-3.1.1l	Materials			
	a) Impeller		Cast bronze	
	b) Casing		Cast iron	
	c) Shaft		stainless steel	
<b>M-3.1.2</b>	<b>Diesel Engine Drive</b>			
M-3.1.2a	Manufacturer		By Contractor	
M-3.1.2b	Place of Manufacture		By Contractor	
M-3.1.2c	Brand/Model		By Contractor	
M-3.1.2d	Rating	hp	By Contractor	
M-3.1.2e	Maximum Fuel Consumption	l/h	By Contractor	
M-3.1.2f	Rated Speed	rpm	By Contractor	
M-3.1.2g	Cylinders (Quantity)		By Contractor	
M-3.1.3	Approving Authority (Driver & Pump)		UL/FM	
M-3.1.4	Weight (Driver & Pump Assembly)	kg	By Contractor	
<b>M-3.2</b>	<b>Jockey Pump &amp; Motor</b>			
<b>M-3.2.1</b>	<b>Pump</b>			
M-3.2.1a	Manufacturer		By Contractor	
M-3.2.1b	Place of Manufacture		By Contractor	
M-3.2.1c	Brand/Model		By Contractor	
M-3.2.1d	Type		Submersible	
M-3.2.1e	Quantity		One (1)	
M-3.2.1f	Capacity	m <sup>3</sup> /h	3.18 (minimum)	
M-3.2.1g	Total Dynamic Head (TDH)	m	40 (minimum)	
M-3.2.1h	Suction Lift	m	1.9 (minimum)	

Name of Firm

Name &amp; Signature of Representative

Designation

NATIONAL POWER CORPORATION



VI-TDS (MW)-4

**M-3.0 FIRE PROTECTION SYSTEM (Cont'd.....)**

ITEM	DESCRIPTION	UNIT	NPC REQUIREMENT	CONTRACTOR's DATA
M-3.2.1i	Speed	rpm	By Contractor	
M-3.2.1j	Efficiency	%	By Contractor	
M-3.2.1k	Power Required	kW	By Contractor	
M-3.2.1l	NPSH Required	m	By Contractor	
M-3.2.1m	Materials			
	a) Impeller		Corrosion Resistant	
	b) Casing		Stainless steel	
	c) Shaft		stainless steel	
<b>M-3.2.2</b>	<b>Motor</b>			
M-3.2.2a	Manufacturer		By Contractor	
M-3.2.2b	Place of Manufacture		By Contractor	
M-3.2.2c	Brand/Model		By Contractor	
M-3.2.2d	Type & Protection		By Contractor	
M-3.2.2e	Insulation Class		By Contractor	
M-3.2.2f	Rating:			
	Voltage	V	By Contractor	
	Power Output	kW	By Contractor	
M-3.2.2g	Current at Rated Voltage:			
	Full Load	A	By Contractor	
	Locked Rotor	A	By Contractor	
M-3.2.2h	Rated Speed	rpm	By Contractor	
M-3.2.3	Weight (Pump and Motor Assembly)	kg	By Contractor	
M-3.2.4	Approving Authority (Pump & Motor)		UL/FM	
<b>M-3.3</b>	<b>Fire Hose Racks/Cabinets</b>			
M-3.3.1	Manufacturer		By Contractor	
M-3.3.2	Place of Manufacture		By Contractor	
M-3.3.3	Type		Galvanized Steel, Gauge 16, Aluminum frame & door, Breakable glass panel door, wall type	
M-3.3.4	Quantity	sets	4	
M-3.3.5	One (1) bronze adjustable fire nozzle, 40mm		Included	
M-3.3.6	Two (2) sets Fire Hose, 40mm x 15 m long, double jacketed rubber-lined		Included	
M-3.3.7	One (1) 40 mm Angle Valve, bronze		Included	
M-3.3.8	One (1) set Wrench		Included	
M-3.3.9	Approving Authority		UL/FM	

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**M-3.0 FIRE PROTECTION SYSTEM (Cont'd...)**

ITEM	DESCRIPTION	UNIT	NPC REQUIREMENT	CONTRACTOR'S DATA
<b>M-3.4</b>	<b>Automatic Fire Water Sprinkler System</b>			
M-3.4.1	Sprinkler heads		Pendent, brass, glass bulb type with temperature rating of 68°C, 1/2 inch dia., standard orifice with k-factor of 5.6, 7 psi min. operating pressure, 175 psi max. operating pressure, UL/FM approved	
M-3.4.2	Alarm Check Valve		Cast iron body, bronze or brass clapper and pilot valve assemblies, UL/FM approved, flanged ends	
<b>M-3.5</b>	<b>Fire Detection and Alarm System</b>			
M-3.5.1	Manufacturer		By Contractor	
M-3.5.2	Place of Manufacture		By Contractor	
M-3.5.3	Main Fire Control Panel (MFCP)	set	1	
	Height	mm	By Contractor	
	Width	mm	By Contractor	
	Depth	mm	By Contractor	
	Weight	kg	By Contractor	
M-3.5.4	Local Fire Control Panel (LFCP)	sets	4	
	Height	mm	By Contractor	
	Width	mm	By Contractor	
	Depth	mm	By Contractor	
	Weight	kg	By Contractor	
M-3.5.5	Approving Authority		UL/FM	
<b>M-3.6</b>	<b>Portable Fire Extinguishers</b>			
M-3.6.1	Manufacturer		By Contractor	
M-3.6.2	Type		HCFC or Halotron I, Wall Hung	
M-3.6.3	Quantity	sets	26	
M-3.6.4	Capacity	kg	7.1	
M-3.6.5	Approving Authority		UL/FM	
<b>M-3.7</b>	<b>Wheeled Type Clean Agent Fire Extinguishers</b>			
M-3.7.1	Manufacturer		By Contractor	
M-3.7.2	Type		HCFC or Halotron I, Wheeled Type	
M-3.7.3	Quantity	set	1	
M-3.7.4	Capacity	kg	29.5	
M-3.7.5	Approving Authority		UL/FM	

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VI-TDS (MW)-6



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## **BID DOCUMENTS**

### **VOLUME 2**

**Name of Project :** CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR

**Location :** BAGACAY, CALBAYOG, SAMAR

**Specs No. :** VisP22Z1464Sc

**Contents:**

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| <b>Section I</b>   | - Invitation to Bid              |
| <b>Section II</b>  | - Instructions to Bidders        |
| <b>Section III</b> | - Bid Data Sheet                 |
| <b>Section IV</b>  | - General Conditions of Contract |
| <b>Section V</b>   | - Special Conditions of Contract |
| <b>Section VI</b>  | - Technical Specifications       |
|                    | <i>PH – Project Highlights</i>   |
|                    | <i>AW – Architectural Works</i>  |
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Design and Development Department



## SECTION VII

# BILL OF QUANTITIES



## SECTION VII

# **BILL OF QUANTITIES ARCHITECTURAL WORKS**

## SECTION VII - BILL OF QUANTITIES

**ARCHITECTURAL WORKS**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
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**I - BUILDING****AW-1.0 WALL SYSTEM AND FINISHES**

a. 150mm thick (6") CHB wall including mortar grout and reinforcing steel bars	furnish & lay	Refer to NPC TS & Drawing	sq.m.	487	_____ (P _____)	_____ (P _____)
b. 100mm thick (4") CHB wall including mortar grout and reinforcing steel bars	furnish & lay	Refer to NPC TS & Drawing	sq.m.	431	_____ (P _____)	_____ (P _____)
c. Plastering: Plain cement plaster wall finish	furnish & apply	Refer to NPC TS & Drawing	sq.m.	2,157	_____ (P _____)	_____ (P _____)
d. Wainscoting: 200mm x 300mm x 6mm thick ceramic glazed wall tiles, colored, including bonding materials. (toilet)	furnish & install	Refer to NPC TS & Drawing	sq.m.	143	_____ (P _____)	_____ (P _____)
e. Pre-cast concrete louvers	furnish & install	Refer to NPC TS & Drawing	sq.m.	54.00	_____ (P _____)	_____ (P _____)

**AW-2.0 FLOOR FINISHES**

a. Vitrified glazed floor tiles 300mm x 300mm x 6mm thick colored including bonding materials.	furnish & install	Refer to NPC TS & Drawing	sq.m.	314	_____ (P _____)	_____ (P _____)
b. Ceramic unglazed floor tiles 200mm x 200mm x 6mm thick colored including bonding materials. (toilet, electrical room & Janitor)	furnish & install	Refer to NPC TS & Drawing	sq.m.	66	_____ (P _____)	_____ (P _____)
c. Vitrified glazed floor tiles, 600mm x 600mm x 6mm thick colored including bonding materials (entrance stoop, lobby, stair)	furnish & install	Refer to NPC TS & Drawing	sq.m.	197	_____ (P _____)	_____ (P _____)
d. Plain cement plaster floor finish w/ floor hardener light traffic density	furnish & apply	Refer to NPC TS & Drawing	sq.m.	234	_____ (P _____)	_____ (P _____)

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## SECTION VII - BILL OF QUANTITIES

**ARCHITECTURAL WORKS**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (in Figures)
<b>AW-3.0 ROOFING SYSTEM AND BUILDING BLANKETS</b>							
a.	Roofing Sheets: 0.5 mm base metal thickness, pre-painted long span, corrugated G.I. roofing sheets, including fasteners, sealants, and 0.5mm base metal thickness pre-painted bended sheets such as end wall flashing, counter flashing and ridge roll including fasteners, sealants and retouching paint.	furnish & install	Refer to NPC TS & Drawing	sq.m.	184	_____(P_____)	_____(P_____)
b.	Downspout: 4" $\phi$ uPVC pipe series 1000 downspout including joint fittings solvents and brackets.	furnish & install	Refer to NPC TS & Drawing	li.m.	92	_____(P_____)	_____(P_____)
c.	Roof Drain: Removable stainless wire basket strainer.	furnish & install	Refer to NPC TS & Drawing	pcs.	4	_____(P_____)	_____(P_____)
d.	Thermal Insulation: 10mm thick polyethelene with aluminum foil on both faces, above purlins.	furnish & install	Refer to NPC TS & Drawing	sq.m.	184	_____(P_____)	_____(P_____)
e.	Inside Gutter: Inside gutter 0.6mm thick, from 600mm wide stainless steel including pre-painted flashing cap, retouching paint, hardware and accessories.	furnish & install	Refer to NPC TS & Drawing	li.m.	17	_____(P_____)	_____(P_____)
f.	Roof Drain: Removable brass scupper strainer including cast iron sump and accessories.	furnish & install	Refer to NPC TS & Drawing	sets	3	_____(P_____)	_____(P_____)
g.	Main Entrance Canopy Roofing: 6mm thk. Solid Polycarbonate roofing sheet including stainless steel fasteners, sealants and accessories.	furnish & install	Refer to NPC TS & Drawing	sq.m.	11.5	_____(P_____)	_____(P_____)
<b>AW-4.0 CEILING SYSTEM</b>							
a.	6mm thk. Fiber cement board on standard metal furring spaced at 0.4 o.c.b.w. and metal hangers at 0.8m o.c.b.w. including hardwares & accessories	furnish & install	Refer to NPC TS & Drawing	sq.m.	535	_____(P_____)	_____(P_____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
<b>AW-5.0 FENESTRATION</b>							
<b>AW-5.1 Doors</b>							
a. D-1 (3500mm x 2500mm)	Double swing type door, 8mm thk tempered tinted glass bronze swing door, with 8mm thk fixed tempered tinted glass bronze window on aluminum frame analok finish	furnish & install	Refer to NPC TS & Drawing	set	1	_____(P_____)	_____(P_____)
b. D-2 (1700mm x 2500mm)	Double swing type door, 8mm thk tempered tinted glass bronze swing door, with 8mm thk fixed tempered tinted glass bronze transom window on aluminum frame analok finish	furnish & install	Refer to NPC TS & Drawing	sets	1	_____(P_____)	_____(P_____)
c. D-3 (900mm x 2500mm)	Swing type door, 8mm thk tempered tinted glass swing door, with 6mm thk fixed tempered tinted glass transom window on aluminum frame analok finish	furnish & install	Refer to NPC TS & Drawing	set	1	_____(P_____)	_____(P_____)
d. D-4 (1500mm x 2100mm)	Flush type wooden door marine plywood both sides, 2"x5" hard wood jamb, including heavy duty loose pin hinges, door knob/lockset weather proof and painting.	furnish & install	Refer to NPC TS & Drawing	sets	1	_____(P_____)	_____(P_____)
e. D-5 (800mm x 2100mm)	Panel type wooden door, 2"x5" hard wood jamb, including 3 pcs heavy duty loose pin hinges, door knob/lockset weather proof and painting	furnish & install	Refer to NPC TS & Drawing	sets	14	_____(P_____)	_____(P_____)
f. D-6 (1000mmx2100mm)	flush type wooden door, marine plywood, both sides, 2"x5" hard wood jamb, including heavy duty loose pin hinges, door knob/lockset weather proof and painting.	furnish & install	Refer to NPC TS & Drawing	set	1	_____(P_____)	_____(P_____)
g. D-7 (700mm x 2100mm)	flush type wooden door, marine plywood both sides, 2"x5" hard wood jamb, including heavy duty loose pin hinges, fixed louver intake, door knob/lockset weather proof and painting.	furnish & install	Refer to NPC TS & Drawing	sets	7	_____(P_____)	_____(P_____)
h. D-8 (600mm x 2100mm)	flush type wooden door, marine plywood both sides, 2"x5" hard wood jamb, including heavy duty loose pin hinges, fixed louver intake, door knob/lockset weather proof and painting.	furnish & install	Refer to NPC TS & Drawing	sets	3	_____(P_____)	_____(P_____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
i. D-9 (2100mm x 2150mm )	Sliding glass door, 8mm thk tempered tinted glass bronze sliding door on aluminum frame analok finish.	furnish & install	Refer to NPC TS & Drawing	set	3	_____ (P _____)	_____ (P _____)
j. D-10 (1000mm x 2100mm)	Plain metal swing door with galvanized iron frame GA.16 epoxy paint finish including hardware and accessories.	furnish & install	Refer to NPC TS & Drawing	sets	2	_____ (P _____)	_____ (P _____)
k. D-11 (600mmx1350mm)	flush type wooden door, marine plywood, both sides, 2"x 5" hard wood jamb, including heavy duty loose pin hinges, door knob/lockset weather proof and painting.	furnish & install	Refer to NPC TS & Drawing	set	2	_____ (P _____)	_____ (P _____)
l. D-12 (W4500mmxH5000mm)	motor operated galvalume roll-up door, S-type Ga. 18 mill finish, 1 unit of 1hp single phase motor, open type installation	furnish & install	Refer to NPC TS & Drawing	set	2	_____ (P _____)	_____ (P _____)

**AW-5.2 Windows**

a. W-1 (1500mmx1200mm)	glass sliding window, 6mm thk tempered tinted glass bronze sliding window on alum. frame analok finish	furnish & install	Refer to NPC TS & Drawing	sets	28	_____ (P _____)	_____ (P _____)
b. W-2 (1370mmx2150mm)	glass awning/fixed window, 6mm thk tempered tinted glass bronze awning/fixed window on alum. frame analok finish	furnish & install	Refer to NPC TS & Drawing	set	1	_____ (P _____)	_____ (P _____)
c. W-3 (1000mmx1200mm)	glass fixed window, 8mm thk tempered tinted glass bronze fixed window on alum. frame analok finish (Transaction window)	furnish & install	Refer to NPC TS & Drawing	sets	2	_____ (P _____)	_____ (P _____)
d. W-4 (3000mmx3000mm)	glass awning/fixed window, 6mm thk tempered tinted glass bronze awning window on alum. frame analok finish	furnish & install	Refer to NPC TS & Drawing	set	4	_____ (P _____)	_____ (P _____)
e. W-5 (3000mmx1025mm)	glass awning window, 6mm thk tempered tinted glass bronze awning on alum. frame analok finish	furnish & install	Refer to NPC TS & Drawing	sets	4	_____ (P _____)	_____ (P _____)
f. W-6 (700mmx2150mm)	glass awning/fixed window, 6mm thk tempered tinted glass bronze awning/fixed window on alum. frame analok finish	furnish & install	Refer to NPC TS & Drawing	sets	3	_____ (P _____)	_____ (P _____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
	g. W-7 (1000mmx500mm) glass awning window, 6mm thk tempered tinted glass bronze awning window on alum. frame analog finish	furnish & install	Refer to NPC TS & Drawing	sets	5	_____(P_____)	_____(P_____)
	h. W-8 (500mmx500mm) glass awning window, 6mm thk tempered tinted glass bronze awning window on alum. frame analog finish	furnish & install	Refer to NPC TS & Drawing	sets	3	_____(P_____)	_____(P_____)
<b>AW-6.0 PLUMBING SYSTEM</b>							
	a. Fixtures including fittings soil and waste pipes Water Closet with bidet spray colored, 680 x 378mm elongated, including nickel plated fittings and bidet spray.	furnish & install	Refer to NPC TS & Drawing	sets	10	_____(P_____)	_____(P_____)
	b. Urinal: Flush type, colored, 305mm x 470mm x 680mm elongated, including nickel plated fittings.	furnish & install	Refer to NPC TS & Drawing	sets	3	_____(P_____)	_____(P_____)
	c. Lavatory: Oval, colored, under-the counter, including nickel plated long spout fittings, 400mm x 540mm.	furnish & install	Refer to NPC TS & Drawing	sets	4	_____(P_____)	_____(P_____)
	d. Lavatory: Wall mounted, colored, 400mm x 540mm including nickel plated long spout fittings.	furnish & install	Refer to NPC TS & Drawing	sets	4	_____(P_____)	_____(P_____)
	e. Soap Dispenser: Wall mounted squeezed liquid sputtering, plastic casing, heavy duty.	furnish & install	Refer to NPC TS & Drawing	pcs	4	_____(P_____)	_____(P_____)
	f. Soap holder, white	furnish & install	Refer to NPC TS & Drawing	pcs	6	_____(P_____)	_____(P_____)
	g. Toilet paper holder, stainless	furnish & install	Refer to NPC TS & Drawing	pcs	10	_____(P_____)	_____(P_____)
	h. Towel holder stainless	furnish & install	Refer to NPC TS & Drawing	pc	6	_____(P_____)	_____(P_____)
	i. Floor drain stainless 100mm x100mm	furnish & install	Refer to NPC TS & Drawing	pcs.	24	_____(P_____)	_____(P_____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
j.	Shower valve and head, including nickel plated fittings	furnish & install	Refer to NPC TS & Drawing	sets	6	_____(P_____)	_____(P_____)
k.	150mm dia. uPVC pipe for storm drain system (including joint fittings)	furnish & install	Refer to NPC TS & Drawing	l.m.	92	_____(P_____)	_____(P_____)
l.	50mm dia. uPVC pipe for plumbing system (including joint fittings)	furnish & install	Refer to NPC TS & Drawing	l.m.	432	_____(P_____)	_____(P_____)
m.	75mm dia. uPVC pipe for plumbing system (including joint fittings)	furnish & install	Refer to NPC TS & Drawing	l.m.	75	_____(P_____)	_____(P_____)
n.	100mm dia. uPVC pipe for plumbing system (including joint fittings)	furnish & install	Refer to NPC TS & Drawing	l.m.	25	_____(P_____)	_____(P_____)
o.	150mm dia. uPVC pipe for plumbing system (including joint fittings)	furnish & install	Refer to NPC TS & Drawing	l.m.	24	_____(P_____)	_____(P_____)
p.	100mm dia. C.I. Sump and removable brass dome roof drain including elbow, joint fittings, etc.	furnish & install	Refer to NPC TS & Drawing	sets	3	_____(P_____)	_____(P_____)

**AW-7.0 PAINTING**

a.	Exterior Concrete Surfaces 1-coat of primer solvent based acrylic paint 2-coats of top coat solvent based acrylic glazing including surface preparation	furnish & apply	Refer to NPC TS & Drawing	sq.m.	779	_____(P_____)	_____(P_____)
b.	Interior Concrete Surfaces 1-coat of water based acrylic paint primer 2-coats of water based acrylic top coat including surface preparation	furnish & apply	Refer to NPC TS & Drawing	sq.m.	1,378	_____(P_____)	_____(P_____)
c.	Fiber Cement Board Surfaces 1-coat of water based acrylic paint primer 2-coats of water based acrylic top coat including surface preparation	furnish & apply	Refer to NPC TS & Drawing	sq.m.	521	_____(P_____)	_____(P_____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
	d. Metal Surfaces: Steel - red oxide primer, enamel finish	furnish & apply	Refer to NPC TS & Drawing	sq.m	29	_____ (P_____)	_____ (P_____)
<b>AW-8.0 COUNTERS AND CABINETS</b>							
	a. Men and Women's Toilet Counter top, 20 x 600 x 1070mm natural granite stone, non-porous, glazed ball nose with 1 block outs for under the counter lavatory with fittings. (2F)	furnish & install	Refer to NPC TS & Drawing	pcs	2	_____ (P_____)	_____ (P_____)
	b. Men and Women's Toilet Counter top, 20 x 600 x 1130mm natural granite stone, non-porous, glazed ball nose with 1 block outs for under the counter lavatory with fittings. (3F)	furnish & install	Refer to NPC TS & Drawing	pcs	2	_____ (P_____)	_____ (P_____)
	c. Men and Women's Toilet Counter Splash board, 20 x 150 x 1070mm natural granite stone, non-porous, glazed round metered corner (2F)	furnish & install	Refer to NPC TS & Drawing	pcs	2	_____ (P_____)	_____ (P_____)
	d. Men and Women's Toilet Counter Splash board, 20 x 150 x 1130mm natural granite stone, non-porous, glazed round metered corner (3F)	furnish & install	Refer to NPC TS & Drawing	pcs	2	_____ (P_____)	_____ (P_____)
	e. Men and Women's Toilet Counter Support Facia, 20 x 150 x 1670mm natural granite stone, non-porous, glazed round metered corner (2F)	furnish & install	Refer to NPC TS & Drawing	pcs	2	_____ (P_____)	_____ (P_____)
	f. Men and Women's Toilet Counter Support Facia, 20 x 150 x 1730mm natural granite stone, non-porous, glazed round metered corner (3F)	furnish & install	Refer to NPC TS & Drawing	pcs	2	_____ (P_____)	_____ (P_____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
<b>AW-9.0 MISCELLANEOUS</b>							
a.	Soil poisoning, authorized anti-termite liquid concentrate	furnish & apply	Refer to NPC TS & Drawing	sq.m.	<b>247</b>	_____ (P_____)	_____(P_____)
b.	Vapor barrier: polyethelene, high grade	furnish & install	Refer to NPC TS & Drawing	sq.m.	<b>262</b>	_____ (P_____)	_____(P_____)
c.	Waterproofing : 5 Layer elastomeric emulsion with fiberglass mesh	furnish & apply	Refer to NPC TS & Drawing	sq.m.	<b>162</b>	_____ (P_____)	_____(P_____)
d.	Stair Handrail: Handrail -2" Ø high nickel content stainless steel pipe including anchoring, flanges, fastening, welding and buffing	furnish & install	Refer to NPC TS & Drawing	l.m	<b>106</b>	_____ (P_____)	_____(P_____)
e.	Stair Railings: Railings -1" Ø high nickel content stainless steel pipe including anchoring, flanges, fastening, welding and buffing	furnish & install	Refer to NPC TS & Drawing	l.m	<b>180</b>	_____ (P_____)	_____(P_____)
f.	Stair Brass Nosing: Extruded brass metal 2" wide nominal dimension	furnish & lay	Refer to NPC TS & Drawing	l.m	<b>132</b>	_____ (P_____)	_____(P_____)
g.	Urinal Partition, Toilet Partition and Cubicle Doors: Hard wood laminate phenolic boards, including polyester coated extruded aluminum framing, non-rusting connection accessories, door hinges and lock sets, toilet paper holder, grab handle, and accessory hook, signage (6 cubicle partiotions and urinal partitions)	furnish & install	Refer to NPC TS & Drawing	lot	<b>1</b>	_____ (P_____)	_____(P_____)
h.	Balcony Steel Railings and Sun breaker: 50mm x 50mm x 2.0mm thk Tubular steel, including painting.	furnish & install	Refer to NPC TS & Drawing	lot	<b>1</b>	_____ (P_____)	_____(P_____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
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**II - PUMPHOUSE****AW-1.0 WALL SYSTEM AND FINISHES**

a. 150mm thick (6") CHB wall including mortar grout and reinforcing steel bars	furnish & lay	Refer to NPC TS & Drawing	sq.m.	37	_____ (P _____)	_____ (P _____)
b. Plastering: Plain cement plaster wall finish	furnish & apply	Refer to NPC TS & Drawing	sq.m.	78	_____ (P _____)	_____ (P _____)
c. Pre-cast concrete louvers	furnish & install	Refer to NPC TS & Drawing	sq.m.	4	_____ (P _____)	_____ (P _____)

**AW-2.0 FLOOR FINISHES**

a. Plain cement floor finish with floor hardener light traffic density	furnish & apply	Refer to NPC TS & Drawing	sq.m.	14	_____ (P _____)	_____ (P _____)
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**AW-3.0 ROOFING SYSTEM AND BUILDING BLANKETS**

a. Roofing Sheets: 0.5mm base metal thickness pre-painted long span corrugated G.I. roofing sheets, including fasteners, sealants, and 0.5mm base metal thickness pre-painted bended sheets such as counter flashing, including fasteners, sealants and retouching paint.	furnish & install	Refer to NPC TS & Drawing	sq.m.	14	_____ (P _____)	_____ (P _____)
b. Downspout: 4" dia. uPVC pipe series 1000 downspout including joint fittings, solvents and brackets	furnish & install	Refer to NPC TS & Drawing	l.m	13	_____ (P _____)	_____ (P _____)

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**ARCHITECTURAL WORKS**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
c.	Roof Drain: Removable stainless wire basket strainer	furnish & install	Refer to NPC TS & Drawing	l.m	4	_____ (P _____)	_____ (P _____)
d.	Thermal Insulation: 10mm thick polyethelene with aluminum foil on both faces, above purlins	furnish & install	Refer to NPC TS & Drawing	sq.m	14	_____ (P _____)	_____ (P _____)
e.	Inside Gutter: Inside Gutter 0.6mm thick, from 600mm wide stainless steel including pre-painted flashing cap, retouching paint, hardware and accessories	furnish & install	Refer to NPC TS & Drawing	l.m	7	_____ (P _____)	_____ (P _____)

**AW-4.0 CEILING SYSTEM**

a. 6mm thk. Fiber cement board on standard metal furring spaced at 0.4 o.c.b.w. and metal hangers at 0.8m o.c.b.w. including hardwares & accessories

furnish &amp; install

Refer to NPC  
TS & Drawing

sq.m.

14

\_\_\_\_\_ (P \_\_\_\_\_)

\_\_\_\_\_ (P \_\_\_\_\_)

**AW-5.0 FENESTRATION****AW-5.1 Doors**

a. D-13 (1600mmx2100mm) flush type wooden door, marine plywood both sides, 2"x 5" hard wood jamb, including heavy duty loose pin hinges, door knob/lockset weather proof and painting.

furnish &amp; install

Refer to NPC  
TS & Drawing

set

1

\_\_\_\_\_ (P \_\_\_\_\_)

\_\_\_\_\_ (P \_\_\_\_\_)

**AW-5.2 Windows**

a. W-1 (1500mmx2100mm) Glass sliding window, 6mm thk tempered tinted glass bronze sliding window on aluminum frame analog finish

furnish &amp; install

Refer to NPC  
TS & Drawing

set

1

\_\_\_\_\_ (P \_\_\_\_\_)

\_\_\_\_\_ (P \_\_\_\_\_)

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NATIONAL POWER



VII-BOQ(AW)10

## SECTION VII - BILL OF QUANTITIES

**ARCHITECTURAL WORKS**

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
<b>AW-6.0 PAINTING</b>							
	a. Exterior Concrete Surfaces 1-coat of primer solvent based acrylic paint 2-coats of top coat solvent based acrylic glazing including surface preparation	furnish & apply	Refer to NPC TS & Drawing	sq.m.	<b>47</b>	_____ (P_____)	_____ (P_____)
	b. Interior Concrete Surfaces 1-coat of water based acrylic paint primer 2-coats of water based acrylic top coat including surface preparation	furnish & apply	Refer to NPC TS & Drawing	sq.m.	<b>31</b>	_____ (P_____)	_____ (P_____)
	c. Fiber Cement Board Surfaces 1-coat of water based acrylic paint primer 2-coats of water based acrylic top coat including surface preparation	furnish & apply	Refer to NPC TS & Drawing	sq.m.	<b>14</b>	_____ (P_____)	_____ (P_____)
<b>AW-7.0 MISCELLANEOUS</b>							
	a. Soil poisoning, authorized anti-termite liquid concentrate	furnish & apply	Refer to NPC TS & Drawing	sq.m.	<b>15</b>	_____ (P_____)	_____ (P_____)
<b>SUB-TOTAL AMOUNT OF BID (ARCHITECTURAL WORKS)</b>						_____ (P_____)	_____ (P_____)

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## SECTION VII

# BILL OF QUANTITIES CIVIL WORKS

## SECTION VII - BILL OF QUANTITIES

SECTION VII - BILL OF QUANTITIES  
(CIVIL WORKS)

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
<b>1.0</b>	<b>GRADING WORKS</b>						
1.1	Stripping	excavate & reuse	Refer to NPC TS & Drawing	cu.m.	40	_____(P_____)	_____(P_____)
1.2	Grading Fill	furnish, spread & compact	Refer to NPC TS & Drawing	cu.m.	130	_____(P_____)	_____(P_____)
<b>2.0</b>	<b>BUILDING</b>						
2.1	Structural Excavation	excavate, stockpile & reuse	Refer to NPC TS & Drawing	cu.m.	530	_____(P_____)	_____(P_____)
2.2	Structural Backfill	furnish, spread, level & compact	Refer to NPC TS & Drawing	cu.m.	415	_____(P_____)	_____(P_____)
2.3	Structural Fill	furnish, spread, level & compact	Refer to NPC TS & Drawing	cu.m.	50	_____(P_____)	_____(P_____)
2.4	Sand and Gravel Bedding (sand & gravel bedding for footing, floor slab and wall footing)	furnish, place level & compact	Refer to NPC TS & Drawing	cu.m.	50	_____(P_____)	_____(P_____)
2.5	Concrete, 20.7 Mpa (beams, columns, slab, stair, canopy and foundation)	furnish & place	Refer to NPC TS & Drawing	cu.m.	380	_____(P_____)	_____(P_____)
2.6	Reinforcing Steel Bars	furnish, cut, bend schedule & install	Refer to NPC TS & Drawing	kgs	63000	_____(P_____)	_____(P_____)

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## SECTION VII - BILL OF QUANTITIES

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(CIVIL WORKS)

Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
2.7	Structural Steel (A36) Including angle bars, purlins, stiffener, cleat and fire exit stair, etc)	Furnish, fabricate and install	Refer to NPC TS & Drawing	kgs.	8500	_____(P_____)	_____(P_____)
3.0	<b>PUMPHOUSE AND CISTERN</b>	Furnish & construct	Refer to NPC TS & Drawing	lot	1	_____(P_____)	_____(P_____)
4.0	<b>DRAINAGE SYSTEM AND APPURTENANT STRUCTURES</b>						
4.1	Catch Basin for Downspouts (CB)	excavate, furnish & construct	Refer to NPC TS & Drawing	pcs	11	_____(P_____)	_____(P_____)
4.2	Septic Tank (ST)	excavate, furnish & construct	Refer to NPC TS & Drawing	pc	1	_____(P_____)	_____(P_____)
5.0	<b>MOTOR CYCLE AREA AND SIDE WALK CONC. PAVEMENT</b> (Including grading, dowels and joint filler, etc.)	furnish & place	Refer to NPC TS & Drawing	cu.m.	20	_____(P_____)	_____(P_____)
6.0	<b>VEHICULAR GATE</b>	furnish, construct & install	Refer to NPC TS & Drawing	pc	1	_____(P_____)	_____(P_____)

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Item No.	Description of Work or Materials	Work to Be Done	Reference	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount (In Figures)
7.0	PEDESTRIAN GATE	furnish, construct & install	Refer to NPC TS & Drawing	pcs	4	_____(P_____)	_____(P_____)
8.0	PERIMETER FENCE (Including NPC wall logo)	furnish & construct	Refer to NPC TS & Drawing	l.m	66	_____(P_____)	_____(P_____)
9.0	FLAG POLE FOUNDATION	furnish & construct	Refer to NPC TS & Drawing	pc	1	_____(P_____)	_____(P_____)
TOTAL CIVIL WORKS						_____(P_____)	_____(P_____)

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## SECTION VII

# **BILL OF QUANTITIES ELECTRICAL WORKS**

## SECTION VII - BILL OF QUANTITIES

## ELECTRICAL WORKS

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
<b>1.0 LIGHTING AND POWER SYSTEM</b>							
a. Panelboards and Circuit Breakers							
a.1	Main Distribution Panel (MDP), 240V, 3-Phase, 60Hz 600AF/300AT, 3P, Main MCCB w/ branch circuits of: 1 - 40AT, 3P, MCCB 1 - 50AT, 3P, MCCB 1 - 80AT, 3P, MCCB 1 - 150AT, 3P, MCCB 1 - 20AT, 2P, Fire Alarm Circuit Breaker 2 - 30AT, 2P, MCCB 1 - 30AT, 2P, MCCB 2 - 45AT, 2P, MCCB	Furnish, Install and Test		set	1	_____ (P _____) P _____	
a.2	Ground & Mezzanine Floor Lighting & Power Panelboard (LPP1), 240V, 3-Phase, 60Hz, 100AF/50AT, 3P, Main MCCB w/ branch circuits of: 4 - 15AT, 2P, MCB 8 - 20AT, 2P, MCB	Furnish, Install and Test		set	1	_____ (P _____) P _____	
a.3	Second Floor Lighting & Power Panelboard (LPP2), 240V, 3-Phase, 60Hz, 225AF/150AT, 3P, Main MCCB w/ branch circuits of: 3 - 15AT, 2P, MCB 4 - 20AT, 2P, MCB 6 - 60AT, 2P, MCB	Furnish, Install and Test		set	1	_____ (P _____) P _____	

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## SECTION VII - BILL OF QUANTITIES

## ELECTRICAL WORKS

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
a.4	Third Floor Lighting & Power Panelboard (LPP3), 240V, 3-Phase, 60Hz, 100AF/80AT, 3P, Main MCCB w/ branch circuits of: 3 - 15AT, 2P, MCB 5 - 20AT, 2P, MCB 3 - 25AT, 2P, MCB 2 - 30AT, 2P, MCB	Furnish, Install and Test		set	1	(P ) P	
a.5	50AF/25AT, 2P, 60Hz, MCB in NEMA-3R Enclosure	Furnish, Install and Test		sets	3	(P ) P	
a.6	50AF/30AT, 2P, 60Hz, MCB in NEMA-3R Enclosure	Furnish, Install and Test		sets	2	(P ) P	
a.7	100AF/60AT, 2P, 60Hz, MCB in NEMA-3R Enclosure	Furnish, Install and Test		sets	4	(P ) P	
a.8	600AF/300AT, 2P, 60Hz, MCCB in NEMA-3R Enclosure	Furnish, Install and Test		sets	4	(P ) P	
b.	Lighting Fixtures						
b.1	Fixture Type A 2 x 18W LED Tube Lighting Fixture, with mirror finished aluminum reflector, 1200mm x 600mm zinc phosphate steel sheet housing	Furnish, Install and Test		sets	38	(P ) P	
b.2	Fixture Type B 1 x 18W Box Type Lighting Fixture	Furnish, Install and Test		sets	9	(P ) P	

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## ELECTRICAL WORKS

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
b.3	Fixture Type C Recessed Mounted Vertical Profile Downlight Powder Coated White Rim with Aluminum Reflector and 1x5W Compact LED Lamp	Furnish, Install and Test		sets	35	(P ) P	
b.4	Fixture Type D Recessed Mounted Vertical Profile Downlight Powder Coated White Rim with Aluminum Reflector and 1x12W Compact LED Lamp	Furnish, Install and Test		sets	28	(P ) P	
b.5	Fixture Type E Surface Mounted Vertical Profile Downlight Powder Coated White Rim with Aluminum Reflector and 1x12W Compact LED Lamp	Furnish, Install and Test		sets	22	(P ) P	
b.6	Fixture Type F Round ceiling luminaire, 350mm dia., white steel base, white opal diffuser and complete with 18W LED COB light	Furnish, Install  and Test		sets	7	(P ) P	
b.7	Fixture Type G IP44 Wall Mounted Luminaire, Steel Base, White Satinated Glass Diffuser with 1x12W Compact LED Lamp	Furnish, Install and Test		sets	11	(P ) P	
b.8	Fixture Type H 110W LED High Bay Fixture with high Specular Aluminum and Prismatic Reflector, Built-In Heat Pipe and Fold-Fin Heat Sink	Furnish, Install and Test		sets	8	(P ) P	

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## ELECTRICAL WORKS

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
b.9	Fixture Type I 2 x 2W LED Emergency Lighting Fixture with Built-in Sealed Lead Acid Battery	Furnish, Install and Test		sets	6	(P ) P	
b.10	Fixture Type J 2W LED Emergency Exit Sign	Furnish, Install and Test		sets	3	(P ) P	
c.	Outlets and Switches including Plate Cover Flush-Mounted, Grounding Type						
c.1	Convenience Outlet, Duplex with Cover, 16 A, 230 V, 1-phase	Furnish, Install and Test		sets	60	(P ) P	
c.2	Convenience Outlet, Duplex, Weatherproof with Cover, 16 A, 230 V, 1-phase	Furnish, Install and Test		sets	3	(P ) P	
c.3	Convenience Outlet, Duplex with Cover, Floor Mounted type, 16 A, 230 V, 1-phase	Furnish, Install and Test		sets	5	(P ) P	
c.4	Outlet for Emergency Lighting Fixture, Single Receptacle, 16 A, 230 V, 1-phase	Furnish, Install and Test		sets	6	(P ) P	
c.5	Outlet for Wall Mounted Exhaust Fan, Single Receptacle, 16 A, 230 V, 1-phase	Furnish, Install and Test		sets	3	(P ) P	
c.6	Single Pole Wall Switch, 10A, 250 V	Furnish, Install and Test		sets	29	(P ) P	

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## ELECTRICAL WORKS

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
c.7	Duplex Pole Wall Switch, 10A, 250 V	Furnish, Install and Test		set	1	(P ) P	
c.8	Triplex Pole Wall Switch, 10A, 250 V	Furnish, Install and Test		sets	15	(P ) P	
c.9	Four Pole Wall Switch, 10A, 250 V	Furnish, Install and Test		set	1	(P ) P	
c.10	Boxes, Fittings, and Accessories	Furnish and Install		lot	1	(P ) P	
d.	Insulated Copper Conductors Including Terminal Lugs, Connectors, Cable Ties, Identification Tags, Etc.	Furnish, Lay and Test		lot	1	(P ) P	
d.1	175 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor						
d.2	50 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor						
d.3	30 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor						
d.4	14 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor						

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Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
d.5	8.0 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor						
d.6	5.5 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor						
d.7	3.5 mm <sup>2</sup> , 600 V, Heat Resistant Thermoplastic, (THHN/THWN-2), Copper Conductor						
e.	Embedded and/or Non-Embedded Conduits Including Boxes, Locknuts, Elbows, Bolts and Other Fittings	Furnish and Lay		lot	1	_____ (P _____) P _____	
e.1	80 mmØ RSC						
e.2	40 mmØ uPVC						
e.3	32 mmØ uPVC						
e.4	25 mmØ uPVC						
e.5	20 mmØ uPVC						
e.6	Service Entrance Cap for 80 mmØ RSC						
<b>2.0 LIGHTNING PROTECTION AND GROUNDING SYSTEM</b>							
a.	Lightning rod (2m x 19mmØ) with G.I. pipe support (60mmØ) and Mounting Accessories	Furnish and Install		set	1	_____ (P _____) P _____	

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Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
b.	100 mm <sup>2</sup> Insulated Copper Down Conductor including cable straps	Furnish and Lay		lot	1	_____ (P _____) P _____	
c.	Grounding Rod (3m x 19mm dia.) Copper Bonded	Furnish and Install		sets	2	_____ (P _____) P _____	
<b>3.0 STRUCTURED CABLING SYSTEM</b>							
a.	Programming (As per NPC Requirements)	Perform		lot	1	_____ (P _____) P _____	
b.	12U Data & Voice Cabinets for Main Distribution Frame (MDF) and Intermediate Distribution Frames (IDF), Wall Mount, Flat-Tray, Switched Power Strip, 2-Cable Organizer, 2-Top Mounted Exhaust Fans with Fasteners	Furnish and Install		sets	3	_____ (P _____) P _____	
c.	Private Automatic Branch Exchange (PABX): 6-CO Lines, 16 SLT ports, 2 Digital Ports, 230Vac, 60Hz	Furnish, Install and Test		set	1	_____ (P _____) P _____	
d.	24-ports Gigabit Manageable Switch	Furnish, Install and Test		sets	4	_____ (P _____) P _____	
e.	Firewall Appliance (PA), 2.4Gbps Throughput, Threat Prevention, IPsecVPN	Furnish, Install and Test		set	1	_____ (P _____) P _____	
f.	Automatic Voltage Regulator (AVR), 1000VA with Power-on Display, 12Vdc-12Ah Back-up Battery and DC Battery Cable	Furnish, Install and Test		set	1	_____ (P _____) P _____	

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**ELECTRICAL WORKS**

Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
g.	650VA Uninterruptible Power Supply (UPS), 220Vac, 60Hz	Furnish, Install and Test		sets	3	_____ (P _____) P _____	
h.	Digital Phone Unit (DPU), 3-Line LCD	Furnish, Install and Test		set	1	_____ (P _____) P _____	
i.	Single Line Phone (SLP)	Furnish, Install and Test		sets	16	_____ (P _____) P _____	
j.	Indoor/Outdoor Dual-Band Wifi Access Point, 2.4Ghz, 300Mbps	Furnish, Install and Test		sets	6	_____ (P _____) P _____	
k.	Disconnection Module with Stainless Steel Frame	Furnish and Install		sets	4	_____ (P _____) P _____	
l.	Patch Panel, 24-Port, RJ-45, Unshielded	Furnish and Install		sets	7	_____ (P _____) P _____	
m.	2-Port Information Outlet (I/O) with Faceplate including Shutter (RJ-45)	Furnish, Install and Test		sets	17	_____ (P _____) P _____	
n.	Structured Cabling Wires including Connectors, Cable Ties, Identification Tags, Etc.	Furnish, Lay and Test		lot	1	_____ (P _____) P _____	
n.1	Cat5e 4-Pairs UTP Cable, Unshielded, Solid						
n.2	Telephone Flat Cable, 4W						

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Item No.	Description of Work or Materials	Work to Be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
o.	Cable Tray and Cable Duct System including Boxes, Elbows, Bolts and Other Fittings	Furnish and Install		lot	1	_____ (P _____) P _____	
o.1	Galvanized Cable Tray, Self-Coupling Light Duty 200mmx50mmx3000mm, Mounting Clamps, Supports and other accessories						
o.2	100mmx60mmx2000mm Cable Duct						
o.3	50mmx60mmx2000mm Cable Duct						
o.4	25mmx60mmx2000mm Cable Duct						
o.5	Boxes, Elbows, Bolts and other fittings						

**4.0 CCTV SURVEILLANCE SYSTEM**

a.	Programming (As per NPC Requirements), Connectors, Tapes and Fasteners	Perform		lot	1	_____ (P _____) P _____	
b.	12U Data & Voice Cabinets Wall Mount, Flat-Tray, Switched Power Strip, 2-Cable Organizer, 2-Top Mounted Exhaust Fans with Fasteners	Furnish and Install		set	1	_____ (P _____) P _____	
c.	Bullet-type Camera: IP-based CCTV, at least 2MP res., at least 30m IR range, full HD w/ wide dynamic range	Furnish, Install and Test		sets	6	_____ (P _____) P _____	
d.	Dome-type Camera: at least 2MP res., IP-based CCTV, at least 30m IR range, full HD w/ wide dynamic range	Furnish, Install and Test		sets	4	_____ (P _____) P _____	

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e.	16-Channel Compact 1U, 8TB HDD Network Video Recorder (NVR) with HDMI, and VGA Ports	Furnish, Install and Test		set	1	_____ (P _____) P _____	
f.	Video Monitor: 42" LED unit w/ 10m HDMI Cable and Wall Bracket	Furnish, Install and Test		set	1	_____ (P _____) P _____	
g.	650VA Uninterruptible Power Supply (UPS), 220Vac, 60Hz	Furnish, Install and Test		set	1	_____ (P _____) P _____	
h.	8-Port PoE, Two-Layer, Industrial Switch, 1000 Base-X, 10/100/1000 Base-T and 8-10/100Base-T, PoE Protocol IEEE802.3at, Power 48-57Vdc including 4kV Lightning Protection	Furnish, Install and Test		sets	4	_____ (P _____) P _____	
i.	HDMI Extender 120m, CATx, 1080P	Furnish, Install and Test		pair	1	_____ (P _____) P _____	
j.	CCTV surveillance Wiring and Cable Duct System Including Connectors, Ties, Tags, Duct Brackets, Boxes, Elbows, Bolts and Other Fittings	Furnish, Lay/Install and Test		lot	1	_____ (P _____) P _____	
j.1	Cat6 U/UTP Shielded Cable						
j.2	25mmx60mmx2000mm Cable Duct						

## SUB-TOTAL AMOUNT OF BID (ELECTRICAL WORKS)

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## SECTION VII

# **BILL OF QUANTITIES MECHANICAL WORKS**

**MECHANICAL WORKS**

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-1.0	<b>DOMESTIC WATER SUPPLY SYSTEM</b>		MW-5.0				
MW-1.1	<b>Water Storage and Pumping System</b>		MW-5.0				
MW-1.1.1	Self-Priming Centrifugal Pump, 13.64m <sup>3</sup> /h (60 gpm) minimum capacity at 35 meters head, 230V, 1phase, 60hz, cast iron casing & diffuser, bronze impeller, 63mm O.D. (50mm N.D.), PP-R pipe PN 20 pressure class, suction pipe, complete with power cable, instruments & controls, control panel, and other accessories as described in the technical specifications.	Supply, Install and Test		sets	2	_____ P _____ (P _____)	_____
MW-1.1.2	Elevated Water Storage tank, 10,000 liters capacity, horizontal cylindrical stainless steel, complete with manhole, inlet and outlet nozzles, overflow and drain, 20mm gauge glass with glass guard rods and bronze isolations valves, supports and other tank appurtenances.	Supply, Install and Test		set	1	_____ P _____ (P _____)	_____
MW-1.1.3	Level Switch, magnetic float level type, stainless steel chamber and float, four (4) level set points for water pumps control and level alarm, field adjustable, designed for top mounting @ water storage tank.	Supply, Install and Test		set	1	_____ P _____ (P _____)	_____
MW-1.1.4	Level Switch, magnetic float level type, stainless steel chamber and float, one (1) level set point for cistern low alarm, field adjustable, designed for top mounting @ cistern.	Supply, Install and Test		set	1	_____ P _____ (P _____)	_____
MW-1.1.5	Float Valve, heavy duty, 50 mm Ø, bronze material, threaded, 100 psi working pressure, for installation in concrete cistern.	Supply, Install and Test		set	1	_____ P _____ (P _____)	_____
MW-1.1.6	Gate Valve, 50mm Ø, OSY or rising stem, cast bronze, flanged or screwed ends, Class 150 (@ pump area & water source)	Supply, Install and Test		sets	5	_____ P _____ (P _____)	_____
MW-1.1.7	Check Valve, 50mm Ø, cast bronze, swing disc type, flanged or screwed ends, Class 150 (@ pump discharge & bypass)	Supply, Install and Test		sets	3	_____ P _____ (P _____)	_____
MW-1.1.8	Gate Valve, 20mm Ø, OSY or rising stem, cast bronze, screwed ends, Class 150 (@ water tank's drain)	Supply, Install and Test		set	1	_____ P _____ (P _____)	_____
MW-1.1.9	Water Pipe, 110mm O.D. (100mm N.D.), PP-R pipe, PN 20 pressure class, and its associated fittings, pipe supports and other accessories	Supply, Excavate, Install, Backfill, Test & Disinfection		lm	8	_____ P _____ (P _____)	_____

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## MECHANICAL WORKS

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-1.1.10	Water Pipe, 63mm O.D. (50mm N.D.), PP-R pipe, PN 20 pressure class, and its associated fittings, pipe supports and other accessories	Supply, Excavate, Install, Backfill, Test & Disinfection		lm	44	P _____ (P _____)	
MW-1.1.11	Screen, 50mmØ, perforated stainless steel, fitted with stainless steel Foot Valve at pump's suction, flanged or screwed ends	Supply, Install and Test		sets	2	P _____ (P _____)	
MW-1.1.12	Pressure gauge @ pump's discharge, 100mm Ø dial gage, bourdon tube type, with isolation bronze valve	Supply, Install and Test		set	1	P _____ (P _____)	
MW-1.1.13	Spare parts for self-priming centrifugal pump for 1 year operation per manufacturer's standard and as specified in the technical specifications.	Supply, Install and Test		set	1	P _____ (P _____)	
<b>MW-1.2</b>	<b>Domestic Water Supply Piping</b>		<b>MW-5.0</b>				
MW-1.2.1	Globe Valve, 15mm Ø ,OSY or rising stem, cast bronze, flanged or screwed ends, Class 150 (distribution line @ ground floor and second	Supply, Install and Test		sets	4	P _____ (P _____)	
MW-1.2.2	Globe Valve, 25mm Ø ,OSY or rising stem, cast bronze, flanged or screwed ends, Class 150 (distribution line @ ground floor and second	Supply, Install and Test		sets	5	P _____ (P _____)	
MW-1.2.3	Globe Valve, 40mm Ø ,OSY or rising stem, cast bronze, flanged or screwed ends, Class 150 (@ water tank's outlet)	Supply, Install and Test		set	1	P _____ (P _____)	
MW-1.2.4	Hose Bibb, 20 mm Ø, bronze body, screwed ends, Class 150	Supply, Install and Test		sets	5	P _____ (P _____)	
MW-1.2.5	Water Pipe, 50mm O.D. (40mm N.D.), PP-R pipe, PN 20 pressure class, and its associated fittings, pipe supports and other accessories	Supply, Install, Test & Disinfection		lm	16	P _____ (P _____)	
MW-1.2.6	Water Pipe, 40mm O.D. (32mm N.D.), PP-R pipe, PN 20 pressure class, and its associated fittings, pipe supports and other accessories	Supply, Install, Test & Disinfection		lm	12	P _____ (P _____)	
MW-1.2.7	Water Pipe, 32mm O.D. (25mm N.D.), PP-R pipe, PN 20 pressure class, and its associated fittings, pipe supports and other accessories	Supply, Install, Test & Disinfection		lm	72	P _____ (P _____)	

Name of Firm

Name and Signature of Authorized Representative

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## SECTION VII - BILL OF QUANTITIES

## MECHANICAL WORKS

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-1.2.8	Water Pipe, 25mm O.D. (20mm N.D.), PP-R pipe, PN 20 pressure class, and its associated fittings, pipe supports and other accessories	Supply, Install, Test & Disinfection		lm	44	_____ P _____ (P _____)	_____
MW-1.2.9	Water Pipe, 20mm O.D. (15mm N.D.), PP-R pipe, PN 20 pressure class, and its associated fittings, pipe supports and other accessories	Supply, Install, Test & Disinfection		lm	44	_____ P _____ (P _____)	_____
<b>MW-2.0</b>	<b>AIR CONDITIONING &amp; VENTILATION SYSTEM</b>		<b>MW-6.0</b>				
<b>MW-2.1</b>	<b>Air-conditioning System</b>						
MW-2.1.1	Air conditioning units, 38,000 kJ/hr minimum cooling capacity, split-type, floor mounted, inverter-type, complete with necessary mounting accessories and controls (infrared remote) and other necessary accessories as described in the technical specifications. Location of the air conditioning units is shown on the Bid Drawings.	Supply, Install and Test		sets	4	_____ P _____ (P _____)	_____
MW-2.1.2	Air conditioning units, 20,000 kJ/hr minimum cooling capacity, split-type, wall mounted, inverter-type, complete with necessary mounting accessories and controls (infrared remote) and other necessary accessories as described in the technical specifications. Location of the air conditioning units is shown on the Bid Drawings.	Supply, Install and Test		sets	2	_____ P _____ (P _____)	_____
MW-2.1.3	Air conditioning units, 13,000 kJ/hr minimum cooling capacity, split-type, wall mounted, inverter-type, complete with necessary mounting accessories and controls (infrared remote) and other necessary accessories as described in the technical specifications. Location of the air conditioning units is shown on the Bid Drawings.	Supply, Install and Test		sets	3	_____ P _____ (P _____)	_____
MW-2.1.4	Air conditioning units, 8,500 kJ/hr minimum cooling capacity, window type, inverter-type, complete with necessary mounting accessories and controls (infrared remote) and other necessary accessories as described in the technical specifications. Location of the air conditioning units is shown on the Bid Drawings.	Supply, Install and Test		sets	4	_____ P _____ (P _____)	_____

\_\_\_\_\_  
Name of Firm\_\_\_\_\_  
Name and Signature of Authorized Representative\_\_\_\_\_  
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## MECHANICAL WORKS

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
<b>MW-2.2 Ventilating System</b>							
MW-2.2.1	Exhaust fan, 250m <sup>3</sup> /h, 230V, 1-phase, 60Hz, ceiling mounted, direct driven, complete with grilles/louvers, flexible hose or ducts, mounting accessories and controls. Location of the exhaust fan is shown on the Bid Drawings.	Supply, Install		sets	4	_____ P _____ (P _____)	
MW-2.2.2	Exhaust fan, 100m <sup>3</sup> /h, 230V, 1-phase, 60Hz, ceiling mounted, direct driven, complete with grilles/louvers, flexible hose or ducts, mounting accessories and controls. Location of the exhaust fan is shown on the Bid Drawings.	Supply, Install		sets	3	_____ P _____ (P _____)	
MW-2.2.3	Exhaust fan, 4,700m <sup>3</sup> /h, 230V, 1-phase, 60Hz, wall mounted, propeller type, direct driven, complete with automatic shutter, mounting accessories and controls. Location of the exhaust fan is shown on the Bid Drawings.	Supply, Install		sets	2	_____ P _____ (P _____)	
MW-2.2.4	Exhaust fan, 150m <sup>3</sup> /h, 230V, 1-phase, 60Hz, wall mounted, propeller type, direct driven, complete with automatic shutter, mounting accessories and controls. Location of the exhaust fan is shown on the Bid Drawings.	Supply, Install		set	1	_____ P _____ (P _____)	

\_\_\_\_\_  
Name of Firm\_\_\_\_\_  
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## MECHANICAL WORKS

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
<b>MW-3.0</b>	<b>FIRE FIGHTING SYSTEM</b>						
					<b>MW-6.0</b>		
<b>MW-3.1</b>	<b>Fire Pumping System and Associated Piping</b>						
MW-3.1.1	Vertical Turbine Fire Pump, Engine Driven, 34.09 m <sup>3</sup> /hr (150 gpm) @ 35 m total head, cast iron casing, bronze impeller, UL listed and/or FM approved, complete with suction piping, controls (automatic & manual) & protection system and associated accessories as described in the technical specifications and shown on the drawing.	Supply, Install, Test & Conduct Training		set	1	_____ P _____ _____ (P _____)	
MW-3.1.2	Jockey Pump, electric motor driven, 3.18 m <sup>3</sup> /h (14 gpm) @ 40 m head, submersible, all stainless steel materials, UL listed and/or FM approved, complete with discharge piping up to interconnection point, controls (automatic & manual) & protection system and other accessories as described in the technical specifications and shown on the bid drawings.	Supply, Install, Test & Conduct Training		set	1	_____ P _____ _____ (P _____)	
MW-3.1.3	Spare Parts for Diesel Driven Fire Pump and Engine per Manufacturer's recommendation and as described in the technical specifications.	Supply and Delivery		lot	1	_____ P _____ _____ (P _____)	
MW-3.1.4	Spare Parts for Jockey Pump per Manufacturer's recommendation and as described in the technical specifications.	Supply and Delivery		lot	1	_____ P _____ _____ (P _____)	
MW-3.1.5	Fire Pumps associated valves, valve box, instrumentation, and other accessories as described in the technical specifications and shown on the drawings, consisting of but not limited to the following:	Supply, Install, Test & Conduct Training		lot	1	_____ P _____ _____ (P _____)	
a)	Four (4) units of 100 mm Ø Gate Valve						
b)	One (1) unit of 25 mm Ø Gate Valve						
c)	Two (2) units of 100 mm Ø Check Valve						
d)	One (1) unit of 25 mm Ø Check Valve						
e)	One (1) set of 65 mm Ø Hose Valve with cap & chain						
f)	One (1) set of 40 mm Ø Hose Valve with cap & chain						
g)	One (1) set of test line complete with flowmeter						
h)	One (1) set of Fuel Oil Day Tank for Diesel Engine Fire Pump						
i)	One (1) set of Relief Valve						
j)	Three (3) units of 100 mm Ø dial size of Pressure Gauges						
k)	One (1) unit of Pressure Switch						
l)	One (1) set of Alarm Check Valve						
m)	One (1) set of Water Strainer						
n)	One (1) lot of other equipment/accessories per Manufacturer's standard design						

Name of Firm

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## SECTION VII - BILL OF QUANTITIES

## MECHANICAL WORKS

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
MW-3.1.6	Indoor Fire Hose Racks/Cabinets Each Weather steel cabinet enclosure, galvanized steel, gauge 16, with aluminum frame and door, one breakable glass panel door with lock complete with the following accessories: a) One (1) 40 mm brass or bronze fire nozzle of adjustable combination straight stream & fire fog type; b) Two (2) sets of 40 mm x 15m long fire hoses of the double jacketed rubber-lined type complete with hose coupling & mounting bracket; c) One (1) 40 mm brass or bronze angle valve; d) Wrench; e) Connecting pipe to fire water line, 65 mm dia., hot-dipped galvanized pipe, Sch. 40, ASTM A-53 including associated fittings All the above accessories shall be UL listed and/or FM approved	Supply, Install, Test & Conduct Training		sets	4	_____ P _____ (P _____)	_____
MW-3.1.7	Fire Pump Discharge Piping (from discharge line up to sprinkler system riser including piping within the pumphouse), 100 mm Ø, A 53 Gr B, seamless or welded, hot dip galvanized, schedule 40, including associated fittings, pipe supports and other accessories as described in the technical specifications	Supply, Install, pipe coating and Test		lm	30	_____ P _____ (P _____)	_____
MW-3.1.8	Jockey Pump Discharge Piping within the pumphouse 25 mm Ø, A 53 Gr B, seamless or welded, hot dip galvanized, schedule 40, including associated fittings, pipe supports and other accessories as described in the technical specifications	Supply, Install, pipe coating and Test		lm	12	_____ P _____ (P _____)	_____
MW-3.2	Automatic Fire Water Sprinkler System Automatic Fire Water Sprinkler System complete with, but not limited to the following as required in the technical specifications and/or Bid Drawings: a) Riser, feed mains, cross mains, branch lines and associated fittings; pipes shall be seamless steel pipe, sch. 40, hot-dipped galvanized conforming to ASTM A 53, Grade B b) Sprinkler Heads, 1/2" dia., pendant, glass-bulb sprinkler, 5.6 k-factor, UL listed and/or FM approved, temperature rating of 68 deg. C, bronze material with chrome plated escutcheon c) Pipe supports, hangers, brackets & sway braces d) Sprinkler Cabinet containing twelve (12) spare glass bulb sprinkler heads, one (1) sprinkler wrench	Design, Supply, Install, Test & Conduct O & M Training		lot	1	_____ P _____ (P _____)	_____

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## MECHANICAL WORKS

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Estimated Quantity	Unit Price In Pesos (Words and Figures)	Total Amount
MW-3.3	<b>Fire Detection and Alarm System</b> Fire alarm and detection system complete with control panels (each with storage battery and charger), smoke and heat detectors, bells and horns with flashing light, manual pull stations and other appurtenances and services as described in the technical shown on the drawings consisting of but not limited to specifications and the following:	Design, Supply, Install, Test & Conduct O & M Training		lot	1	P _____ (P _____)	
a)	One (1) set of Main Fire Alarm Control Panel (MFCP), UL listed and/or FM approved capable of operating addressable and non-addressable devices						
b)	Four (4) set of Local Fire Alarm Control Panel (LFCP), UL listed and/or FM approved capable of operating addressable and non-addressable devices						
c)	Eight (8) units of Heat Detector, fixed temperature, UL listed and/or FM approved, addressable & Non-addressable type						
d)	Twenty Seven (27) units of Smoke Detector, photoelectric type, UL listed and/or FM approved, addressable & Non-addressable type						
e)	Eight (8) units of Manual Pull Station, UL listed and/or FM approved, addressable						
f)	Seven (7) units of 200mm Ø Bell with flashing light and one (1) unit of Horn with flashing light, outdoor type, both are UL listed and/or FM approved						
g)	One (1) lot of Wirings, Groundings, Conduits, Fittings and accessories						
h)	One (1) lot of Recommended Spare Parts during the warranty period						
i)	One (1) lot of other equipment/accessories per Manufacturer's standard design or per applicable standard requirements						

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## SECTION VII - BILL OF QUANTITIES

## MECHANICAL WORKS

Item No.	Description of Work or Materials	Work to be Done	Ref.	Unit	Estimated Quantity	Unit Price in Pesos (Words and Figures)	Total Amount
<b>MW-3.4</b>	<b>Fire Extinguisher System</b>						
MW-3.4.1	Portable Fire Extinguishers, HCFC or Halotron I, 7.1 kg. (15.5 lbs.), non-expiry, multi shots, wall hung type with bracket and mounting accessories, UL/FM approved	Supply and Install		units	26	_____ P _____ (P _____)	
MW-3.4.2	Fire Extinguishers, HCFC or Halotron, 29.5 kg (65 lbs), wheeled type, UL/FM approved, complete with associated valves, dial gauge indicator, nitrogen expellant, 15 m long distance hose of appropriate size, mounted on a frame with handle, floorstand and rubberized wheels.	Supply and Install		units	1	_____ P _____ (P _____)	

## TOTAL MECHANICAL WORKS

\_\_\_\_\_ P \_\_\_\_\_  
(P \_\_\_\_\_)

\_\_\_\_\_  
Name of Firm\_\_\_\_\_  
Name and Signature of Authorized Representative\_\_\_\_\_  
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## SECTION VIII

# BIDDING FORMS



## SECTION VIII – BIDDING FORMS

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Standard Form No: NPCSF-INFR-01

**Checklist of Technical & Financial Envelope Requirements for Bidders****A. THE 1<sup>ST</sup> ENVELOPE (TECHNICAL COMPONENT) SHALL CONTAIN THE FOLLOWING:****1. ELIGIBILITY DOCUMENTS****a. (CLASS A)****➤ Any of the following:**

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

**OR:**

- The following updated and valid Class “A” eligibility documents enumerated under “Annex A” of the Platinum Membership:

- Registration Certificate from the Securities and Exchange Commission (SEC) for corporations, Department of Trade and Industry (DTI) for sole proprietorship, or Cooperative Development Authority (CDA) for cooperatives;
- Mayor's/Business permit issued by the city or municipality where the principal place of business of the prospective bidder is located, or the equivalent document for Exclusive Economic Zones or Areas.

In cases of recently expired Mayor's/Business permits, it shall be accepted together with the official receipt as proof that the bidder has applied for renewal within the period prescribed by the concerned local government unit, provided that the renewed permit shall be submitted as a post qualification requirement in accordance with Section 34.2 of the Revised IRR of RA 9184.

- The prospective bidder's audited financial statements, showing, among others, the prospective bidder's total and current assets and liabilities, stamped “received” by the BIR or its duly accredited and authorized institutions, for the preceding calendar year which should not be earlier than two (2) years from the date of bid submission.
- Tax clearance per Executive Order 398, Series of 2005, as finally reviewed and approved by the BIR;
- Valid Philippine Contractors Accreditation Board (PCAB) license and registration for the type and cost of the contract for this Project or Special PCAB License in case of Joint Ventures.

**OR:**

- A combination thereof.

**➤ Statement of all its ongoing government and private contracts if any, whether similar or not similar in nature and complexity to the contract to be bid (NPCSF-INFR-02)**

**➤ The Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid, and whose value, adjusted to current prices using the Philippine Statistics Authority (PSA) consumer price index, must be at least 50% of the ABC (NPCSF-INFR-03) complete with the following supporting documents:**

- Contract
- Owner's Certificate of Final Acceptance issued by the project owner other than the contractor or a final rating of at least Satisfactory in the Constructors Performance Evaluation System (CPES). In case of contracts with the private sector, an equivalent document (Ex. Official Receipt or Sales Invoice) shall be submitted

*This Checklist of Requirements shall be provided to prospective suppliers/contractors including all forms. Suppliers/contractors are encouraged to consult this checklist before submitting their proposals on the deadline for the submission and receipt of offers.*

Standard Form No: NPCSF-INFR-01  
Page 2 of 3

*(The Single Largest Completed Contract (SLCC) as declared by the bidder shall be verified and validated to ascertain such completed contract. Hence, bidders must ensure access to sites of such projects/equipment to NPC representatives for verification and validation purposes during post-qualification process.*

*It shall be a ground for disqualification, if verification and validation cannot be conducted due to inaccessibility of the site for whatever reason or fault of the bidder.)*

- Special PCAB License in case of Joint Ventures
- Duly signed computation of its Net Financial Contracting Capacity (NFCC) at least equal to the ABC (NPCSF-INFR-04);

**b. (CLASS B)**

- Valid Joint Venture Agreement, if applicable (NPCSF-INFR-05)

**2. Technical Documents**

- Bid Security, any one of the following:
  - Bid Securing Declaration (NPCSF-INFR-06c)  
**OR**
  - Cash or Cashier's/Manager's check issued by a Universal or Commercial Bank – 2% of ABC;  
**OR**
  - Bank draft/guarantee or irrevocable letter of credit issued by a Universal or Commercial Bank: (NPCSF-INFR-06a) - 2% of ABC;  
**OR**
  - Surety Bond callable upon demand issued by a reputable surety or insurance company (NPCSF-INFR-06b) - 5% of ABC, with
    - Certification from the Insurance Commission as authorized company to issue surety
- Duly signed, completely filled-out and notarized Omnibus Sworn statement (Revised) (NPCSF-INFR-07), complete with the following attachments:
  - For Sole Proprietorship:
    - Special Power of Attorney
  - For Partnership/Corporation/Cooperative/Joint Venture:
    - Document showing proof of authorization (e.g., duly notarized Secretary's Certificate, Board/Partnership Resolution, or Special Power of Attorney, whichever is applicable)
- Organization Chart for the project (NPCSF-INFR-08)
- Duly Signed List of Contractor's Key Personnel (based on the minimum key personnel) with complete supporting documents (NPCSF-INFR-09, 10a, 10b & 11)
- Duly Signed List of Contractor's Equipment (owned, leased or under purchase agreement (NPCSF-INFR-12), with
  - Proof of ownership and/or certificate of availability issued by Equipment Lessors
- Completely filled out and duly signed Technical Data Sheets (MW), Section VI - Technical Specifications (Mechanical Works)
- Complete eligibility documents of proposed sub-contractor, if applicable

*This Checklist of Requirements shall be provided to prospective suppliers/contractors including all forms. Suppliers/contractors are encouraged to consult this checklist before submitting their proposals on the deadline for the submission and receipt of offers.*

Standard Form No: NPCSF-INFR-01  
Page 3 of 3

**B. THE 2<sup>ND</sup> ENVELOPE (FINANCIAL COMPONENT) SHALL CONTAIN THE FOLLOWING:**

- Duly signed Bid Letter indicating the total bid amount in accordance with the prescribed form (NPCSF-INFR-13)
- Duly signed and completely filled-out Bill of Quantities (Section 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	%		
<u>Government</u>						
<u>Private</u>						
					Total Cost	

The bidder shall declare in this form all his on-going government and private contracts including contracts where the bidder (either as individual or as a Joint Venture) is a partner in a Joint Venture agreement other than his current joint venture where he is a partner. Non declaration will be a ground for disqualification of bid.

Note : This statement shall be supported with the following documents for all the contract(s) stated above which shall be submitted during Post-qualification:

1. Contract/Purchase Order and/or Notice of Award
2. Certification coming from the project owner/client that the performance is satisfactory as of the bidding date.

Submitted by : \_\_\_\_\_  
(Printed Name & Signature)

Designation : \_\_\_\_\_

Date : \_\_\_\_\_

## SECTION VIII – BIDDING FORMS

Standard Form Number: NPCSF-INFR-03

**The Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid**

Business Name : \_\_\_\_\_  
 Business Address : \_\_\_\_\_

Name of Contract	a. Owner's Name b. Address c. Telephone Nos.	Nature of Work	Contractor's Role		a.Amount at Award b.Amount at Completion c.Duration	a. Date Awarded b. Contract Effectivity c. Date Completed
			Description	%		

- Notes: 1. The bidder must state only one (1) Single Largest Completed Contract (SLCC) similar to the contract to be bid.  
 2. Supporting documents such as Contract/Purchase Order and any of the following: Owner's Certificate of Final Acceptance issued by the project owner other than the contractor; or A final rating of at least Satisfactory in the Constructors Performance Evaluation System (CPES); or Official Receipt (O.R); or Sales Invoice for the contract stated above shall be submitted during Bid Opening.

Submitted by \_\_\_\_\_  
 (Printed Name & Signature)

Designation : \_\_\_\_\_  
 Date : \_\_\_\_\_

Standard Form Number: NPCSF-INFR-04

**NET FINANCIAL CONTRACTING CAPACITY (NFCC)**

- A. Summary of the Bidder's/Contractor's assets and liabilities on the basis of the income tax return and audited financial statement for the immediately preceding calendar year are:

		Year 20__
1.	Total Assets	
2.	Current Assets	
3.	Total Liabilities	
4.	Current Liabilities	
5.	Net Worth (1-3)	
6.	Net Working Capital (2-4)	

- B. The Net Financial Contracting Capacity (NFCC) based on the above data is computed as follows:

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

NFCC = P \_\_\_\_\_

Herewith attached is certified true copy of the audited financial statement, stamped "RECEIVED" by the BIR or BIR authorized collecting agent for the immediately preceding calendar year.

Submitted by:

\_\_\_\_\_  
Name of Bidder/Contractor

\_\_\_\_\_  
Signature of Authorized Representative

Date : \_\_\_\_\_

Standard Form Number: NPCSF-INFR-05

**JOINT VENTURE AGREEMENT****KNOW ALL MEN BY THESE PRESENTS:**

That this JOINT VENTURE AGREEMENT is entered into by and between:  
\_\_\_\_\_, of legal age, (*civil status*) \_\_\_\_\_, authorized representative of  
\_\_\_\_\_ and a resident of \_\_\_\_\_.

- and -

\_\_\_\_\_, of legal age, (*civil status*) \_\_\_\_\_, authorized representative of  
\_\_\_\_\_ a resident of \_\_\_\_\_.

That both parties agree to join together their capital, manpower, equipment, and other resources and efforts to enable the Joint Venture to participate in the Bidding and Undertaking of the hereunder stated Contract of the **National Power Corporation**.

**NAME OF PROJECT****CONTRACT AMOUNT**

That the capital contribution of each member firm:

NAME OF FIRM	CAPITAL CONTRIBUTION
1.	P
2.	P

That both parties agree to be jointly and severally liable for their participation in the Bidding and Undertaking of the said contract.

That both parties agree that \_\_\_\_\_ and/or \_\_\_\_\_ shall be the Official Representative/s of the Joint Venture, and are granted full power and authority to do, execute and perform any and all acts necessary and/or to represent the Joint Venture in the Bidding and Undertaking of the said contract, as fully and effectively and the Joint Venture may do and if personally present with full power of substitution and revocation.

That this Joint Venture Agreement shall remain in effect only for the above stated Contract until terminated by both parties.

\_\_\_\_\_  
*Name & Signature of Authorized Representative*

\_\_\_\_\_  
*Official Designation*

\_\_\_\_\_  
*Name of Firm*

\_\_\_\_\_  
*Name & Signature of Authorized Representative*

\_\_\_\_\_  
*Official Designation*

\_\_\_\_\_  
*Name of Firm*

**Witnesses**

1. \_\_\_\_\_

2. \_\_\_\_\_

**[Jurat]**

*[Format shall be based on the latest Rules on Notarial Practice]*

Standard Form Number: NPCSF-INFR-06a

**FORM OF BID SECURITY (BANK GUARANTEE)**

WHEREAS, (Name of Bidder) (hereinafter called "the Bidder") has submitted his bid dated (Date) for the [name of project] (hereinafter called "the Bid").

KNOW ALL MEN by these presents that We (Name of Bank) of (Name of Country) having our registered office at \_\_\_\_\_ (hereinafter called "the Bank" are bound unto National Power Corporation (hereinafter called "the Entity") in the sum of [amount in words & figures as prescribed in the bidding documents] for which payment well and truly to be made to the said Entity the Bank binds himself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this \_\_\_\_ day of \_\_\_\_\_ 20\_\_.

THE CONDITIONS of this obligation are that:

- 1) if the Bidder withdraws his Bid during the period of bid validity specified in the Bidding Documents; or
- 2) if the Bidder does not accept the correction of arithmetical errors of his bid price in accordance with the Instructions to Bidder; or
- 3) if the Bidder, having determined as the LCB, fails or refuses to submit the required tax clearance, latest income and business tax returns and PhilGEPS registration certificate within the prescribed period; or
- 4) if the Bidder having been notified of the acceptance of his bid and award of contract to him by the Entity during the period of bid validity:
  - a) fails or refuses to execute the Contract; or
  - b) fails or refuses to submit the required valid JVA, if applicable; or
  - c) fails or refuses to furnish the Performance Security in accordance with the Instructions to Bidders;

we undertake to pay to the Entity up to the above amount upon receipt of his first written demand, without the Entity having to substantiate its demand, provided that in his demand the Entity will note that the amount claimed by it is due to the occurrence of any one or combination of the four (4) conditions stated above.

The Guarantee will remain in force up to 120 days after the opening of bids or as it may be extended by the Entity, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

DATE \_\_\_\_\_ SIGNATURE OF THE BANK \_\_\_\_\_

WITNESS \_\_\_\_\_ SEAL \_\_\_\_\_

\_\_\_\_\_  
(Signature, Name and Address)

Standard Form Number: NPCSF-INFR-06b

**FORM OF BID SECURITY (SURETY BOND)**

BOND NO.: \_\_\_\_\_ DATE BOND EXECUTED: \_\_\_\_\_

By this bond, We (Name of Bidder) (hereinafter called "the Principal") and (Name of Surety) of (Name of Country of Surety), authorized to transact business in the Philippines (hereinafter called "the Surety") are held and firmly bound unto National Power Corporation (hereinafter called "the Employer") as Obligee, in the sum of (amount in words & figures as prescribed in the bidding documents), callable on demand, for the payment of which sum, well and truly to be made, we, the said Principal and Surety bind ourselves, our successors and assigns, jointly and severally, firmly by these presents.

SEALED with our seals and dated this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_

WHEREAS, the Principal has submitted a written Bid to the Employer dated the \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_, for the \_\_\_\_\_ (hereinafter called "the Bid").

NOW, THEREFORE, the conditions of this obligation are:

- 1) if the Bidder withdraws his Bid during the period of bid validity specified in the Bidding Documents; or
- 2) if the Bidder does not accept the correction of arithmetical errors of his bid price in accordance with the Instructions to Bidder; or
- 3) if the Bidder, having determined as the LCB, fails or refuses to submit the required tax clearance, latest income and business tax returns and PhilGEPS registration certificate within the prescribed period; or
- 4) if the Bidder having been notified of the acceptance of his bid and award of contract to him by the Entity during the period of bid validity:
  - d) fails or refuses to execute the Contract; or
  - e) fails or refuses to submit the required valid JVA, if applicable; or
  - f) fails or refuses to furnish the Performance Security in accordance with the Instructions to Bidders;

then this obligation shall remain in full force and effect, otherwise it shall be null and void.

PROVIDED HOWEVER, that the Surety shall not be:

- a) liable for a greater sum than the specified penalty of this bond, nor
- b) liable for a greater sum than the difference between the amount of the said Principal's Bid and the amount of the Bid that is accepted by the Employer.

Standard Form Number: NPCSF-INFR-06b  
Page 2 of 2

This Surety executing this instrument hereby agrees that its obligation shall be valid for 120 calendar days after the deadline for submission of Bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Surety is hereby waived.

PRINCIPAL \_\_\_\_\_ SURETY \_\_\_\_\_

SIGNATURE(S) \_\_\_\_\_ SIGNATURES(S) \_\_\_\_\_

NAME(S) AND TITLE(S) \_\_\_\_\_ NAME(S) \_\_\_\_\_

SEAL \_\_\_\_\_ SEAL \_\_\_\_\_

Standard Form No: NPCSF-INFR-06c

REPUBLIC OF THE PHILIPPINES )  
CITY OF \_\_\_\_\_ ) S.S.**BID-SECURING DECLARATION**  
**CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG**  
**CITY, WESTERN SAMAR (VisP22Z1464Sc)**To: **National Power Corporation**  
BIR Road cor. Quezon Ave.  
Diliman, Quezon CityI/We<sup>1</sup>, the undersigned, declare that:

1. I/We understand that, according to your conditions, bids must be supported by a Bid Security, which may be in the form of a Bid-Securing Declaration.
2. I/We accept that: (a) I/we will be automatically disqualified from bidding for any contract with any procuring entity for a period of two (2) years upon receipt of your Blacklisting Order; and, (b) I/we will pay the applicable fine provided under Section 6 of the Guidelines on the Use of Bid Securing Declaration, within fifteen (15) days from receipt of the written demand by the Procuring Entity for the commission of acts resulting to the enforcement of the Bid Securing Declaration under Sections 23.1 (b), 34.2, 40.1 and 69.1, except 69.1 (f) of the IRR of R.A. 9184; without prejudice to other legal action the government may undertake.
3. I/We understand that this Bid-Securing Declaration shall cease to be valid on the following circumstances:
  - (a) Upon expiration of the bid validity period, or any extension thereof pursuant to your request;
  - (b) I am/we are declared ineligible or post-disqualified upon receipt of your notice to such effect, and (i) I/we failed to timely file a request for reconsideration or (ii) I/we filed a waiver to avail of said right;
  - (c) I am/we are declared as the bidder with the Lowest Calculated and Responsive Bid, and I/we have furnished the performance security and signed the Contract.

IN WITNESS WHEREOF, I/we have hereunto set my hand this \_\_\_\_ day of \_\_\_\_  
20\_\_\_\_ at \_\_\_\_\_, Philippines.\_\_\_\_\_  
[Name and Signature of Bidder's Representative/  
Authorized Signatory] [Signatory's legal capacity]  
Affiant**[Jurat]***[Format shall be based on the latest Rules on Notarial Practice]*<sup>1</sup> Select one and delete the other. Adopt same instruction for similar terms throughout the document.

Standard Form No: NPCSF-INFR-07

**Omnibus Sworn Statement (Revised)****REPUBLIC OF THE PHILIPPINES )**  
**CITY/MUNICIPALITY OF \_\_\_\_\_ ) S.S.****AFFIDAVIT**

I, [Name of Affiant], of legal age, [Civil Status], [Nationality], and residing at [Address of Affiant], after having been duly sworn in accordance with law, do hereby depose and state that:

1. *[Select one, delete the other:]*

*[If a sole proprietorship:]* I am the sole proprietor or authorized representative of [Name of Bidder] with office address at [address of Bidder];

*[If a partnership, corporation, cooperative, or joint venture:]* I am the duly authorized and designated representative of [Name of Bidder] with office address at [address of Bidder];

2. *[Select one, delete the other:]*

*[If a sole proprietorship:]* As the owner and sole proprietor, or authorized representative of [Name of Bidder], I have full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached duly notarized Special Power of Attorney;

*[If a partnership, corporation, cooperative, or joint venture:]* I am granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached [state title of attached document showing proof of authorization (e.g., duly notarized Secretary's Certificate, Board/Partnership Resolution, or Special Power of Attorney, whichever is applicable)];

3. [Name of Bidder] is not "blacklisted" or barred from bidding by the Government of the Philippines or any of its agencies, offices, corporations, or Local Government Units, foreign government/foreign or international financing institution whose blacklisting rules have been recognized by the Government Procurement Policy Board, by itself or by relation, membership, association, affiliation, or controlling interest with another blacklisted person or entity as defined and provided for in the Uniform Guidelines on Blacklisting;

4. Each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;

5. [Name of Bidder] is authorizing the Head of the Procuring Entity or its duly authorized representative(s) to verify all the documents submitted;

6. *[Select one, delete the rest:]*

*[If a sole proprietorship:]* The owner or sole proprietor is not related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

*[If a partnership or cooperative:]* None of the officers and members of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

*[If a corporation or joint venture:]* None of the officers, directors, and controlling stockholders of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

7. *[Name of Bidder]* complies with existing labor laws and standards; and
8. *[Name of Bidder]* is aware of and has undertaken the responsibilities as a Bidder in compliance with the Philippine Bidding Documents, which includes:
  - a. Carefully examining all of the Bidding Documents;
  - b. Acknowledging all conditions, local or otherwise, affecting the implementation of the Contract;
  - c. Making an estimate of the facilities available and needed for the contract to be bid, if any; and
  - d. Inquiring or securing Supplemental/Bid Bulletin(s) issued for the *[Name of the Project]*.
9. *[Name of Bidder]* did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.
10. In case advance payment was made or given, failure to perform or deliver any of the obligations and undertakings in the contract shall be sufficient grounds to constitute criminal liability for Swindling (Estafa) or the commission of fraud with unfaithfulness or abuse of confidence through misappropriating or converting any payment received by a person or entity under an obligation involving the duty to deliver certain goods or services, to the prejudice of the public and the government of the Philippines pursuant to Article 315 of Act No. 3815 s. 1930, as amended, or the Revised Penal Code.

**IN WITNESS WHEREOF**, I have hereunto set my hand this \_\_\_\_ day of \_\_\_\_, 20\_\_ at \_\_\_\_\_, Philippines.

*[Insert NAME OF BIDDER OR ITS AUTHORIZED  
REPRESENTATIVE]*

*[Insert signatory's legal capacity]*  
Affiant

**[Jurati]**

*[Format shall be based on the latest Rules on Notarial Practice]*

Standard Form Number: NPCSF-INFR-08

## CONTRACTOR'S ORGANIZATIONAL CHART FOR THE CONTRACT

Submit Copy of the Organizational Chart that the Contractor intends to use to execute the Contract if awarded to him. Indicate in the chart the names of the Project Manager, Project Engineer, Foreman and other Key Engineering Personnel.

Attach the required Proposed Organizational Chart for the Contract as stated above

### NOTES:

1. This organization chart should represent the "Contractor's Organization" required for the Project, and not the organizational chart of the entire firm.
2. Each such nominated engineer/key personnel shall comply with and submit duly accomplished forms NPCSF-INFR-10a, NPCSF-INFR-10b and NPCSF-INFR-11.
3. All these are required to be in the Technical Envelope of the Bidder.

Standard Form Number: NPCSF-INFR-09

**LIST OF KEY PERSONNEL PROPOSED TO BE ASSIGNED TO THE CONTRACT**  
*(Based on the Minimum Key Personnel Required in the Bidding Documents)*

Business Name: \_\_\_\_\_

Business: \_\_\_\_\_

	DESIGNATION				
1 Name					
2 Address					
3 Date of Birth					
4 Employed Since					
5 Experience					
6 Previous Employment					
7 Education					
8 PRC License					

**Required Attachments:**

1. Certificate of Employment, Bio Data and Construction Safety and Health Training Certificate of the Safety Officer
2. Certificate of Employment, Bio Data and valid PRC License of the (professional) personnel
3. Certificate of Employment, Bio Data and accreditation from DPWH as Materials Engineer for the Materials Engineer

Submitted by: \_\_\_\_\_

(Printed Name &amp; 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.

I do not allow the use of my name for the purpose of enabling the above-mentioned Contractor to qualify for the Contract without any firm commitment on my part to assume the post of (Designation) therefor, if the contract is awarded to him since I understand that to do so will be a sufficient ground for my disqualification as (Designation) in any future National Power Corporation bidding or employment with any Contractor doing business with the National Power Corporation.

\_\_\_\_\_  
(Name and Signature)  
AFFIANT**[Jurat]***[Format shall be based on the latest Rules on Notarial Practice]*

One of the requirements from the bidder to be included in its Technical Envelope is a list of contractor's key personnel (viz. Project Manager, Project Engineer, Construction Safety Officer, Foremen, etc), to be assigned to the contract to be bid, with their complete qualification and experience data (including the key personnel's signed written commitment to work for the project once awarded the contract).

Standard Form Number: NPCSF-INFR-10b

**KEY PERSONNEL'S CERTIFICATE OF EMPLOYMENT  
(CONSTRUCTION SAFETY AND HEALTH OFFICER)**\_\_\_\_\_  
Issuance Date**THE PRESIDENT**National Power Corporation  
BIR Road cor. Quezon Ave.  
Diliman, Quezon City

Dear Sir:

I am (Name of Nominee) an Construction Safety & Health Officer with  
Certificate No. \_\_\_\_\_ issued on (date of issuance) at (place of  
issuance).

I hereby certify that (Name of Bidder) has engaged my services as  
Construction Safety & Health Officer for the (Name of Project), if awarded to it.

I am the Construction Safety & Health Officer of the following completed projects similar  
to the contract under bidding:

NAME OF PROJECT	OWNER	COST	DATE COMPLETED
_____	_____	_____	_____
_____	_____	_____	_____

At present, I am the Construction Safety & Health Officer of the following projects:

NAME OF PROJECT	OWNER	COST	DATE COMPLETED
_____	_____	_____	_____
_____	_____	_____	_____

In case of my separation for any reason whatsoever from the above-mentioned  
Contractor, I shall notify the National Power Corporation at least twenty one (21) days before the  
effective date of my separation.

As Construction Safety & Health Officer, I know I will have to stay in the job site all the  
time and aware that I am authorized to handle only one (1) contract at a time.

I do not allow the use of my name for the purpose of enabling the above-mentioned  
Contractor to qualify for the Contract without any firm commitment on my part to assume the post  
of Construction Safety & Health Officer, if the contract is awarded to him since I understand that  
to do so will be a sufficient ground for my disqualification as Construction Safety & Health Officer  
in any future National Power Corporation bidding or employment with any Contractor doing  
business with the National Power Corporation.

\_\_\_\_\_  
(Name and Signature)  
AFFIANT**[Jurat]***[Format shall be based on the latest Rules on Notarial Practice]*

One of the requirements from the bidder to be included in its Technical Envelope is a list of contractor's key personnel (viz.  
Project Manager, Project Engineer, Construction Safety Officer, Foremen, etc), to be assigned to the contract to be bid, with  
their complete qualification and experience data (including the key personnel's signed written commitment to work for the  
project once awarded the contract).

Standard Form Number: NPCSF-INFR-11

**KEY PERSONNEL  
(FORMAT OF BIO-DATA)**

Give the detailed information of the following personnel who are scheduled to be assigned as full-time field staff for the project. Fill up a form for each person.

1. Name : \_\_\_\_\_
2. Date of Birth : \_\_\_\_\_
3. Nationality : \_\_\_\_\_
4. Education and Degrees : \_\_\_\_\_
5. Specialty : \_\_\_\_\_
6. Registration : \_\_\_\_\_
7. Length of Service with the Firm : \_\_\_\_\_ Year from \_\_\_\_\_ (months) \_\_\_\_\_ (year)  
To \_\_\_\_\_ (months) \_\_\_\_\_ (year)
8. Years of Experience : \_\_\_\_\_
9. If Item 7 is less than ten (10) years, give name and length of service with previous employers for a ten (10)-year period (attached additional sheet/s), if necessary:

Name and Address of EmployerLength 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).*

## SECTION VIII – BIDDING FORMS

VisP22Z1464Sc

*Standard Form Number: NPCSF-INFR-11*  
*Page 2 of 2*

1. Name : \_\_\_\_\_
2. Name and Address of Owner : \_\_\_\_\_
3. Name and Address of the  
Owner's Engineer : \_\_\_\_\_  
(Consultant)
4. Indicate the Features of Project  
(particulars of the project  
components and any other particular  
interest connected with the project): \_\_\_\_\_
5. Contract Amount Expressed in  
Philippine Currency : \_\_\_\_\_
6. Position : \_\_\_\_\_
7. Structures for which the employee  
was responsible : \_\_\_\_\_
8. Assignment Period : from \_\_\_\_\_ (months) \_\_\_\_\_ (years)  
: to \_\_\_\_\_ (months) \_\_\_\_\_ (years)

\_\_\_\_\_  
Name and Signature of Employee

It is hereby certified that the above personnel can be assigned to this project, if the contract is awarded to our company.

\_\_\_\_\_  
(Place and Date)\_\_\_\_\_  
(The Authorized Representative)

*One of the requirements from the bidder to be included in its Technical Envelope is a list of contractor's key personnel (viz. Project Manager, Project Engineer, Construction Safety Officer, Foremen, etc), to be assigned to the contract to be bid, with their complete qualification and experience data (including the key personnel's signed written commitment to work for the project once awarded the contract).*

Standard Form Number: NPCSF-INFR-12

**LIST OF EQUIPMENT, OWNED OR LEASED AND/OR UNDER PURCHASE AGREEMENTS**  
(Based on the Minimum Equipment Required in the Bidding Documents)

Business Name: \_\_\_\_\_

Business: \_\_\_\_\_

Description	Model/Year	Capacity / Performance / Size	Plate No.	Motor No. / Body No.	Location	Condition	Proof of Ownership / Lessor or Vendor
<b>A. Owned</b>							
i.							
ii.							
iii.							
iv.							
v.							
<b>B. Leased</b>							
i.							
ii.							
iii.							
iv.							
v.							
<b>C. Under Purchase Agreements</b>							
i.							
ii.							
iii.							
iv.							
v.							

Submitted by: \_\_\_\_\_

(Printed Name &amp; Signature)

Designation: \_\_\_\_\_

Date: \_\_\_\_\_

One of the requirements from the bidder to be included in its Technical Envelope is the list of its equipment units pledged for the contract to be bid, based on minimum equipment required in the bidding docs. which are owned (supported by proof/s of ownership), leased, and/or under purchase agreements (with corresponding engine numbers, chassis numbers and/or serial numbers), supported by certification of availability of equipment from the equipment lessor/vendor for the duration of the project

Standard Form No. : NPCSF-INFR-13

**BID LETTER**

Date: \_\_\_\_\_

To: **THE PRESIDENT**  
National Power Corporation  
BIR Road cor. Quezon Ave.  
Diliman, Quezon City

We, the undersigned, declare that:

- (a) We have examined and have no reservation to the Bidding Documents, including Addenda, for the Contract **CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR (VisP22Z1464Sc)**.
- (b) We offer to execute the Works for this Contract in accordance with the Bid Documents, Technical Specifications, General and Special Conditions of Contract accompanying this Bid;

The total price of our Bid, excluding any discounts offered below is: insert information \_\_\_\_\_;

The discounts offered and the methodology for their application are: insert information \_\_\_\_\_;

- (c) Our Bid shall be valid for a period of insert number \_\_\_\_\_ days from the date fixed for the Bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (d) If our Bid is accepted, we commit to obtain a Performance Security in the amount of insert percentage amount \_\_\_\_\_ percent of the Contract Price for the due performance of the Contract;
- (e) Our firm, including any subcontractors or suppliers for any part of the Contract, have nationalities from the following eligible countries: insert information \_\_\_\_\_;
- (f) We are not participating, as Bidders, in more than one Bid in this bidding process, other than alternative offers in accordance with the Bidding Documents;
- (g) Our firm, its affiliates or subsidiaries, including any subcontractors or suppliers for any part of the Contract, has not been declared ineligible by the Funding Source;
- (h) We understand that this Bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal Contract is prepared and executed; and
- (i) We understand that you are not bound to accept the Lowest Calculated Bid or any other Bid that you may receive.

- (j) We likewise certify/confirm that the undersigned, is the duly authorized representative of the bidder, and granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for the **CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR (VisP22Z1464Sc)** 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: \_\_\_\_\_

Name of Bidder : \_\_\_\_\_

Name of Bidder : \_\_\_\_\_

[illegible]

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

## SECTION IX

# BID DRAWINGS

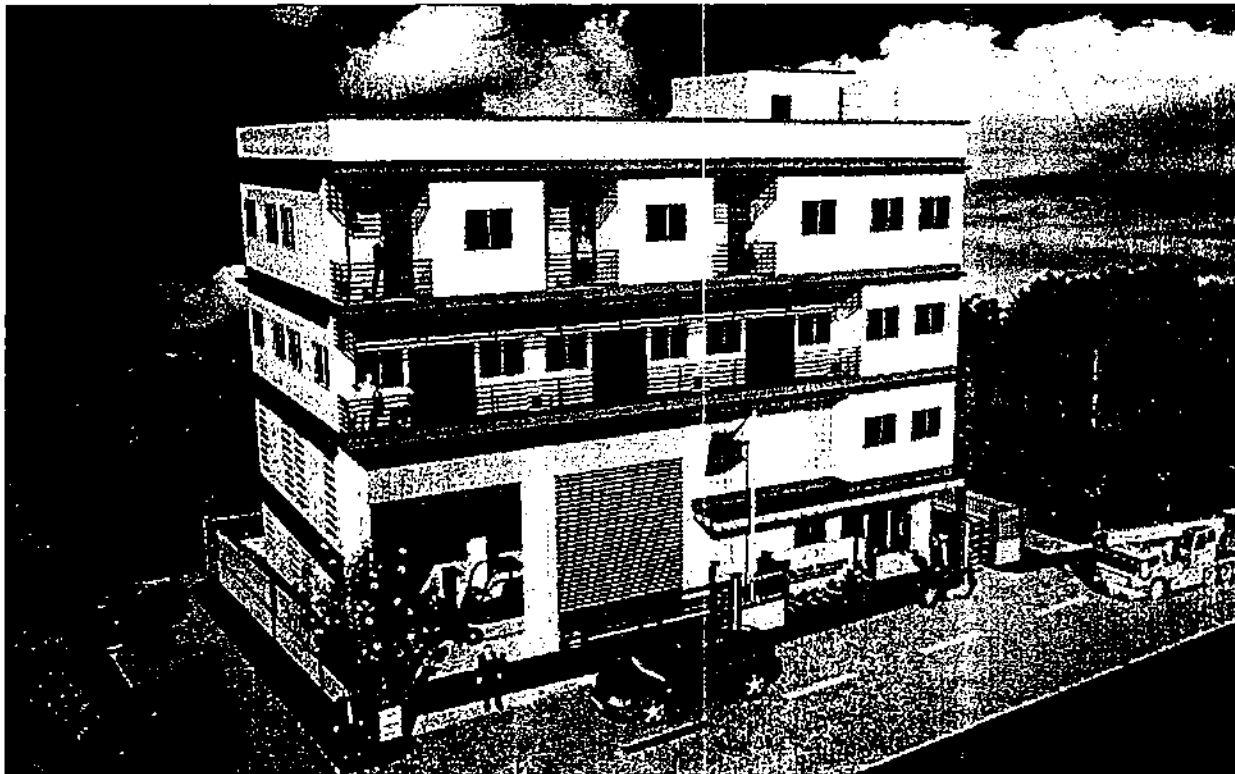
# ARCHITECTURAL WORKS

**SECTION IX – BID DRAWINGS  
AW – ARCHITECTURAL WORKS**


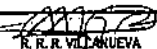

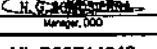
<b><u>DRAWING NO.</u></b>	<b><u>TITLE</u></b>
COSC-BDA-15.001	PERSPECTIVE
COSC-BDA-15.002	GROUND FLOOR PLAN
COSC-BDA-15.003	MEZZANINE FLOOR PLAN
COSC-BDA-15.004	SECOND FLOOR PLAN
COSC-BDA-15.005	THIRD FLOOR PLAN
COSC-BDA-15.006	ROOF DECK FLOOR PLAN
COSC-BDA-15.007	ROOF PLAN
COSC-BDA-15.008	FRONT AND LEFT SIDE ELEVATION
COSC-BDA-15.009	REAR AND RIGHT SIDE ELEVATION
COSC-BDA-15.010	SECTION THRU A AND SECTION THRU B
COSC-BDA-15.011	GROUND FLOOR REFLECTED CEILING PLAN
COSC-BDA-15.012	MEZZANINE REFLECTED CEILING PLAN
COSC-BDA-15.013	SECOND FLOOR REFLECTED CEILING PLAN
COSC-BDA-15.014	THIRD FLOOR REFLECTED CEILING PLAN
COSC-BDA-15.015	SCHEDULE OF DOORS
COSC-BDA-15.016	SCHEDULE OF WINDOW



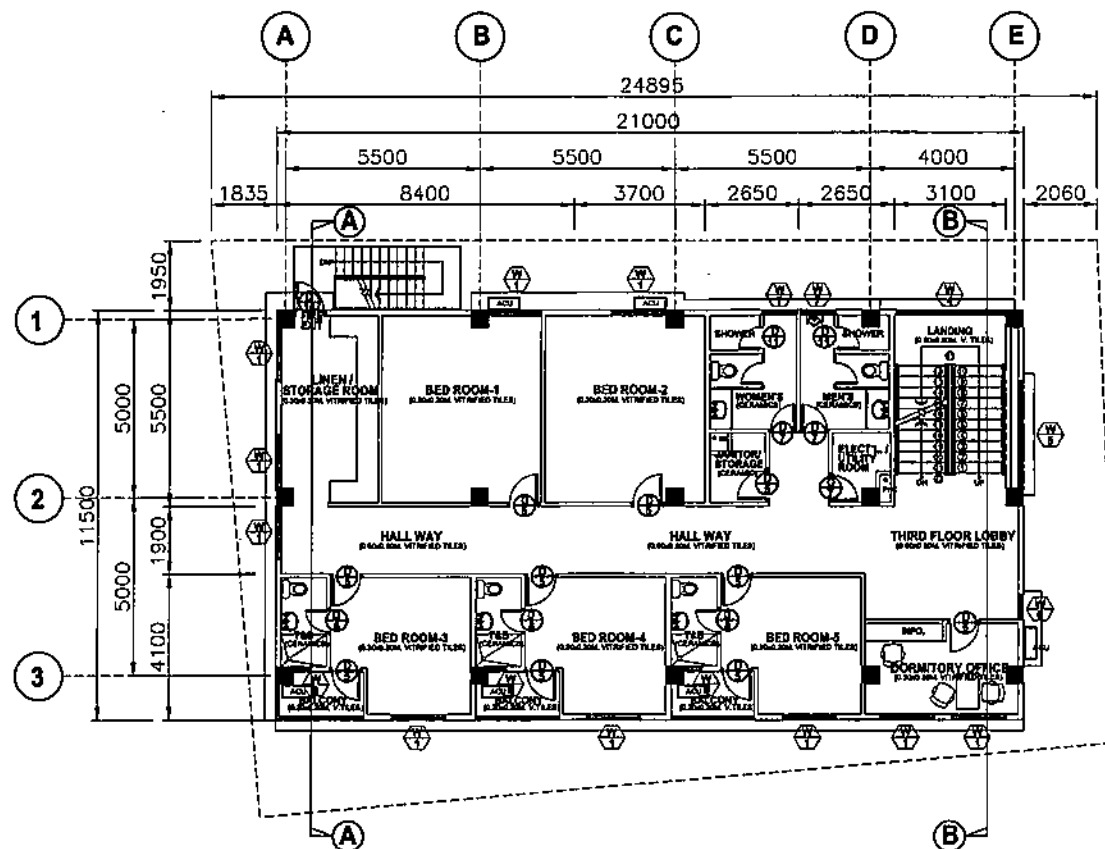






**PERSPECTIVE**  
 SCALE NTS

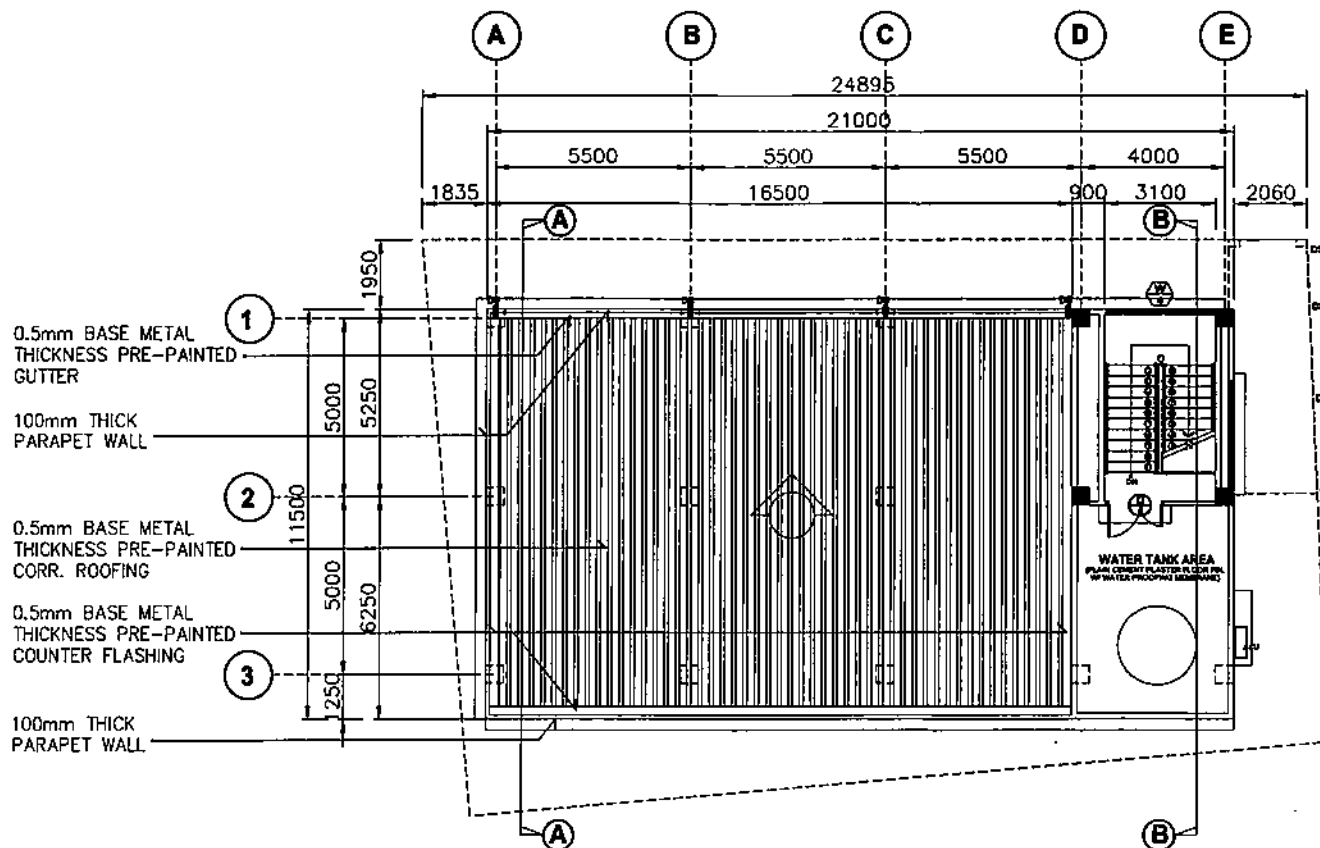
OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE:			
<b>(PERSPECTIVE)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	KING		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			
SUBMITTED:		 <b>R. R. VILLANUEVA</b> Principal Engineer A. C. 12/20	
RECOMMENDED:		 <b>A. C. ESPIRITU</b> Manager, E&C	
APPROVED:		 <b>H. G. VILLANUEVA</b> Manager, E&C	
DWG. NO. <b>COSC-BDA-15.001</b>		SPECS. NO. <b>VibP22Z1464Sc</b>	
REV.		DATE	
NATURE OF REVISION		BY	
		CHKD.	
		RECD.	
		APD.	
SCALE: AS SHOWN		<b>BID DRAWING</b>	
		REV. 0	










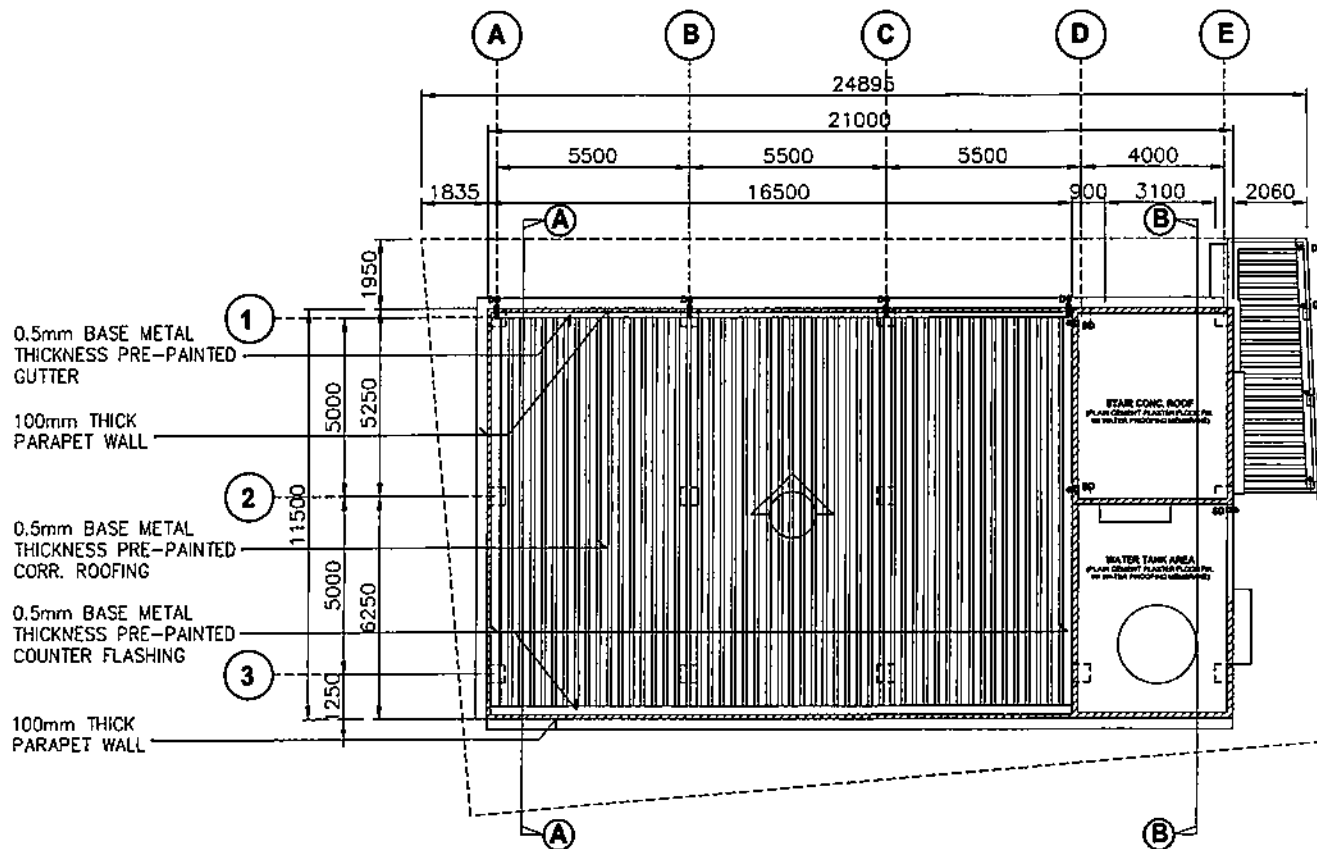
**THIRD FLOOR PLAN**  
SCALE 1:150

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>(THIRD FLOOR PLAN)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	XING		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			
SUMMITTER:		R. R. R. VILLANUEVA Principal Architect, CEAD	
RECOMMENDED:		A. C. B. MIRITU CEAD	
APPROVED:		M. D. S. S. S. S. Manager, COO	
DWG. NO. <b>COSC-BDA-15.005</b>		SPECS. NO. <b>VisP22Z1464Sc</b>	
REV.	DATE	NATURE OF REVISION	BY
SCALE: AS SHOWN		<b>BID DRAWING</b>	
		REV. D	



**ROOF DECK FLOOR PLAN**  
SCALE 1:150





OWNER:  <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR	
LOCATION: BAGACAY, CALBAYOG, SAMAR	
TITLE: <b>(ROOF DECK FLOOR PLAN)</b>	
DESIGNED: 	SUBMITTED:  <b>R. R. R. VILLANUEVA</b> Principal Architect / CAD
DRAWN: KING	RECOMMENDED:  <b>A. C. ESPINOSA</b> Principal Engineer / Architect
REVIEWED: PRINCIPAL ENGR. / ARCHT.	APPROVED:  <b>N. G. S. S. S. S.</b> Manager, DDO
CIVIL/ARCHT.	
ELEC.	
MECH.	
DWG. NO. <b>COSC-BDA-15.006</b>	SPEC. NO. <b>VisP22Z1464Sc</b>
SCALE: AS SHOWN	<b>BID DRAWING</b>
REV. DATE NATURE OF REVISION BY CHKD. RECD. APPD.	REV. D

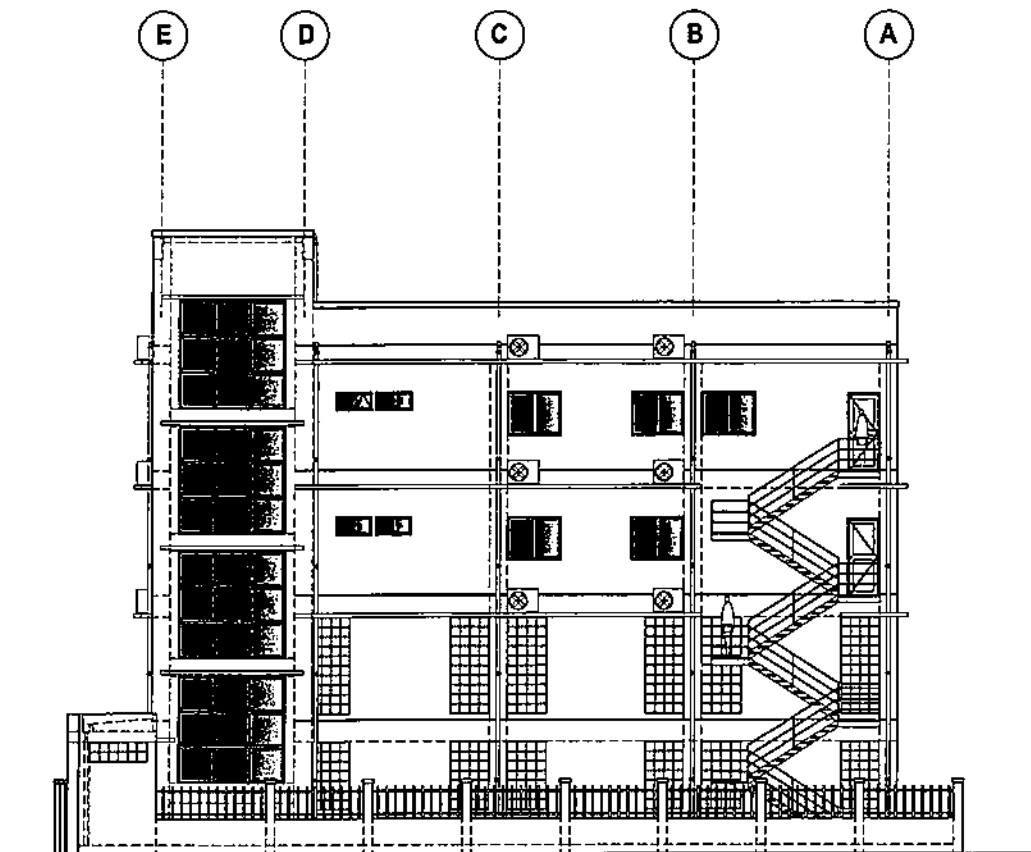


**ROOF PLAN**  
SCALE 1:150

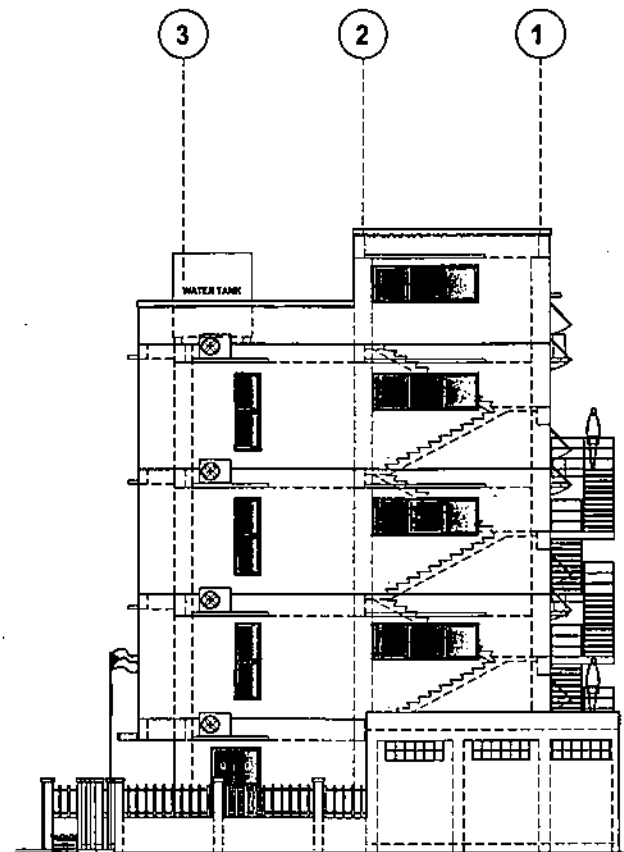
OWNER		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: (ROOF PLAN)			
DESIGNED	BY	CHKD	DATE
DRAWN	ENG		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED	
CAL/ARCHT		APPROVED	
ELEC.			
MECH.			
DWG. NO. COSC-BDA-15.007		SPECS. NO. VisP22Z1464Sc	
REV. DATE		NATURE OF REVISION	
BY	CHKD	REQD	APPD
SCALE: AS SHOWN		BID DRAWING	
REV. 0			






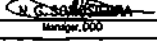
OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>(FRONT AND LEFT SIDE ELEVATION)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	KING		
REVIEWED	PRINCIPAL ENGR. I. ARET.		
CIVIL ARCHT			
ELEC.			
MECH.			
SUBMITTED:		 <b>R. R. VILLANUEVA</b> Principal Architect & CEAO	
RECOMMENDED:		 <b>A. C. ESPIRITU</b> Manager, PDU	
APPROVED:		 <b>N. C. SUBOSIEROTA</b> Manager, EDO	
DWG. NO. <b>COSC-BDA-15.008</b>		SPECS. NO. <b>VisP22Z1464Sc</b>	

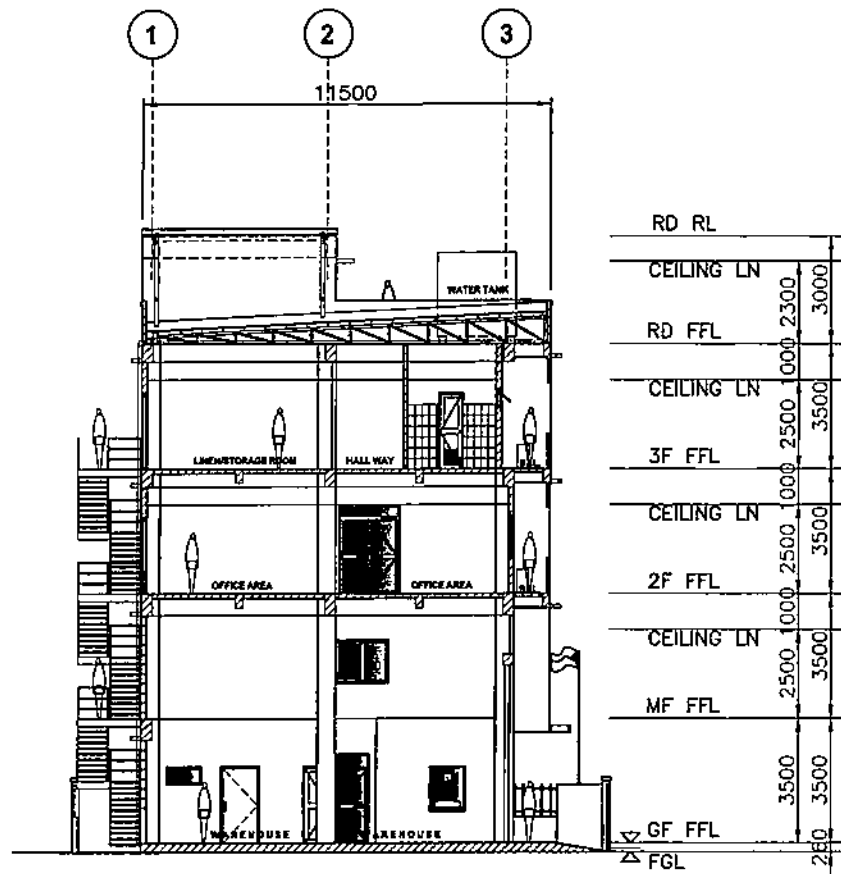


REAR ELEVATION  
SCALE 1:150

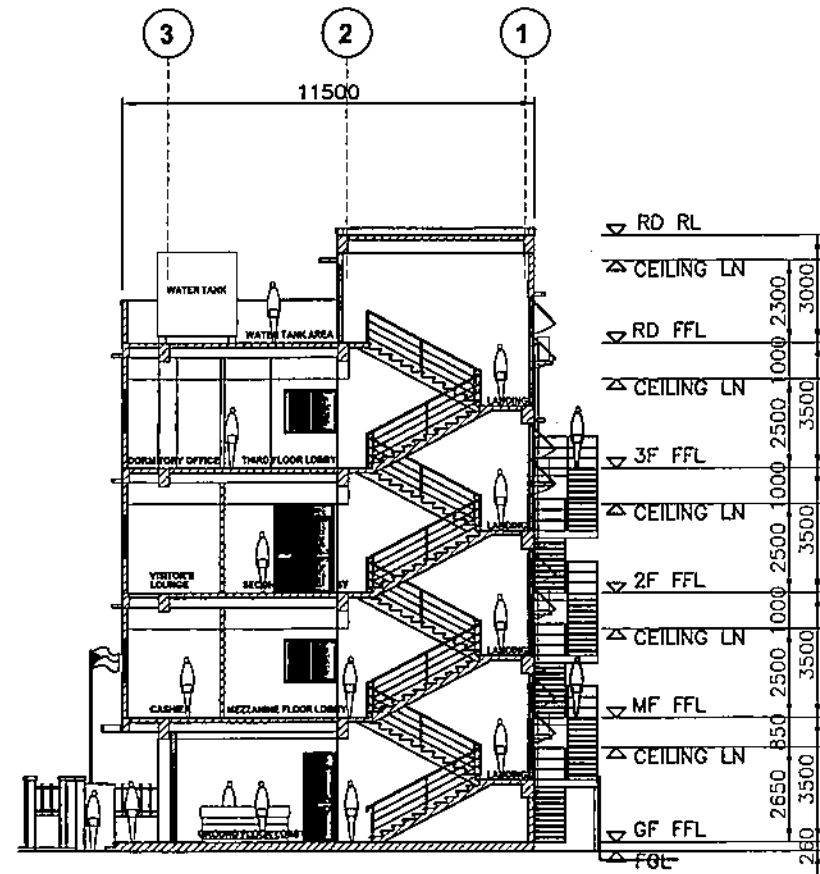


RIGHT SIDE ELEVATION  
SCALE 1:100





OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>(REAR AND RIGHT SIDE ELEVATION)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	ING		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			
SUBMITTED:		 <b>R. R. VILLANUEVA</b> Principal Architect, C.E.O.	
RECOMMENDED:		 <b>A. C. ESPIRITU</b> Manager, C.E.O.	
APPROVED:		 <b>W. C. SOMATERRA</b> Manager, C.E.O.	
DWG. NO. <b>COSC-BDA-15.009</b>		SPECS. NO. <b>VIsP22Z1464Sc</b>	
REV.	DATE	NATURE OF REVISION	BY
SCALE: AS SHOWN		<b>BID DRAWING</b>	
		REV. 0	



SECTION THRU 'A'  
SCALE 1:150



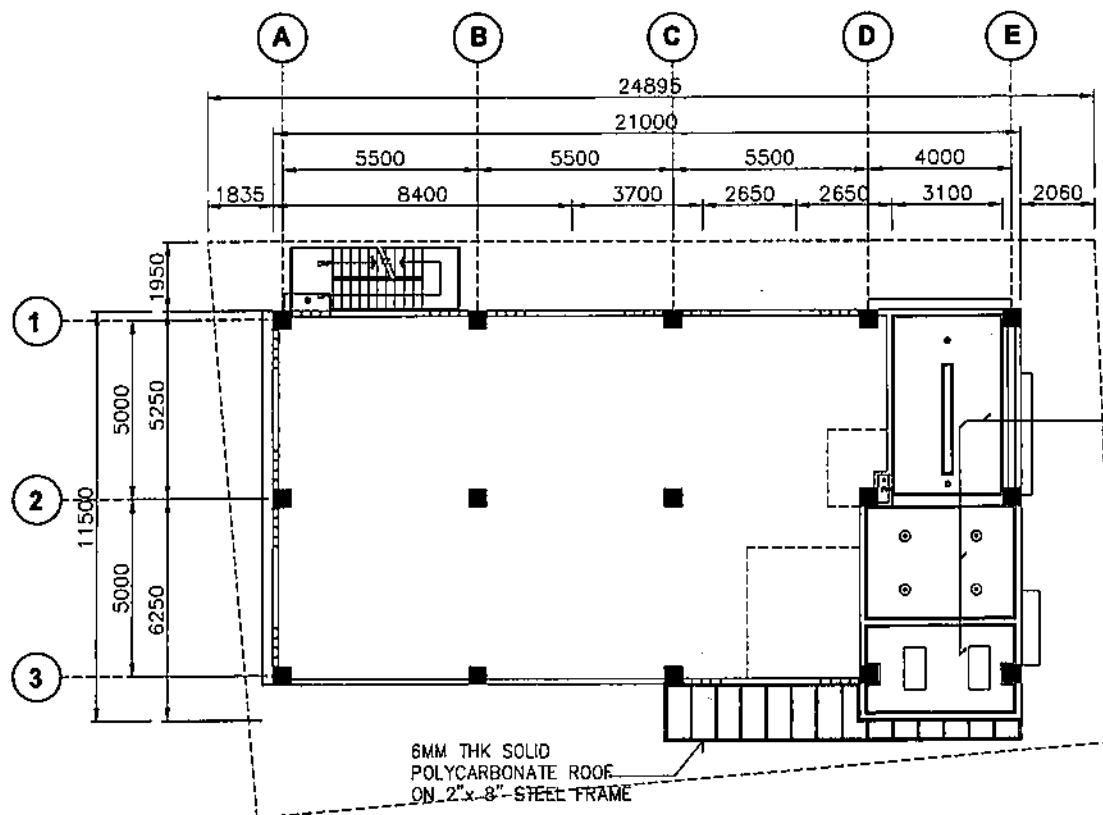
SECTION THRU 'B'  
SCALE 1:150

OWNER		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>(SECTION THRU 'A' AND SECTION THRU 'B')</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	PRINCIPAL ENGR. / ARCHT.		DATE
CIVIL ARCHT.			DATE
ELEC.			DATE
MECH.			DATE
SUBMITTED:		 <b>R. R. VILLANUEVA</b> Principal Architect & CEAD	
RECOMMENDED:		 <b>A. C. B. PARITU</b> Manager, CEAD	
APPROVED:		 <b>R. B. S. S. S. S.</b> Manager, CEAD	
DWG. NO. <b>COSC-BDA-15.0010</b>		SPEC. NO. <b>VisP22Z1464Sc</b>	
SCALE: AS SHOWN		BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY
CHKD.			
RECD.			
APPD.			



CEILING SYSTEM:  
USE FIBER CEMENT BOARD  
ON STANDARD METAL FURING  
SPACED @ 0.40M O.C., B.W.  
AND METAL HANGERS SPACED  
@ 0.80M. O.C., B.W.

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY			
PROJECT: <b>CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR</b>					
LOCATION: <b>BAGACAY, CALBAYOG, SAMAR</b>					
TITLE: <b>(GROUND FLOOR REFLECTED CEILING PLAN)</b>					
DESIGNED	BY	CHKD	DATE	SUBMITTED: <u>                    </u> <b>R. R. R. VILLANUEVA</b> Principal Architect, C.E.D.  RECOMMENDED: <u>                    </u> <b>A. C. PASBITU</b> Manager, C.E.D.  APPROVED: <u>                    </u> <b>N. G. SANCHEZ</b> Manager, CDD	
DRAWN	KING				
REVIEWED	PRINCIPAL ENGR. / ARCHT.				
CIVIL/ARCHT					
ELEC.					
MECH.					
DWG. NO. <b>COSC-BDA-15.0011</b>				SPECS. NO. <b>VisP22Z1464Sc</b>	
SCALE: AS SHOWN				<b>BID DRAWING</b>	
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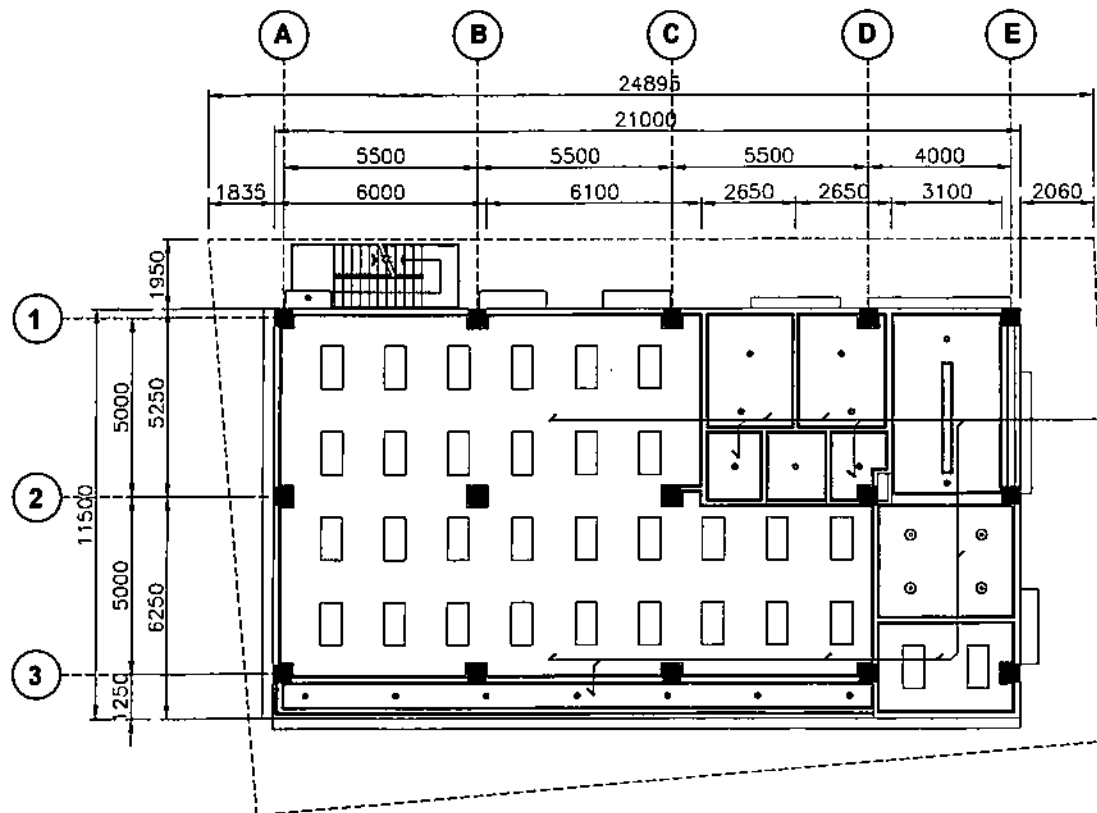


CEILING SYSTEM:  
USE FIBER CEMENT BOARD  
ON STANDARD METAL FURING  
SPACED @ 0.40M O.C., B.W.  
AND METAL HANGERS SPACED  
@ 0.80M O.C., B.W.

**MEZZANINE FLOOR REFLECTED CEILING PLAN**  
SCALE 1:150

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>(MEZZANINE REFLECTED CEILING PLAN)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	KNO		
REVIEWED	PRINCIPAL ENGR. I. A. RICHY		
CIVIL/ARCHT			
ELEC.			
MECH.			
SUBMITTED:		R. R. R. VILLARUEVA Principal Architect / CEO	
RECOMMENDED:		A. C. B. RITU Manager / CEO	
APPROVED:		H. C. B. RITU Manager / CEO	
DWG. NO. <b>COSC-BDA-15.0012</b>		SPEC. NO. <b>VlsP22Z1484Sc</b>	
SCALE: <b>AS SHOWN</b>		<b>BID DRAWING</b>	
REV. 0			


REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



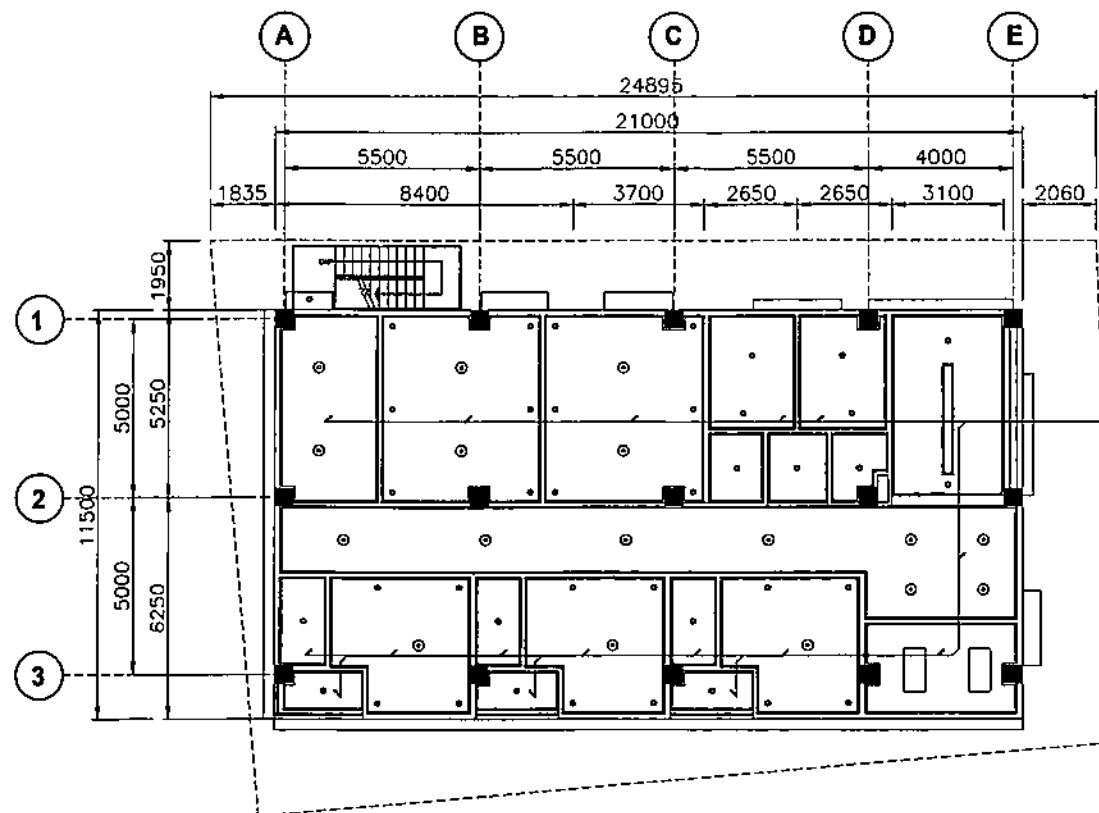
## SECOND FLOOR REFLECTED CEILING PLAN

SCALE

1:150





OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>(SECOND FLOOR REFLECTED CEILING PLAN)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	CHKD		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			
SUBMITTED:		R. R. R. VILLARUEVA Principal Architect / CEAD	
RECOMMENDED:		A. C. ESPRITU Manager, CEAD	
APPROVED:		N. C. SANCHEZ Manager, DDO	
DWG. NO. COSC-BDA-15.0013		SPECS. NO. VisP2221464Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. 0			

REV.	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPD.



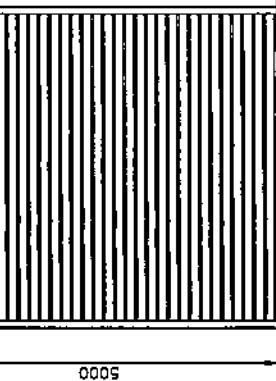
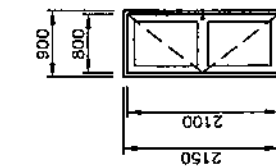
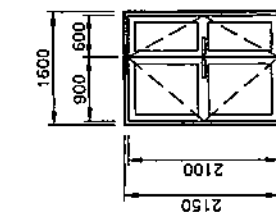
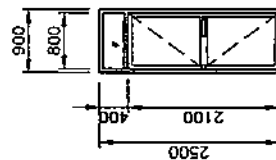
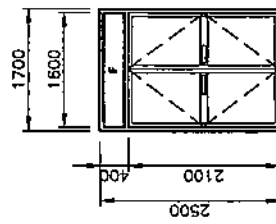
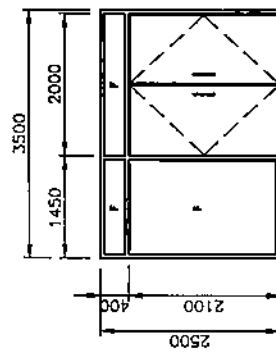
CEILING SYSTEM:  
USE FIBER CEMENT BOARD  
ON STANDARD METAL FURING  
SPACED @ 0.40M O.C., B.W.  
AND METAL HANGERS SPACED  
@ 0.80M. O.C., B.W.

**THIRD FLOOR REFLECTED CEILING PLAN**  
SCALE 1:150

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>(THIRD FLOOR REFLECTED CEILING PLAN)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	KING		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			
SUBMITTED:		 <b>R. R. R. VILLANUEVA</b> Project Engineer / A. C. E. D.	
RECOMMENDED:		 <b>A. C. ESPIRITU</b> Designer / A. C. E. D.	
APPROVED:		 <b>N. C. DELA CRUZ</b> Manager, EOD	
DWG. NO. <b>COSC-BDA-15.0014</b>		SPEC. NO. <b>VisP22Z1464Sc</b>	
SCALE: AS SHOWN		<b>BID DRAWING</b>	
REV. 0			

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.

4500



D 1

- GLASS AND ALUM. SWING DOOR
- 8mm THK. TEMPERED TINTED GLASS
- BRONZE, ONE WHOLE PIECE
- ALUMINUM FRAME ANALOK FINISH
- 50x100mm ON FIXED FRAME
- HEAVY DUTY MECHANISM

D 2

- GLASS AND ALUM. SWING DOOR
- 8mm THK. TEMPERED TINTED GLASS
- BRONZE, ONE WHOLE PIECE
- ALUMINUM FRAME ANALOK FINISH
- 50x100mm ON FIXED FRAME
- HEAVY DUTY MECHANISM

D 3

- GLASS AND ALUM. SWING DOOR
- 8mm THK. TEMPERED TINTED GLASS
- BRONZE, ONE WHOLE PIECE
- ALUMINUM FRAME ANALOK FINISH
- 50x100mm ON FIXED FRAME
- HEAVY DUTY MECHANISM

D 4

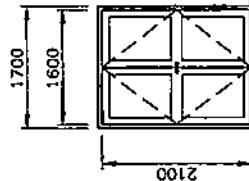
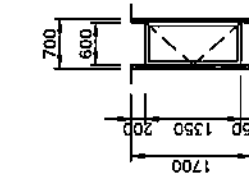
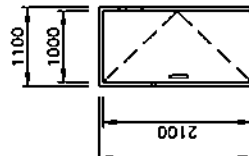
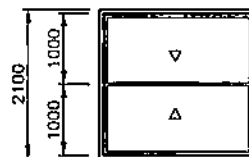
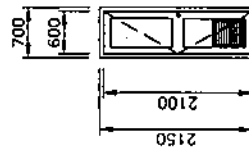
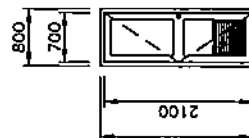
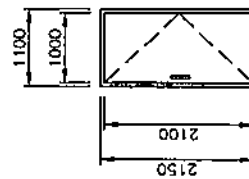
- FLUSH TYPE WOOD DOOR
- MARINE PLYWOOD BOTH SIDES
- 2-1/2" HARD WOOD JAMB
- 3 PIN HINGES
- ONE SET DOOR KNOB, WEATHERPROOF
- GLAZED LACQUER PAINT FINISH ON DOOR AND JAMB

D 5

- PANEL TYPE WOOD DOOR
- 2-1/2" HARD WOOD JAMB
- 3 PIN HINGES
- ONE SET DOOR KNOB, WEATHERPROOF
- GLAZED LACQUER PAINT FINISH ON DOOR AND JAMB

D 12

- MOTOR OPERATED GALVALUME ROLL UP
- 5-TYPE GALVALUME FINISH
- OPEN TYPE INSTALLATION



D 6

- FLUSH TYPE WOOD DOOR
- MARINE PLYWOOD BOTH SIDES
- 2-1/2" HARD WOOD JAMB
- 3 PIN HINGES
- ONE SET DOOR KNOB, WEATHERPROOF
- GLAZED LACQUER PAINT FINISH ON DOOR AND JAMB
- FIXED LOUVER INTAKE

D 7

- FLUSH TYPE WOOD DOOR
- MARINE PLYWOOD BOTH SIDES
- 2-1/2" HARD WOOD JAMB
- 3 PIN HINGES
- ONE SET DOOR KNOB, WEATHERPROOF
- GLAZED LACQUER PAINT FINISH ON DOOR AND JAMB
- FIXED LOUVER INTAKE

D 8

- FLUSH TYPE WOOD DOOR
- MARINE PLYWOOD BOTH SIDES
- 2-1/2" HARD WOOD JAMB
- 3 PIN HINGES
- ONE SET DOOR KNOB, WEATHERPROOF
- GLAZED LACQUER PAINT FINISH ON DOOR AND JAMB
- FIXED LOUVER INTAKE

D 9

- GLASS AND ALUM. SWING DOOR
- 8mm THK. TEMPERED TINTED GLASS
- BRONZE, ONE WHOLE PIECE
- ALUMINUM FRAME ANALOK FINISH
- 50x100mm ON FIXED FRAME
- HEAVY DUTY MECHANISM

D 10

- METAL DOOR JAMB
- GLASS DOOR
- 3 PIN HINGES
- ONE SET DOOR KNOB, WEATHERPROOF
- EPOXY PAINT FINISH ON DOOR AND JAMB

D 11

- FLUSH TYPE WOOD DOOR
- MARINE PLYWOOD BOTH SIDES
- 2-1/2" HARD WOOD JAMB
- 3 PIN HINGES
- ONE SET DOOR KNOB, WEATHERPROOF
- GLAZED LACQUER PAINT FINISH ON DOOR AND JAMB
- FIXED LOUVER INTAKE

D 13

- FLUSH TYPE WOOD DOOR
- MARINE PLYWOOD BOTH SIDES
- 2-1/2" HARD WOOD JAMB
- 3 PIN HINGES
- ONE SET DOOR KNOB, WEATHERPROOF
- GLAZED LACQUER PAINT FINISH ON DOOR AND JAMB



**NATIONAL POWER CORPORATION**  
AGHAM ROAD, DILIMAN, QUEZON CITY

**PROJECT:** CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR  
**LOCATION:** BAGACAY, CALBAYOG, SAMAR

# **(SCHEDULE OF DOORS)**

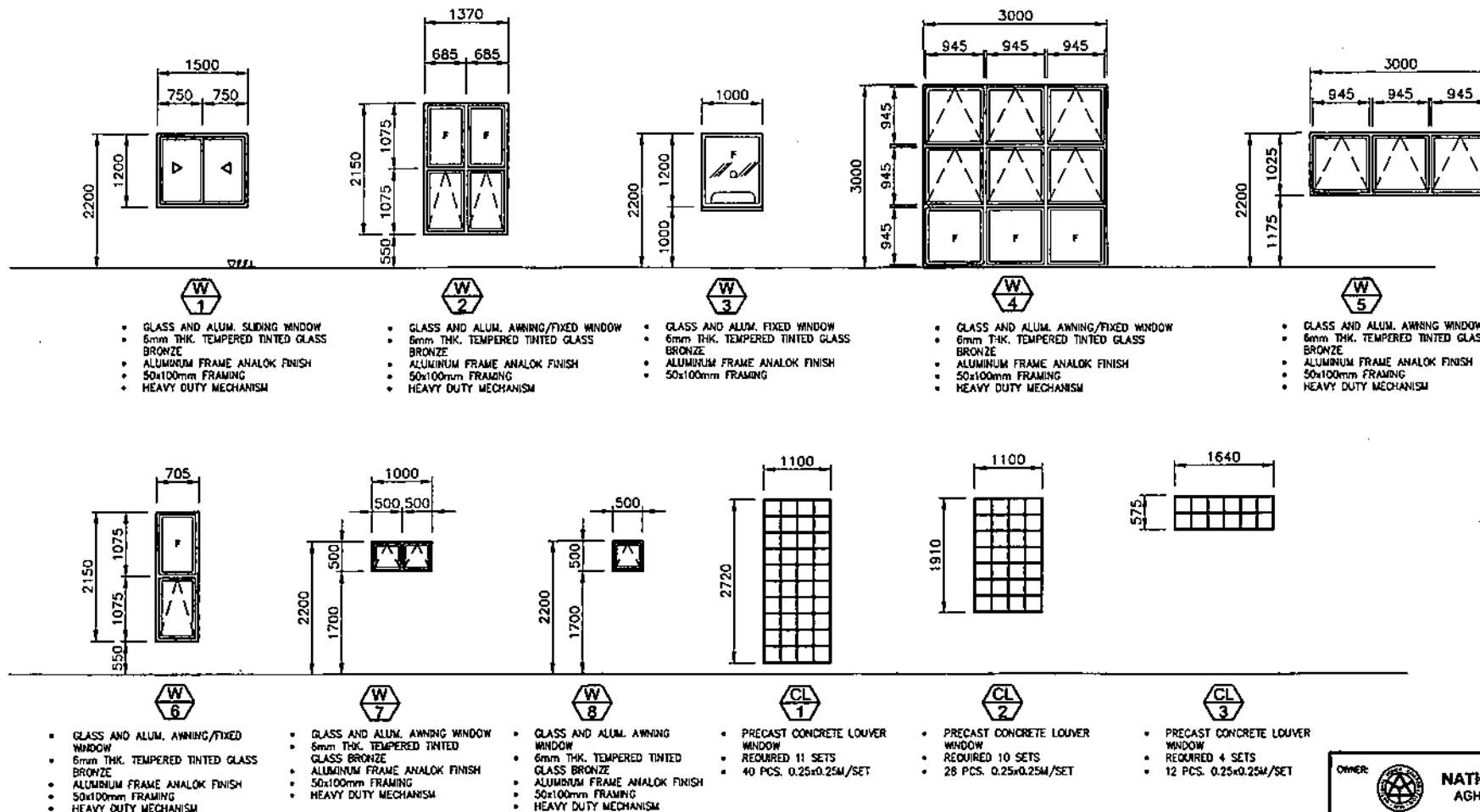
TITLE

DESIGNED	BY	CHKD	DATE
DRWN	ENG		
REVIEWED	PRINCIPAL ENGR./ARCHT.		
CALCULATED			
ELEC.			
MECH.			
APPROVED			

DWG. NO.	COSC-BDA-15.0015	SPEC. NO.	V18P22Z1464Sc
SCALE	AS SHOWN	BID DRAWING	REV. 0

## **SCHEDULE OF DOORS** SCALE 1/25

REV.	DATE	NATURE OF REVISION	BY	CHKD.	APPR.



**SCHEDULE OF WINDOWS**  
SCALE 1:75

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>(SCHEDULE OF DOORS)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	KING		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED:	R. R. R. VILLANUEVA Principal Architect, CEAD
CONTRACT		APPROVED:	N. C. PERILLITO Manager, CEAD
ELEC.			
MECH.			
DWG. NO. COSC-BDA-15.0016		SPECS. NO. VisP2221464Sc	
REV.	DATE	NATURE OF REVISION	BY
SCALE: AS SHOWN		<b>BID DRAWING</b>	
		REV. 0	

## SECTION IX

# BID DRAWINGS

# CIVIL WORKS

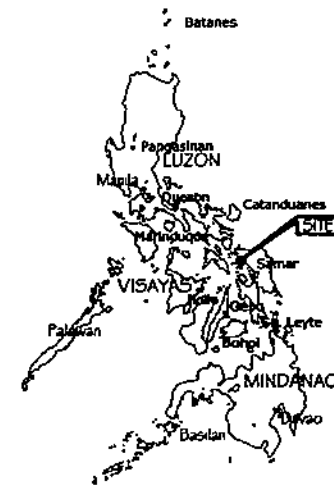
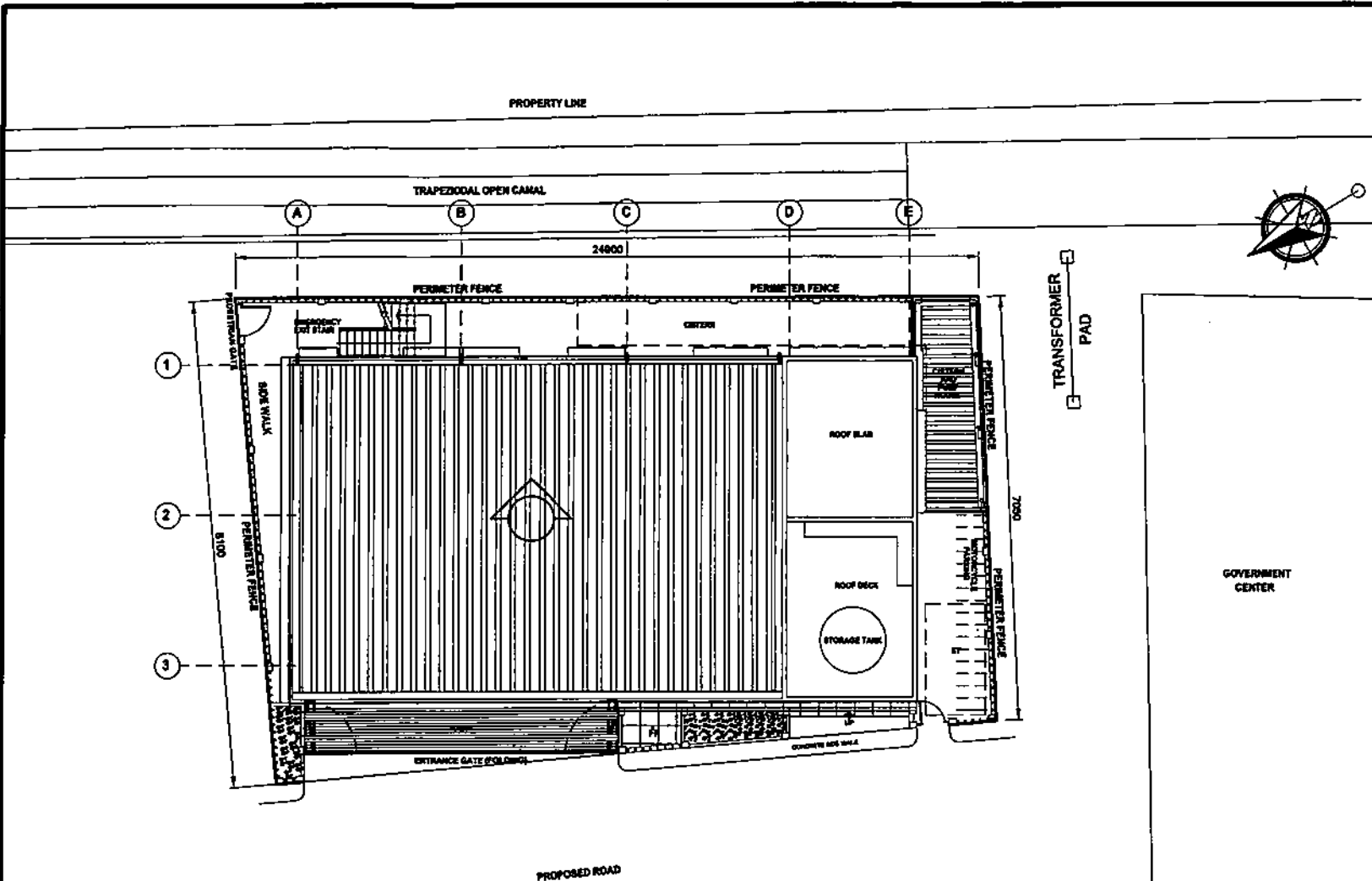
**SECTION IX – BID DRAWINGS  
CW – CIVIL WORKS**

<b><u>DRAWING NO.</u></b>	<b><u>TITLE</u></b>
COSC-BDC-15.001	SITE DEVELOPMENT PLAN
COSC-BDC-15.002	FOUNDATION AND GRADE BEAM FRAMING PLAN
COSC-BDC-15.003	UPPER GROUND AND SECOND FLOOR FRAMING PLAN
COSC-BDC-15.004	THIRD AND ROOF DECK FRAMING PLAN
COSC-BDC-15.005	ROOF FRAMING PLAN
COSC-BDC-15.006	FOUNDATION & WALL FOOTING DETAILS
COSC-BDC-15.007	FOOTING-COLUMN-GIRDER CONNECTIONS (SECTIONS & DETAILS)
COSC-BDC-15.008	TYPICAL COLUMN DETAIL
COSC-BDC-15.009	TYPICAL BEAM/GIRDER DETAILS (ELEVATION, SECTION AND DETAILS)
COSC-BDC-15.010	SCHEDULE OF BEAMS & GIRDERS
COSC-BDC-15.011	UPPER GROUND AND SECOND FRAMING PLAN (SLAB LAYOUT)
COSC-BDC-15.012	THIRD AND ROOF DECK FRAMING PLAN (SLAB LAYOUT)
COSC-BDC-15.013	SCHEDULE OF SLAB REINFORCEMENT
COSC-BDC-15.014	TRUSS AND HORIZONTAL STRUT DETAILS
COSC-BDC-15.015	TRUSS DETAILS (CONNECTION DETAILS)
COSC-BDC-15.016	PURLINS CROSSBRACE DETAILS (CONNECTION DETAILS)
COSC-BDC-15.017	STAIR DETAILS
COSC-BDC-15.018	EMERGENCY EXIT STAIR DETAILS (FRONT AND SIDE VIEW)
COSC-BDC-15.019	EMERGENCY EXIT STAIR (DETAILS)

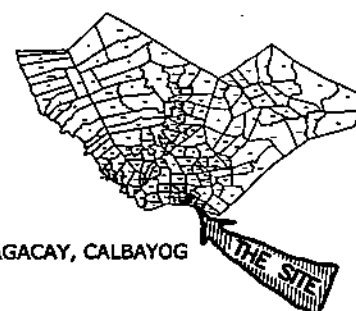
## SECTION IX – BID/REFERENCE DRAWINGS

VisP22Z1464Sc

COSC-BDC-15.020	VEHICULAR GATE (ELEVATION, SECTION AND POST DETAIL)
COSC-BDC-15.021	PERIMETER FENCE (SECTION, ELEVATION AND DETAILS)
COSC-BDC-15.022	DRAINAGE PLAN
COSC-BDC-15.023	PLUMBING LAYOUT (SITE DEVELOPMENT)
COSC-BDC-15.024	PLUMBING LAYOUT (GROUND FLOOR)
COSC-BDC-15.025	PLUMBING LAYOUT (SECOND FLOOR)
COSC-BDC-15.026	PLUMBING LAYOUT (THIRD FLOOR - 1)
COSC-BDC-15.027	PLUMBING LAYOUT (THIRD FLOOR - 2)
COSC-BDC-15.028	SEPTIC TANK AND CATCH BASIN (PLAN AND SECTION)
COSC-BDC-15.029	FLAGPOLE (PLAN, SECTION AND DETAILS)
COSC-BDC-15.030	CISTERN AND PUMPHOUSE (PLAN, SECTION AND DETAILS)
COSC-BDC-15.031	FOOTING, COLUMN, BEAM & SLAB DETAILS (PUMPHOUSE AND CISTERN)



LOCATION PLAN  
NOT TO SCALE

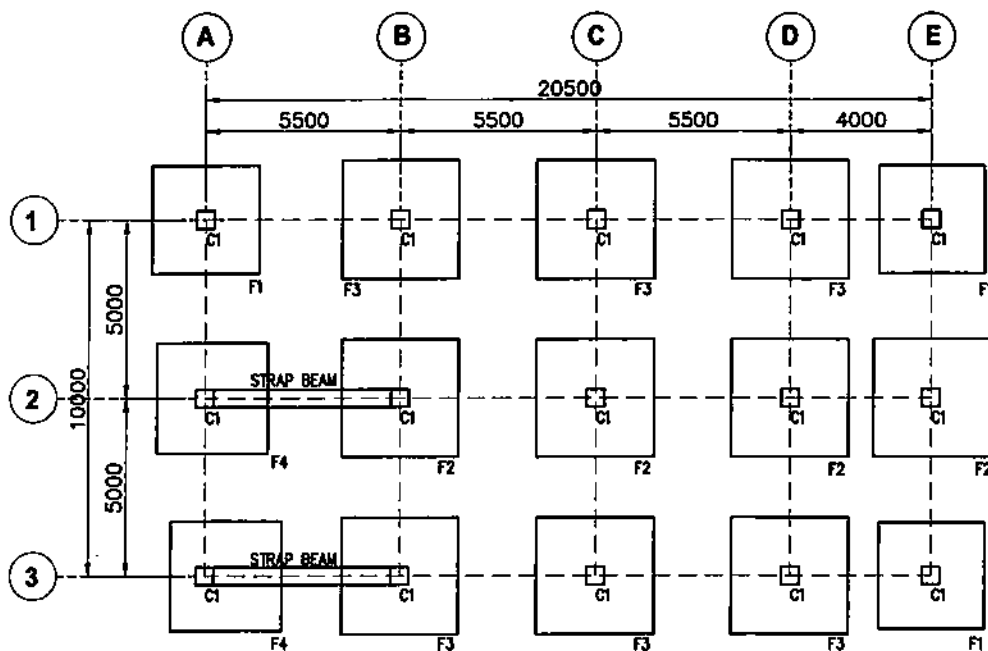


VICINITY PLAN  
NOT TO SCALE

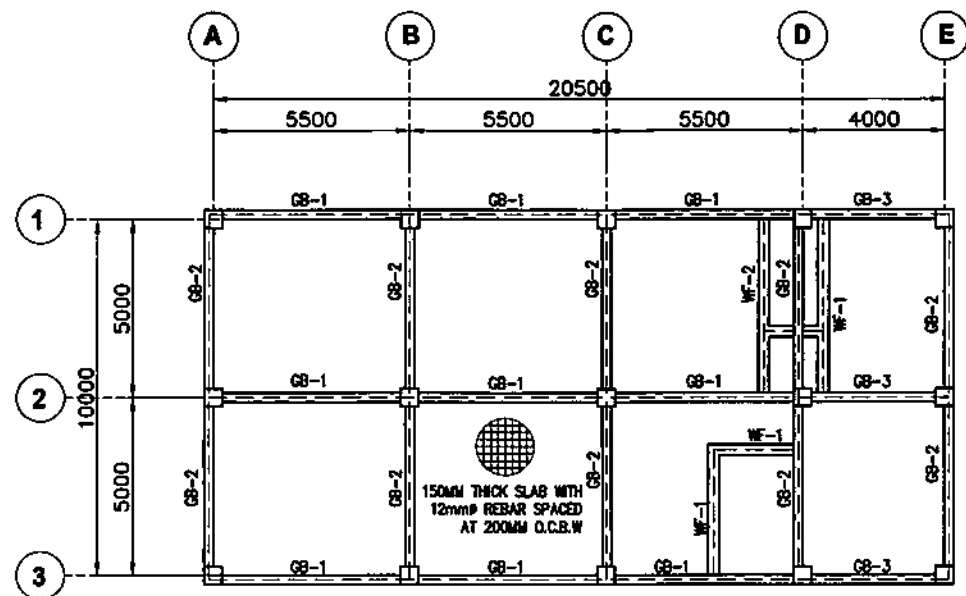
NOTES:

1. ALL DIMENSIONS AND ELEVATIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. THE CONTRACTOR SHALL INVESTIGATE SITE FOR FILLED EXCAVATION OR BURIED STRUCTURES SUCH AS CESSPOOLS, CISTERNS, FOUNDATIONS, ETC. IF ANY SUCH STRUCTURES ARE FOUND, THE NPC SHALL BE NOTIFIED IMMEDIATELY.

OWNER:  NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR	
LOCATION: BAGACAY, CALBAYOG, SAMAR	
TITLE: <b>SITE DEVELOPMENT PLAN</b>	
DESIGNED BY	DATE
DRAWN BY	DATE
REVIEWED BY	DATE
CHECKED BY	DATE
APPROVED BY	DATE
SUBMITTED: H. L. MENDOZA Principal Engineer A, E&C RECOMMENDED: N. C. ESPINOZA Manager, E&C APPROVED: N. C. ESPINOZA Manager, E&C	
DWG. NO. COSC-BDC-15.001	SPEC. NO. VisP22Z1464Sc
SCALE: 1:150	<b>BID DRAWING</b>
REV.	DATE
NATURE OF REVISION	BY
DATE	DATE



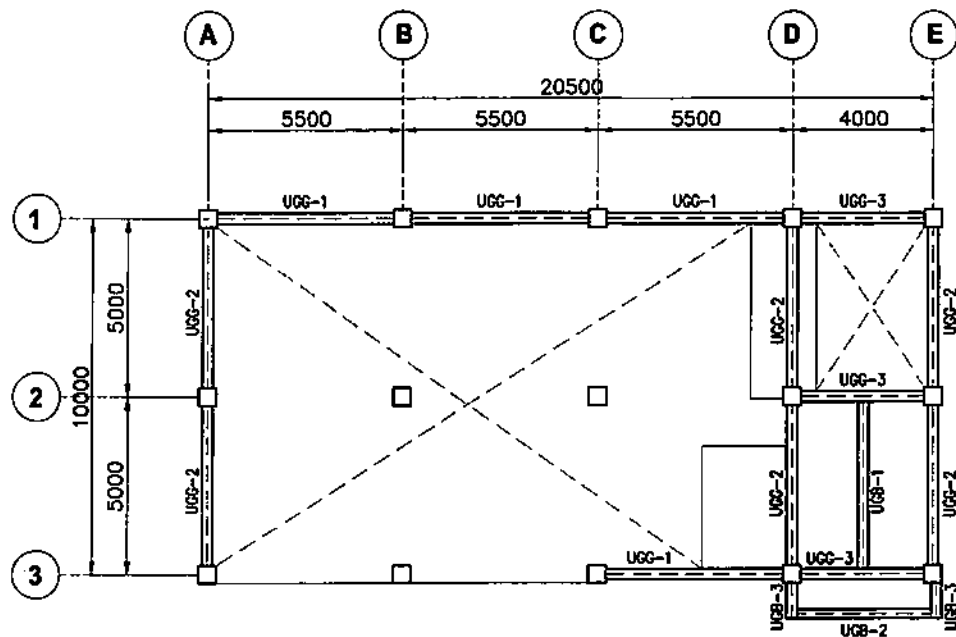
**1 FOUNDATION PLAN**  
COSC-BDC-15.002 SCALE 1:150



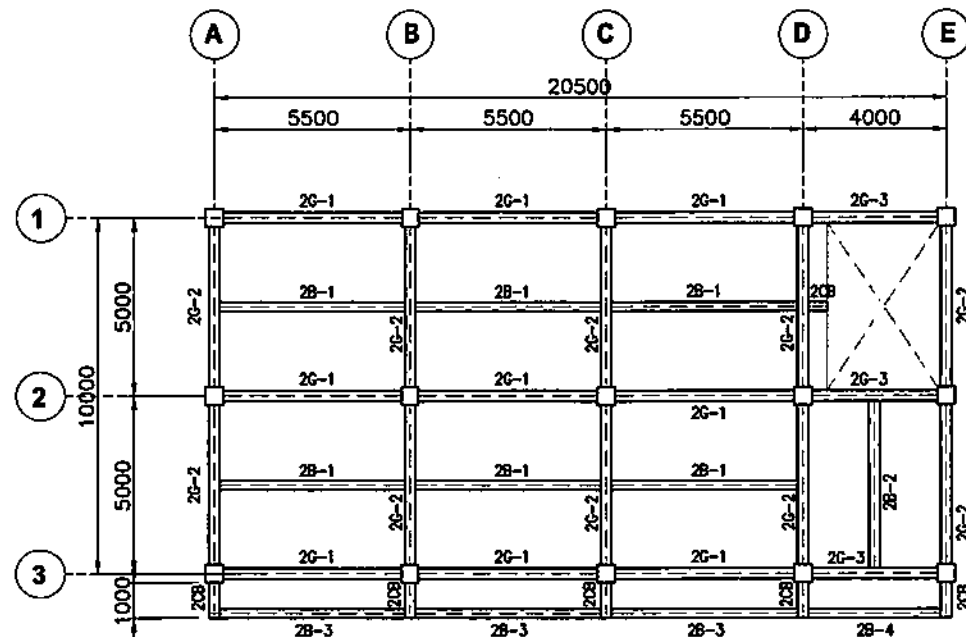
**2 GRADE BEAM WALL FOOTING FRAMING PLAN**  
COSC-BDC-15.002 SCALE 1:150

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>FOUNDATION AND GRADE BEAM FRAMING PLAN</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	PRINCIPAL ENGR./ ARCHT.		SUBMITTED: <i>H. L. MENDOZA</i> Principal Engr. & Lead
REVIEWED			RECOMMENDED: <i>A. C. SORBITO</i> Engr.
CIVIL/ARCHT			APPROVED: <i>H. L. MENDOZA</i> Engr. 200
ELEC			
MECH			
DWG. NO. COSC-BDC-15.002		SPEC. NO. VIsP22Z1464Sc	
SCALE 1:150		<b>BID DRAWING</b>	
REV. DATE		NATURE OF REVISION	
BY	CHKD	RECD	APPD.

REV.	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPD.

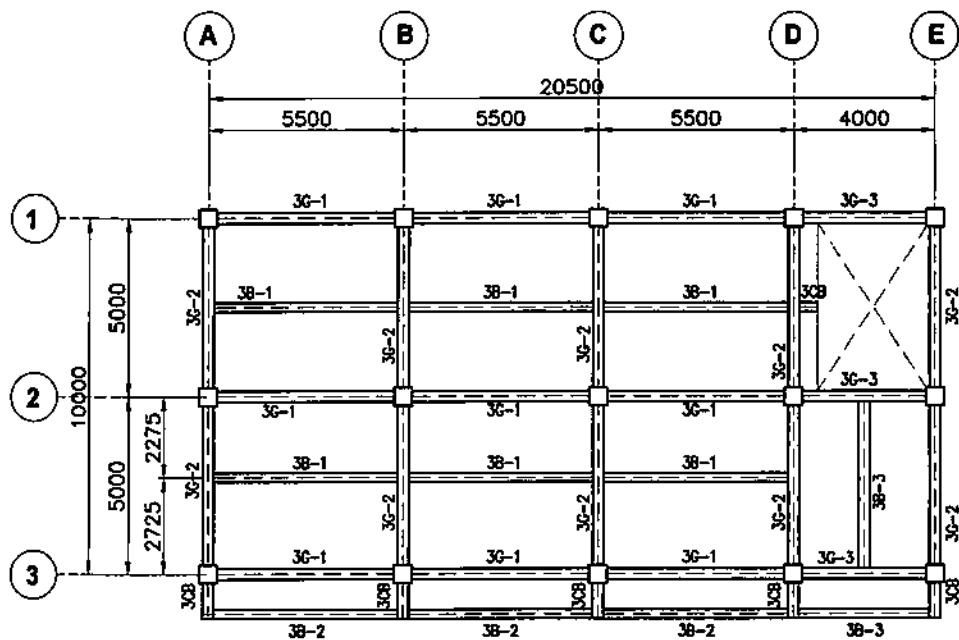


**1 UPPER GROUND FRAMING PLAN (MEZZANINE)**  
COSC-BDC-15.003 SCALE 1:150

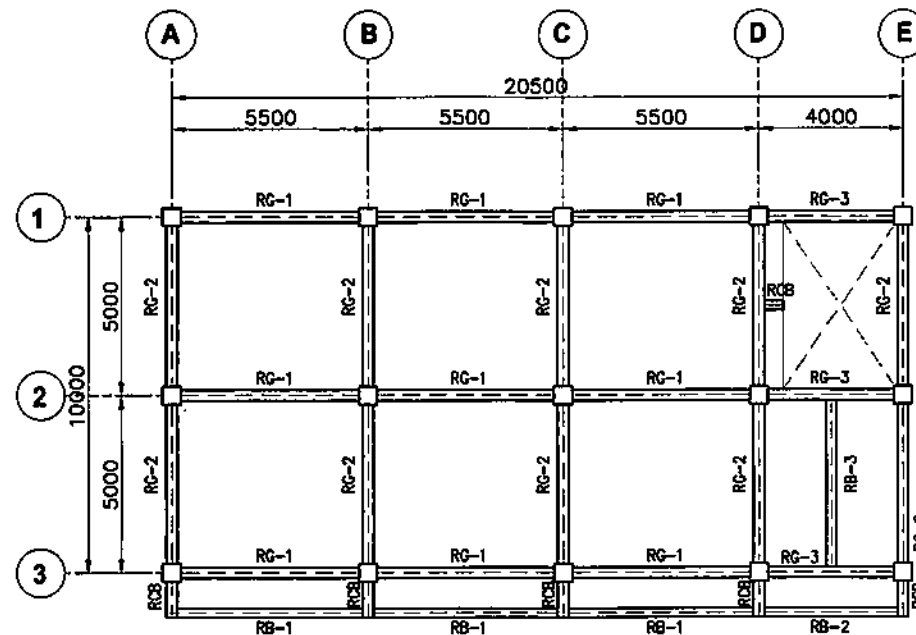


**2 SECOND FLOOR FRAMING PLAN**  
COSC-BDC-15.003 SCALE 1:150


OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>UPPER GROUND AND SECOND FLOOR FRAMING PLAN</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	PRINCIPAL ENGR. / ARCHT.		SUBMITTED: <i>H. L. MENDOZA</i>
REVIEWED			RECOMMENDED: <i>A. C. BUSTO</i>
CIVIL/ARCHT			APPROVED: <i>H. L. MENDOZA</i>
ELEC.			Manager, DDO
MECH.			
DWG. NO. COSC-BDC-15.003		SPEC. NO. VIsP22Z1464Sc	
REV. DATE NATURE OF REVISION		SCALE: 1:150 <b>BID DRAWING</b>	
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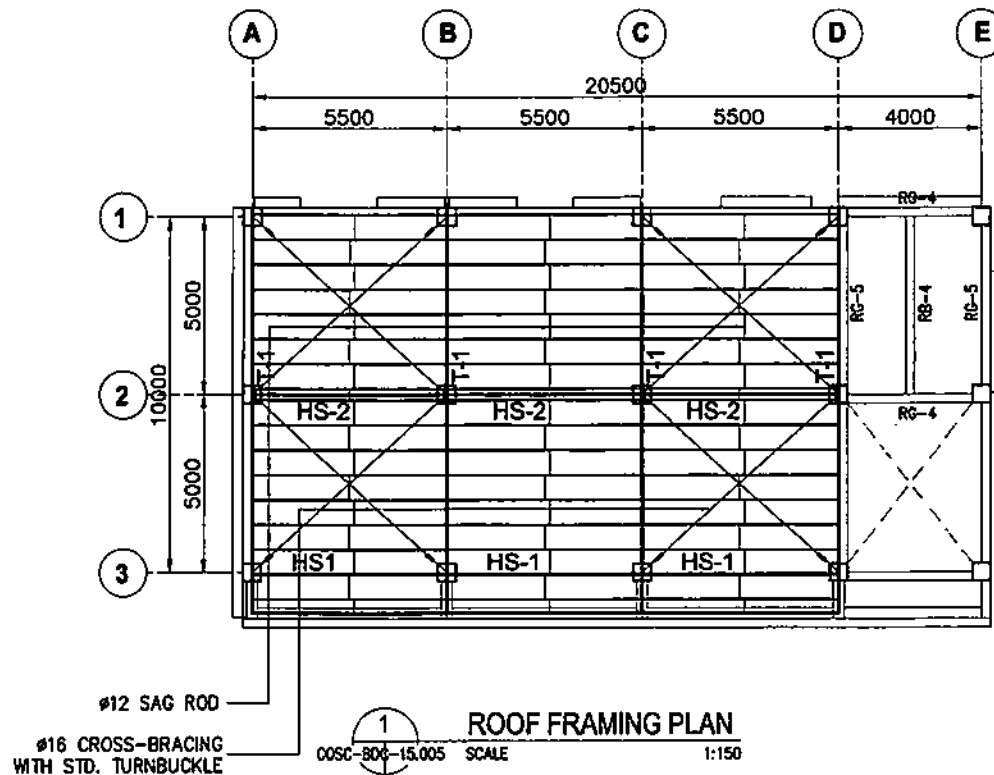




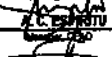

1 THIRD FLOOR FRAMING PLAN  
COSC-BDC-15.004 SCALE 1:150

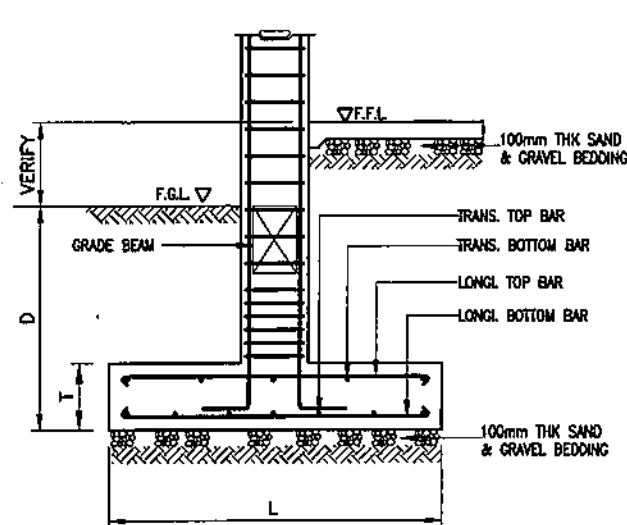


2 ROOF DECK FRAMING PLAN  
COSC-BDC-15.004 SCALE 1:150

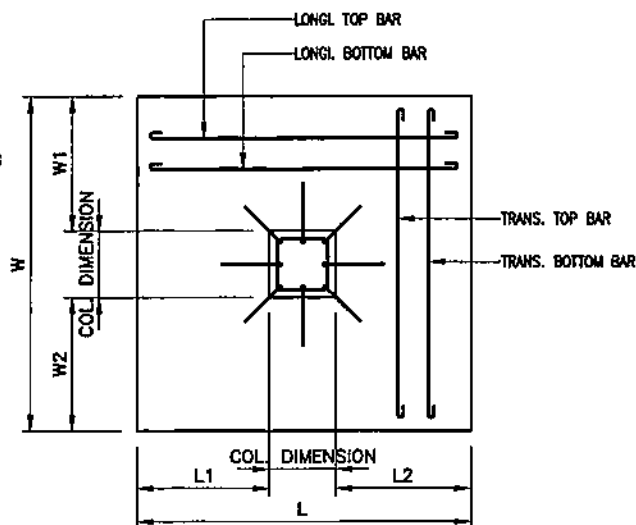
OWNER:				<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR					
LOCATION: BAGACAY, CALBAYOG, SAMAR					
TITLE: <b>THIRD AND ROOF DECK FRAMING PLAN</b>					
DESIGNED	BY	CHKD	DATE	SUBMITTED	<i>H. L. MENDOZA</i> Principal Engineer A/C-2
DRAWN				RECOMMENDED	<i>A. C. ESPINOSA</i> Principal Engineer A/C-3
REVIEWED	PRINCIPAL ENGR. / ARCHT.			APPROVED	<i>H. L. MENDOZA</i> Principal Engineer A/C-2
CIVIL/ARCHT					
ELEC.					
MECH.					
DWG. NO. COSC-BDC-15.004				SPECS. NO. VisP22Z1454Sc	
REV. DATE NATURE OF REVISION				SCALE: AS SHOWN <b>BID DRAWING</b> REV. 0	



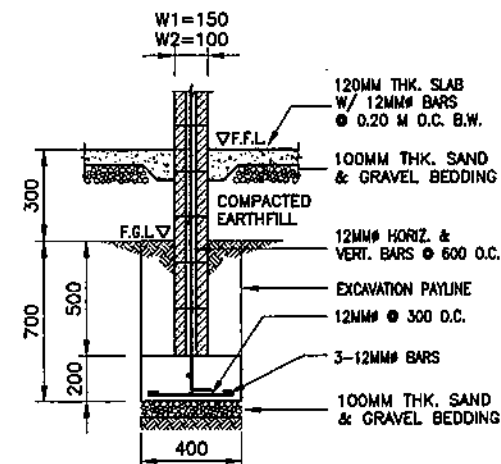
OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE:			
<b>ROOF FRAMING PLAN</b>			
DESIGNED	BY	CHKD	DATE
DRAWN			
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CYLL/ARCHT			
ELEC.			
MECH.			
SUBMITTED:		 H. L. BENDOZA Principal Engineer / CEAD	
RECOMMENDED:		 J. C. ESPRITU Manager / ESO	
APPROVED:		 H. D. SANCHEZ Manager / OOO	
DWG. NO. COSC-BDC-15.005		SPECS. NO. VisP2221464Sc	
REV. DATE		NATURE OF REVISION	
BY	CHKD	RECD	APPD.
SCALE: AS SHOWN		<b>BID DRAWING</b> REV. 0	



**SECTION**



**PLAN**



**WALL FOOTING DETAILS**  
COSC-BDC-15.006 SCALE NTS

**NOTES:**

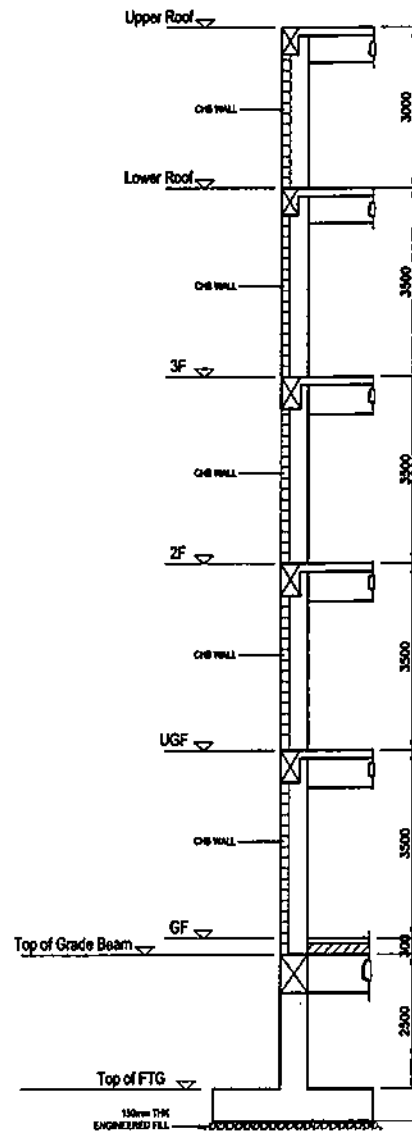
- FOOTING DESIGN IS BASED ON ALLOWABLE SOIL PRESSURE OF 144KPA. CONTRACTOR SHALL NOTIFY NPC THE ACTUAL SOIL CONDITIONS UNCOVERED AND CONFIRM ACTUAL BEARING CAPACITY OF SOIL BEFORE DEPOSITING CONCRETE.
- MINIMUM CONCRETE PROTECTION FOR REINFORCEMENT SHALL BE 75mm FOR CONCRETE DEPOSITED AGAINST GROUND.
- THE MINIMUM 28-DAY CYLINDER COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 27.50Mpa (4000psi) FOR FOOTINGS AND THE BEAMS.
- MINIMUM YIELD STRENGTH OF REINFORCING STEEL BARS SHALL BE:  $F_y = 40 \text{ Ksi (276Mpa)}$  FOR 12mm# AND SMALLER,  $F_y = 60 \text{ Ksi (413Mpa)}$  FOR 16mm# AND LARGER.
- MINIMUM COMPRESSIVE STRENGTH  $f_m$  OF CHB SHALL BE = 700 PSI.
- REFER THE THICKNESS OF THE WALL IN ARCHITECTURAL DRAWINGS.

**SCHEDULE OF FOOTINGS**

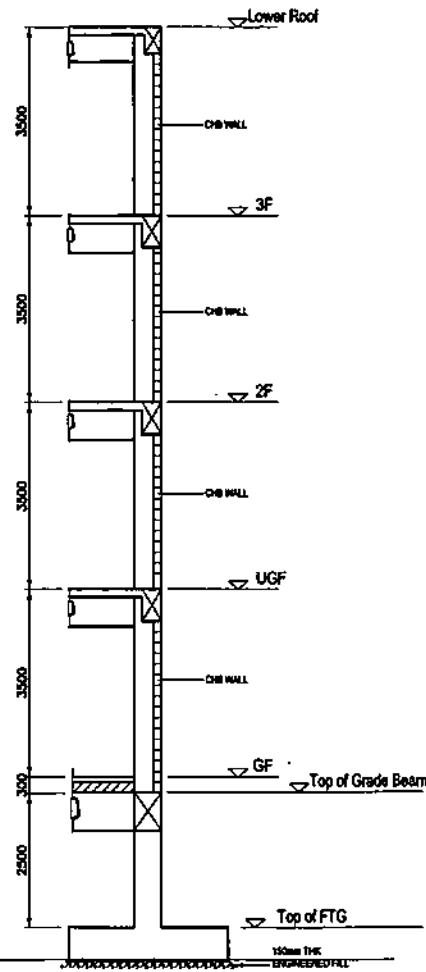
MARK	DIMENSIONS								STEEL REINFORCEMENT				REMARKS	
	LENGTH	WIDTH	THICKNESS	EMBEDMENT					BOTTOM BARS		TOP BARS			
	"L"	"W"	"T"	"D"	"L1"	"L2"	"W1"	"W2"	ALONG "W"	ALONG "L"	ALONG "W"	ALONG "L"		
F1	3000	3000	500	3000	1250	1250	1250	1250	16 – #20	16 – #20	6 – #20	6 – #20	ISOLATED	
F2	3300	3300	600	3100	1400	1400	1400	1400	18 – #20	18 – #20	6 – #20	6 – #20	ISOLATED	
F3	3300	3300	550	3000	1400	1400	1400	1400	18 – #20	18 – #20	6 – #20	6 – #20	ISOLATED	
F4	3100	3100	500	3000	AT GRD 2 AT GRD 3	1100 720	1500 1690	1300	1300	16 – #20	16 – #20	9 – #20	9 – #20	ECCENTRIC

**1 FOUNDATION DETAILS**  
COSC-BDC-15.006 SCALE NTS





OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>FOUNDATION &amp; WALL FOOTING DETAILS</b>			
DESIGNED	BY	CHKD	DATE
DRAWN			
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED:	
CH/ARCHT			
ELEC.		APPROVED:	
MECH.			
DWG. NO. COSC-BDC-15.006		SPECS. NO. VisP22Z1464Sc	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPD.	
SCALE: NTS		<b>BID DRAWING</b>	
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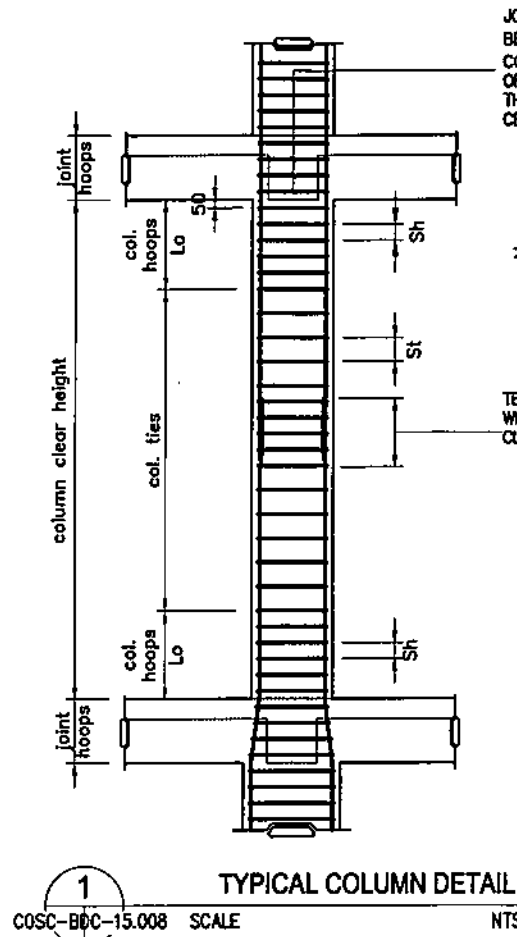


1 GRID 1 & D DETAIL  
COSC-BDC-15.007 SCALE 1:75



2 GRID 3 & D DETAIL  
COSC-BDC-15.007 SCALE 1:75

OWNER:				NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR					
LOCATION: BAGACAY, CALBAYOG, SAMAR					
TITLE: FOOTING-COLUMN-GIRDER CONNECTIONS (SECTIONS & DETAILS)					
DESIGNED	BY	CHKD	DATE	SUBMITTED:	 H. L. MENDOZA Principal Engineer, CEAD
DRAWN				RECOMMENDED:	 A. C. BARTITU Manager, CEAD
REVIEWED	PRINCIPAL ENGR. / ARCHT.			APPROVED:	 H. G. BARRERA Manager, CDD
CIVIL/ARCHT					
ELEC.					
MECH.					
DWG. NO. COSC-BDC-15.007				SPECS. NO. VisP22Z1464Sc	
REV.		DATE	NATURE OF REVISION	BY	CHKD. RECD. APPD.
SCALE: NTS				BID DRAWING	
				REV. 0	



JOINT HOOP SPACE  $\leq 2S_h$  WHEN THEIR AREA BEAMS HAVING WIDTH OF AT LEAST  $\frac{1}{3}$  THE COLUMN WIDTH & DEPTHS NOT LESS THAN  $\frac{1}{3}$  OF THE DEEPEST BEAM THAT FRAMED INTO THE COLUMN. OTHERWISE USE HOOPS  $\leq S_h$  CENTERS.

CONSECUTIVE CROSSTIES HAVE THEIR 90° HOOKS ON OPPOSITE SIDES OF COLUMN





TENSION LAP SPACE ONLY WITHIN CENTER HALF OF CLEAR COLUMN HEIGHT.

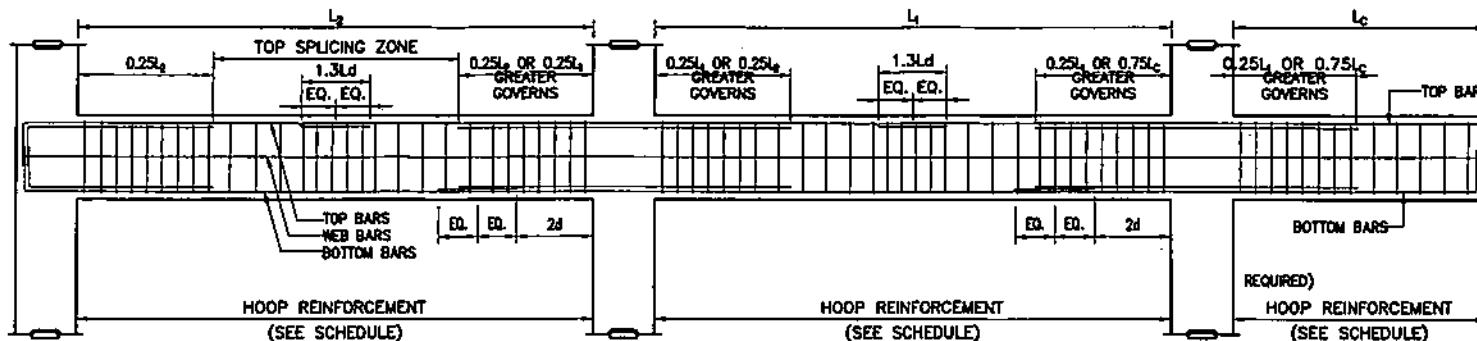
## SCHEDULE OF COLUMNS

LOWER ROOF FLOOR TO UPPER ROOF		VERT. BARS	10-20mm
		TIES	#12mm $\phi$ 250
		CONF. REINF.	#12mm $\phi$ 200
		JOINT REINF.	#12mm $\phi$ 200
2ND FLOOR TO LOWER ROOF FLOOR		VERT. BARS	14-25mm
		TIES	#12mm $\phi$ 150
		CONF. REINF.	#12mm $\phi$ 100
		JOINT REINF.	#12mm $\phi$ 100
UPPER GROUND FLOOR TO 2ND FLOOR		VERT. BARS	16-25mm
		TIES	#12mm $\phi$ 150
		CONF. REINF.	#12mm $\phi$ 100
		JOINT REINF.	#12mm $\phi$ 100
FOUNDATION TO UPPER GROUND (F - UG) FLOOR		VERT. BARS	16-25mm
		TIES	#12mm $\phi$ 150
		CONF. REINF.	#12mm $\phi$ 100
		JOINT REINF.	#12mm $\phi$ 100
		C1	

### NOTES:

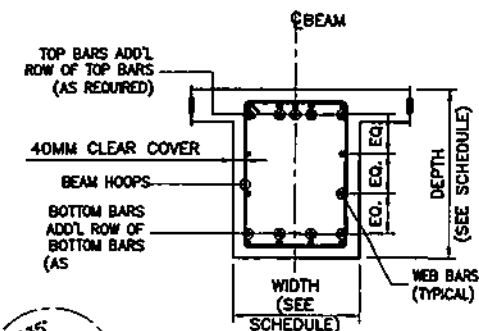
- MINIMUM YIELD STRENGTH OF REINFORCING STEEL BARS SHALL BE:  $F_y = 40$  Ksi (276MPa) FOR 12mm AND SMALLER,  $F_y = 60$  Ksi (413MPa) FOR 16mm AND LARGER.
- THE MINIMUM 28-DAY CYLINDER COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 27.50MPa (4000psi) FOR COLUMNS.
- PROVIDE EXTRA SETS OF TIES AT 100mm O.C. FOR TIED COLUMN REINFORCEMENT ABOVE AND BELOW BEAM-COLUMN CONNECTIONS FOR A DISTANCE FROM FACE OF CONNECTION EQUAL TO THE GREATER OF THE OVERALL THICKNESS OF COLUMN,  $1/6$  THE CLEAR HEIGHT OF COLUMN OR 500mm.
- COLUMN TIES SHALL BE PROTECTED EVERYWHERE BY A COVERING OF CONCRETE CAST MONOLITHICALLY WITH THE CORE WITH THE MINIMUM THICKNESS OF 40mm.
- LAP SPACES FOR VERTICAL COLUMN REINFORCEMENT SHALL BE MADE WITHIN THE CENTER HALF OF COLUMN HEIGHT, AND THE SPACE LENGTH SHALL NOT BE LESS THAN 40 BAR DIAMETERS OR 100mm.

OWNER:				<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR					
LOCATION: BAGACAY, CALBAYOG, SAMAR					
TITLE: <b>TYPICAL COLUMN DETAIL</b>					
DESIGNED	BY	CHKD	DATE	SUBMITTED:	
DRAWN				RECOMMENDED:	
REVIEWED	PRINCIPAL ENGR./ARCHT.			APPROVED:	
CHECKED					
BLK.					
MECL					
DWG. NO. COSC-BDC-15.008		SPECS. NO. VisP2221454Sc			
REV.	DATE	NATURE OF REVISION	BY	CHKD	RECD
SCALE: NTS			BID DRAWING		
			REV. 0		

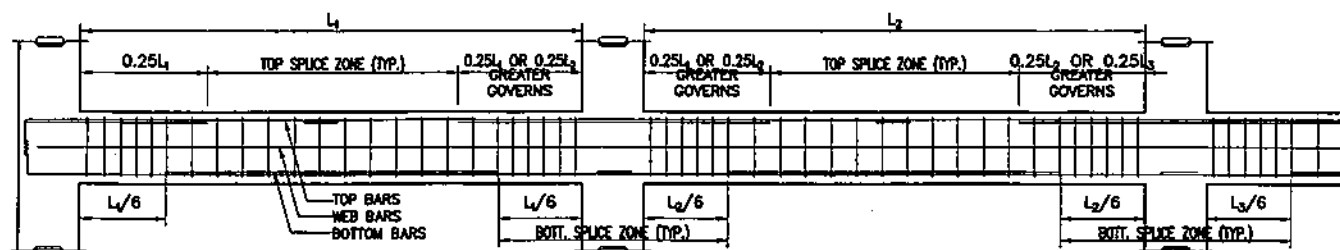
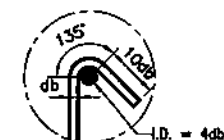


**ELEVATION**

1  
COSC-BDC-15.009 SCALE NTS  
TYPICAL GIRDER DETAILS

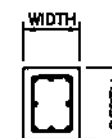


**SECTION**



**ELEVATION**


2  
COSC-BDC-15.009 SCALE NTS  
TYPICAL BEAM DETAILS



**SECTION**


**NOTES:**

1. THE MINIMUM 28-DAY CYLINDER COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 3000psi FOR BEAMS AND GIRDERS.
2. THE MINIMUM YIELD STRENGTH OF LONGITUDINAL REINFORCEMENT SHALL BE GRADE 60 (415MPa).
3. THE MINIMUM YIELD STRENGTH OF STIRRUPS REINFORCEMENT SHALL BE GRADE 40 (275MPa).
4. ALL REINFORCEMENT FOR BEAMS AND GIRDERS SHALL BE 40mm CLEAR MINIMUM.
5. WHEN A BEAM CROSSES A GIRDER, REST BEAM ON TOP OF GIRDER BARS.
6. NO SPlice SHALL BE ALLOWED 2d FROM THE FACE OF THE SUPPORT.

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>TYPICAL BEAM/GIRDER DETAILS</b> (ELEVATION, SECTION & DETAILS)			
DESIGNED	BY	CHKD	DATE
DRAWN	REVIEWED		PRINCIPAL ENGR. / ARCHT.
CIVIL/ARCHT.	ELEC.		MECH.
SUBMITTED:		RECOMMENDED:	
APPROVED:		APPROVED:	
DWG. NO. COSC-BDC-15.009		SPEC. NO. VisP22Z1454Sc	
SCALE: NTS		BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY
CHKD	RECD	APPD	

# SCHEDULE OF CONCRETE GIRDER/BEAM REINFORCEMENTS

FLOOR LEVEL	BEAM MARK	DIMENSIONS (mm)		STEEL REINFORCEMENTS										RED MARK EACH FACE CONTINUOUS	STIRRUPS (WELDED WOUND CHAIRS)
		Ø	H	BAR DIAMETER	TOP	BOTTOM	LEFT	RIGHT	TOP	BOTTOM	TOP	BOTTOM			
GRADE BEAM	GB-1	500	600	20MM#	3	3	3	3	3	3	3	3	1-12#	1050, 50100, REST Ø200	
	GB-1	300	500	20MM#	2	2	2	2	2	2	2	2	1-12#	1050, 50100, REST Ø200	
	GB-2	300	500	20MM#	2	2	2	2	2	2	2	2	1-12#	1050, 50100, REST Ø200	
	GB-3	300	500	20MM#	2	2	2	2	2	2	2	2	1-12#	1050, 50100, REST Ø200	
UPPER GROUND FLOOR LEVEL	UGC-1	300	600	20MM#	4	2	2	2	3	4	2	2	1-16#	1050, 50100, REST Ø175	
	UGC-2	300	600	20MM#	4	2	2	2	3	4	2	2	1-16#	1050, 50100, REST Ø175	
	UGC-3	300	600	20MM#	3	2	2	2	3	3	2	2	1-16#	1050, 50100, REST Ø175	
	UGB-1	200	400	16MM#	3	2	2	2	3	3	2	2	-	1050, 50100, REST Ø200	
UPPER FLOOR LEVEL	UCB-2	200	400	16MM#	3	2	2	2	3	3	2	2	-	1050, 50100, REST Ø200	
	UCB-3	250	400	16MM#	2	2	2	2	2	2	2	2	-	1050, 50100, REST Ø200	
	2G-1	300	600	20MM#	4	2	2	2	3	4	2	2	1-16#	1050, 50100, REST Ø175	
	2G-2	300	600	20MM#	4	2	2	2	3	4	2	2	1-16#	1050, 50100, REST Ø175	
2ND FLOOR LEVEL	2G-3	300	500	20MM#	3	2	2	2	2	3	2	2	1-16#	1050, 50100, REST Ø175	
	2B-1	200	400	16MM#	3	2	2	2	3	3	2	2	-	1050, 50100, REST Ø200	
	2B-2	200	400	16MM#	3	2	2	2	3	3	2	2	-	1050, 50100, REST Ø200	
	2B-3	200	300	16MM#	2	2	2	2	2	2	2	2	-	1050, 50100, REST Ø200	
	2B-4	200	300	16MM#	2	2	2	2	2	2	2	2	-	1050, 50100, REST Ø200	
	2CB	250	400	16MM#	2	2	2	2	2	2	2	2	1-16#	1050, 20100, REST Ø200	
	3G-1	300	500	20MM#	3	2	2	2	3	3	2	2	1-16#	1050, 50100, REST Ø175	
	3G-2	300	500	20MM#	3	2	2	2	3	3	2	2	1-16#	1050, 50100, REST Ø175	
3RD FLOOR LEVEL	3G-3	300	500	20MM#	3	2	2	2	3	3	2	2	1-16#	1050, 50100, REST Ø175	
	3B-1	200	400	16MM#	3	2	2	2	3	3	2	2	-	1050, 50100, REST Ø200	
	3B-2	200	400	16MM#	3	2	2	2	3	3	2	2	-	1050, 50100, REST Ø200	
	3B-3	200	300	16MM#	2	2	2	2	2	2	2	2	-	1050, 50100, REST Ø200	
	3B-4	200	300	16MM#	2	2	2	2	2	2	2	2	-	1050, 50100, REST Ø200	
	3CB	250	400	16MM#	2	2	2	2	2	2	2	2	-	1050, 50100, REST Ø200	
	RG-1	250	400	16MM#	3	2	2	2	3	3	2	2	1-16#	1050, 50100, REST Ø175	
	RG-2	250	400	16MM#	3	2	2	2	3	3	2	2	1-16#	1050, 50100, REST Ø175	
LOWER ROOF FLOOR LEVEL	RG-3	250	400	16MM#	2	2	2	2	2	2	2	2	1-16#	1050, 50100, REST Ø175	
	RB-1	200	300	16MM#	2	2	2	2	2	2	2	2	-	1050, 50100, REST Ø200	
	RB-2	200	300	16MM#	2	2	2	2	2	2	2	2	-	1050, 50100, REST Ø200	
	RB-3	200	300	16MM#	2	2	2	2	2	2	2	2	-	1050, 50100, REST Ø200	
UPPER ROOF FLOOR LEVEL	RCB	250	400	16MM#	2	2	2	2	2	2	2	2	1-16#	1050, 20100, REST Ø200	
	RG-4	200	300	16MM#	3	2	2	2	3	3	2	2	1-16#	1050, 50100, REST Ø200	
	RG-5	200	300	16MM#	3	2	2	2	3	3	2	2	1-16#	1050, 50100, REST Ø200	
	RB-4	200	300	16MM#	2	2	2	2	2	2	2	2	-	1050, 50100, REST Ø200	



**NATIONAL POWER CORPORATION**  
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR  
LOCATION: BAGACAY, CALBAYOG, SAMAR

TITLE: **SCHEDULE OF BEAMS & GIRDERS**

OWNER: **NATIONAL POWER CORPORATION**  
AGHAM ROAD, DILIMAN, QUEZON CITY

DESIGNED: **H. L. BENDOLA**  
DRAWN: **ALCANTARA**  
CHECKED: **ALCANTARA**  
ELECT: **ALCANTARA**  
MECH: **ALCANTARA**

BY: **CHD** DATE: **10/10/2018**  
SUBMITTED: **10/10/2018**  
REVIEWED: **10/10/2018**  
APPROVED: **10/10/2018**

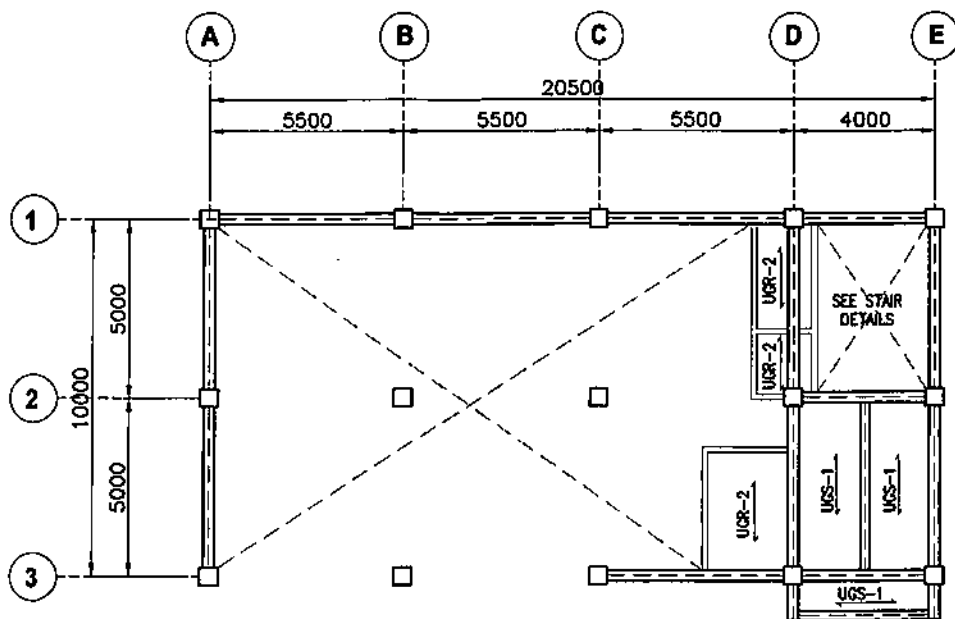
DATE: **10/10/2018**

SCALE: **1:1**

REV: **0**

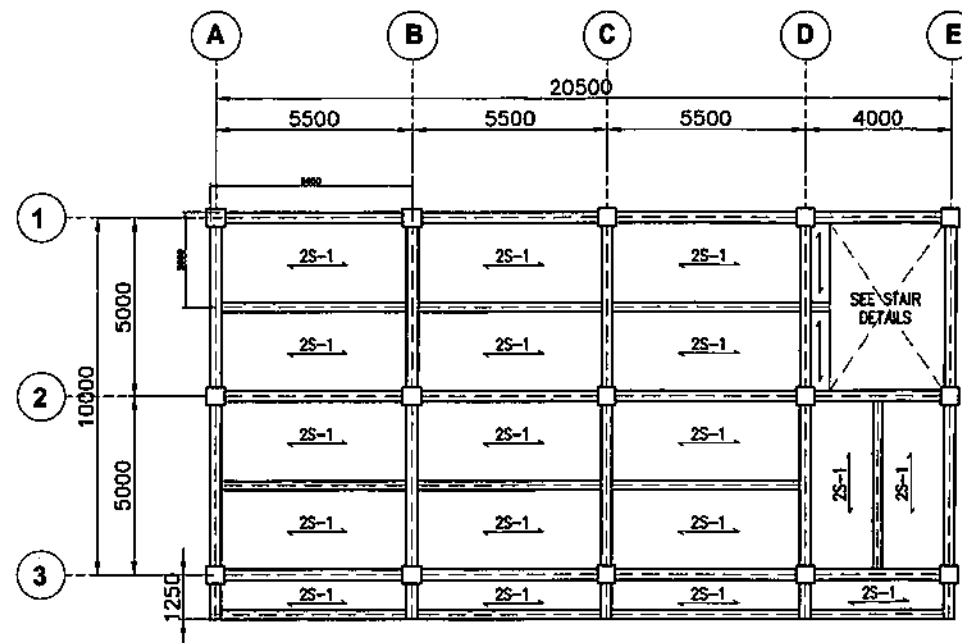
SPEC. NO. **VBP22Z1464SC**

BID DRAWING



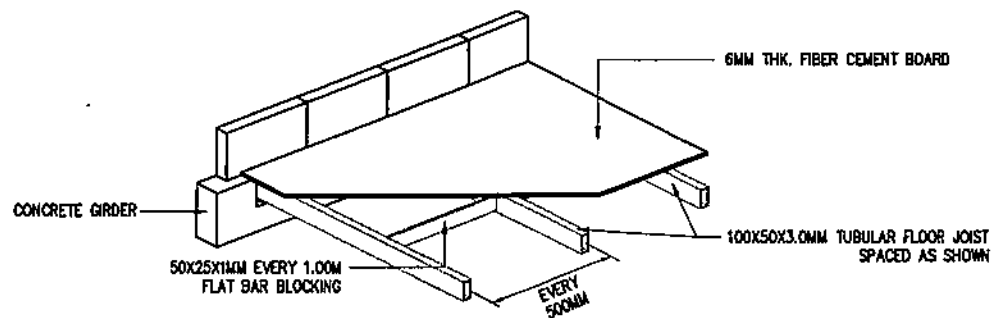
UPPER GROUND FLOOR  
SLAB LAYOUT (MEZZANINE)

1  
COSC-BDC-15.011 SCALE 1:150



2 SECOND FLOOR SLAB LAYOUT

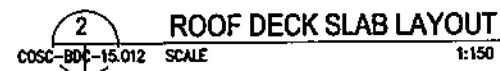
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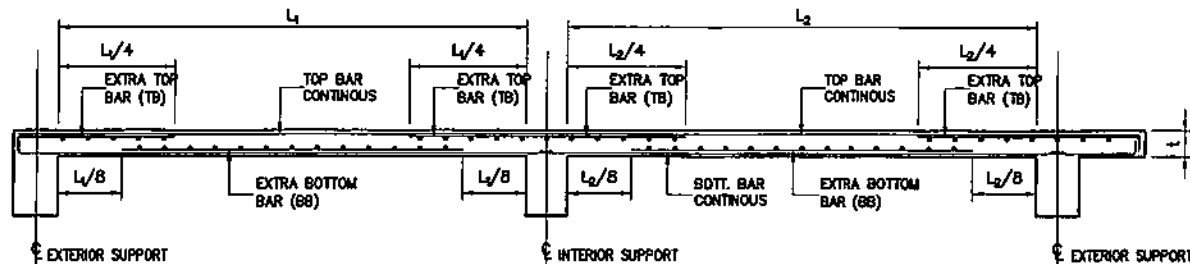
UPPER GROUND ROOF (UGR-2) DETAILS

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: UPPER GROUND AND SECOND FRAMING PLAN (SLAB LAYOUT)			
DESIGNED	BY	CHKD	DATE
DRAWN			
REVIEWED	PRINCIPAL ENGR./ARCHT.		SUBMITTED: <i>M. L. MENDOZA</i> Principal Engineer, PEAD
CIVIL/ARCHT.			RECOMMENDED: <i>A. G. ESPINILLO</i> Manager, PEAD
ELEC.			APPROVED: <i>N. C. NOLAN</i> Manager, DDO
MECH.			
DWG. NO. COSC-BDC-15.011		SPECS. NO. VisP22Z1464Sc	
SCALE: 1:150		BID DRAWING	
REV. 0			

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



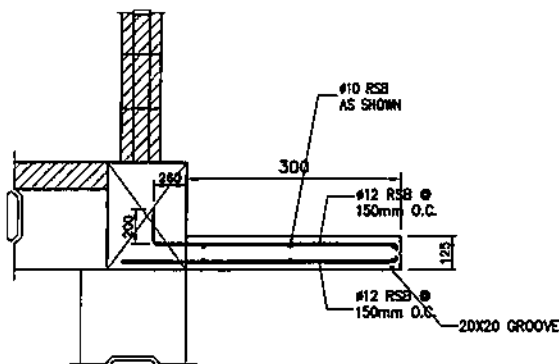
OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE:		<b>THIRD AND ROOF DECK FRAMING PLAN (SLAB LAYOUT)</b>	
DESIGNED	BY	CHKD	DATE
DRAWN			
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			
SUBMITTED:		 <b>H.L. SOROGA</b> Principal Engineer / CEAD	
RECOMMENDED:		 <b>A.C. DEPUTU</b> Manager, CEAD	
APPROVED:		 <b>M. U. SOROGA</b> Manager, DDO	
DWG. NO. <b>COSC-BDC-15.012</b>		SPECS. NO. <b>VisP2221464Sc</b>	
SCALE: 1:150		<b>BID DRAWING</b>	
		REV. 0	



1  
COSC-BDC-15.013 SCALE NTS  
TYPICAL RC SLAB SECTION

### SCHEDULE OF CONCRETE SLAB REINFORCEMENT

LOCATION	SLAB MARK	THICKNESS "t"	CONTINUOUS REINFORCING BARS			EXTRA BAR SPACING PARALLEL TO SHORT SPAN			EXTRA BAR SPACING PARALLEL TO LONG SPAN			REMARKS
				PARALLEL TO SHORT SPAN	PARALLEL TO LONG SPAN	DISCONTINUOUS END	MIDSPAN	CONTINUOUS END	DISCONTINUOUS END	MIDSPAN	CONTINUOUS END	
UPPER GROUND FLR TO UPPER ROOF	UGS-1	125	TB	#12 @ 250	#12 @ 350	-	-	-	-	-	-	ONE WAY
			BB	#12 @ 250	#12 @ 350	-	-	-	-	-	-	
	2S-2	125	TB	#12 @ 250	#12 @ 350	-	-	-	-	-	-	ONE WAY
			BB	#12 @ 250	#12 @ 350	-	-	-	-	-	-	
	3S-3	125	TB	#12 @ 250	#12 @ 350	-	-	-	-	-	-	ONE WAY
			BB	#12 @ 250	#12 @ 350	-	-	-	-	-	-	
	LRS	125	TB	#12 @ 250	#12 @ 350	-	-	-	-	-	-	ONE WAY
			BB	#12 @ 250	#12 @ 350	-	-	-	-	-	-	
	URS	100	TB	#12 @ 250	#12 @ 350	-	-	-	-	-	-	ONE WAY
			BB	#12 @ 250	#12 @ 350	-	-	-	-	-	-	

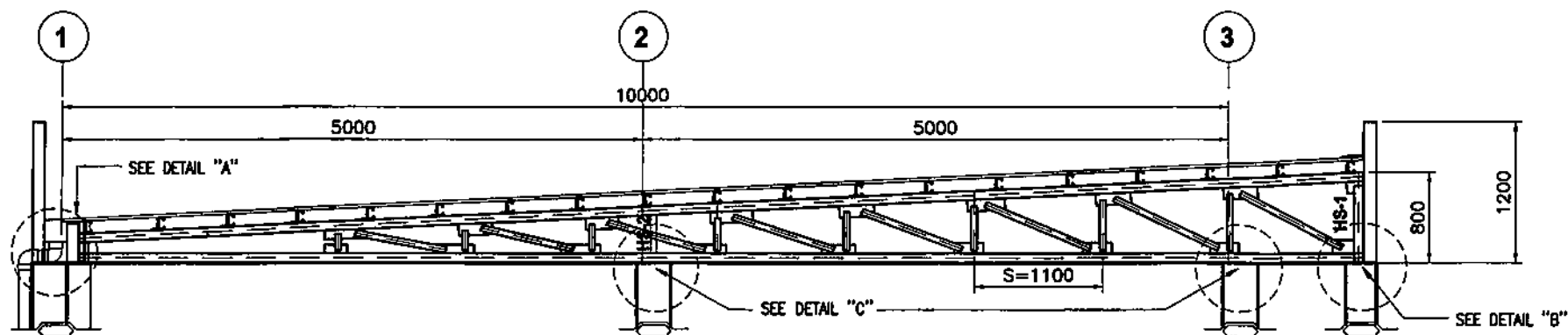


2  
COSC-BDC-15.013 SCALE NTS  
WINDOW CANOPY

#### NOTES:

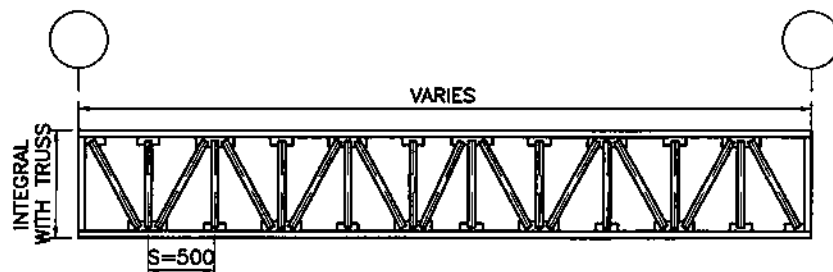
1. THE MINIMUM 28-DAY CYLINDER COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 27.5MPa (4000psi) FOR CONCRETE SLABS.
2. THE MINIMUM YIELD STRENGTH OF SLAB REINFORCEMENT SHALL BE GRADE 60 (415MPa) FOR 12mm# AND GRADE 40 (275MPa) FOR 10mm#.
3. ALL SLABS REINFORCEMENT SHALL BE 20mm CLEAR MINIMUM FROM BOTTOM AND FROM THE TOP OF SLAB.
4. IF SLABS ARE REINFORCED BOTHWAYS, BARS PARALLEL TO THE SHORTER SPAN SHALL BE PLACED BELOW THOSE PARALLEL TO THE LONG SPAN FOR BOTTOM BARS.
5. TEMPERATURE BARS FOR SLAB SHALL BE GENERALLY PLACED NEAR THE FACE IN TENSION AND SHALL NOT BE LESS THAN 0.0025 x GROSS CROSS-SECTIONAL AREA ( $A_g$ ) OF THE SLAB.

OWNER		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>SCHEDULE OF SLAB REINFORCEMENT</b>			
DESIGNED	BY	CHKD	DATE
DRAWN			
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED:	 H. L. MENDOZA Principal Engineer
CONTRACT		APPROVED:	 A. C. SISON Manager
ELEC.			
MECH.			
DWG. NO. COSC-BDC-15.013		SPECS. NO. VisP22214548c	
REV.	DATE	NATURE OF REVISION	BY
SCALE: 1:150		BID DRAWING	
		REV. 0	



TRUSS DETAILS (T-1)	
TOP CHORD	= 2L-50x50x6mm ANGLE BARS
BOTTOM CHORD	= 2L-50x50x6mm ANGLE BARS
WEB MEMBERS	= 50x50x6mm ANGLE BARS

TRUSS DETAIL (T-1)  
COSC-BDC-15.014 SCALE 1:40




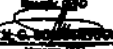
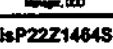





HS-1 AND 2 DETAILS	
TOP CHORD	= 2L-50x50x6mm ANGLE BARS
BOTTOM CHORD	= 2L-50x50x6mm ANGLE BARS
WEB MEMBERS	= 50x50x6mm ANGLE BARS

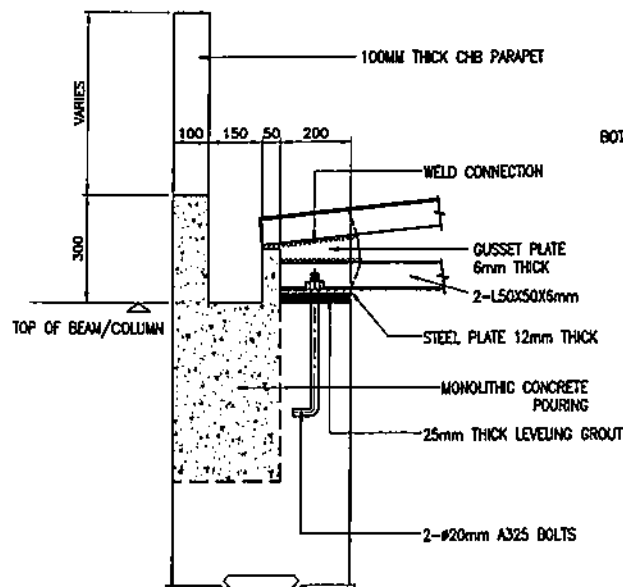
HORIZONTAL STRUT  
DETAIL (HS-1/HS-2)  
COSC-BDC-15.014 SCALE 1:40

#### NOTES ON STRUCTURAL STEEL:

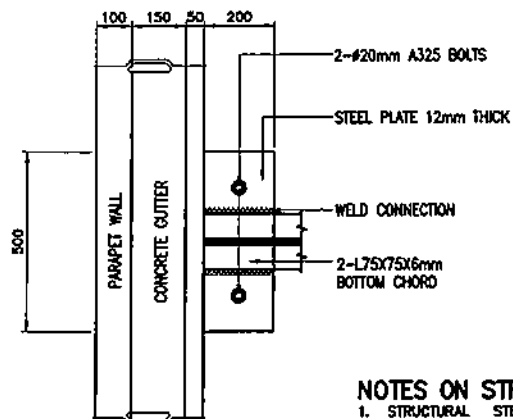
1. STRUCTURAL STEEL TO BE USED FOR FABRICATION AND ERECTION OF THIS STRUCTURE SHALL COMPLY WITH ALL THE PERTINENT PROVISION OF AISC SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDING LATEST EDITION.
2. ALL STRUCTURAL STEEL SHAPES SHALL CONFORM TO ASTM A36 STRUCTURAL STEEL, UNLESS OTHERWISE INDICATED.
3. USE 6MM THICK GUSSET PLATE.
4. ALL BOLTS USED UNLESS OTHERWISE SPECIFIED SHALL BE A325 BOLTS.
5. ALL CONNECTION DETAILS SHOWN ARE CONCEPTUAL DESIGN AND OF CONNECTION DETAILS IS THE RESPONSIBILITY OF THE CONTRACTOR.
6. SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO FABRICATION WORKS.

OWNER:  NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR	
LOCATION: BAGACAY, CALBAYOG, SAMAR	
TITLE: TRUSS AND HORIZONTAL STRUT DETAILS	
DESIGNED BY: 	SUBMITTED: 
DRAWN BY: 	RECOMMENDED: 
REVIEWED BY: 	APPROVED: 
DATE: 	
DWG. NO. COSC-BDC-15.014	SPEC. NO. VIsP22Z1464Sc
SCALE: AS SHOWN	BID DRAWING
REV. 1	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.



SECTION

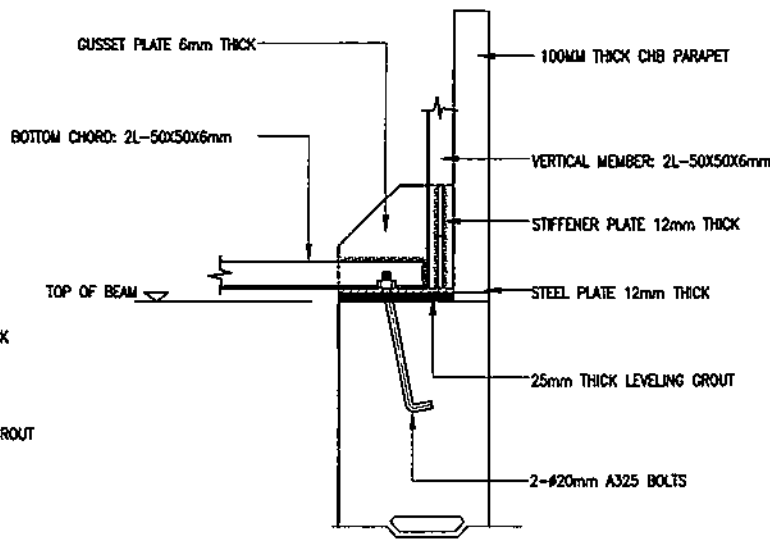


PLAN

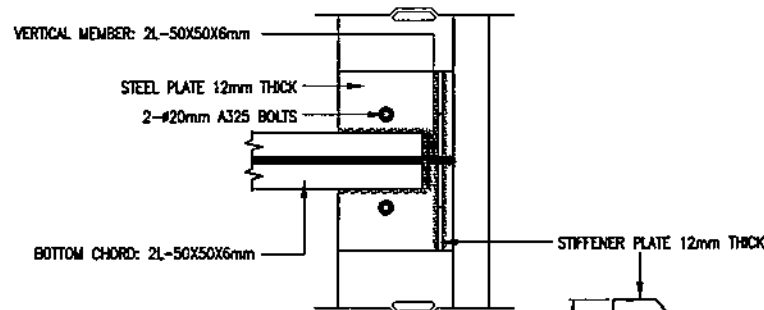
1  
COSC-BDC-15.015 SCALE 1:15

# NOTES ON STRUCTURAL STEEL:

1. STRUCTURAL STEEL TO BE USED FOR FABRICATION AND ERECTION OF THIS STRUCTURE SHALL COMPLY WITH ALL THE PERTINENT PROVISION OF AISC SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDING LATEST EDITION.
2. ALL STRUCTURAL STEEL SHAPES SHALL CONFORM TO ASTM A36 STRUCTURAL STEEL UNLESS OTHERWISE INDICATED.
3. ALL BOLTS USED UNLESS OTHERWISE SPECIFIED SHALL BE A325 BOLTS.
4. ALL CONNECTION DETAILS SHOWN ARE CONCEPTUAL DESIGN AND OF CONNECTION DETAILS IS THE RESPONSIBILITY OF THE CONTRACTOR.
5. SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO FABRICATION WORKS.

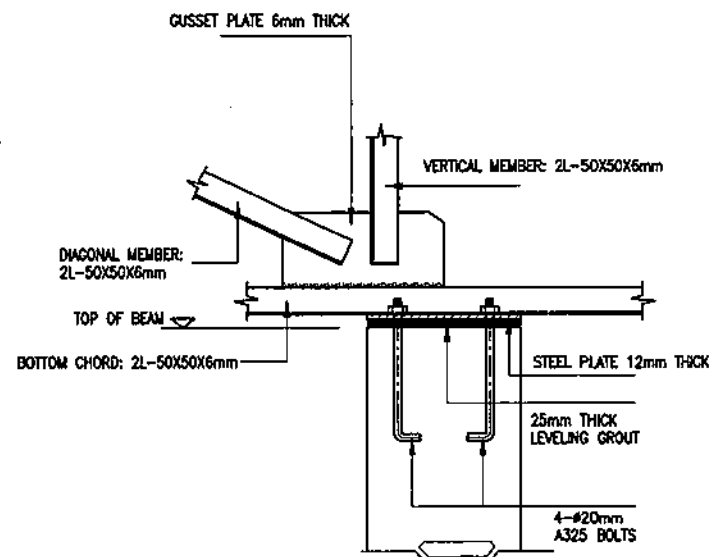


SECTION



PLAN

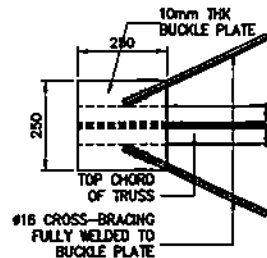
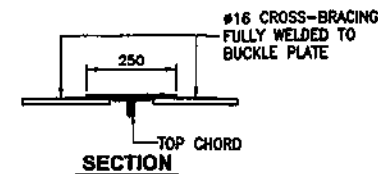
2  
COSC-BDC-15.015 SCALE 1:15



3  
COSC-BDC-15.015 SCALE 1:15

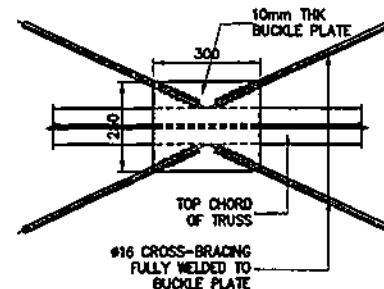
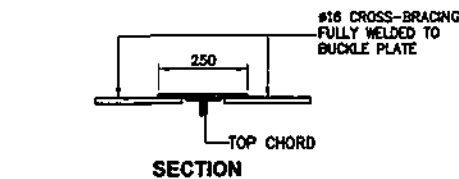
DETAIL "C"

OWNER		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: TRUSS DETAILS (CONNECTION DETAILS)			
DESIGNED	BY	CHKD	DATE
DRAWN	SUBMITTED:		H. L. MENDOZA
REVIEWED	RECOMMENDED:		A. C. GERRITU
ENLIGHTEN	APPROVED:		H. L. MENDOZA
ELEC.			Manager, O&M
MECH.			
DWG. NO. COSC-BDC-15.015		SPECS. NO. VisP22Z1464Sc	
SCALE: AS SHOWN		BID DRAWING	
REV.		DATE	
NATURE OF REVISION		BY	
CHKD		RECD	
APPD			
REV. 0			



DETAIL CONNECTION OF CROSS BRACING AT SUPPORT

1  
COSC-BDC-15.016 SCALE 1:15

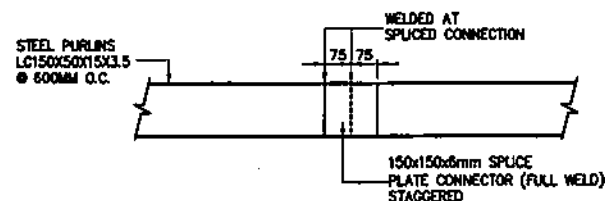
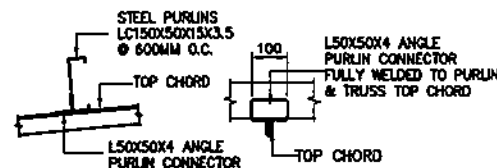
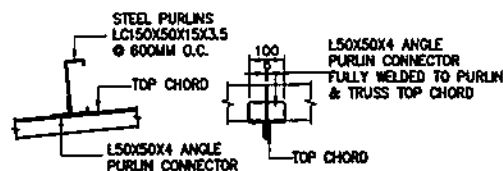


DETAIL CONNECTION OF CROSS BRACING AT TRUSS APEX

2  
COSC-BDC-15.016 SCALE 1:15

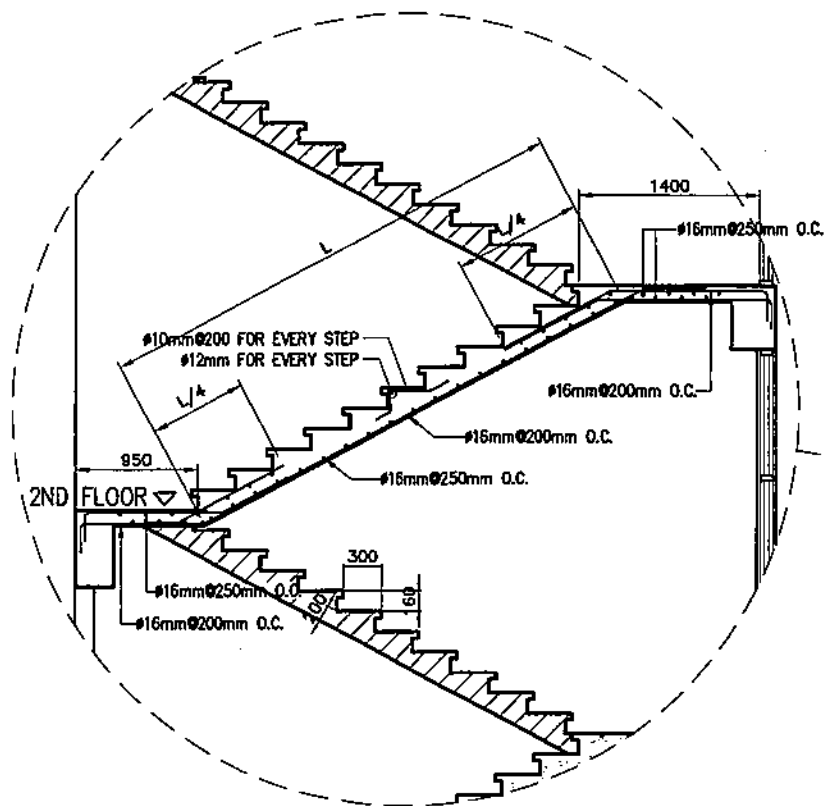
### NOTES ON STRUCTURAL STEEL:

1. STRUCTURAL STEEL TO BE USED FOR FABRICATION AND ERECTION OF THIS STRUCTURE SHALL COMPLY WITH ALL THE PERTINENT PROVISION OF AISC SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDING LATEST EDITION.
2. ALL STRUCTURAL STEEL SHAPES SHALL CONFORM TO ASTM A36 STRUCTURAL STEEL UNLESS OTHERWISE INDICATED.
3. ALL BOLTS USED UNLESS OTHERWISE SPECIFIED SHALL BE A325 BOLTS.
4. ALL CONNECTION DETAILS SHOWN ARE CONCEPTUAL DESIGN AND OF CONNECTION DETAILS IS THE RESPONSIBILITY OF THE CONTRACTOR.
5. SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO FABRICATION WORKS.

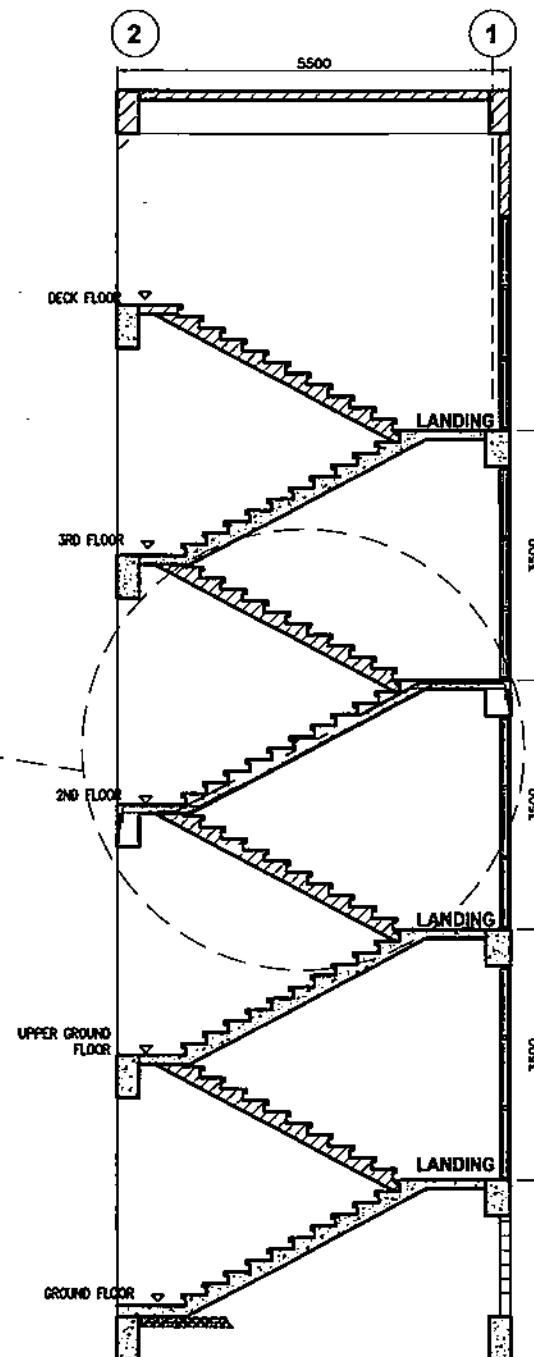


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COSC-BDC-15.016 SCALE 1:15

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT:		CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR	
LOCATION:		BAGACAY, CALBAYOG, SAMAR	
TITLE:		<b>PURLINS CROSSBRACE DETAILS</b> (CONNECTION DETAILS)	
DESIGNED	BY	CHKD	DATE
DRAWN			
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED:	 H. L. MENDOZA Project Engineer / A. CAD
CIVIL/ARCHT.			
ELEC.			
MECH.			
APPROVED:		 H. L. MENDOZA Manager, DDO	
DWG. NO.		COSC-BDC-15.016	
SPECS. NO.		VisP22Z1464Sc	
SCALE:		AS SHOWN	
REV.		DATE	
NATURE OF REVISION		BY	
		CHKD	
		RECD.	
		APPD.	
		REV. 0	



1  
COSC-BDC-15.017 SCALE 1:75  
STAIRDETAIL



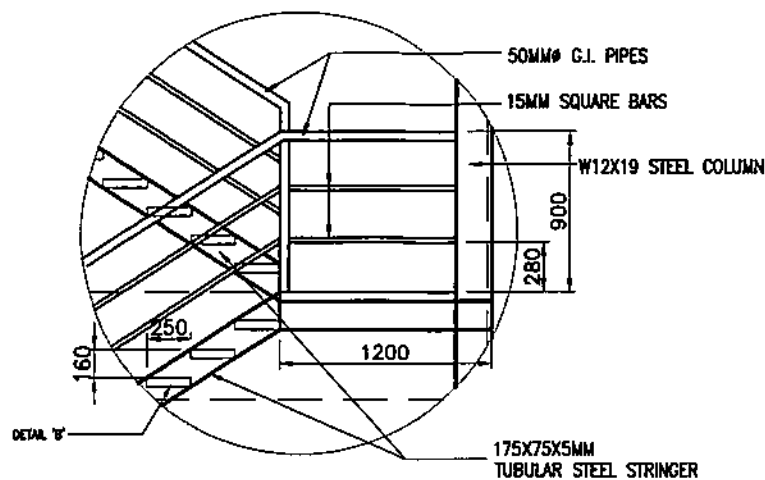
# NOTES:

1. THE MINIMUM 28-DAY CYLINDER COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 27.5MPa (4000psi) FOR CONCRETE STAIR.
2. THE MINIMUM YIELD STRENGTH OF SLAB REINFORCEMENT SHALL BE GRADE 60 (415MPa) FOR 12mm# AND GRADE 40 (275MPa) FOR 10mm#.
3. ALL SLABS REINFORCEMENT SHALL BE 20mm CLEAR MINIMUM FROM BOTTOM AND FROM THE TOP OF SLAB.
4. IF SLABS ARE REINFORCED BOTHWAYS, BARS PARALLEL TO THE SHORTER SPAN SHALL BE PLACED BELOW THOSE PARALLEL TO THE LONG SPAN FOR BOTTOM BARS.
5. TEMPERATURE BARS FOR SLAB SHALL BE GENERALLY PLACED NEAR THE FACE IN TENSION AND SHALL NOT BE LESS THAN  $0.0025 \times$  GROSS CROSS-SECTIONAL AREA ( $A_g$ ) OF THE SLAB.

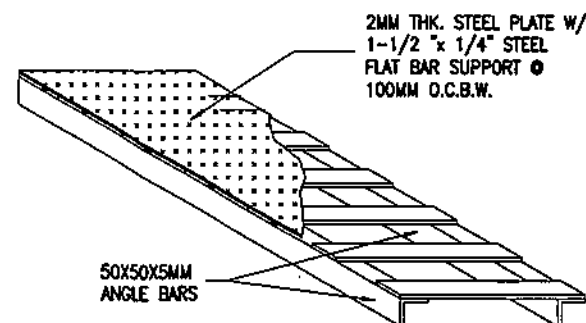
OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>STAIR DETAILS</b>			
DESIGNED	BY	CHKD	DATE
DRAWN			SUBMITTED: <i>H. L. MENDOZA</i> Principal Engng. & LEAD
REVIEWED	PRINCIPAL ENGR./ARCHT.		RECOMMENDED: <i>A. C. ESPINOSA</i> Manager, E&C
CIVIL/ARCHT			APPROVED: <i>H. L. MENDOZA</i> Manager, E&C
ELEC.			
MECH.			
DWG. NO. COSC-BDC-15.017		SPCS. NO. VIsP22Z1464Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. 0			

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

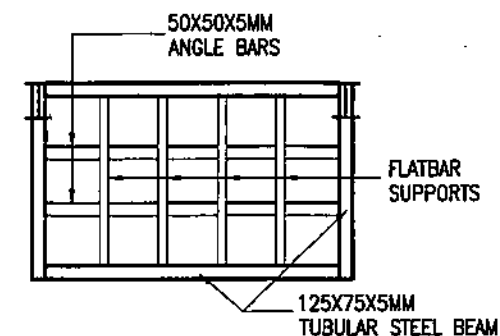




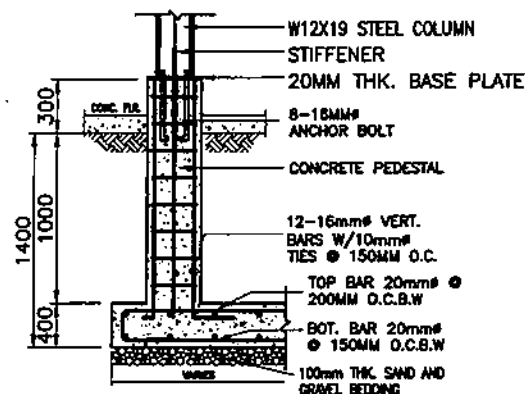
DETAIL 'A'



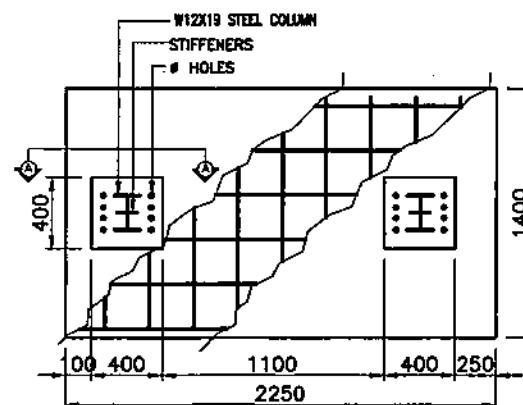
DETAIL 'B'



LANDING  
FRAME PLAN



SECTION A



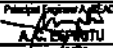

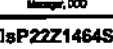



COLUMN AND FOUNDATION  
DETAIL (P1/F1)

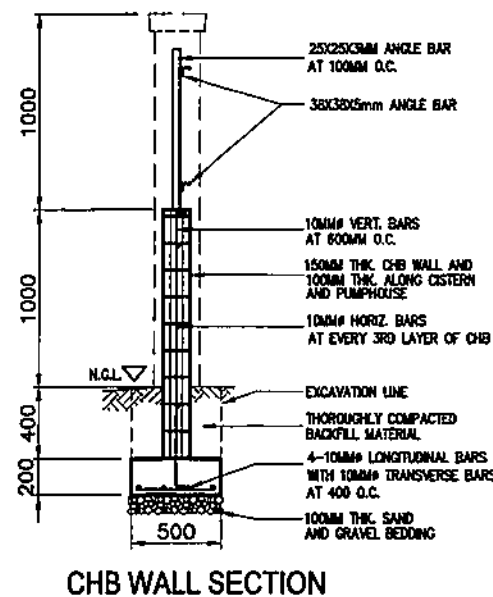
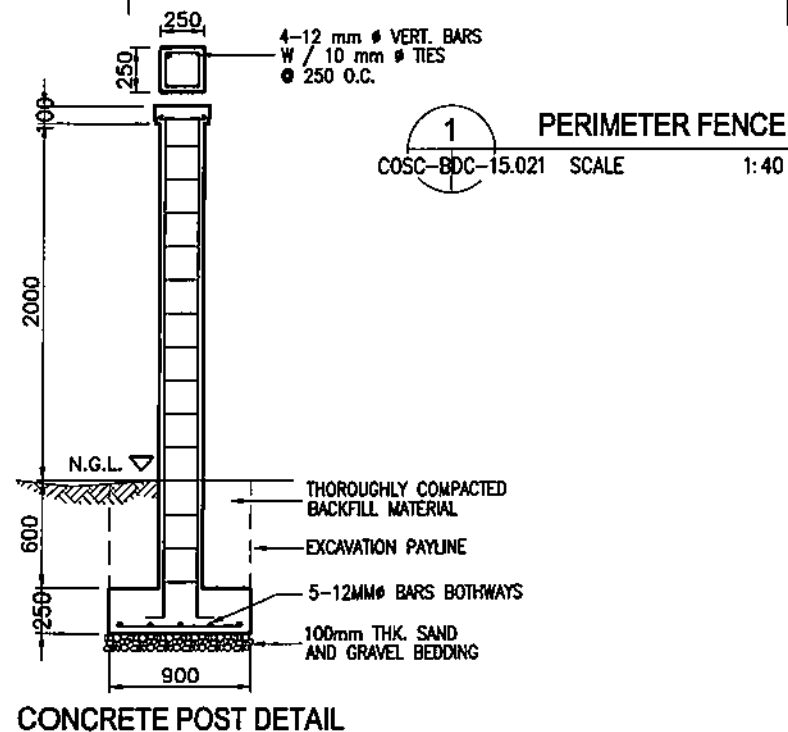
# EMERGENCY EXIT STAIR DETAILS


COSC-BDC-15.019

SCALE 1:50

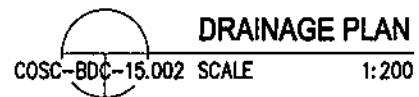
OWNER:  NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR	
LOCATION: BAGACAY, CALBAYOG, SAMAR	
TITLE: EMERGENCY EXIT STAIR (DETAILS)	
DESIGNED BY: 	SUBMITTED: H. L. MENDOZA
DRAWN BY: 	RECOMMENDED: A. C. ESPINOSA
REVIEWED BY: PRINCIPAL ENGR. J. ARDIT	APPROVED: M. G. SORIANO
CHECKED BY: 	MANAGER, DCD
ELEC. 	
MECH. 	
DWG. NO. COSC-BDC-15.019	SPECS. NO. VIsP22Z1464Sc
SCALE: 1:50	BID DRAWING
REV. DATE NATURE OF REVISION BY CHD. RECD. APPD.	REV. D






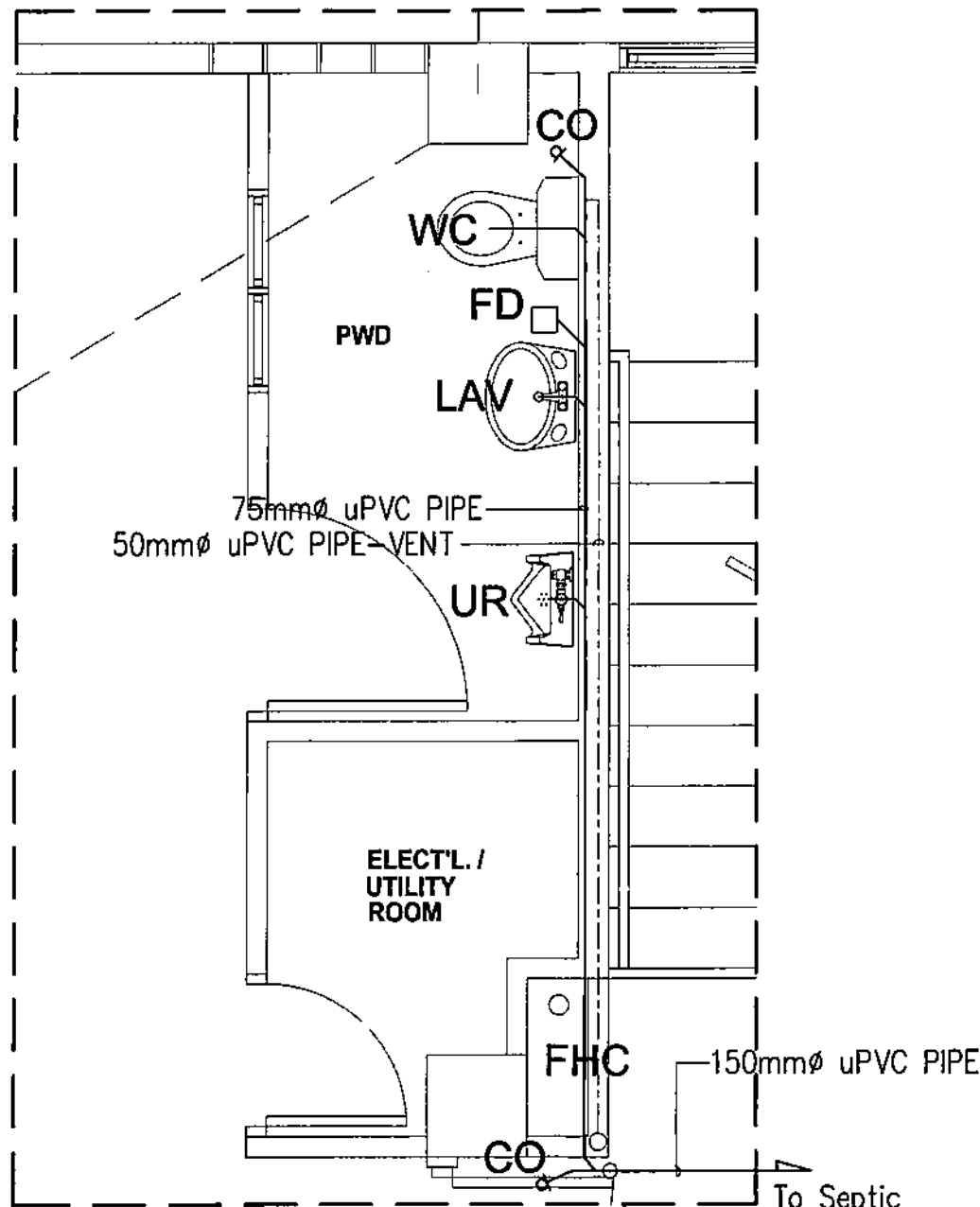
OWNER:		<b>NATIONAL POWER CORPORATION</b>	
		AGHAM ROAD, DILIMAN, QUEZON CITY	
<b>PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR</b>			
<b>LOCATION: BAGACAY, CALBAYOG, SAMAR</b>			
<b>TITLE:</b>		<b>PERIMETER FENCE (SECTION, ELEVATION &amp; DETAILS)</b>	
	<b>BY</b>	<b>CHKD</b>	<b>DATE</b>
<b>DESIGNED</b>			
<b>DRAWN</b>			
<b>REVIEWED</b>	<b>PRINCIPAL ENGR./ARCHT.</b>		
<b>CIVIL/ARCHT</b>			
<b>ELEC.</b>			
<b>MECH.</b>			
<b>SUBMITTED:</b>		<b>H. L. MENDOZA</b> Principal Engineer / CEO	
<b>RECOMMENDED:</b>		<b>J. C. ESPRITO</b> Engrg. / CEO	
<b>APPROVED:</b>		<b>M. C. SORIANO</b> Manager, DDO	
<b>DWG. NO. COSC-BDC-15.021</b>		<b>SPEC. NO. VIsP22Z1464Sc</b>	

[illegible]



OWNER:	 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY			
<b>PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATIONS CENTER AT CALBAYOG CITY, WESTERN SAMAR</b>				
<b>LOCATION: BAGACAY, CALBAYOG, SAMAR</b>				
<b>TITLE:</b>  <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <h2 style="text-align: center; margin: 0;">DRAINAGE PLAN</h2> </div>				
	BY	ORD	DATE	
DESIGNED				SUBMITTED: <u>H. L. MENDOZA</u> <small>Principal Engineer, A. CE, RD</small>
DRAWN				
REVIEWED	PRINCIPAL ENGINEER / ARCHT.			RECOMMENDED: <u>A. C. ESPINOSA</u> <small>Manager, C&amp;D</small>
CHALKING / CRT				
ELEC.				APPROVED: <u>H. G. SANCHEZ</u> <small>Manager, C&amp;D</small>
MECH.				
DWG. NO. <b>COSC-BDC-15.022</b>				SPECS. NO. <b>VI&amp;P22Z1464Sc</b>
SCALE: 1:200				<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>BID DRAWING</b> </div>
				REV. 0









# LEGEND:

LAV-LAVATORY  
UR -URINAL  
FD -FLOOR DRAIN  
CO -CLEAN OUT  
WC -WATER CLOSET  
DF -DRINKING FOUNTAIN

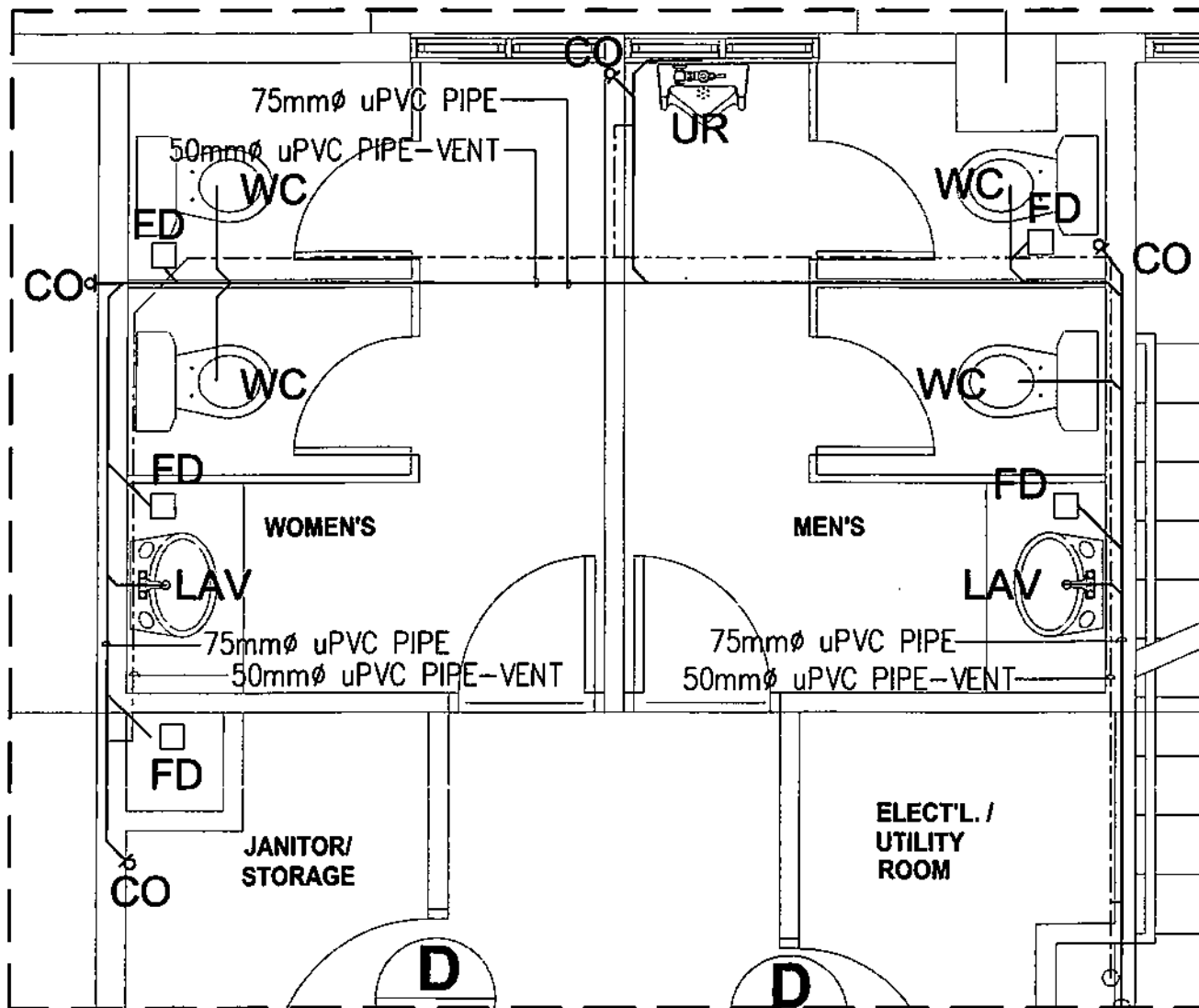
## NOTES:

1. ALL ASPECTS OF CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE PROVISIONS OF THE LATEST APPLICABLE CODE OR EDITION OF THE NATIONAL PLUMBING CODE, LOCAL REQUIREMENTS AND SUBDIVISION RULES AND REGULATIONS.
2. ALL INDIVIDUAL BRANCHES TO FIXTURE OR GROUP FIXTURE SHALL BE PROVIDED WITH AIR CAP, CAPPED CHAMBER OR CAPPED VERTICAL EXTENSIONS.
3. ALL CLEAN OUT SHALL BE FLUSHED MOUNTED AND PROVIDED WITH POLISHED COVER. DO NOT INSTALL FLOOR CLEANOUT AT LINE ON GRADE AND SERVICE AREA NOT SUBJECT TO TRAFFIC.
4. THE PLUMBING LAYOUTS ARE ONLY DIAGRAMMATIC PIPES, CLEANOUT, CHECK VALVES SHALL BE LOCATED INSIDE BATHROOMS AND SERVICE AREA CONCEALED AS MUCH AS POSSIBLE.
5. ALL CAST IRON PIPES, UNPLASTICIZED POLYVINYL CHLORIDE (uPVC), GALVANIZED IRON (G.I.) SHALL BE OF APPROVED QUALITY.
6. PROVIDE VENT PIPES AND VENT STACK THRU ROOF AS REQUIRED.
7. THE MINIMUM SLOPE OF SEWER SHALL BE TWO PERCENT (2%) AND FOR DRAIN LINES SHALL BE ONE PERCENT (1%).
8. THE CONTRACTOR SHALL PROVIDE 3D DRAWINGS OF SANITARY WITH VENT SYSTEM FOR THE APPROVAL OF NPC.

PLUMBING LAYOUT  
(GROUND FLOOR)  
COSC-BDC-15.024 SCALE NTS

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>PLUMBING LAYOUT (GROUND FLOOR)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN			
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			
SUBMITTED:		 M.L. MENDOZA Principal Engineer / CHIEF	
RECOMMENDED:		 A.C. BORLITA Engr. / CHIEF	
APPROVED:		 M.C. BORLITA Engr. / CHIEF	
DWG. NO. COSC-BDC-15.024		SPEC. NO. VlsP2221464Sc	
SCALE: 1:200		REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.






PLUMBING LAYOUT  
(SECOND FLOOR)  
COSC-BDC-15.025 SCALE: NTS

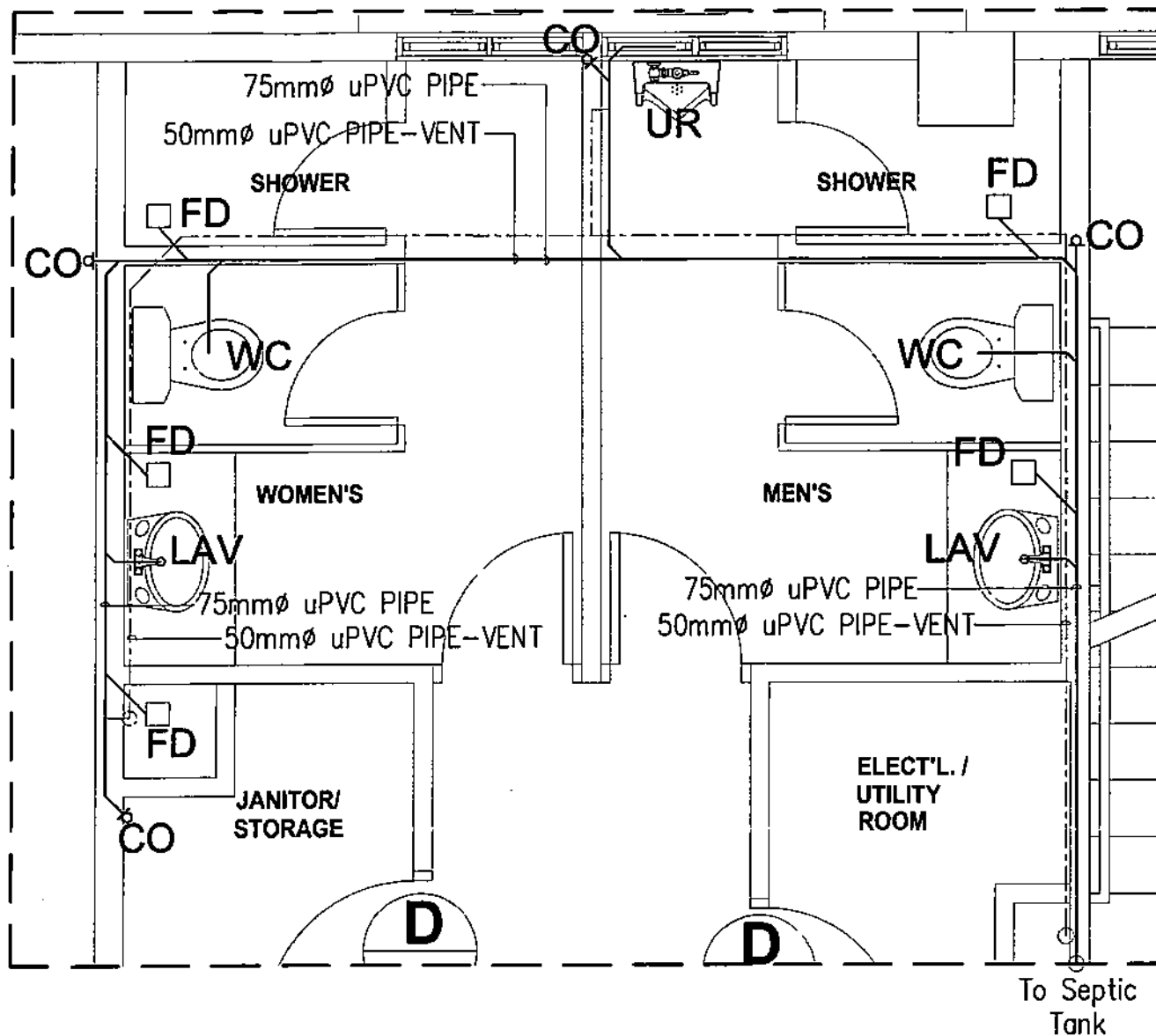
LEGEND:  
LAV-LAVATORY  
UR-URINAL  
FD-FLOOR DRAIN  
CO-CLEAN OUT  
WC-WATER CLOSET  
DF-DRINKING FOUNTAIN

NOTES:

1. ALL ASPECTS OF CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE PROVISIONS OF THE LATEST APPLICABLE CODE OR EDITION OF THE NATIONAL PLUMBING CODE, LOCAL REQUIREMENTS AND SUBDIVISION RULES AND REGULATIONS.
2. ALL INDIVIDUAL BRANCHES TO FIXTURE OR GROUP FIXTURE SHALL BE PROVIDED WITH AIR CAP, CAPPED CHAMBER OR CAPPED VERTICAL EXTENSIONS.
3. ALL CLEAN OUT SHALL BE FLUSHED MOUNTED AND PROVIDED WITH POLISHED COVER. DO NOT INSTALL FLOOR CLEANOUT AT LINE ON GRADE AND SERVICE AREA NOT SUBJECT TO TRAFFIC.
4. THE PLUMBING LAYOUTS ARE ONLY DIAGRAMMATIC PIPES. CLEANOUT, CHECK VALVES SHALL BE LOCATED INSIDE BATHROOMS AND SERVICE AREA CONCEALED AS MUCH AS POSSIBLE.
5. ALL CAST IRON PIPES, UNPLASTICIZED POLYVINYL CHLORIDE (UPVC), GALVANIZED IRON (G.I.) SHALL BE OF APPROVED QUALITY.
6. PROVIDE VENT PIPES AND VENT STACK THRU ROOF AS REQUIRED.
7. THE MINIMUM SLOPE OF SEWER SHALL BE TWO PERCENT (2%) AND FOR DRAIN LINES SHALL BE ONE PERCENT (1%).
8. THE CONTRACTOR SHALL PROVIDE 3D DRAWINGS OF SANITARY WITH VENT SYSTEM FOR THE APPROVAL OF NPC.

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>PLUMBING LAYOUT (SECOND FLOOR)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN			
REVIEWED	PRINCIPAL ENGINEER / ARCHT.	RECOMMENDED:	 H. L. MENDOZA Principal Engineer & CEO
CIVIL/ARCHT			 A. C. B. B. B. Manager, O&O
ELEC.			
MECH.			
DWG. NO. COSC-BDC-15.025		SPEC. NO. VisP22Z1484Sc	
REV.		DATE	
NATURE OF REVISION		BY	
		CHKD.	
		RECD.	
		APPL.	
SCALE: NTS		BID DRAWING	
		REV. 0	

To Septic Tank




# LEGEND:

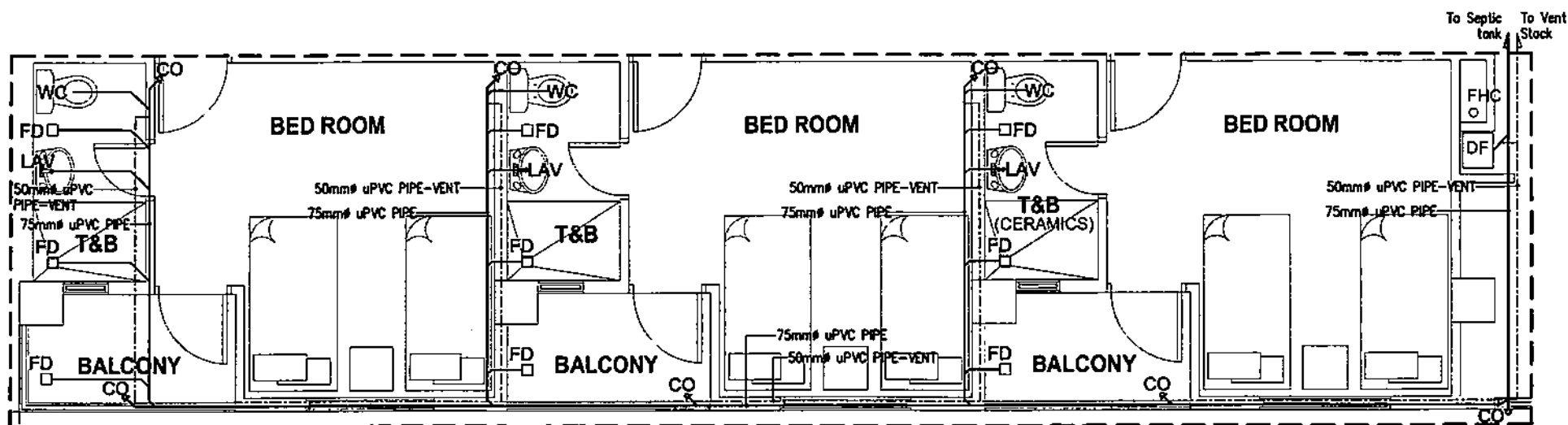
LAV - LAVATORY  
UR - URINAL  
FD - FLOOR DRAIN  
CO - CLEAN OUT  
WC - WATER CLOSET  
DF - DRINKING FOUNTAIN

## NOTES:

1. ALL ASPECTS OF CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE PROVISIONS OF THE LATEST APPLICABLE CODE OR EDITION OF THE NATIONAL PLUMBING CODE, LOCAL REQUIREMENTS AND SUBDIVISION RULES AND REGULATIONS.
2. ALL INDIVIDUAL BRANCHES TO FIXTURE OR GROUP FIXTURE SHALL BE PROVIDED WITH AIR CAP, CAPPED CHAMBER OR CAPPED VERTICAL EXTENSIONS.
3. ALL CLEAN OUT SHALL BE FLUSHED MOUNTED AND PROVIDED WITH POLISHED COVER. DO NOT INSTALL FLOOR CLEANOUT AT LINE ON GRADE AND SERVICE AREA NOT SUBJECT TO TRAFFIC.
4. THE PLUMBING LAYOUTS ARE ONLY DIAGRAMMATIC PIPES, CLEANOUT, CHECK VALVES SHALL BE LOCATED INSIDE BATHROOMS AND SERVICE AREA CONCEALED AS MUCH AS POSSIBLE.
5. ALL CAST IRON PIPES, UNPLASTICIZED POLYVINYL CHLORIDE (uPVC), GALVANIZED IRON (GI) SHALL BE OF APPROVED QUALITY.
6. PROVIDE VENT PIPES AND VENT STACK THRU ROOF AS REQUIRED.
7. THE MINIMUM SLOPE OF SEWER SHALL BE TWO PERCENT (2%) AND FOR DRAIN LINES SHALL BE ONE PERCENT (1%).
8. THE CONTRACTOR SHALL PROVIDE 3D DRAWINGS OF SANITARY WITH VENT SYSTEM FOR THE APPROVAL OF NPC.

**PLUMBING LAYOUT  
(THIRD FLOOR - 1)**  
COSC-BDC-15.026 SCALE NTS

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>PLUMBING LAYOUT (THIRD FLOOR - 1)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN			
REVIEWED	PRINCIPAL ENGINEER / ARCHT.	RECOMMENDED	
CHECKED			
ELEC.		APPROVED	
MECH.			
DWG. NO. COSC-BDC-15.026		SPECS. NO. VIsP2221464Sc	
SCALE: NTS		BID DRAWING	
REV.	DATE	NATURE OF REVISION	BY



#### LEGEND:

LAV - LAVATORY  
UR - URINAL  
FD - FLOOR DRAIN  
CO - CLEAN OUT  
WC - WATER CLOSET  
DF - DRINKING FOUNTAIN

### PLUMBING LAYOUT (THIRD FLOOR - 2)

COSC-BDC-15.027 SCALE

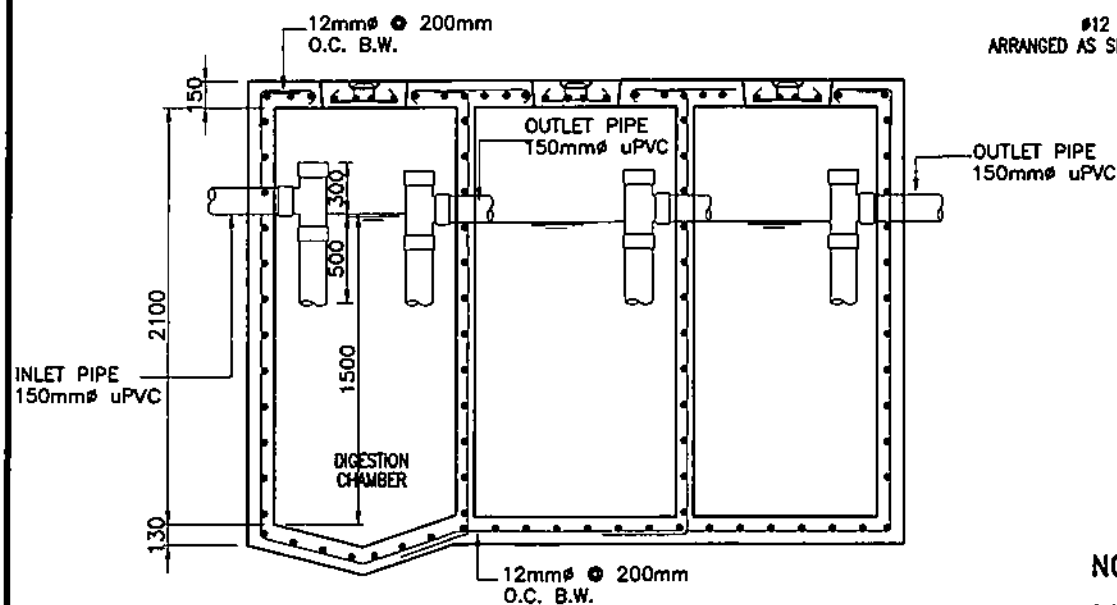
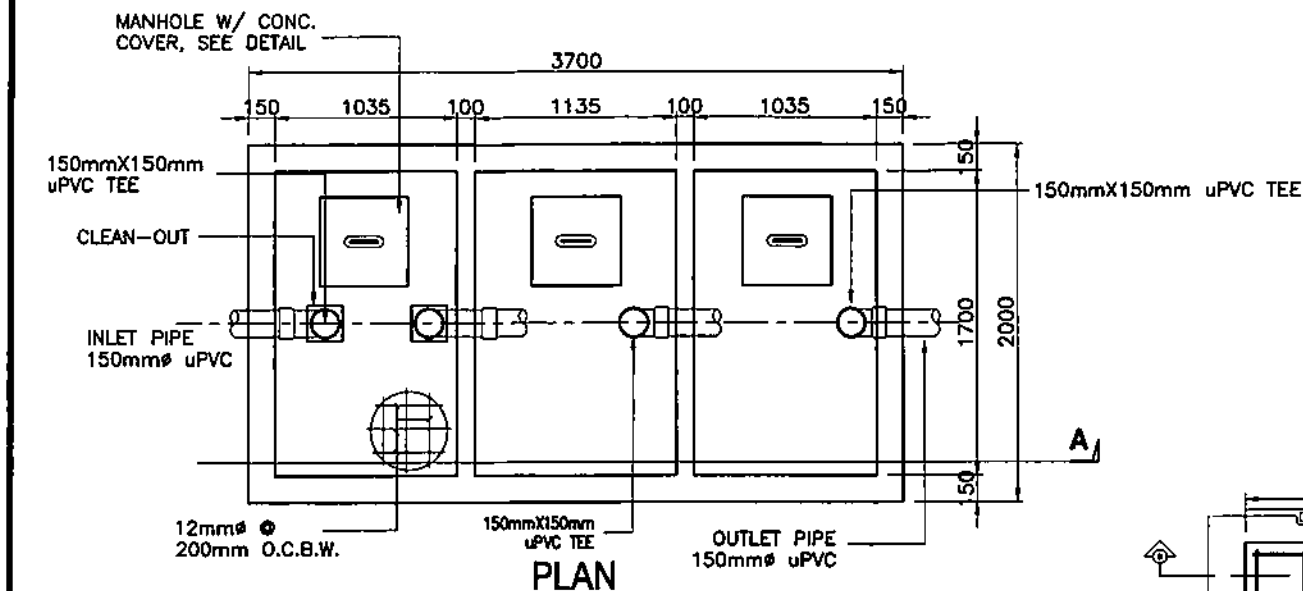
NTS

#### NOTES:

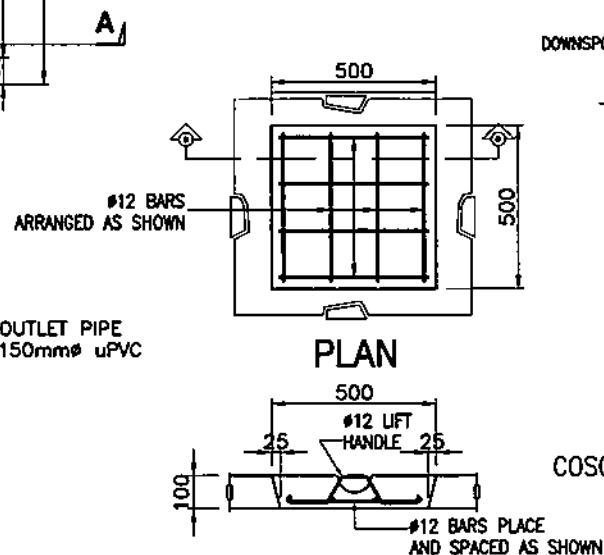
1. ALL ASPECTS OF CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE PROVISIONS OF THE LATEST APPLICABLE CODE OR EDITION OF THE NATIONAL PLUMBING CODE/LOCAL REQUIREMENTS AND SUBDIVISION RULES AND REGULATIONS.
2. ALL INDIVIDUAL BRANCHES TO FIXTURE OR GROUP FIXTURE SHALL BE PROVIDED WITH AIR CAP, CAPPED CHAMBER OR CAPPED VERTICAL EXTENSIONS.
3. ALL CLEAN OUT SHALL BE FLUSHED MOUNTED AND PROVIDED WITH POLISHED COVER. DO NOT INSTALL FLOOR CLEANOUT AT LINE ON GRADE AND SERVICE AREA NOT SUBJECT TO TRAFFIC.
4. THE PLUMBING LAYOUTS ARE ONLY DIAGRAMMATIC PIPES, CLEANOUT, CHECK VALVES SHALL BE LOCATED INSIDE BATHROOMS AND SERVICE AREA CONCEALED AS MUCH AS POSSIBLE.
5. ALL CAST IRON PIPES, UNPLASTICIZED POLYVINYL CHLORIDE (UPVC), GALVANIZED IRON (G.I.) SHALL BE OF APPROVED QUALITY.
6. PROVIDE VENT PIPES AND VENT STACK THRU ROOF AS REQUIRED.
7. THE MINIMUM SLOPE OF SEWER SHALL BE TWO PERCENT (2%) AND FOR DRAIN LINES SHALL BE ONE PERCENT (1%).
8. THE CONTRACTOR SHALL PROVIDE 3D DRAWINGS OF SANITARY WITH VENT SYSTEM FOR THE APPROVAL OF NPC.

OWNER		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>PLUMBING LAYOUT (THIRD FLOOR - 2)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	PRINCIPAL ENGR. / ARCHT.		SUBMITTED:
REVIEWED			RECOMMENDED:
CHECKED			APPROVED:
ELEC.			Manager, DDO
MECH.			
DWG. NO. COSC-BDC-15.027		SPEC. NO. VlsP22Z1464Sc	
SCALE: NTS		BID DRAWING	
REV. 0			

REV.	DATE	NATURE OF REVISION	BY	CHKD.	REC'D.	APP'D.

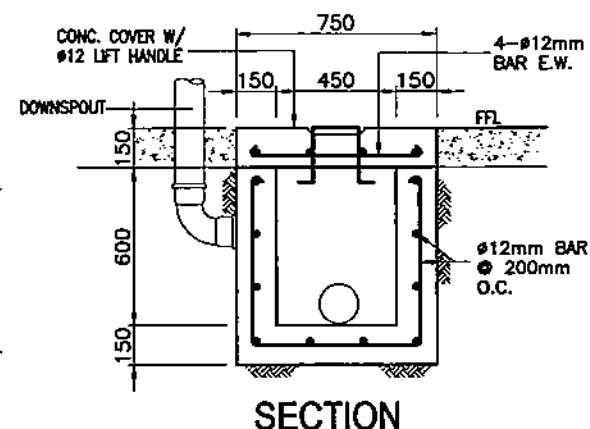
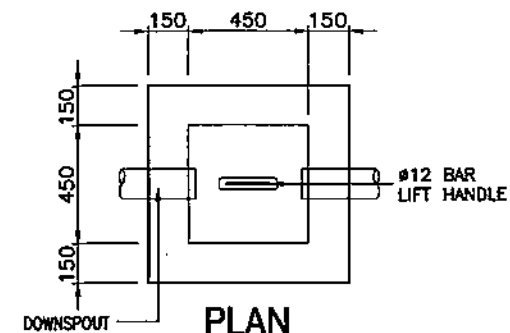


COSC-BDC-15.028 SCALE 1:50



#### NOTES:

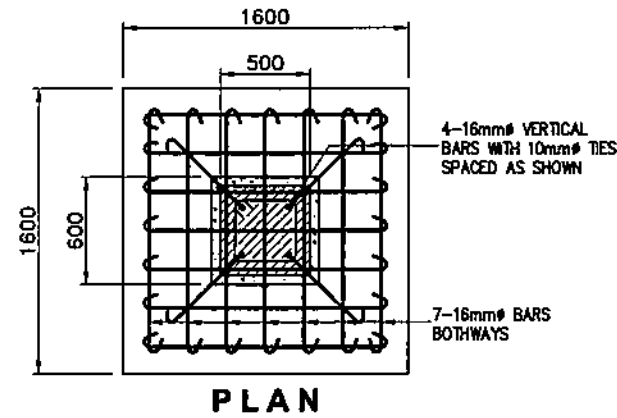
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE SHALL BE  $f_c = 20.7 \text{ MPa}$  AT 28-DAYS PERIOD.
3. REINFORCING BARS SHALL CONFORM TO THE LATEST REQUIREMENTS OF PHILIPPINE NATIONAL STANDARD FOR DSB GRADE 275.




CATCH BASIN

COSC-BDC-15.028 SCALE NTS

OWNER:		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT:		CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR	
LOCATION:		BAGACAY, CALBAYOG, SAMAR	
TITLE: SEPTIC TANK AND CATCH BASIN (PLAN AND SECTION)			
DESIGNED	BY	CHKD	DATE
DRAWN			
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	
CHECKED		APPROVED	
ELEC.			
MECH.			
DWG. NO. COSC-BDC-15.028		SPECS. NO. VisP2221464Sc	
SCALE: AS SHOWN		BID DRAWING	
REV.		REV. 0	

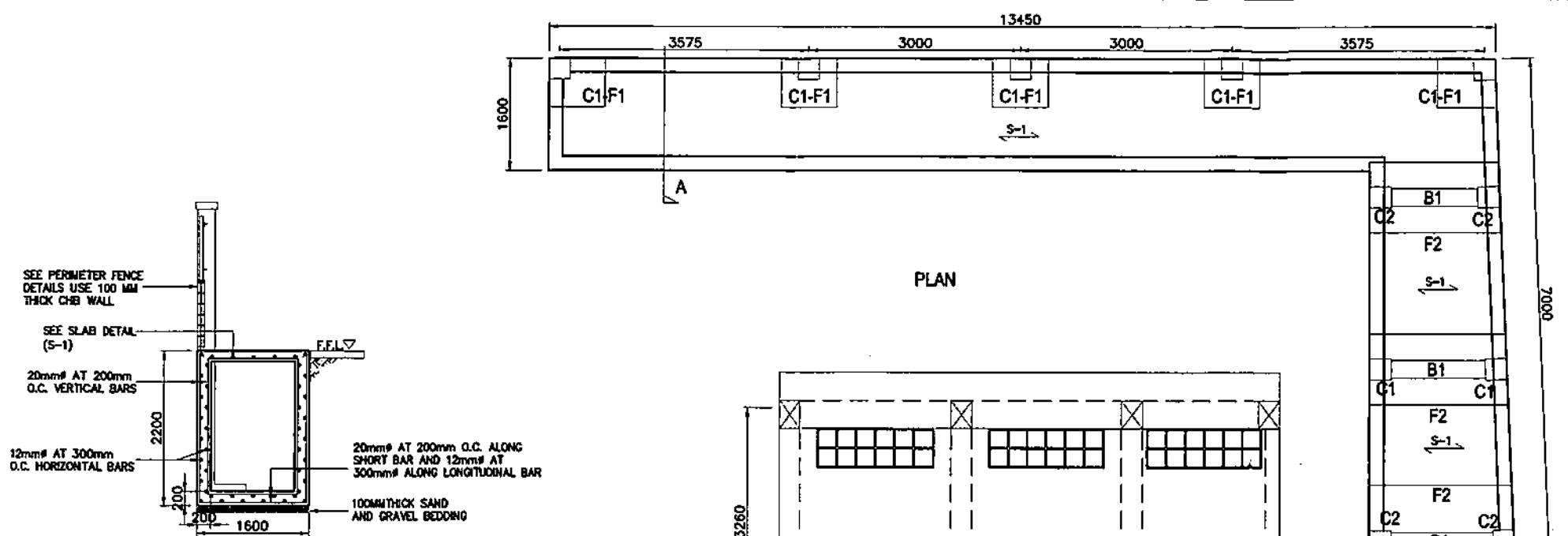


1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE AT 28 DAY PERIOD SHALL BE 17.25MPa (2500psi).
3. REINFORCING STEEL BARS SHALL CONFORM TO THE LATEST REQUIREMENTS OF PNS 49 FOR DEFORMED STEEL BARS GRADE 275.

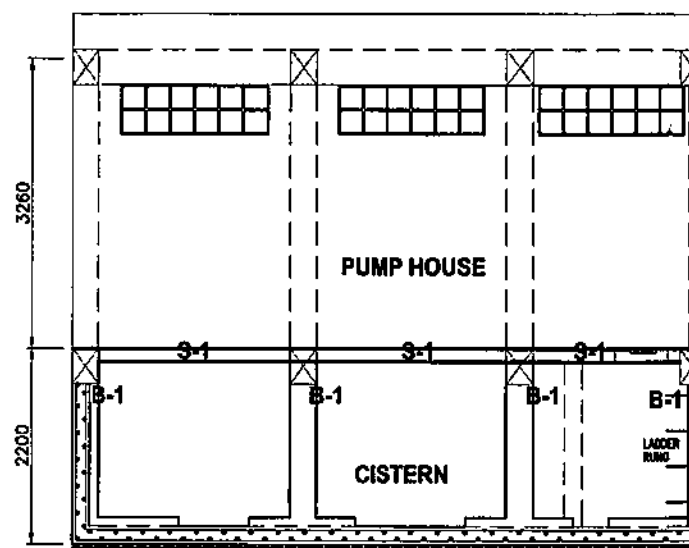
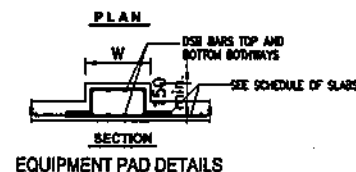
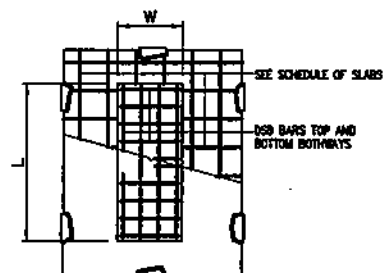
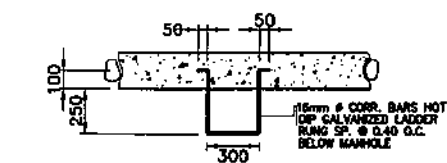
OWNER:	 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY
<b>PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR</b>	
<b>LOCATION: BAGACAY, CALBAYOG, SAMAR</b>	
TITLE:	<b>FLAG POLE</b> <b>(PLAN, SECTIONS &amp; DETAILS)</b>

	BY	CWD	DATE	
DESIGNED				SUBMITTED: <u>H. L. MENDOZA</u> <i>[Signature]</i> Principal Engineer, CEAD
DRAWN				
REVIEWED	PRINCIPAL ENGR./ARCHT.			RECOMMENDED: <u>A. C. ESPINOSA</u> <i>[Signature]</i> Manager, CEAD
CIVIL/ARCHT.				
ELEC.				APPROVED: <u>M. G. GARCIA</u> <i>[Signature]</i> Manager, DDO
MECH.				

DWG. NO. <b>COSC-BDC-15.029</b>	SPECS. NO. <b>VisP22Z1464Sc</b>
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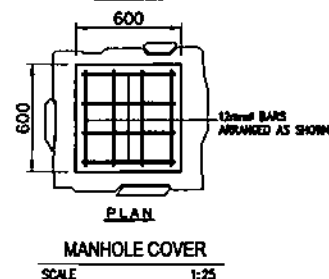
SECTION 'A'



- NOTES:
1. THE MINIMUM 28-DAY CYLINDER COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 20.7MPa.
  2. THE MINIMUM YIELD STRENGTH OF REINFORCEMENT SHALL BE GRADE 40 (275MPa).
  3. THE DESIGN OF THE EQUIPMENT PAD AND MOUNTING DETAILS SHALL BE PREPARED BY THE CONTRACTOR SUBJECT TO NPC'S REVIEW AND APPROVAL. FINAL DIMENSION SHALL BE AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER IN CONSIDERATION OF THE MINIMUM REQUIREMENTS.

OWNER:		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: CISTERN AND PUMPHOUSE (PLAN, SECTION AND DETAILS)			
DESIGNED	BY	CHKD	DATE
DRAWN			
REVIEWED	PRINCIPAL ENGR./ARCHT.		
CHILANCI			
ELEC.			
MECH.			
DNG. NO. COSC-BDC-15.030		SPCS. NO. VIsP22Z1464Sc	
REV.		DATE	
NATURE OF REVISION		BY	
CHKD.		RECD.	
APPD.		SCALE: AS SHOWN	
BID DRAWING		REV. 0	

CISTERN AND PUMPHOUSE  
COSC-BDC-15.030 SCALE NTS



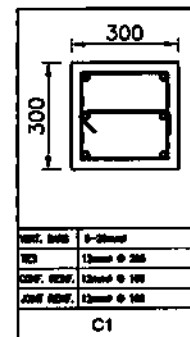



## SCHEDULE OF FOOTINGS

**SCHEDULE OF CONCRETE SLAB REINFORCEMENT (SEE TYPICAL SLAB DETAILS)**

**SCHEDULE OF BEAM REINFORCEMENT (SEE TYPICAL BEAM DETAILS)**

### SCHEDULE OF COLUMNS



OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DELIMAN, QUEZON CITY		
<b>PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR</b>				
LOCATION: <b>BAGACAY, CALBAYOG, SAMAR</b>				
<b>TITLE:</b> <b>FOOTING, COLUMN, BEAM &amp; SLAB DETAILS</b> <b>(PUMPHOUSE AND CISTERN )</b>				
	BY	CNO	DATE	
DESIGNED				SUBMITTED: <u>H. L. MENDOZA</u> <i>Principal Engineer, C&amp;S</i> RECOMMENDED: <u>A. C. EMBITU</u> <i>Assistant Eng. C&amp;S</i> APPROVED: <u>H. C. SORIANO</u> <i>Manager, C&amp;S</i>
DRAWN				
REVIEWED	PRINCIPAL ENGR./ARCHT.			
CHECKED				
FILED				
MECH.				
DWG. NO. <b>COSC-BDC-15.031</b>				SPEC. NO. <b>VS-P22Z1464Sc</b>

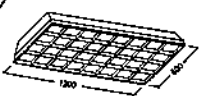









## SECTION IX

# **BID DRAWINGS**

# **ELECTRICAL WORKS**

**SECTION IX - BID DRAWINGS****EW - ELECTRICAL DRAWINGS**





<b>DRAWING NO.</b>	<b>TITLE</b>
COSC-BDE-15.001	DETAILS OF LIGHTING FIXTURES AND GENERAL NOTES
COSC-BDE-15.002	LIGHTING & POWER LAYOUT (GROUND FLOOR & MEZZANINE FLOOR)
COSC-BDE-15.003	LIGHTING & POWER LAYOUT (SECOND FLOOR)
COSC-BDE-15.004	LIGHTING & POWER LAYOUT (THIRD FLOOR & ROOF DECK FLOOR)
COSC-BDE-15.005	SCHEDULE OF LOADS & RISER DIAGRAM (GROUND FLOOR & MEZZANINE FLOOR – LPP1)
COSC-BDE-15.006	SCHEDULE OF LOADS & RISER DIAGRAM (SECOND FLOOR – LPP2)
COSC-BDE-15.007	SCHEDULE OF LOADS & RISER DIAGRAM (THIRD FLOOR – LPP3)
COSC-BDE-15.008	SCHEDULE OF LOADS & RISER DIAGRAM (MAIN DISTRIBUTION PANELBOARD – MDP)
COSC-BDE-15.009	SINGLE LINE DIAGRAM AND CONCRETE PEDESTAL DETAILS
COSC-BDE-15.010	LIGHTNING PROTECTION SYSTEM DETAILS
COSC-BDE-15.011	STRUCTURED CABLING SYSTEM NETWORK DIAGRAM
COSC-BDE-15.012	STRUCTURED CABLING SYSTEM RISER DIAGRAM
COSC-BDE-15.013	STRUCTURED CABLING SYSTEM (GROUND FLOOR AND MEZZANINE FLOOR)
COSC-BDE-15.014	STRUCTURED CABLING SYSTEM (SECOND FLOOR AND THIRD FLOOR)
COSC-BDE-15.015	DETAILS OF CCTV SURVEILLANCE EQUIPMENT AND RISER DIAGRAM
COSC-BDE-15.016	CCTV SURVEILLANCE SYSTEM (GROUND FLOOR AND MEZZANINE FLOOR)
COSC-BDE-15.017	CCTV SURVEILLANCE SYSTEM (SECOND FLOOR AND THIRD FLOOR)

			
<p>IP20 LOUVERED LIGHTING FIXTURE, WITH MIRROR FINISH ALUMINUM REFLECTOR, 2 x 18 WATTS COOL WHITE HIGH LED T8 LAMP TUBE LUMINAIRE. (MIN. Lm/LAMP = 1800lm/LAMP)</p>	<p>IP20 OPEN TYPE LUMINAIRE, WITH ZINC PHOSPHATED DIE-FORMED STEEL SHEET BASE AND WHITE POWDER COAT PAINT FINISH COMPLETE WITH 1 x 18 WATTS LED TUBE LAMP. (MIN. Lm/LAMP = 1800lm/LAMP)</p>	<p>IP20 RECESSED MOUNTED VERTICAL PROFILE DOWNLIGHT WITH ALUMINUM REFLECTOR AND POWDER COATED RIM FITTED WITH VERTICALLY PLACED E27 BASE 1 x 12 WATTS COMPACT LED LAMP (MIN. Lm = 1080lm).</p>	<p>IP20 RECESSED MOUNTED VERTICAL PROFILE DOWNLIGHT WITH ALUMINUM REFLECTOR AND POWDER COATED RIM FITTED WITH VERTICALLY PLACED E27 BASE 1 x 5 WATTS COMPACT LED LAMP (MIN. Lm = 400lm).</p>
			
<p>IP20 SURFACE MOUNTED VERTICAL PROFILE DOWNLIGHT, ALUMINUM REFLECTOR AND POWDER COATED RIM FITTED WITH VERTICALLY PLACED E27 BASE 1 x 12 WATTS COMPACT LED LAMP (MIN. Lm = 1080lm).</p>	<p>IP20 ROUND CEILING LUMINAIRE, SURFACE MOUNTED, 350mm DIAMETER, WHITE STEEL BASE, WHITE OPAL GLASS DIFFUSER AND COMPLETE WITH 18 WATTS LED COB LIGHT. (MIN. Lm = 1200lm)</p>	<p>IP44 WALL MOUNTED LIGHTING FIXTURE, STEEL BASE, WHITE SATINATED GLASS DIFFUSER WITH 1 x 12 WATTS DAY LIGHT COMPACT LED LAMP. (MIN. Lm = 1080lm)</p>	<p>IP40 110W LED HIGH BAY LIGHTING FIXTURE WITH HIGH SPECULAR ALUMINUM AND PRISMATIC REFLECTOR, BUILT-IN HEAT PIPE AND FOLD-FIN HEAT SINK. (MIN. Lm = 9300lm)</p>
			
<p>PORTABLE EMERGENCY LIGHTING FIXTURE, 2 x 2 WATTS LED WARM WHITE WITH BUILT-IN SEALED LEAD ACID BATTERY. CHARGING TIME &lt; 20 HRS; USAGE TIME &lt;= 4 HRS</p>		<p>IP30 HANGING EMERGENCY EXIT SIGN LIGHT, 2 WATTS.</p>	

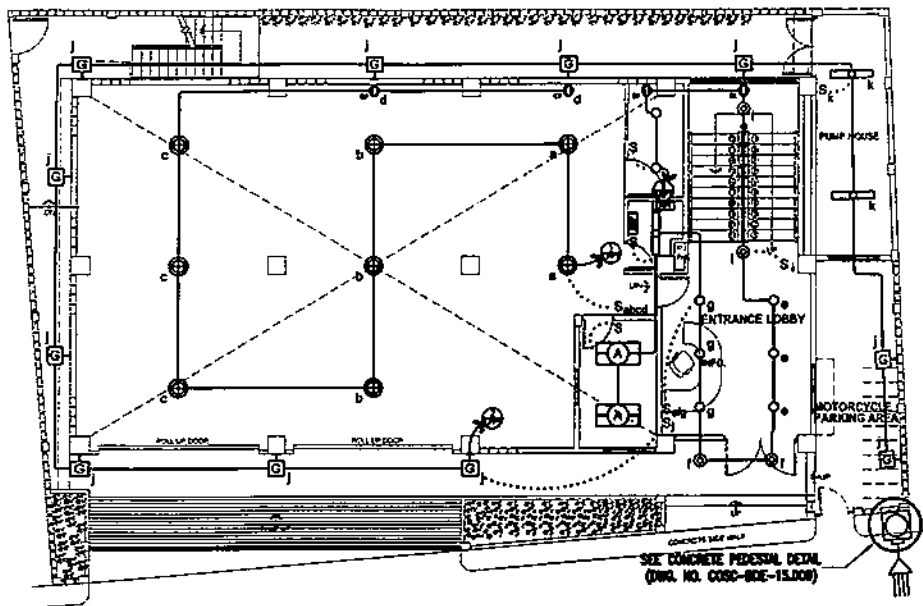
DETAILS OF LIGHTING FIXTURES

## GENERAL NOTES:

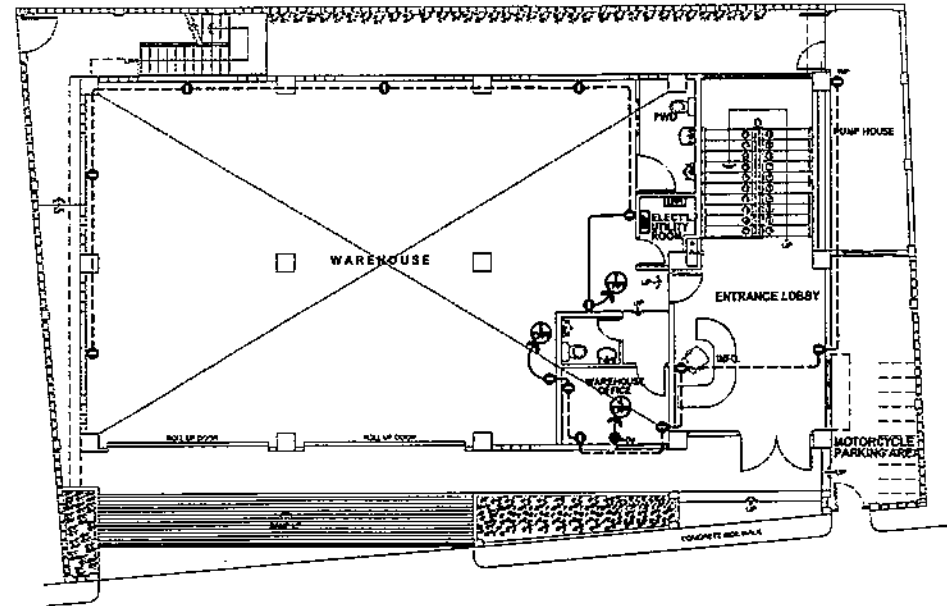
- ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE LATEST PROVISIONS OF THE PHILIPPINE ELECTRICAL CODE, LAWS AND ORDINANCES OF THE LOCAL CODE ENFORCING AUTHORITIES.
- POWER SUPPLY SHALL BE THREE PHASE, 230 VOLTS, 60 HERTZ, FOUR (4) WIRE SYSTEM TO BE TAKEN FROM THE NEAREST POWER SUPPLY. POWER SUPPLY SHALL BE RUN UNDERGROUND. THE CONTRACTOR SHALL SUBMIT THE ACTUAL LAYOUT OF THE POWER SUPPLY ROUTE.
- METHOD OF WIRING SHALL BE IN uPVC WITH PROPER FITTINGS, DEVICES, BOXES AND SUPPORTS. WORK SHALL BE AS PER PLAN AND SPECIFICATIONS AS TO LOCATION, TYPE AND USE.
- ALL SWITCHES AND CONVENIENCE OUTLETS SHALL BE FLUSH-MOUNTED 1.37 METERS AND 0.30 METER RESPECTIVELY ABOVE THE FINISHED FLOOR.
- CONDUIT RUNS ARE INDICATIVE ONLY. THE ACTUAL RUNS SHALL BE DETERMINED IN THE FIELD.
- WIRES, BOXES, ELECTRICAL AS WELL AS NON-ELECTRICAL MATERIALS NOT INCLUDED IN THE PLANS AND SPECIFICATION BUT NECESSARY TO COMPLETE THE JOB SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.
- ALL ELECTRICAL MATERIALS TO BE USED IN THE INSTALLATION SHALL BE NEW, STANDARD AND APPROVED TYPE AS TO LOCATION, TYPES AND PURPOSE.
- MINIMUM SIZE OF CONDUCTOR TO BE USED SHALL BE 3.5 mm<sup>2</sup> THWN IN 20 mmø uPVC, SCH.40 CONDUIT UNLESS OTHERWISE SPECIFIED IN THE PLAN.
- ELECTRICAL WORKS SHALL BE DONE UNDER THE DIRECT SUPERVISION OF A DULY LICENSED ELECTRICAL ENGINEER.

OWNER		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: GENERAL NOTES AND DETAILS OF LIGHTING FIXTURES			
DESIGNED	BY	CHKD	DATE
DRAWN	INC		
REVIEWED	PRINCIPAL ENGR./ARCHT.		
CIVIL/ARCHT.			
ELEC.			
MECH.			
SUBMITTED:		 J.B. M. AGUILERA Principal Engineer A. E.E.	
RECOMMENDED:		 E.Z. C. LUGOD, JR. Manager, E.E.	
APPROVED:		 H.G. SISON Manager, E.E.	
DWG. NO. COSC-BDE-15.001		SPECS. NO. VisP22Z1464Sc	
SCALE: N.T.S.		BID DRAWING	
REV. 0			

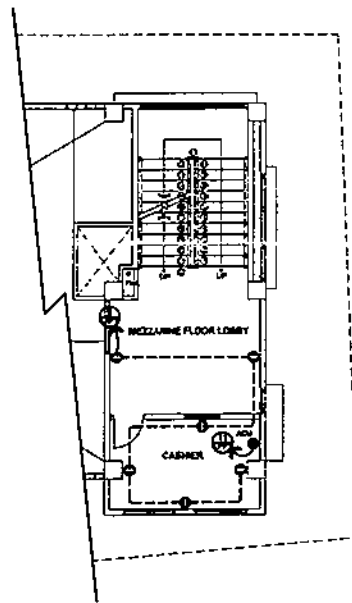
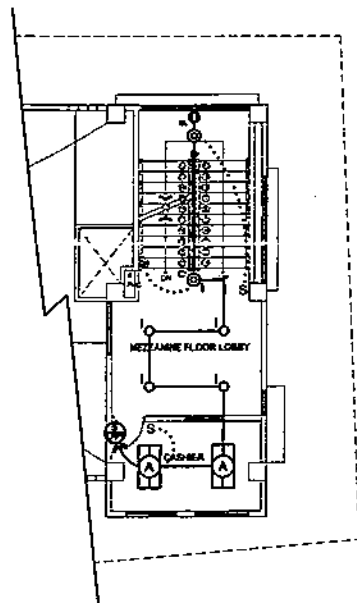
REV.	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPD.



1  
E-2  
SCALE 1:150  
GROUND FLOOR LIGHTING



2  
E-2  
SCALE 1:150  
GROUND FLOOR POWER



3  
E-2  
SCALE 1:150  
MEZZANINE FLOOR LIGHTING

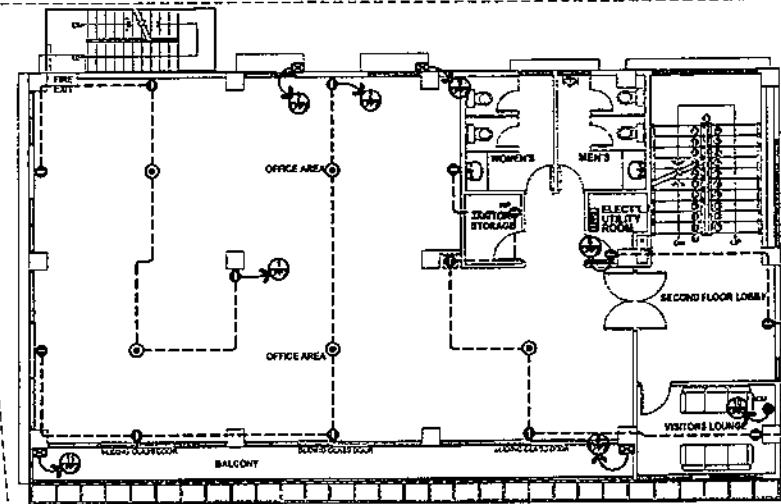
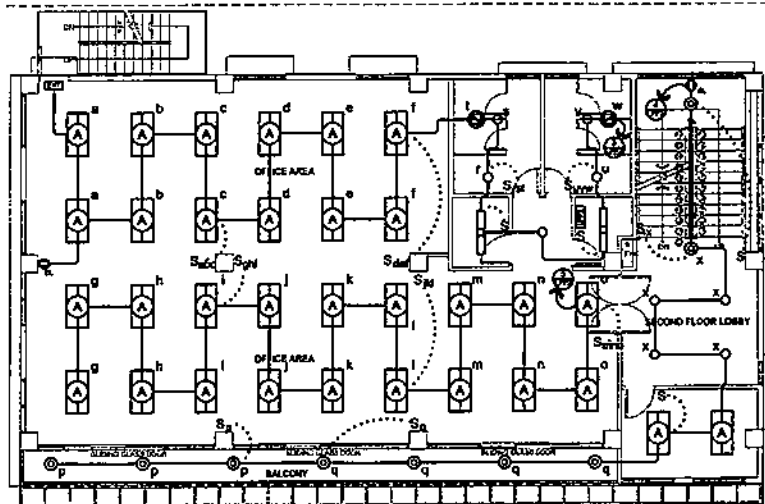
4  
E-2  
SCALE 1:150  
MEZZANINE FLOOR POWER

### LEGEND:

- |  |                                                                         |  |                                 |
|--|-------------------------------------------------------------------------|--|---------------------------------|
|  | - FIXTURE TYPE A                                                        |  | - CIRCUIT RUNNING ON CEILING    |
|  | - FIXTURE TYPE B                                                        |  | - CONTROL CIRCUIT               |
|  | - FIXTURE TYPE C                                                        |  | - CIRCUIT RUNNING UNDERGROUND   |
|  | - FIXTURE TYPE E                                                        |  | - CIRCUIT HOMERUN               |
|  | - FIXTURE TYPE G                                                        |  | - LIGHTING & POWER PANELBOARD 1 |
|  | - FIXTURE TYPE H                                                        |  | - MAIN DISTRIBUTION PANELBOARD  |
|  | - EMERGENCY LIGHT OUTLET                                                |  |                                 |
|  | - WALL MOUNTED EXHAUST FAN OUTLET                                       |  |                                 |
|  | - DUPLEX CONVENIENCE OUTLET                                             |  |                                 |
|  | - WINDOW TYPE ACU OUTLET                                                |  |                                 |
|  | - WEATHERPROOF DUPLEX C.O.                                              |  |                                 |
|  | - SINGLE POLE SWITCH<br>(SUBSCRIPT DENOTES LAMP BEING CONTROLLED)       |  |                                 |
|  | - TRIPLEX POLE WALL SWITCH<br>(SUBSCRIPT DENOTES LAMP BEING CONTROLLED) |  |                                 |
|  | - FOUR POLE WALL SWITCH<br>(SUBSCRIPT DENOTES LAMP BEING CONTROLLED)    |  |                                 |

OWNER:  NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR	
LOCATION: BAGACAY, CALBAYOG, SAMAR	
TITLE: LIGHTING & POWER LAYOUT (GROUND FLOOR AND MEZZANINE FLOOR)	
DESIGNED BY: MC	SUBMITTED BY: B. M. AGUILA
DRAWN BY: MC	RECOMMENDED BY: C. Z. LUCERO, JR.
REVIEWED BY: PRINCIPAL ENGR. / ARCHT.	APPROVED BY: M. G. SOMERSONA
CALCULATED BY:	MECH. 100
ELEC.	
MECH.	
DWG. NO. COSC-BDE-15.002	SPEC. NO. VisP22Z1464Sc
SCALE: AS SHOWN	BID DRAWING
REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



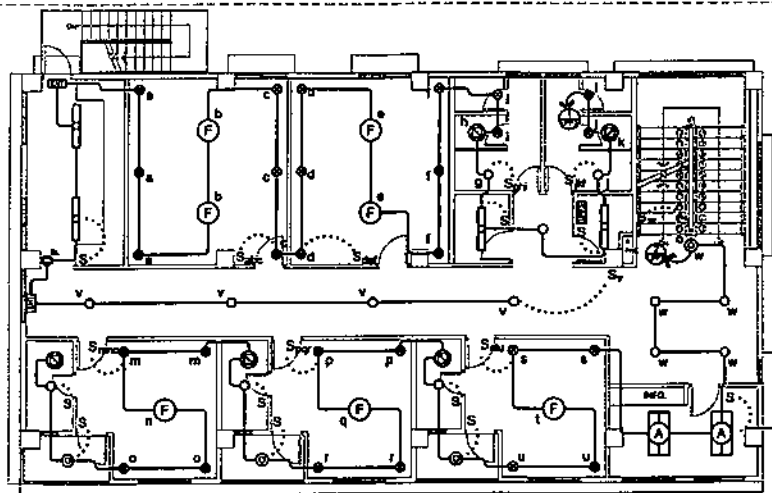
## LEGEND:

- FIXTURE TYPE A
- FIXTURE TYPE B
- FIXTURE TYPE C
- FIXTURE TYPE E
- LED EXIT LIGHT
- EMERGENCY LIGHT OUTLET
- CEILING MOUNTED EXHAUST FAN
- DUPLEX CONVENIENCE OUTLET
- WEATHERPROOF DUPLEX C.O.
- FLOOR MOUNTED DUPLEX C.O.

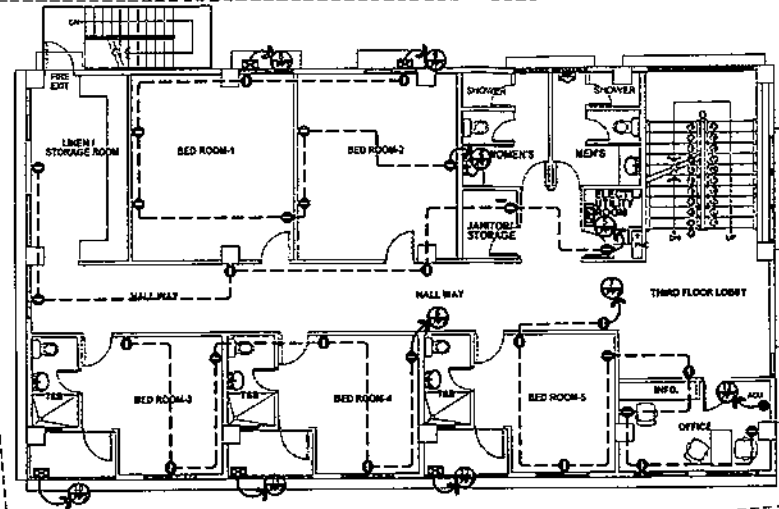
- WINDOW TYPE ACU OUTLET
- NEMA 3R ENCLOSED CKT. BKR.
- SINGLE POLE SWITCH (SUBSCRIPT DENOTES LAMP BEING CONTROLLED)
- TRIPLEX POLE WALL SWITCH (SUBSCRIPT DENOTES LAMP BEING CONTROLLED)
- CIRCUIT RUNNING ON CEILING
- CONTROL CIRCUIT
- CIRCUIT RUNNING UNDERGROUND
- CIRCUIT HOMERUN
- LIGHTING & POWER PANELBOARD 2

OWNER		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: LIGHTING & POWER LAYOUT (SECOND FLOOR)			
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	BY	CHKD	DATE
CHECKED	BY	CHKD	DATE
ELEC.	BY	CHKD	DATE
MECH.	BY	CHKD	DATE
SUBMITTED:		RECOMMENDED:	
APPROVED:		APPROVED:	
DWG. NO. COSC-BDE-15.003		SPEC. NO. VisP22Z1454Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. 0		REV. 0	

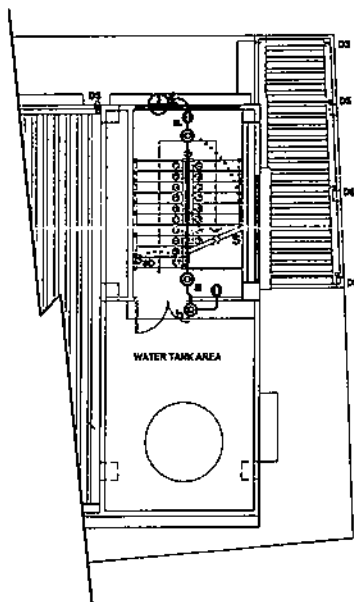
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



1 THIRD FLOOR LIGHTING  
E-4 SCALE 1:150



2 THIRD FLOOR POWER  
E-4 SCALE 1:150



### LEGEND:

- FIXTURE TYPE A
- FIXTURE TYPE B
- FIXTURE TYPE C
- FIXTURE TYPE D
- FIXTURE TYPE E
- LED EXIT LIGHT
- EMERGENCY LIGHT OUTLET
- CEILING MOUNTED EXHAUST FAN
- DUPLEX CONVENIENCE OUTLET
- WEATHERPROOF DUPLEX C.O.
- FLOOR MOUNTED DUPLEX C.O.
- WINDOW TYPE ACU OUTLET
- NEMA 3R ENCLOSED CKT. BKR.
- SINGLE POLE SWITCH  
(SUBSCRIPT DENOTES LAMP BEING CONTROLLED)
- DUPLEX POLE WALL SWITCH  
(SUBSCRIPT DENOTES LAMP BEING CONTROLLED)
- TRIPLEX POLE WALL SWITCH  
(SUBSCRIPT DENOTES LAMP BEING CONTROLLED)
- CIRCUIT RUNNING ON CEILING
- CONTROL CIRCUIT
- CIRCUIT RUNNING UNDERGROUND
- CIRCUIT HOMERUN
- LIGHTING & POWER PANELBOARD 2

3 ROOF DECK FLOOR LIGHTING & POWER  
E-4 SCALE 1:150

OWNER:		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: LIGHTING & POWER LAYOUT (THIRD FLOOR AND ROOF DECK FLOOR)			
DESIGNED	BY	CHKD	DATE
DRAWN	INC		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED	
CIVIL/ARCHT.			
ELEC.		APPROVED	
MECH.			
DWG. NO. COSC-BDE-15.004		SPECS. NO. VisP22Z1484Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPD.	

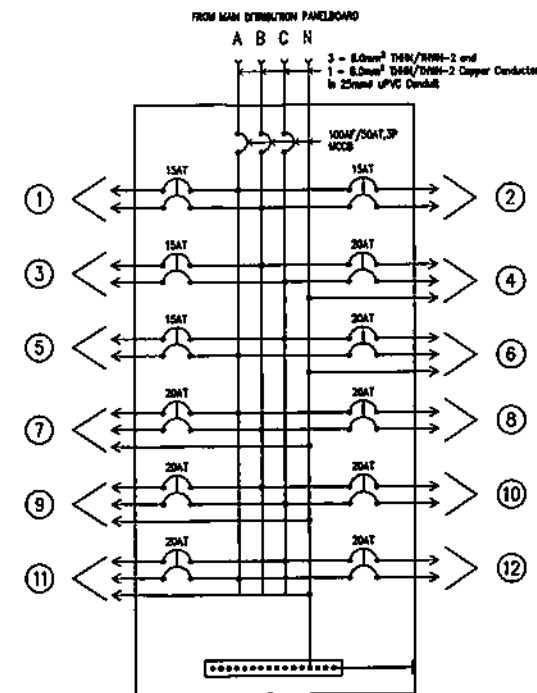
# SCHEDULE OF LOADS: GROUND FLOOR & MEZZANINE FLOOR LIGHTING AND POWER PANELBOARD (LPP1)

CMT NO.	DESCRIPTION	VA	V	AMPS				SIZES		
				3Ø	AB	BC	CA	BREAKER	WIRE	CONDUIT
1	8 - 310W FIXTURE TYPE H 2 - 250W WALL MOUNTED EXHAUST FAN	1551	230		6.74			15AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
2	2 - 1x18W FIXTURE TYPE B 11 - 1x12W FIXTURE TYPE G	176	230		0.77			15AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
3	2 - 2x18W FIXTURE TYPE A 1 - 1x18W FIXTURE TYPE B 8 - 1x12W FIXTURE TYPE C 4 - 1x12W FIXTURE TYPE E 1 - 2x2W EMERGENCY LIGHT 1 - 7W WALL MOUNTED EXHAUST FAN	258	230			1.13		15AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
4	0.8HP WINDOW TYPE AIR CONDITIONING UNIT	1537	230			7.12		20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
5	2 - 2x18W FIXTURE TYPE A 4 - 1x12W FIXTURE TYPE C 2 - 1x12W FIXTURE TYPE E 1 - 2x2W EMERGENCY LIGHT	155	230				0.57	15AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
6	6 - 200VA DUPLEX CONVENIENCE OUTLET 1 - 200VA FLOOR WEATHERPROOF DUPLEX C.O.	1400	230				6.09	20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
7	7 - 200VA DUPLEX CONVENIENCE OUTLET	1400	230		8.09			20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
8	SPARE	1500	230		6.52			20AT		
9	6 - 200VA DUPLEX CONVENIENCE OUTLET	1200	230			5.22		20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
10	SPARE	1500	230			6.52		20AT		
11	0.8HP WINDOW TYPE AIR CONDITIONING UNIT	1537	230				7.12	20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
12	SPARE	1500	230				6.52	20AT		
	TOTAL	13915			20.12	19.98	20.40			

PROVIDE: 100AF/50AT, 3P, MCCB  
WITH BRANCH CIRCUIT OF:  
4 - 15AT, 2P, MCB  
8 - 20AT, 2P, MCB

PROVIDE: 3 - 8.0mm<sup>2</sup> THHN/THWN-2 Copper Conductor and  
1 - 8.0mm<sup>2</sup> THHN/THWN-2 Copper (Neutral) Conductor  
in 25mmØ uPVC Conduit

## RISER DIAGRAM



OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>SCHEDULE OF LOADS &amp; RISER DIAGRAM (GROUND FLOOR &amp; MEZZANINE FLOOR - LPP1)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	MC		
REVIEWED	PRINCIPAL ENGINEER / ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			
SUBMITTED:		 J. M. AQUILA Project Engineer A (EOP)	
RECOMMENDED:		 E. C. LUGO Manager, EOP	
APPROVED:		 J. B. SORIANO Manager, EOP	
DWG. NO. COSC-BDE-15.005		SPEC. NO. VisP22.1464Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. 0		REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

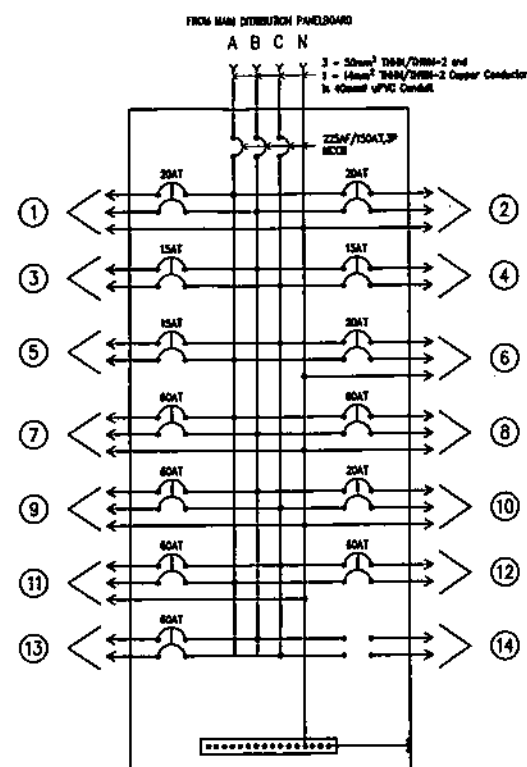
# SCHEDULE OF LOADS: SECOND FLOOR LIGHTING AND POWER PANELBOARD (LPP2)


CKT NO.	DESCRIPTION	VA	V	AMPS				SIZES		
				3Ø	AB	BC	CA	BREAKER	WIRE	CONDUIT
1	3 - 200VA DUPLEX CONVENIENCE OUTLET	1000	230		4.35			20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
	2 - 200VA FLOOR MOUNTED DUPLEX CONVENIENCE OUTLET									
2	4 - 200VA DUPLEX CONVENIENCE OUTLET	1200	230		5.22			20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
	2 - 200VA FLOOR MOUNTED DUPLEX CONVENIENCE OUTLET									
3	12 - 2x18W FIXTURE TYPE A	632	230							
	2 - 1x18W FIXTURE TYPE B									
	5 - 1x12W FIXTURE TYPE C									
	1 - 2x2W EMERGENCY LIGHT									
	1 - 2W EXT LIGHT									
	2 - 28W CEILING MOUNTED EXHAUST FAN									
4	2 - 2x18W FIXTURE TYPE A	244	230							
	4 - 1x12W FIXTURE TYPE C									
	9 - 1x12W FIXTURE TYPE E									
	1 - 2x2W EMERGENCY LIGHT									
5	18 - 2x18W FIXTURE TYPE A	682	230				2.97	15AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
6	6 - 200VA DUPLEX CONVENIENCE OUTLET	1600	230							
	1 - 200VA FLOOR MOUNTED DUPLEX CONVENIENCE OUTLET						6.96	20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
	1 - 200VA FLOOR WEATHERPROOF DUPLEX C.O.									
7	4HP SPLIT TYPE AIR CONDITIONING UNIT	5175	230		22.50			60AT	2 - 14mm <sup>2</sup> THHN/THWN-2 & 1 - 5.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
8	4HP SPLIT TYPE AIR CONDITIONING UNIT	5175	230		22.50			60AT	2 - 14mm <sup>2</sup> THHN/THWN-2 & 1 - 5.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
9	4HP SPLIT TYPE AIR CONDITIONING UNIT	5175	230			22.50		60AT	2 - 14mm <sup>2</sup> THHN/THWN-2 & 1 - 5.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
10	0.8HP WINDOW TYPE AIR CONDITIONING UNIT	1637	230			7.12		20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
11	4HP SPLIT TYPE AIR CONDITIONING UNIT	5175	230				22.50	60AT	2 - 14mm <sup>2</sup> THHN/THWN-2 & 1 - 5.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
12	SPARE	5175	230				22.50	60AT		
13	SPARE	5175	230			22.50		60AT		
14	SPARE									
	TOTAL	38045			54.57	55.93	54.92			

PROVIDE: 225AF/150AT, 3P, MCCB  
WITH BRANCH CIRCUIT OF:  
3 - 15AT, 2P, MCB  
4 - 20AT, 2P, MCB  
6 - 60AT, 2P, MCB

PROVIDE: 3 - 50mm<sup>2</sup> THHN/THWN-2 Copper Conductor and  
1 - 14mm<sup>2</sup> THHN/THWN-2 Copper (Neutral) Conductor  
in 40mmØ uPVC Conduit

## RISER DIAGRAM



OWNER: 		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: SCHEDULE OF LOADS & RISER DIAGRAM (SECOND FLOOR - LPP2)			
DESIGNED	BY	CHKD	DATE
DRAWN	MC		
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED	
CIVIL/ARCHT		APPROVED	
ELEC			
MECH			
DWG. NO. COSC-BDE-15.006		SPEC. NO. VisP22Z1484Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. DATE		NATURE OF REVISION	
BY	CHKD	REC'D	APP'D

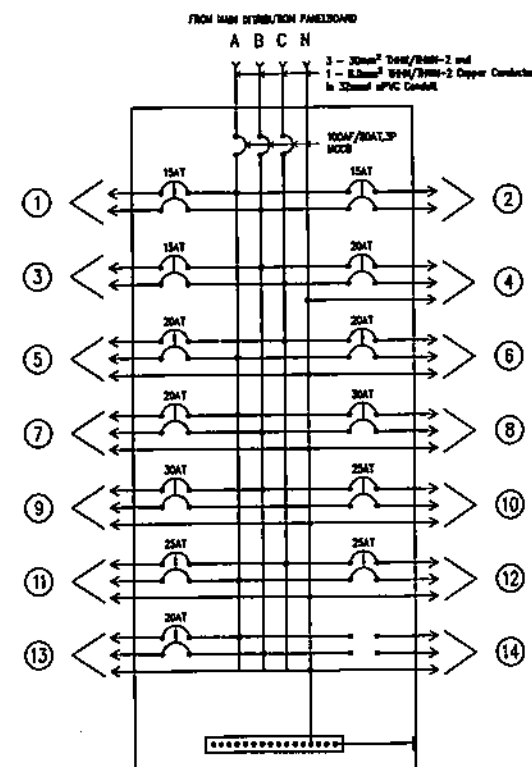
# SCHEDULE OF LOADS: THIRD FLOOR LIGHTING AND POWER PANELBOARD (LPP3)


CKT NO.	DESCRIPTION	VA	V	AMPS				SIZES		
				3Ø	AB	BC	CA	BREAKER	WIRE	CONDUIT
1	4 - 1x18W FIXTURE TYPE B	402	230	1.75				15AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
	7 - 1x12W FIXTURE TYPE C									
	16 - 1x5W FIXTURE TYPE D									
	4 - 18W FIXTURE TYPE F									
	1 - 2x2W EMERGENCY LIGHT									
	2 - 2W EXT LIGHT									
	2 - 28W CEILING MOUNTED EXHAUST FAN									
2	2 - 2x18W FIXTURE TYPE A	383	230	1.67				15AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
	7 - 1x12W FIXTURE TYPE C									
	12 - 1x5W FIXTURE TYPE D									
	4 - 1x12W FIXTURE TYPE E									
	3 - 18W FIXTURE TYPE F									
	3 - 13W CEILING MOUNTED EXHAUST FAN									
3	3 - 1x12W FIXTURE TYPE E	242	230			1.05		15AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
	1 - 2x2W EMERGENCY LIGHT									
	1 - 200VA DUPLEX CONVENIENCE OUTLET									
4	8 - 200VA DUPLEX CONVENIENCE OUTLET	1600	230			8.96		20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
5	5 - 200VA DUPLEX CONVENIENCE OUTLET	1200	230			5.22		20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
	1 - 200VA WEATHERPROOF DUPLEX C.O.									
6	6 - 200VA DUPLEX CONVENIENCE OUTLET	1200	230			5.22		20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
7	8 - 200VA DUPLEX CONVENIENCE OUTLET	1600	230			8.96		20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
8	2HP SPLIT TYPE AIR CONDITIONING UNIT	2760	230			12.00		30AT	3 - 5.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
9	2HP SPLIT TYPE AIR CONDITIONING UNIT	2760	230			12.00		30AT	3 - 5.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
10	1.5HP SPLIT TYPE AIR CONDITIONING UNIT	2300	230			10.00		25AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
11	1.5HP SPLIT TYPE AIR CONDITIONING UNIT	2300	230			10.00		25AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
12	1.5HP SPLIT TYPE AIR CONDITIONING UNIT	2300	230			10.00		25AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
13	0.8HP WINDOW TYPE AIR CONDITIONING UNIT	1537	230			7.12		20AT	3 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
14	SPACE									
	TOTAL	20584			29.49	30.01	30.43			

PROVIDE: 100AF/80AT, 3P, MCCB  
WITH BRANCH CIRCUIT OF:  
3 - 15AT, 2P, MCB  
5 - 20AT, 2P, MCB  
3 - 25AT, 2P, MCB  
2 - 30AT, 2P, MCB

PROVIDE: 3 - 30mm<sup>2</sup> THHN/THWN-2 Copper Conductor and  
1 - 8.0mm<sup>2</sup> THHN/THWN-2 Copper (Neutral) Conductor  
in 32mmØ uPVC Conduit

## RISER DIAGRAM



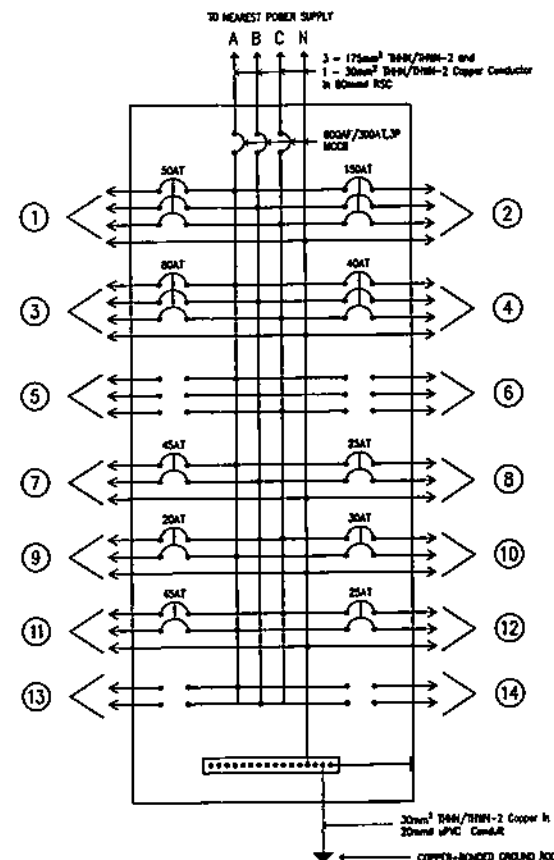
OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT:		<b>CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR</b>	
LOCATION:		BAGACAY, CALBAYOG, SAMAR	
TITLE:		<b>SCHEDULE OF LOADS &amp; RISER DIAGRAM (THIRD FLOOR - LPP3)</b>	
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	BY	CHKD	DATE
CIVIL/ARCHT	BY	CHKD	DATE
ELEC.	BY	CHKD	DATE
MECH.	BY	CHKD	DATE
DWG. NO.		SPEC. NO.	
COSC-BDE-15.007		VisP2221464Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. #		REV. #	




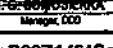
# SCHEDULE OF LOADS: MAIN DISTRIBUTION PANELBOARD (MDP)

CKT NO.	DESCRIPTION	VA	V	AMPS				SIZES		
				3Ø	AB	BC	CA	BREAKER	WIRE	CONDUIT
1	GROUND & MEZZANINE FLR LIGHTING & POWER PANELBOARD (UP1)	13195	230		20.12	19.98	20.40	50AT	3 - 8.0mm <sup>2</sup> THHN/THWN-2 & 1 - 8.0mm <sup>2</sup> THHN/THWN-2	25mmØ uPVC
2	SECOND FLOOR LIGHTING & POWER PANELBOARD (UP2)	38045	230		54.57	55.63	54.92	150AT	3 - 50mm <sup>2</sup> THHN/THWN-2 & 1 - 14mm <sup>2</sup> THHN/THWN-2	40mmØ uPVC
3	THIRD FLOOR LIGHTING & POWER PANELBOARD (UP3)	20684	230		29.49	30.01	30.43	80AT	3 - 30mm <sup>2</sup> THHN/THWN-2 & 1 - 8.0mm <sup>2</sup> THHN/THWN-2	32mmØ uPVC
4	FUTURE ELEVATOR	3498	230	15.20				40AT		
5	SPACE									
6	SPACE									
7	3HP CENTRIFUGAL PUMP	3910	230		17.00			45AT	2 - 8.0mm <sup>2</sup> THHN/THWN-2 & 1 - 5.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
8	ROLL UP DOOR MOTOR 1	1500	230		6.52			25AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2 & 1 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
9	FIRE ALARM CONTROL PANEL	1500	230			6.52		20AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2 & 1 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
10	2HP JOCKEY PUMP	2760	230			12.00		30AT	2 - 5.5mm <sup>2</sup> THHN/THWN-2 & 1 - 5.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
11	3HP CENTRIFUGAL PUMP	3910	230				17.00	45AT	2 - 8.0mm <sup>2</sup> THHN/THWN-2 & 1 - 5.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
12	ROLL UP DOOR MOTOR 2	1500	230			6.52		25AT	2 - 3.5mm <sup>2</sup> THHN/THWN-2 & 1 - 3.5mm <sup>2</sup> THHN/THWN-2	20mmØ uPVC
13	SPACE									
14	SPACE									
	TOTAL	80500			127.70	124.44	129.27			

PROVIDE: 600AF/300AT, 3P, MCCB  
WITH BRANCH CIRCUIT OF:  
1 - 40AT, 3P, MCCB  
1 - 50AT, 3P, MCCB  
1 - 80AT, 3P, MCCB  
1 - 150AT, 3P, MCCB  
1 - 20AT, 2P, FIRE ALARM CB  
2 - 25AT, 2P, MCCB  
1 - 30AT, 2P, MCCB  
2 - 45AT, 2P, MCCB

PROVIDE: 3 - 175mm<sup>2</sup> THHN/THWN-2 Copper Conductor and  
1 - 30mm<sup>2</sup> THHN/THWN-2 Copper (Neutral) Conductor  
in 80mmØ RMC

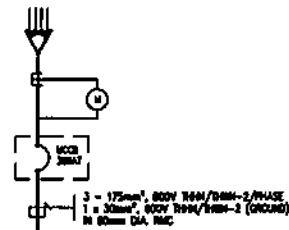


OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: SCHEDULE OF LOADS & RISER DIAGRAM (MAIN DISTRIBUTION PANELBOARD - MDP)			
DESIGNED	BY	CHKD	DATE
DRAWN	INC		
REVIEWED	PRINCIPAL ENGR./ARCHT.		
CHECKED			
ELEC.			
MECH.			
SUBMITTED:		 B. M. NGULA	
RECOMMENDED:		 S. Z. C. LUGOD, JR.	
APPROVED:		 N. G. S. S. S. S.	
DWG. NO. COSC-BDE-15.008		SPECS. NO. VisP22Z1464Sc	
SCALE: AS SHOWN		BID DRAWING	
REV. 0			

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

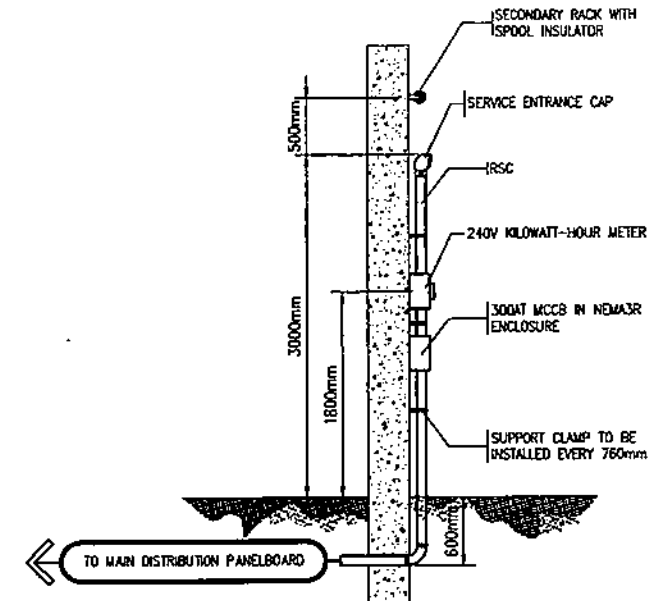
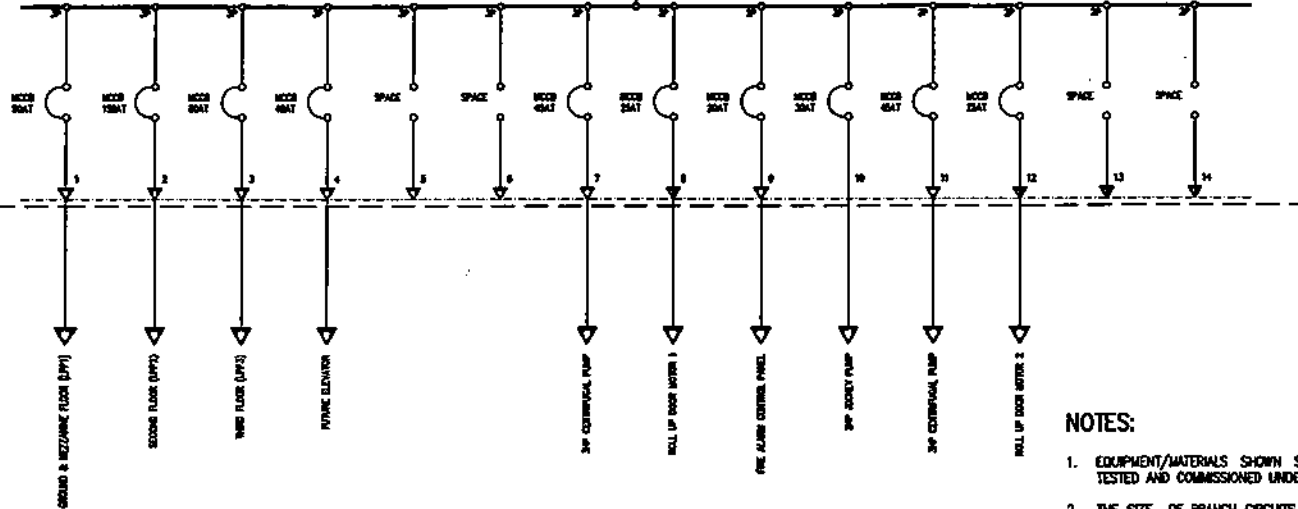
# FROM NEAREST POWER SUPPLY

(LOCAL COOPERATIVE)



240V MAIN DISTRIBUTION PANEL (MDP)

240V, 3-Ø, 500A BUSBAR



## CONCRETE PEDESTAL DETAILS

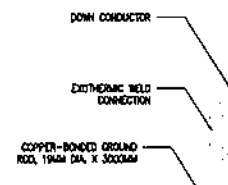
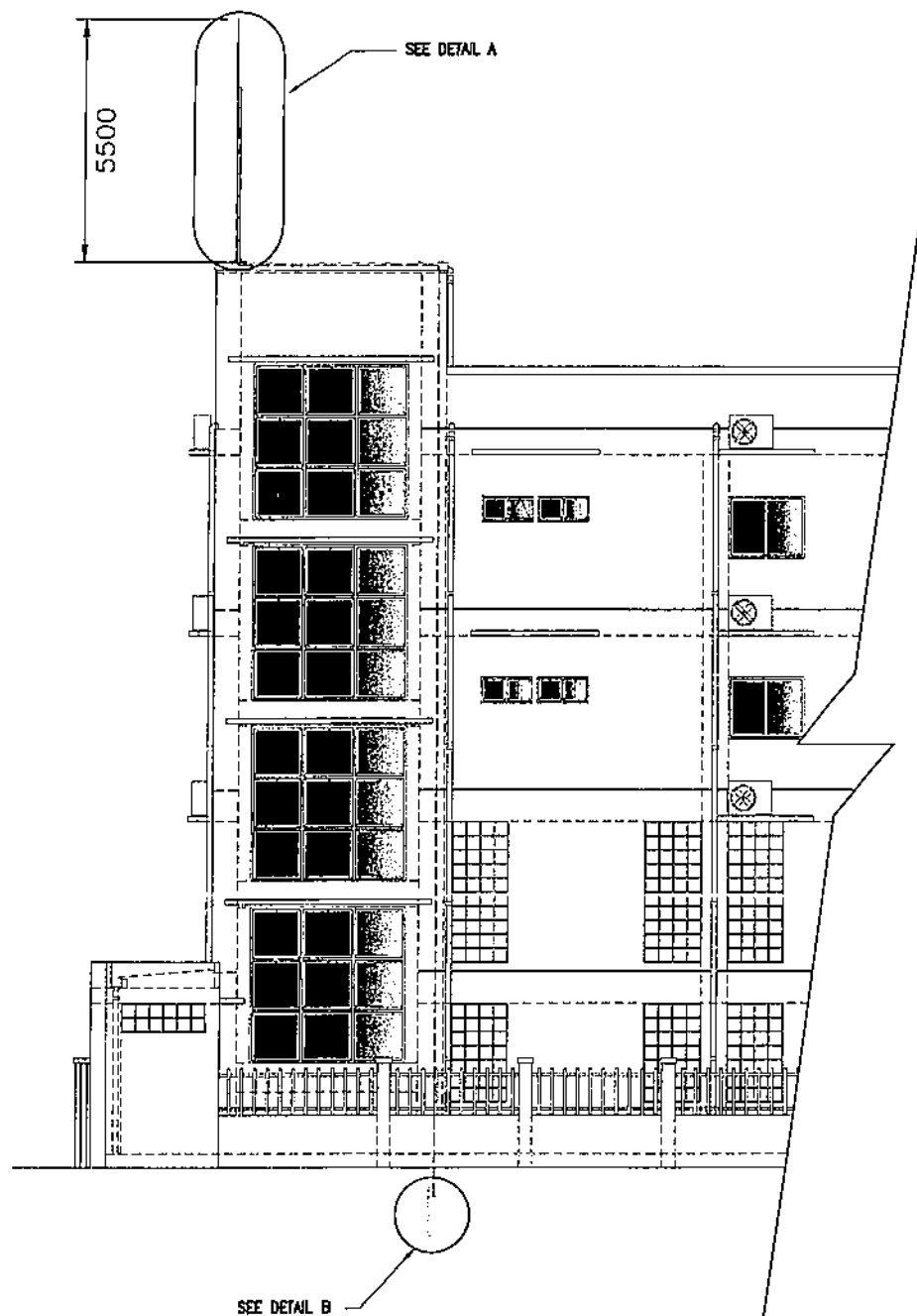
MCCB = MOLDED CASE CIRCUIT BREAKER  
M = KILOWATT-HOUR METER  
TVSS = TRANSIENT VOLTAGE SURGE SUPPRESSOR

### NOTES:

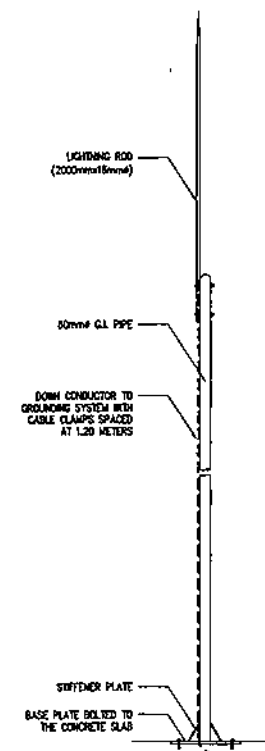
- EQUIPMENT/MATERIALS SHOWN SHALL BE SUPPLIED, INSTALLED, TESTED AND COMMISSIONED UNDER THIS CONTRACT.
- THE SIZE OF BRANCH CIRCUITS ARE TENTATIVE AND FOR BIDDING PURPOSES ONLY. ACTUAL QUANTITIES AND RATING OF CIRCUIT AND BREAKERS INCLUDING ALL NECESSARY MATERIALS AND ACCESSORIES TO FUNCTION AS INTENDED SHALL BE DETERMINED BY THE CONTRACTOR BASED ON THE ACTUAL LOAD REQUIREMENTS.
- THE DETAILED DESIGN AND CALCULATION FOR THE REQUIRED NUMBER OF CIRCUITS FOR INDOOR AND OUTDOOR LIGHTING INCLUDING SIZES OF CABLES, CONDUITS, BREAKERS AND SHORT CIRCUIT & VOLTAGE DROP CALCULATION SHALL BE SUBMITTED FOR NPC'S REVIEW AND APPROVAL.
- THE DETAILED DESIGN, EQUIPMENT/COMPONENTS, CATALOGS/BROCHURES AND OTHER TECHNICAL DATA SHALL BE SUBMITTED FOR REVIEW AND APPROVAL.
- ACTUAL LOCATION OF THE CONCRETE PEDESTAL SHALL BE COORDINATED WITH THE END-USER. THE CONTRACTOR SHALL COORDINATE WITH THE LOCAL COOPERATIVE FOR THE ENERGIZATION OF THE PROPOSED BUILDING.

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>SINGLE LINE DIAGRAM AND CONCRETE PEDESTAL DETAILS</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	NC		
REVIEWED	PRINCIPAL ENGR./ARCHT.		
CHECKED			
ELC.			
MECH.			
SUBMITTED:		 B. M. AGUILERA	
RECOMMENDED:		 C. Z. C. LUGO, JR. Engr. (ECC)	
APPROVED:		 H. O. SISON Engr. (ECC)	
DWG. NO. <b>COSC-BDE-15.001</b>		SPEC. NO. <b>VisP22Z1464Sc</b>	
SCALE: AS SHOWN		<b>BID DRAWING</b> REV. 0	


REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.



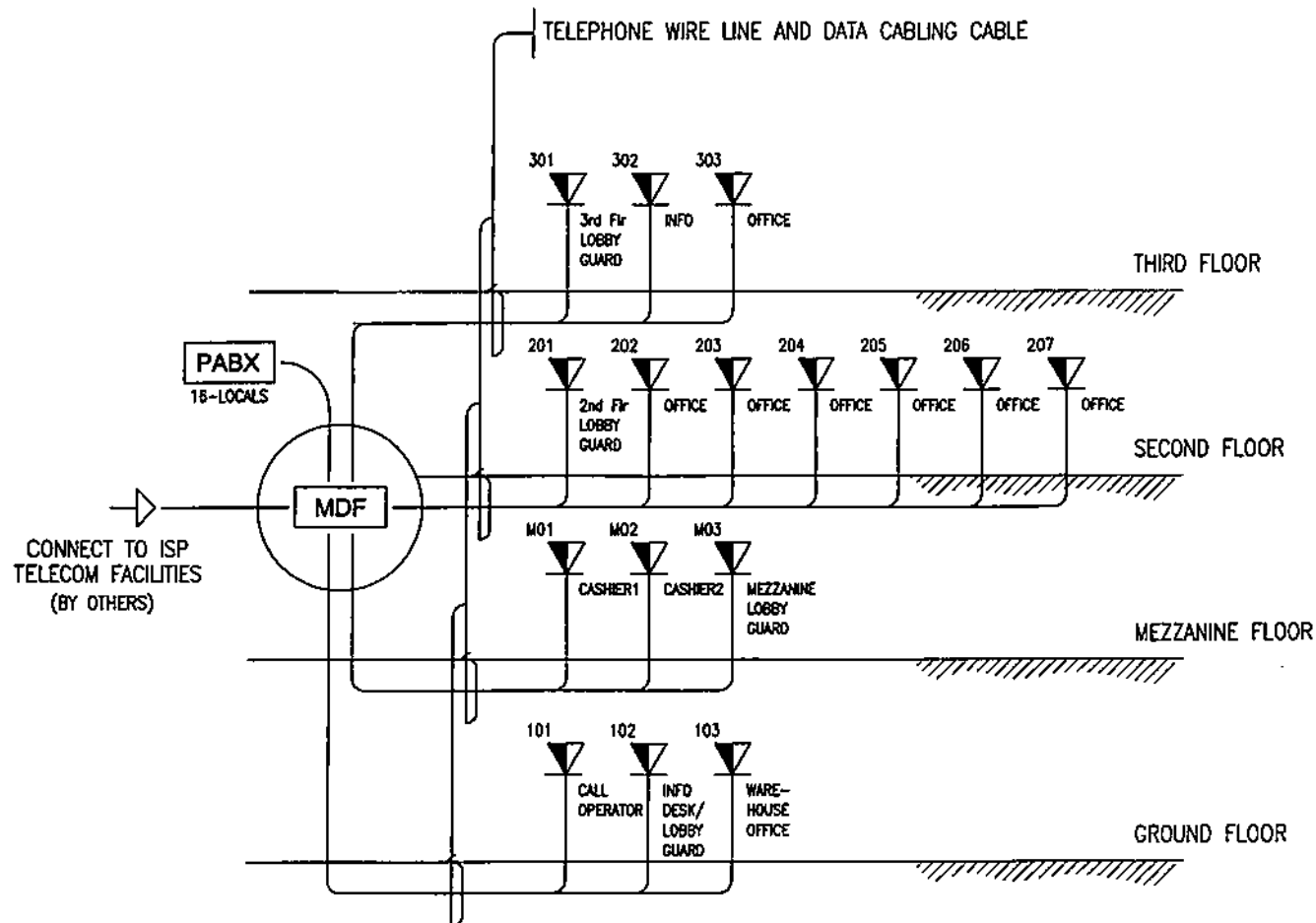
DETAIL B



DETAIL A

OWNER:				<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR					
LOCATION: BAGACAY, CALBAYOG, SAMAR					
TITLE: <b>LIGHTNING PROTECTION SYSTEM DETAILS</b>					
DESIGNED	BY	CHKD	DATE	SUBMITTED	<i>B. M. AGUILA</i>
DRAWN	NSC			RECOMMENDED	<i>C. Z. C. LUGOD, JR.</i>
REVIEWED	PRINCIPAL ENGR. / ARCHT.			APPROVED	<i>Manager, E&amp;C</i>
CIVIL/ARCHT					
ELEC.					
MECH.					
DWG. NO. <b>COSC-BDE-15.010</b>			SPECS. NO. <b>VisP22Z1464Sc</b>		
SCALE: AS SHOWN			<b>BID DRAWING</b>		REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.



# NOTES:

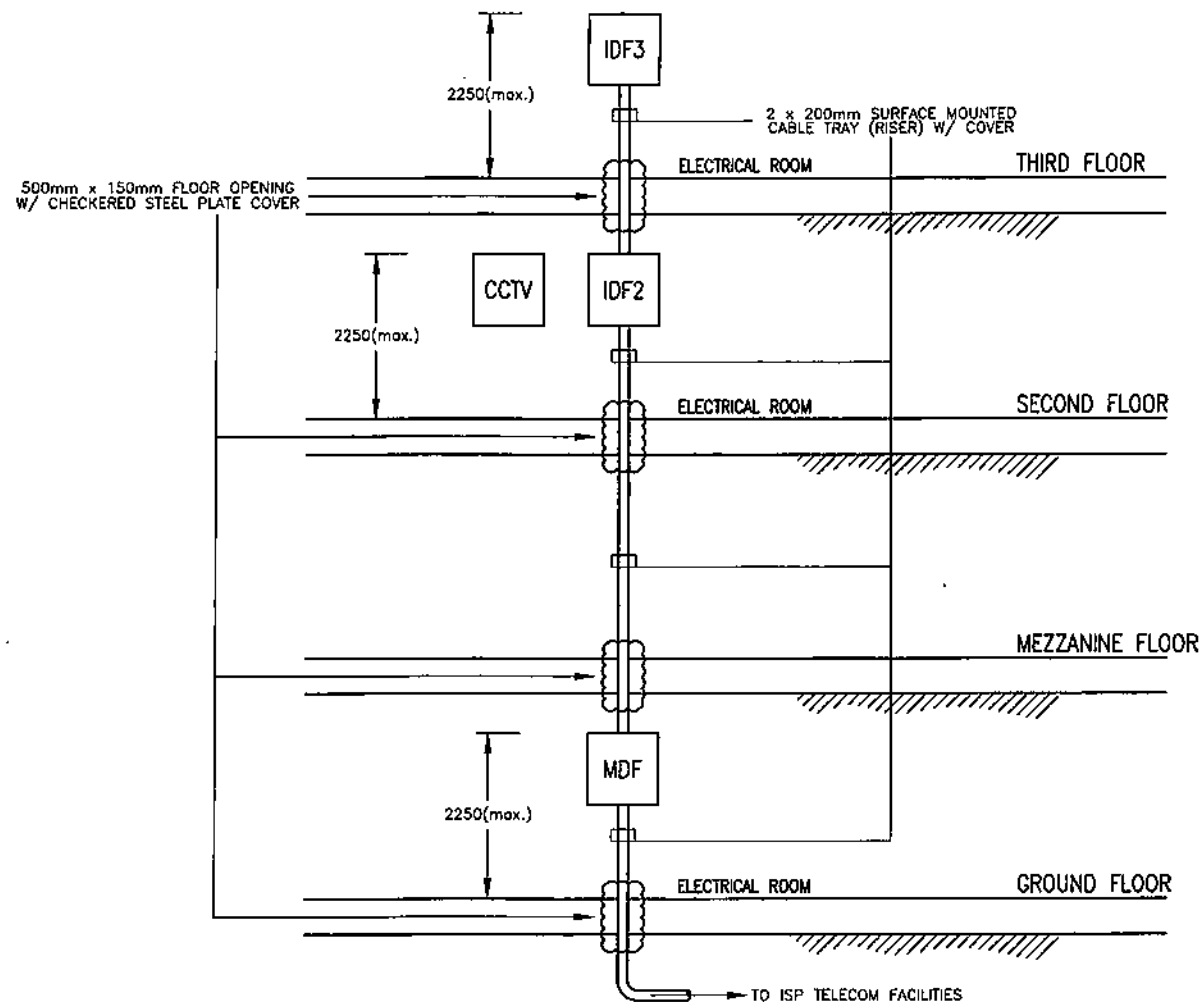
1. THE DESIGN SYSTEM REQUIREMENTS SHALL NOT BE LESS THAN QUANTITIES SPECIFIED IN THE BILL OF QUANTITIES (BOQ).
2. CONDUITS SHALL BE uPVC, SCHEDULE 40, UNLESS OTHERWISE INDICATED.
3. ALL NECESSARY MATERIALS AND ACCESSORIES THAT ARE NEEDED FOR THE COMPLETE AND RELIABLE OPERATION OF THE SYSTEM SHALL HEREBY PROVIDED BY THE CONTRACTOR.
5. THE STRUCTURED CABLING SYSTEM AND NETWORK DIAGRAM SHALL BE COORDINATED WITH THE END-USER AND THE INTERNET SERVICE PROVIDER (ISP).
6. THE DETAILED DESIGN, EQUIPMENT/COMPONENTS, CATALOG/ BROCHURES AND OTHER TECHNICAL DATA SHALL BE SUBMITTED FOR REVIEW AND APPROVAL.

## STRUCTURED CABLING SYSTEM NETWORK DIAGRAM

1  
E-11 SCALE

N.T.S.


OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>STRUCTURED CABLING SYSTEM NETWORK DIAGRAM</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	NG		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		SUBMITTED: <i>[Signature]</i>
CIVIL/ARCHT			RECOMMENDED: <i>[Signature]</i>
ELEC.			APPROVED: <i>[Signature]</i>
MECH.			
DWG. NO. <b>COSC-BDE-15.011</b>		SPEC. NO. <b>VisP22.1464Sc</b>	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPD.	
SCALE: N.T.S.		BID DRAWING	
REV. 6			

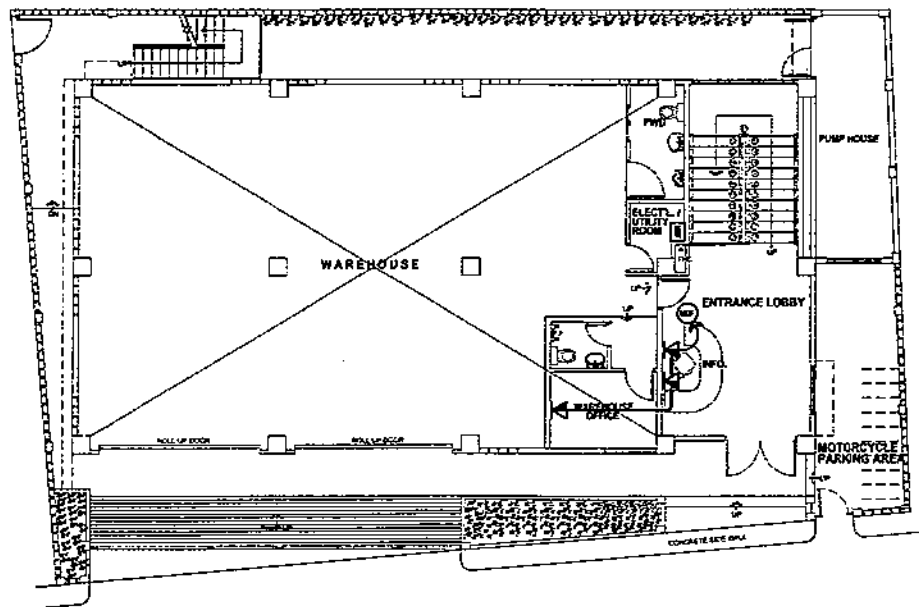


### STRUCTURED CABLING SYSTEM RISER DIAGRAM

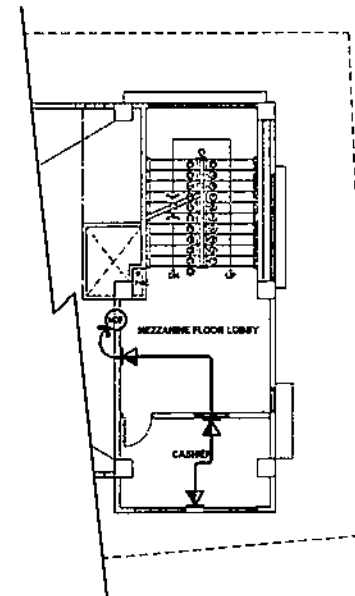
1  
E-12 SCALE

N.T.S.

OWNER:		 NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: STRUCTURED CABLING SYSTEM RISER DIAGRAM			
DESIGNED	BY	CHKD	DATE
DRAWN	MC		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		SUBMITTED: R. P. VERAR
ENCL/ARCHT			RECOMMENDED: R. Z. C. LUGO, JR.
ELEC.			APPROVED: R. D. BONGIORNO
MECH.			Manager, EOD
DWG. NO. COSC-BDE-15.012		SPEC. NO. VisP2221464Sc	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPD.	
SCALE: N.T.S.		BID DRAWING	
REV. 0			



1  
E-13  
**GROUND FLOOR**  
SCALE 1:150



2  
E-13  
**MEZZANINE FLOOR**  
SCALE 1:150

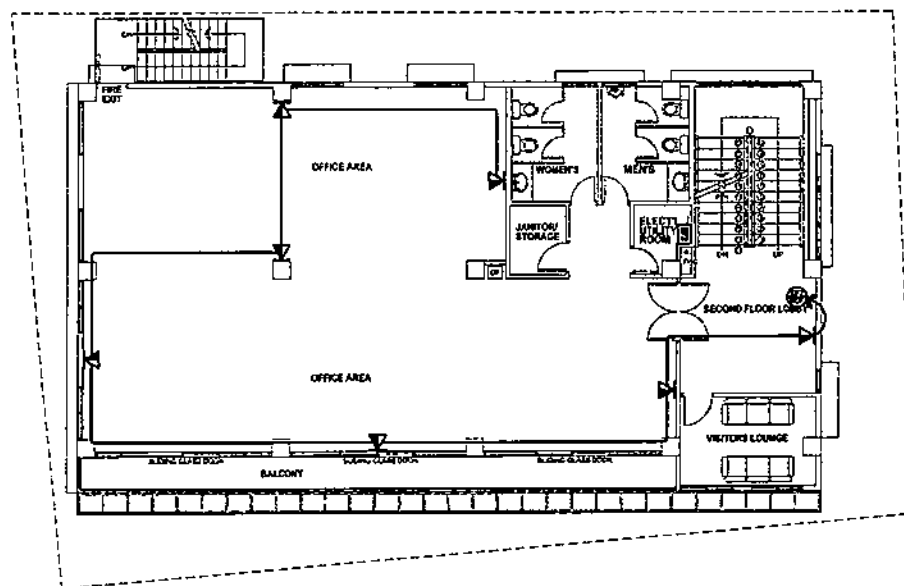
#### LEGENDS:

- FLUSH MOUNTED VOICE AND DATA FACEPLATE
- MAIN DISTRIBUTION FRAME
- CIRCUIT HOMERUN
- WIRING IN CABLE DUCT

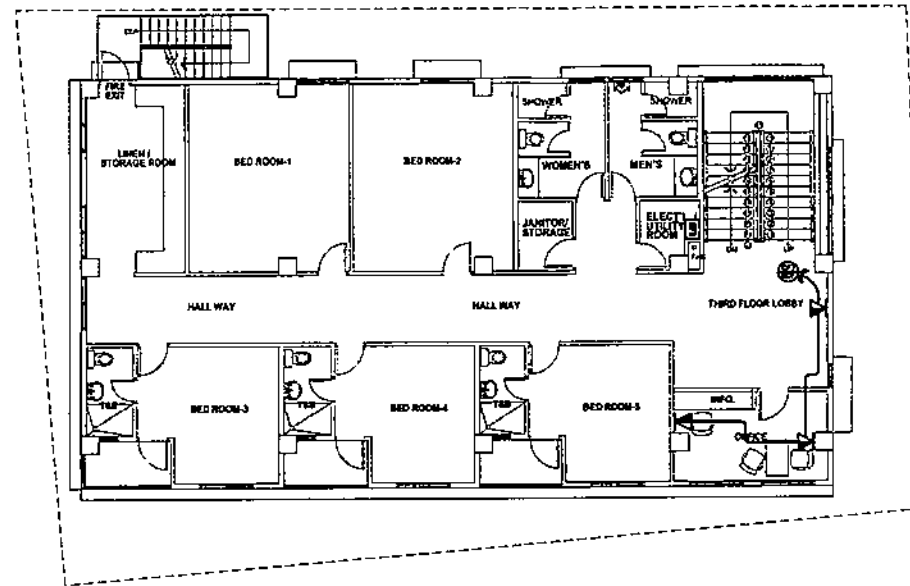
#### NOTES:

1. CABLES RUNNING ON CEILING SHALL BE INSTALLED INSIDE THE CABLE TRAY.
2. ALL CABLE RUNS SHALL BE CONTINUOUS AND NO SPLICES ALLOWED IN CONDUITS AND CABLE TRAY.
3. CONDUITS SHALL BE PERMANENTLY AND EFFECTIVELY GROUNDED.

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>STRUCTURED CABLING SYSTEM (GROUND FLOOR AND MEZZANINE FLOOR)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED	DATE
CIVIL/ARCHT		APPROVED	DATE
ELEC.			
MECH.			
DWG. NO. <b>COSC-B0E-15.013</b>		SPECS. NO. <b>VisP22Z1464Sc</b>	
SCALE: AS SHOWN		<b>BID DRAWING</b>	
REV. DATE		NATURE OF REVISION	
BY	CHKD	RECD	APPD



**1 SECOND FLOOR**  
E-14 SCALE 1:150



**2 THIRD FLOOR**  
E-14 SCALE 1:150

**LEGENDS:**

- FLUSH MOUNTED VOICE AND DATA FACEPLATE
- SECOND FLR INTERMEDIATE DISTRIBUTION FRAME
- THIRD FLR INTERMEDIATE DISTRIBUTION FRAME
- CIRCUIT HOMERUN
- WIRING IN CABLE DUCT

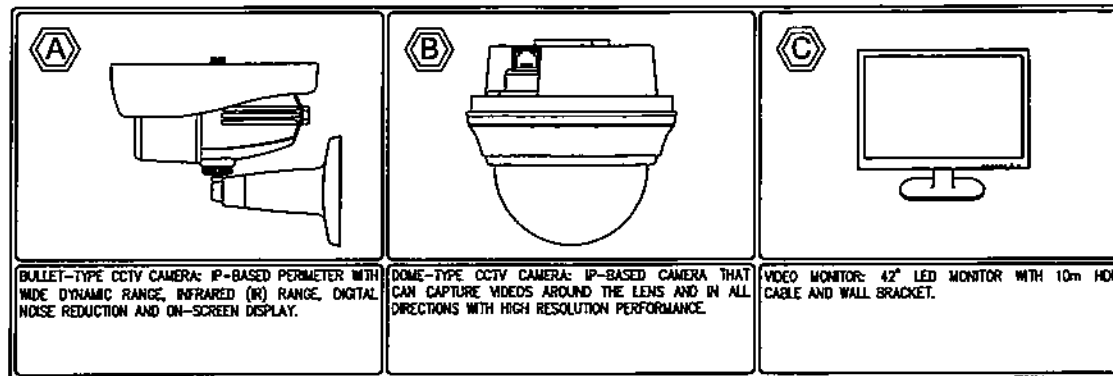
**NOTES:**

1. CABLES RUNNING ON CEILING SHALL BE INSTALLED INSIDE THE CABLE TRAY.
2. ALL CABLE RUNS SHALL BE CONTINUOUS AND NO SPLICES ALLOWED IN CONDUITS AND CABLE TRAY.
3. CONDUITS SHALL BE PERMANENTLY AND EFFECTIVELY GROUNDED.

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>STRUCTURED CABLING SYSTEM (SECOND FLOOR AND THIRD FLOOR)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	NSC		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		RECOMMENDED:
CONTRACT			Manager, E&C
ELEC.			APPROVED:
MECH.			Manager, E&C
DWG. NO. <b>COSC-BDE-15.014</b>		SPEC. NO. <b>VisP22Z148-Sc</b>	
SCALE: AS SHOWN		<b>BID DRAWING</b>	
REV. 0			

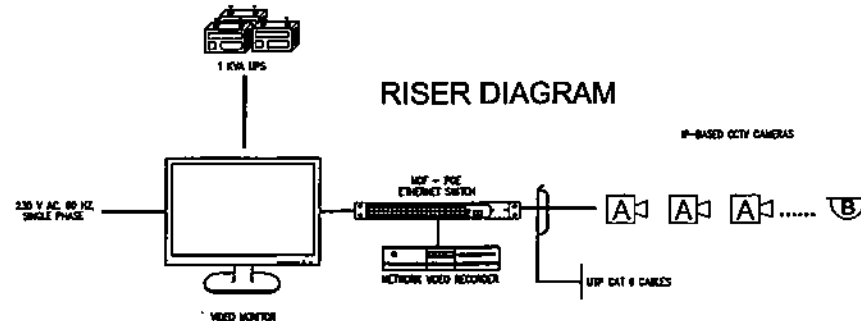
REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.

## DETAILS OF CCTV EQUIPMENT



### NOTES:

1. THE DESIGN SYSTEM REQUIREMENTS SHALL NOT BE LESS THAN THE QUANTITIES SPECIFIED IN THE BILL OF QUANTITIES (BOQ).
2. THE SUPPLIER SHALL SUBMIT DETAILED INSTALLATION PROCEDURE FOR NPC APPROVAL.
3. ALL OTHER NECESSARY MATERIALS AND ACCESSORIES THAT ARE NEEDED FOR THE COMPLETE AND RELIABLE OPERATION OF THE SYSTEM SHALL HEREBY PROVIDED BY THE CONTRACTOR.




## DETAILS OF CCTV SURVEILLANCE EQUIPMENT AND RISER DIAGRAM

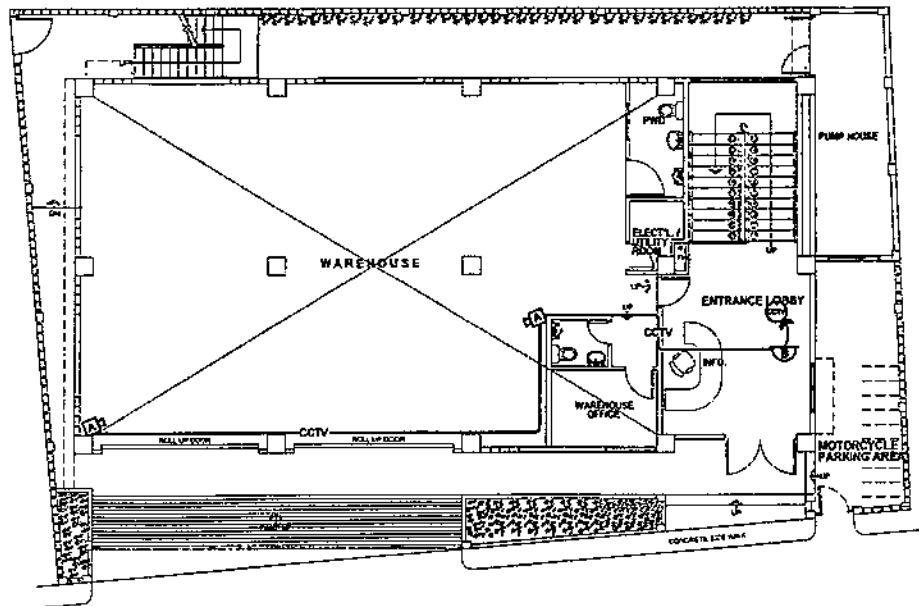
1  
E-15

SCALE

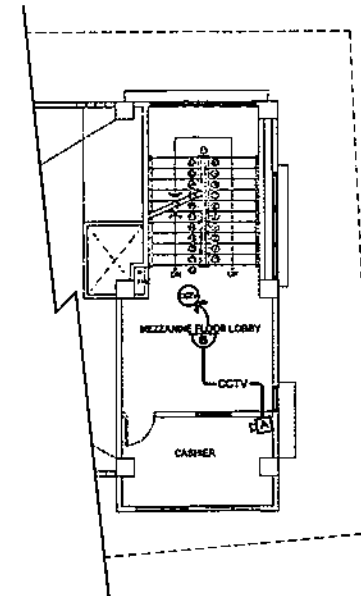
N.T.S.

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>DETAILS OF CCTV SURVEILLANCE EQUIPMENT &amp; RISER DIAGRAM</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	NIC		
REVIEWED	PRINCIPAL ENGR./ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			
SUBMITTED:		RECOMMENDED:	
R.P. VERAR		C.E. LUCAS, JR.	
APPROVED:		APPROVED:	
R. G. S. S. S.		R. G. S. S. S.	
DWG. NO. <b>COSC-BDE-15.015</b>		SPECS. NO. <b>VisP22Z1464Sc</b>	
SCALE: AS SHOWN		BID DRAWING	
REV. 0			

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



1  
E-16  
SCALE 1:150  
**GROUND FLOOR**







2  
E-16  
SCALE 1:150  
**MEZZANINE FLOOR**

#### LEGENDS:

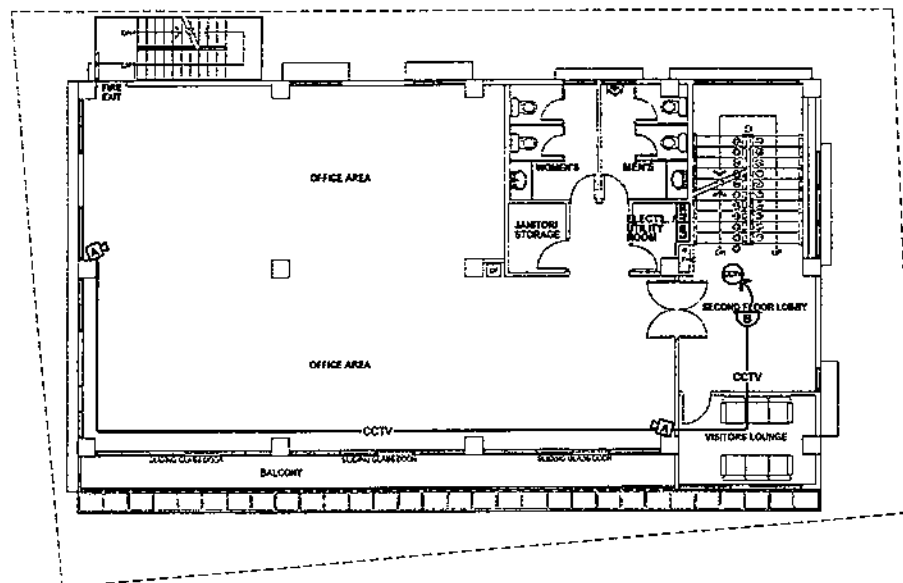
- [A] - CAMERA TYPE A  
 [B] - CAMERA TYPE B  
 ---CCTV--- CCTV SYSTEM WIRING

#### NOTES:

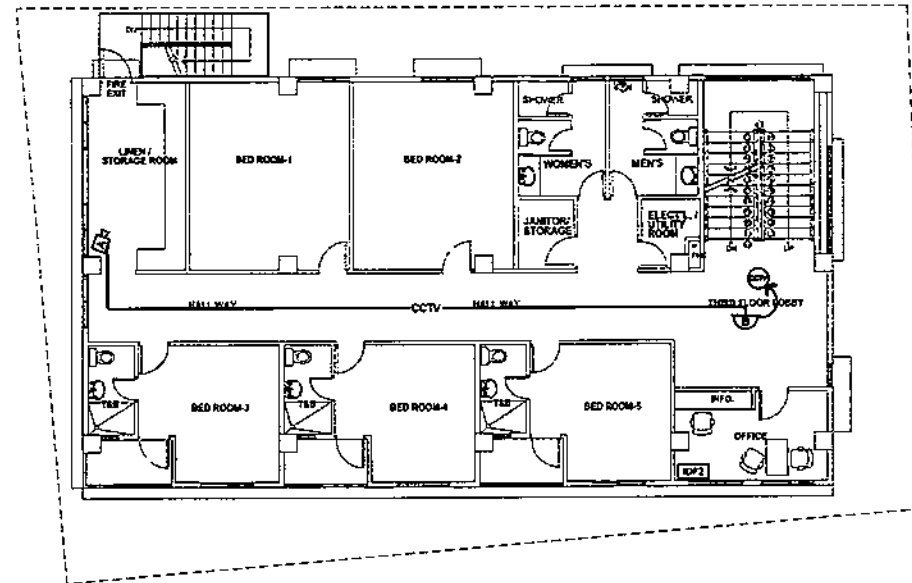
1. CABLES RUNNING ON CEILING SHALL BE INSTALLED INSIDE THE CABLE TRAY.
2. ALL CABLE RUNS SHALL BE CONTINUOUS AND NO SPLICES ALLOWED IN CONDUITS AND CABLE TRAY.
3. CONDUITS SHALL BE PERMANENTLY AND EFFECTIVELY GROUNDED.

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>CCTV SURVEILLANCE SYSTEM          (GROUND FLOOR AND MEZZANINE FLOOR)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	NC		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT.			
ELEC.			
MECH.			
SUBMITTED:		 R.P. VERAR Principal Engineer - E&I	
RECOMMENDED:		 C.Z.C. LOBO Manager, E&I	
APPROVED:		 R.P. VERAR Manager, E&I	
DWG. NO. COSC-8DE-15.013		SPECS. NO. VIsP22Z1484Sc	
SCALE: AS SHOWN		<b>BID DRAWING</b> REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



1 **SECOND FLOOR**  
E-17 SCALE 1:150





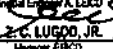

2 **THIRD FLOOR**  
E-17 SCALE 1:150

**LEGENDS:**

- [A] - CAMERA TYPE A  
 [B] - CAMERA TYPE B  
 -CCTV- - CCTV SYSTEM WIRING

**NOTES:**

1. CABLES RUNNING ON CEILING SHALL BE INSTALLED INSIDE THE CABLE TRAY.
2. ALL CABLE RUNS SHALL BE CONTINUOUS AND NO SPLICES ALLOWED IN CONDUITS AND CABLE TRAY.
3. CONDUITS SHALL BE PERMANENTLY AND EFFECTIVELY GROUNDING.

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: <b>CCTV SURVEILLANCE SYSTEM (SECOND FLOOR &amp; THIRD FLOOR)</b>			
DESIGNED	BY	CHKD	DATE
DRAWN	N/C		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC			
MECH			
SUBMITTED:		 R. P. VERAR Principal Engineer A, E&C	
RECOMMENDED:		 C. Z. C. LUGOD, JR. Manager, E&C	
APPROVED:		 N. G. B. B. B. Manager, E&C	
DWG. NO. COSC-BDE-15.017		SPEC. NO. VisP22Z1464Sc	
SCALE: AS SHOWN		<b>BID DRAWING</b> REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.

SECTION IX

**BID DRAWINGS**

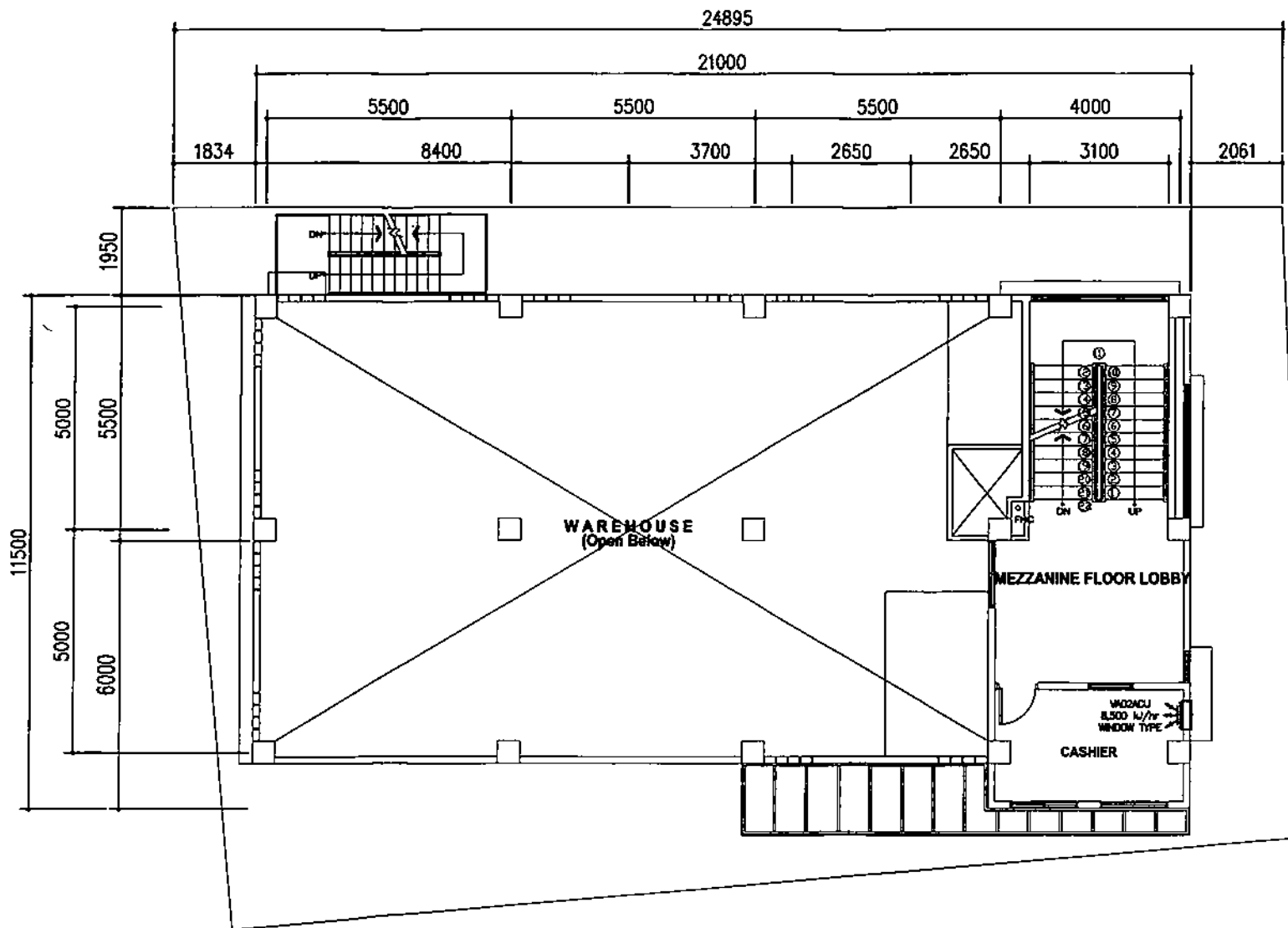
**MECHANICAL WORKS**

**SECTION IX - BID DRAWINGS****MW - MECHANICAL DRAWINGS**

<b>DRAWING NO.</b>	<b>TITLE</b>
COSC-BDM-15.001	AIRCONDITIONING AND VENTILATION SYSTEM (Ground Floor)
COSC-BDM-15.002	AIRCONDITIONING SYSTEM (Mezzanine)
COSC-BDM-15.003	AIRCONDITIONING AND VENTILATION SYSTEM (Second Floor)
COSC-BDM-15.004	AIRCONDITIONING AND VENTILATION SYSTEM (Third Floor)
COSC-BDM-15.005	FIRE FIGHTING, ALARM AND DETECTION SYSTEM (Ground Floor)
COSC-BDM-15.006	FIRE FIGHTING, ALARM AND DETECTION SYSTEM (Mezzanine)
COSC-BDM-15.007	FIRE FIGHTING, ALARM AND DETECTION SYSTEM (Second Floor)
COSC-BDM-15.008	FIRE FIGHTING, ALARM AND DETECTION SYSTEM (Third Floor)
COSC-BDM-15.009	DOMESTIC WATER PIPING LAYOUT (Roof Deck Floor)
COSC-BDM-15.010	DOMESTIC WATER PIPING SYSTEM (Side Elevation)
COSC-BDM-15.011	DOMESTIC WATER PIPING SYSTEM (Pumphouse, Cistern and Water Storage Tank)
COSC-BDM-15.012	DOMESTIC WATER PIPING LAYOUT (Third Floor)
COSC-BDM-15.013	DOMESTIC WATER PIPING LAYOUT (Second Floor)

COSC-BDM-15.014	DOMESTIC WATER PIPING LAYOUT (Ground Floor)
COSC-BDM-15.015	DOMESTIC WATER PIPING SYSTEM (Isometric Diagram 1 of 2)
COSC-BDM-15.016	DOMESTIC WATER PIPING SYSTEM (Isometric Diagram 2 of 2)
COSC-BDM-15.017	AUTOMATIC SPRINKLER SYSTEM (Ground Floor)
COSC-BDM-15.018	AUTOMATIC SPRINKLER SYSTEM (Mezzanine)
COSC-BDM-15.019	AUTOMATIC SPRINKLER SYSTEM (Second Floor)
COSC-BDM-15.020	AUTOMATIC SPRINKLER SYSTEM (Third Floor)
COSC-BDM-15.021	AUTOMATIC SPRINKLER SYSTEM (Pumphouse)
COSC-BDM-15.022	AUTOMATIC SPRINKLER SYSTEM (Isometric Diagram)
COSC-BDM-15.023	AUTOMATIC SPRINKLER SYSTEM (Mechanical Details)







**MEZZANINE FLOOR PLAN**  
SCALE 1:100

# NOTES:

1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. EQUIPMENT TO BE FURNISHED SHALL BE DESIGNED & CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE SPECIFICATIONS & SHALL FIT INTO THE SPACE AVAILABLE WITH PROPER REGARD TO ACCESSIBILITY, PASSAGEWAY, HANDLING AND STRUCTURE LIMITATIONS.
4. ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
5. ALL AIRCONDITIONING EQUIPMENT BROCHURES/CATALOGUES SHALL BE SUBMITTED BY THE CONTRACTOR, FOR NPC'S REVIEW AND APPROVAL, PRIOR TO PROCUREMENT/INSTALLATION.
6. ALL PIPES, CABLES, FITTINGS, AND ANGLE SUPPORTS SHALL BE INSTALLED FOR THE EFFICIENT AND PROPER OPERATION OF THE AIRCONDITIONING SYSTEM.
7. FINAL DETAILS AND ADJUSTMENT SHALL BE DONE IN THE FIELD BY THE CONTRACTOR DURING INSTALLATION TO SUIT ACTUAL SITE CONDITIONS. ALL WORKS SHALL BE EXECUTED IN CLOSE COORDINATION WITH ALL TRADES.

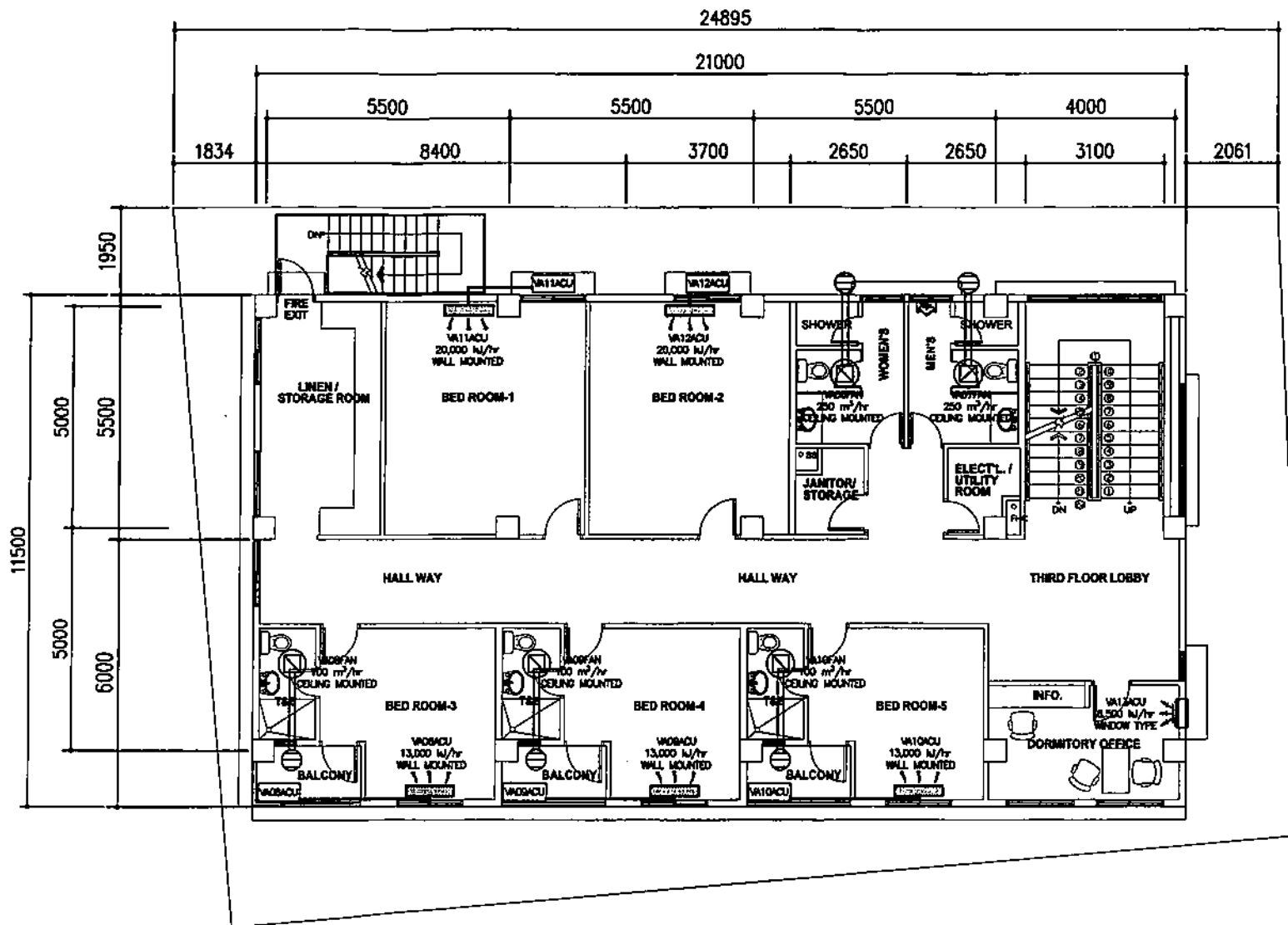
## LEGEND:

 WINDOW TYPE AIR CONDITIONING UNIT (INVERTER)

OWNER:  NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR	
LOCATION: BAGACAY, CALBAYOG, SAMAR	
TITLE: AIRCONDITIONING SYSTEM (MEZZANINE)	
DESIGNED: LACR	BY: CHD DATE: <i>[Signature]</i>
DRAWN: LACR	SUBMITTED: <i>[Signature]</i> N.G. ESPAYOS PROJECT ENGINEER A
REVIEWED: PRINCIPAL ENGR./ARCHT.	RECOMMENDED: <i>[Signature]</i> J. A. PASEL JR. MECHANICAL ENGR.
ENLARGED:	APPROVED: <i>[Signature]</i> N. G. ESPAYOS MECHANICAL ENGR.
ELEC:	
MECH:	
DWG. NO. COSC-BDM-15.002 SPEC. NO. VIsP22Z1464Sc	
SCALE: 1:100	BID DRAWING
REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.





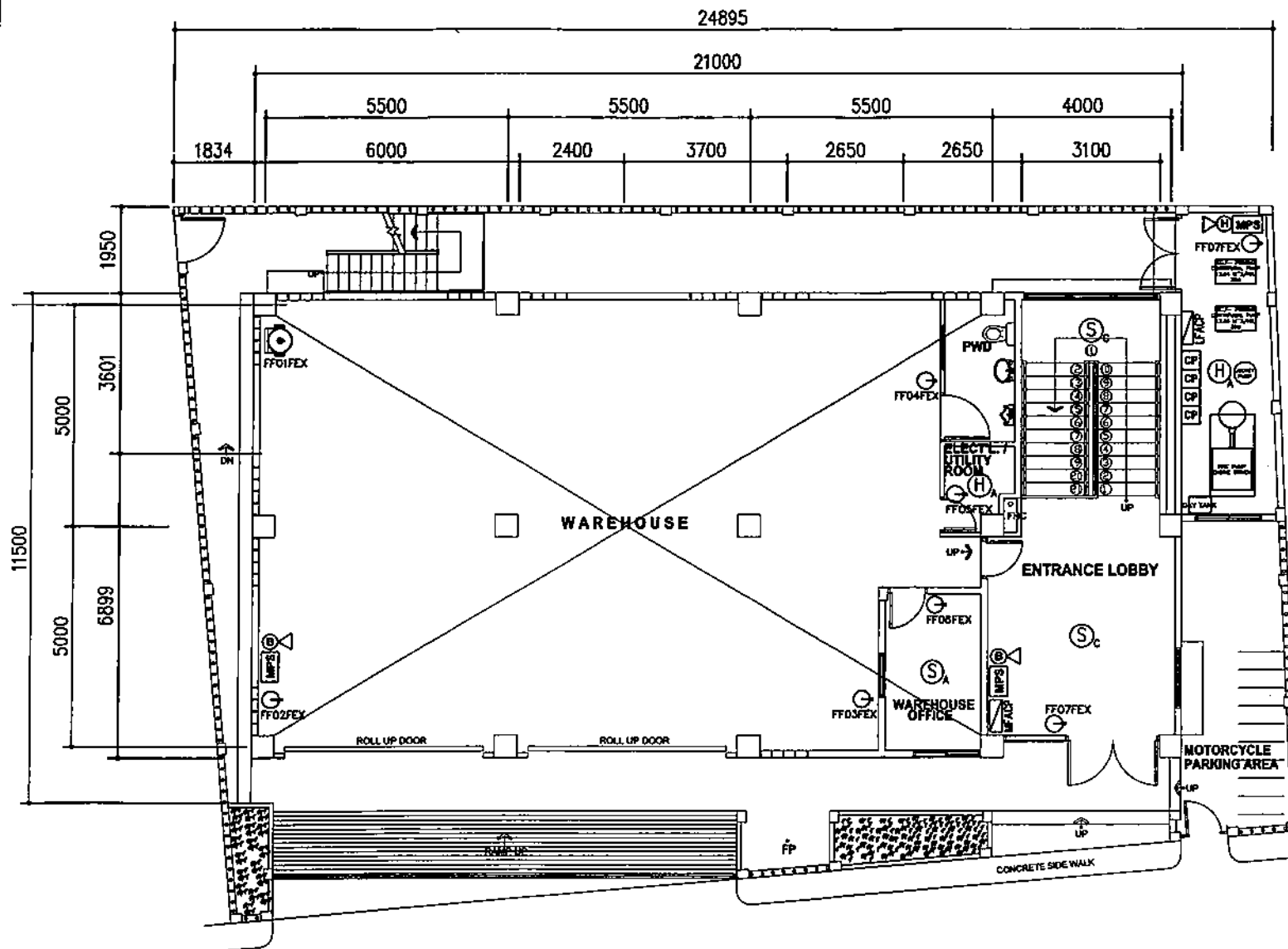
# NOTES:

- THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
- EQUIPMENT TO BE FURNISHED SHALL BE DESIGNED & CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE SPECIFICATIONS & SHALL FIT INTO THE SPACE AVAILABLE WITH PROPER REGARD TO ACCESSIBILITY, PASSAGEWAY, HANDLING AND STRUCTURE LIMITATIONS.
- ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
- ALL EXHAUST FAN AND AIRCONDITIONING EQUIPMENT BROCHURES/CATALOGUES SHALL BE SUBMITTED BY THE CONTRACTOR, FOR NPC'S REVIEW AND APPROVAL, PRIOR TO PROCUREMENT/INSTALLATION.
- ALL PIPES, CABLES, FITTINGS, AND ANGLE SUPPORTS SHALL BE INSTALLED FOR THE EFFICIENT AND PROPER OPERATION OF THE AIRCONDITIONING SYSTEM.
- FINAL DETAILS AND ADJUSTMENT SHALL BE DONE IN THE FIELD BY THE CONTRACTOR DURING INSTALLATION TO SUIT ACTUAL SITE CONDITIONS. ALL WORKS SHALL BE EXECUTED IN CLOSE COORDINATION WITH ALL TRADES.

## LEGEND:

- INVERTER SPLIT TYPE AIR CONDITIONING UNIT (WALL MOUNTED OR FLOOR MOUNTED)
- CEILING MOUNTED EXHAUST FAN
- DISCHARGE OPENING (WITH GRILLES/LOUVERS)
- WINDOW TYPE AIR CONDITIONING UNIT (INVERTER)

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: AIRCONDITIONING AND VENTILATION SYSTEM (THIRD FLOOR)			
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	PRINCIPAL ENGR. / ARCHT.		RECOMMENDED
OVERSIGHT			APPROVED
ELEC.			
MECH.			
DWG. NO. COSC-BDM-15.004		SPEC. NO. VisP22Z1464Sc	
SCALE 1:100		BID DRAWING	
REV. DATE		BY CHKD. RECD. APPD.	



**GROUND FLOOR PLAN**  
SCALE 1:100

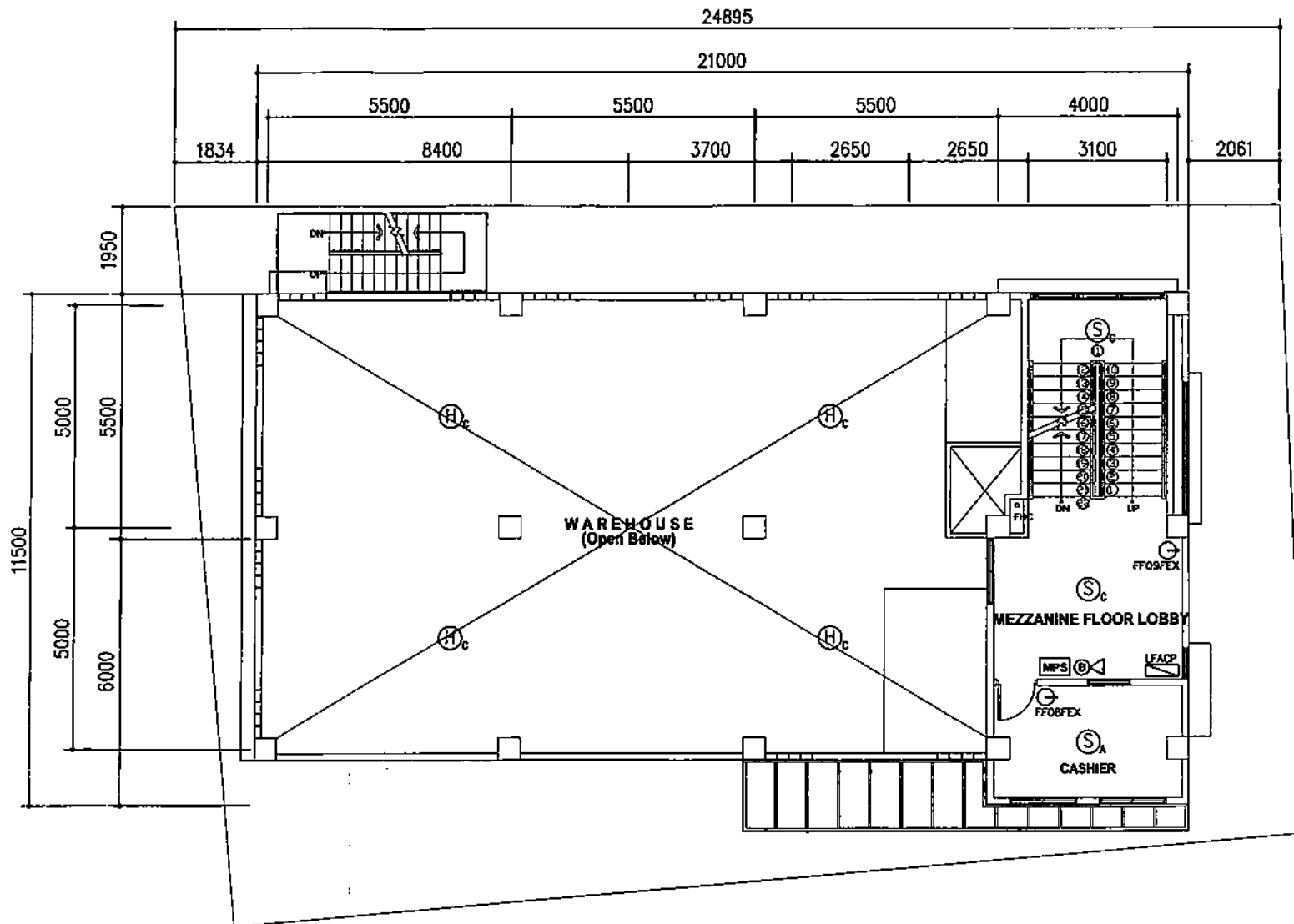
# NOTES:

1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
4. THE CONTRACTOR SHALL SUBMIT DETAILED DRAWINGS/TECHNICAL DATA FOR THE FIRE HYDRANT, ALARM AND DETECTION SYSTEM, INCLUDING THE LOCATION OF THE DETECTORS, WIRING DIAGRAM, ETC. FOR NPC'S REVIEW AND APPROVAL.
5. DETECTORS SHALL BE LOCATED NOT LESS THAN 300MM AWAY FROM ANY PART OF ANY LIGHTING FIXTURES.
6. MAIN FIRE ALARM CONTROL PANEL SHALL BE WALL MOUNTED AND LOCATED AS SHOWN IN THE DRAWING OR AS DIRECTED BY NPC PERSONNEL.
7. BROCHURES/CATALOGUES FOR ALL MATERIALS AND EQUIPMENT TO BE SUPPLIED SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC'S REVIEW AND APPROVAL PRIOR TO PROCUREMENT/INSTALLATION.
8. ALL MATERIALS AND PARTS WHICH ARE NOT SPECIFICALLY MENTIONED HEREIN BUT ARE NECESSARY FOR THE PROPER INSTALLATION AND OPERATION OF THE FIRE ALARM SYSTEM SHALL BE FURNISHED AT NO ADDITIONAL COST TO NPC.

## LEGEND:

- Ⓢ<sub>A</sub> - ADDRESSABLE SMOKE DETECTOR (PHOTOELECTRIC)
- Ⓢ<sub>C</sub> - CONVENTIONAL SMOKE DETECTOR (PHOTOELECTRIC)
- ⓗ - ADDRESSABLE HEAT DETECTOR
- Ⓢ<sub>B</sub> - FIRE ALARM BELL
- Ⓢ<sub>L</sub> - HORN WITH FLASHING LIGHT (OUTDOOR TYPE)
- MPS - MANUAL PULL STATION
- Ⓢ<sub>E</sub> - PORTABLE FIRE EXTINGUISHER (7.1KG HCFC OR HALOTRON)
- Ⓢ<sub>M</sub> - MAIN FIRE ALARM CONTROL PANEL
- FHC - FIRE HOSE CABINET
- CP - CONTROL PANEL
- Ⓢ<sub>W</sub> - WHEELED TYPE FIRE EXTINGUISHER (29.5KG HCFC OR HALOTRON)

OWNER		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: FIRE FIGHTING, ALARM AND DETECTION SYSTEM (GROUND FLOOR)			
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	PRINCIPAL ENGR./ARCHT.		RECOMMENDED
CIVIL/ARCHT			APPROVED
ELEC			
MECH			
DWG. NO. COSC-BDM-15.005		SPECS. NO. VisP22Z1464Sc	
SCALE: 1:100		BID DRAWING	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPL.	



**MEZZANINE FLOOR PLAN**





SCALE 1:100

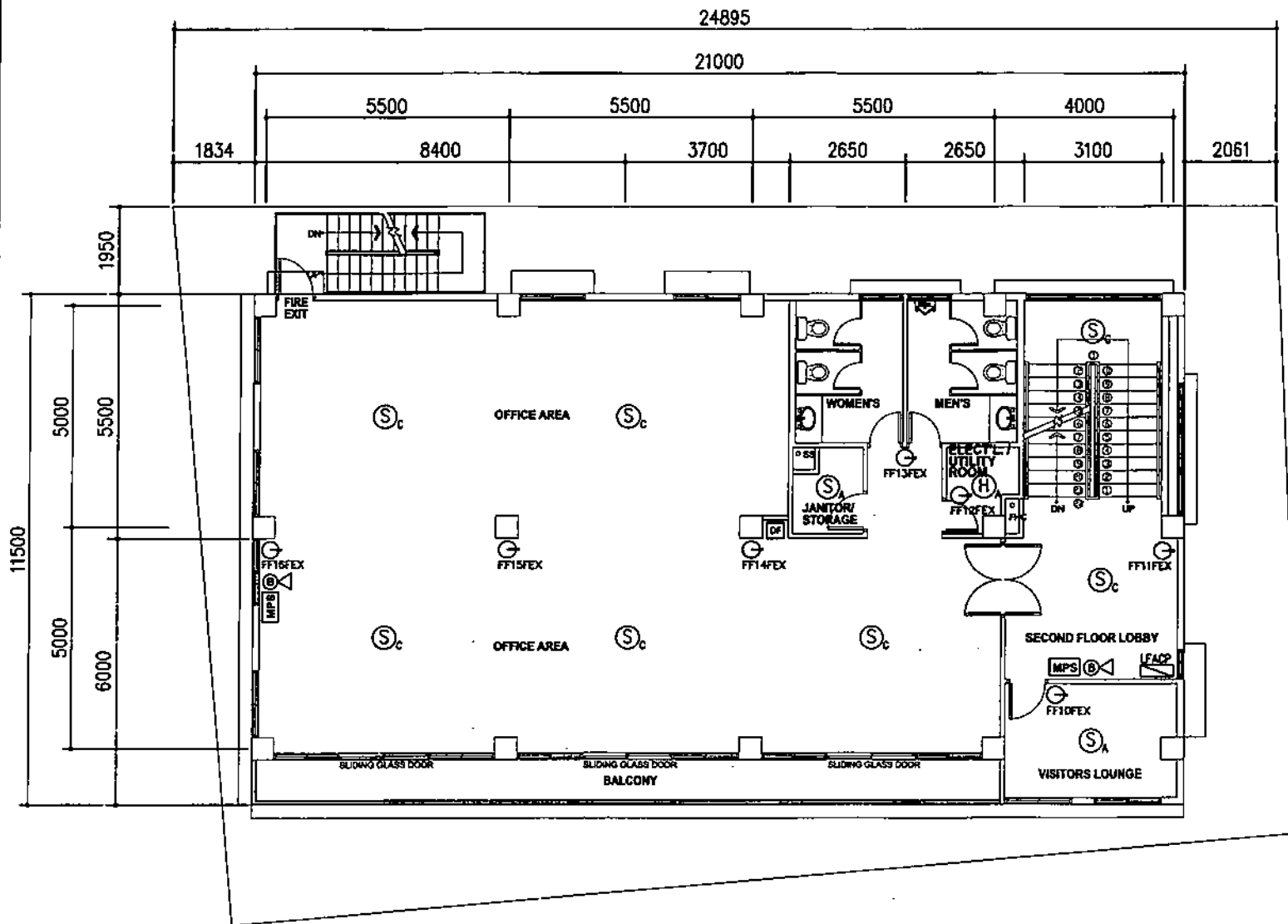
# NOTES:

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2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
4. THE CONTRACTOR SHALL SUBMIT DETAILED DRAWINGS/TECHNICAL DATA FOR THE FIRE HYDRANT, ALARM AND DETECTION SYSTEM, INCLUDING THE LOCATION OF THE DETECTORS, WIRING DIAGRAM, ETC. FOR NPC'S REVIEW APPROVAL.
5. DETECTORS SHALL BE LOCATED NOT LESS THAN 300MM AWAY FROM ANY PART OF ANY LIGHTING FIXTURES.
6. MAIN FIRE ALARM CONTROL PANEL SHALL BE WALL MOUNTED AND LOCATED AS SHOWN IN THE DRAWING OR AS DIRECTED BY NPC PERSONNEL.
7. BROCHURES/CATALOGUES FOR ALL MATERIALS AND EQUIPMENT TO BE SUPPLIED SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC'S REVIEW AND APPROVAL PRIOR TO PROCUREMENT/INSTALLATION.
8. ALL MATERIALS AND PARTS WHICH ARE NOT SPECIFICALLY MENTIONED HEREIN BUT ARE NECESSARY FOR THE PROPER INSTALLATION AND OPERATION OF THE FIRE ALARM SYSTEM SHALL BE FURNISHED AT NO ADDITIONAL COST TO NPC.

## LEGEND:

- (S<sub>A</sub>) - ADDRESSABLE SMOKE DETECTOR (PHOTOELECTRIC)
- (S<sub>C</sub>) - CONVENTIONAL SMOKE DETECTOR (PHOTOELECTRIC)
- (H<sub>C</sub>) - CONVENTIONAL HEAT DETECTOR
- (B) - FIRE ALARM BELL
- (M) - MANUAL PULL STATION
- (E) - PORTABLE FIRE EXTINGUISHER (7.1KG HCFC OR HALOTRON)
- (FHC) - LOCAL FIRE ALARM CONTROL PANEL
- FHC - FIRE HOSE CABINET

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: FIRE FIGHTING, ALARM AND DETECTION SYSTEM (MEZZANINE)			
DESIGNED	BY	CHKD	DATE
DRAWN	LACR		
REVIEWED	PRINCIPAL ENGR./ARCHT.		
CIVIL/ARCHT			
ELEC.			
MECH.			
SUBMITTER:		 <b>H. G. ESPAYOS</b> Principal Engineer	
RECOMMENDED:		 <b>J. P. DELA CRUZ</b> Manager	
APPROVED:		 <b>N. C. SERRANO</b> Manager, DDO	
DWG. NO. COSC-BDM-15.006		SPEC. NO. VisP22Z1464Sc	
SCALE: 1:100		BID DRAWING	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPD.	



**SECOND FLOOR PLAN**  
SCALE 1:100

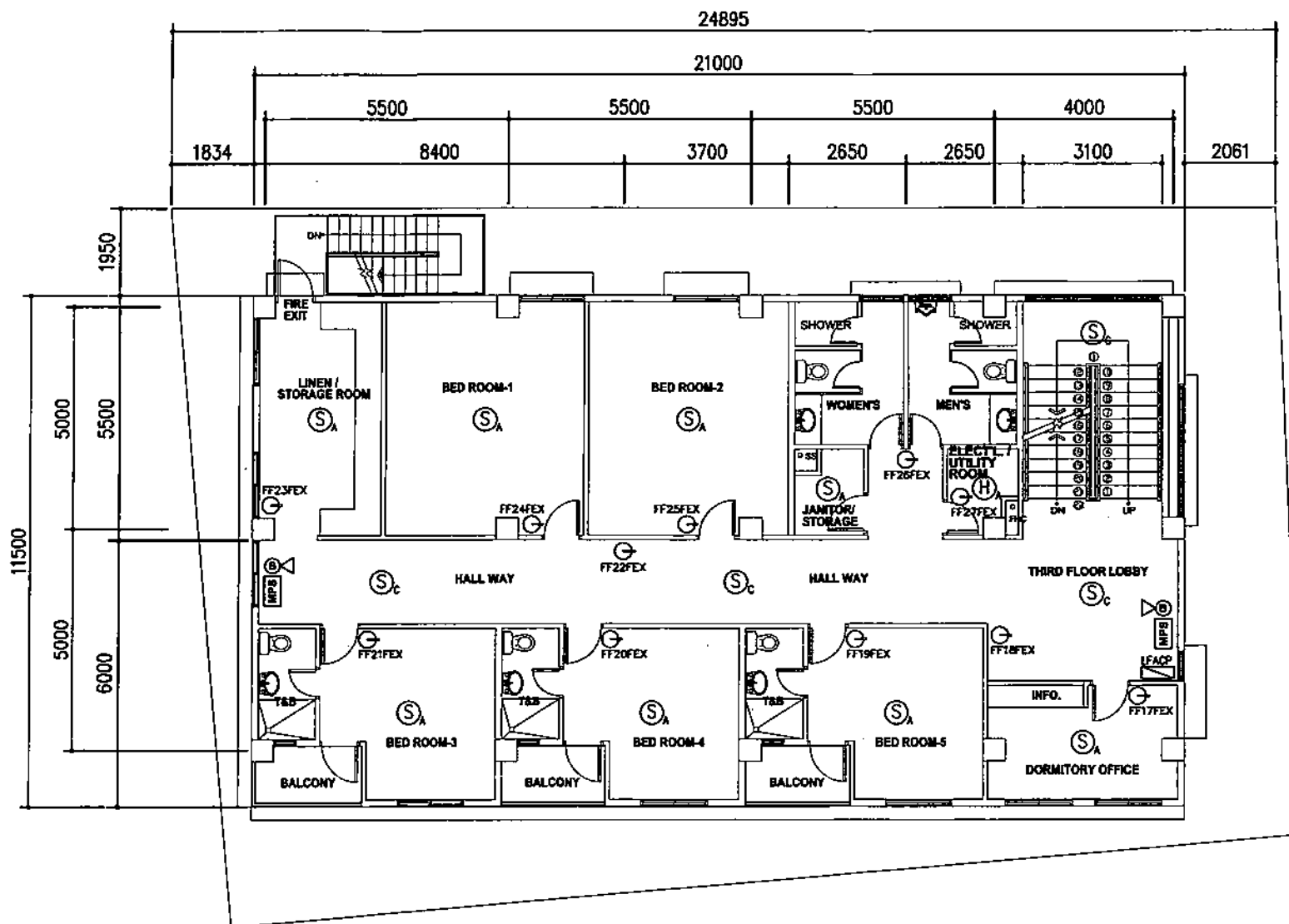
# NOTES:

1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
4. THE CONTRACTOR SHALL SUBMIT DETAILED DRAWINGS/TECHNICAL DATA FOR THE FIRE HYDRANT, ALARM AND DETECTION SYSTEM, INCLUDING THE LOCATION OF THE DETECTORS, WIRING DIAGRAM, ETC. FOR NPC'S REVIEW AND APPROVAL.
5. DETECTORS SHALL BE LOCATED NOT LESS THAN 300MM AWAY FROM ANY PART OF ANY LIGHTING FIXTURES.
6. MAIN FIRE ALARM CONTROL PANEL SHALL BE WALL MOUNTED AND LOCATED AS SHOWN IN THE DRAWING OR AS DIRECTED BY NPC PERSONNEL.
7. BROCHURES/CATALOGUES FOR ALL MATERIALS AND EQUIPMENT TO BE SUPPLIED SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC'S REVIEW AND APPROVAL PRIOR TO PROCUREMENT/INSTALLATION.
8. ALL MATERIALS AND PARTS WHICH ARE NOT SPECIFICALLY MENTIONED HEREIN BUT ARE NECESSARY FOR THE PROPER INSTALLATION AND OPERATION OF THE FIRE ALARM SYSTEM SHALL BE FURNISHED AT NO ADDITIONAL COST TO NPC.

## LEGEND:

- (S<sub>a</sub>) - ADDRESSABLE SMOKE DETECTOR (PHOTOELECTRIC)
- (S<sub>c</sub>) - CONVENTIONAL SMOKE DETECTOR (PHOTOELECTRIC)
- (H<sub>c</sub>) - ADDRESSABLE HEAT DETECTOR
- (B) - FIRE ALARM BELL
- (MPS) - MANUAL PULL STATION
- (FF15FEX) - PORTABLE FIRE EXTINGUISHER (7.1KG HCFC OR HALOTRON)
- (FACP) - LOCAL FIRE ALARM CONTROL PANEL
- (FHC) - FIRE HOSE CABINET

OWNER:		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: FIRE FIGHTING, ALARM AND DETECTION SYSTEM (SECOND FLOOR)			
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	PRINCIPAL ENGR. / ARCHT.	RECOMMENDED	DATE
CIVIL/ARCHT.		APPROVED	DATE
ELEC.			
MECH.			
DWG. NO. COSC-BDM-15.007		SPEC. NO. VisP2221464Sc	
SCALE: 1:100		BID DRAWING	
REV. 0		REV. 0	




**THIRD FLOOR PLAN**  
SCALE 1:100

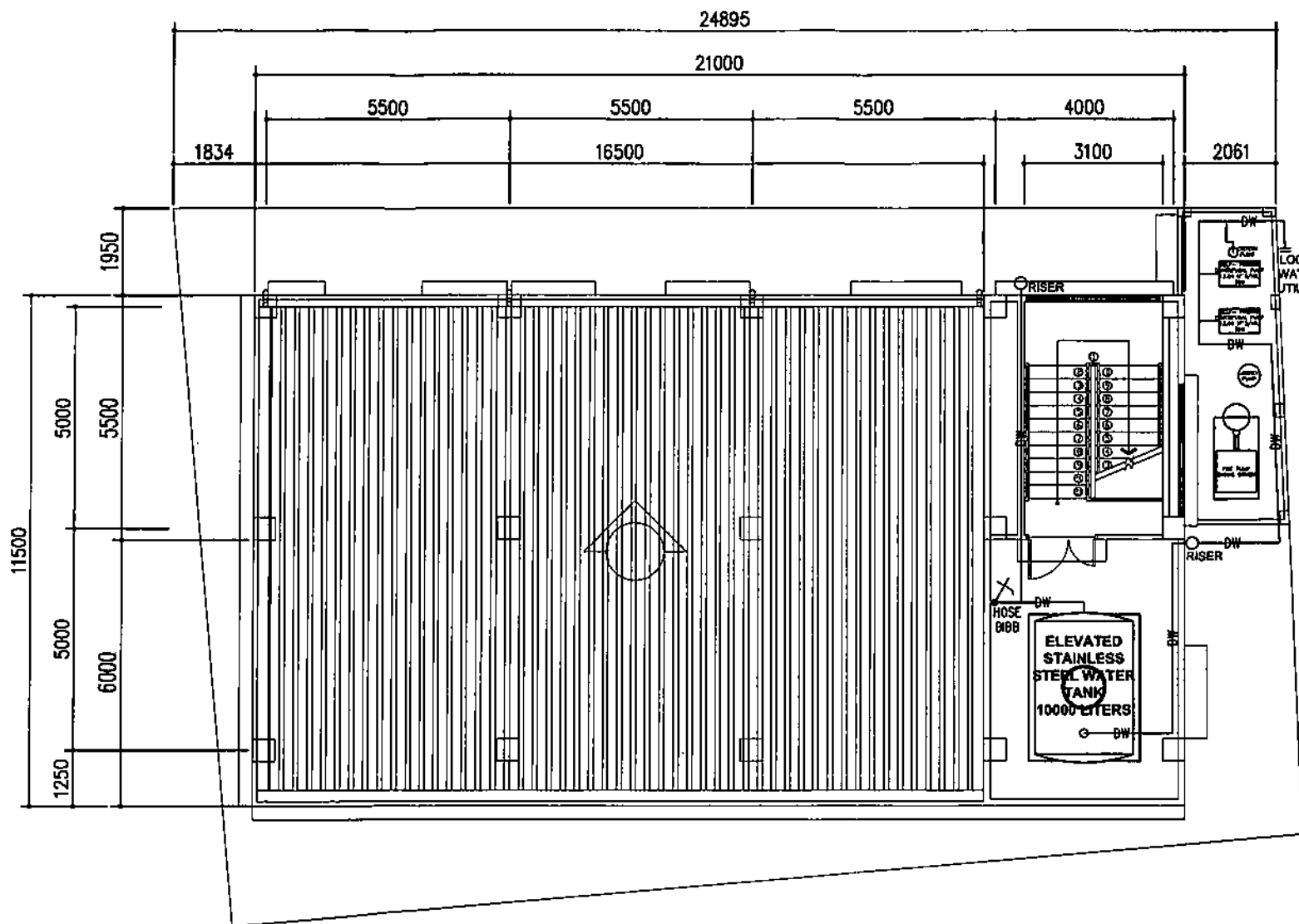
# NOTES:

1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
4. THE CONTRACTOR SHALL SUBMIT DETAILED DRAWINGS/TECHNICAL DATA FOR THE FIRE HYDRANT, ALARM AND DETECTION SYSTEM, INCLUDING THE LOCATION OF THE DETECTORS, WIRING DIAGRAM, ETC. FOR NPC'S REVIEW APPROVAL.
5. DETECTORS SHALL BE LOCATED NOT LESS THAN 300MM AWAY FROM ANY PART OF ANY LIGHTING FIXTURES.
6. MAIN FIRE ALARM CONTROL PANEL SHALL BE WALL MOUNTED AND LOCATED AS SHOWN IN THE DRAWING OR AS DIRECTED BY NPC PERSONNEL.
7. BROCHURES/CATALOGUES FOR ALL MATERIALS AND EQUIPMENT TO BE SUPPLIED SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC'S REVIEW AND APPROVAL PRIOR TO PROCUREMENT/INSTALLATION.
8. ALL MATERIALS AND PARTS WHICH ARE NOT SPECIFICALLY MENTIONED HEREIN BUT ARE NECESSARY FOR THE PROPER INSTALLATION AND OPERATION OF THE FIRE ALARM SYSTEM SHALL BE FURNISHED AT NO ADDITIONAL COST TO NPC.

## LEGEND:

- (S<sub>A</sub>) - ADDRESSABLE SMOKE DETECTOR (PHOTODELECTRIC)
- (S<sub>c</sub>) - CONVENTIONAL SMOKE DETECTOR (PHOTODELECTRIC)
- (H<sub>A</sub>) - ADDRESSABLE HEAT DETECTOR
- (B) - FIRE ALARM BELL
- (MPS) - MANUAL PULL STATION
- (G) - PORTABLE FIRE EXTINGUISHER (7.1KG HFC OR HALOTRON)
- (LACP) - LOCAL FIRE ALARM CONTROL PANEL
- (FHC) - FIRE HOSE CABINET

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: FIRE FIGHTING, ALARM AND DETECTION SYSTEM (THIRD FLOOR)			
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/RIGHT			
ELEC.			
MECH.			
SUBMITTED:		RECOMMENDED:	
APPROVED:		APPROVED:	
DWG. NO. COSC-BDM-15.008		SPECS. NO. VisP22Z1464Sc	
SCALE: 1:100		BID DRAWING	
REV.		REV. 0	



# ROOF PLAN AND ROOF DECK FLOOR

SCALE

1:100


## NOTES:

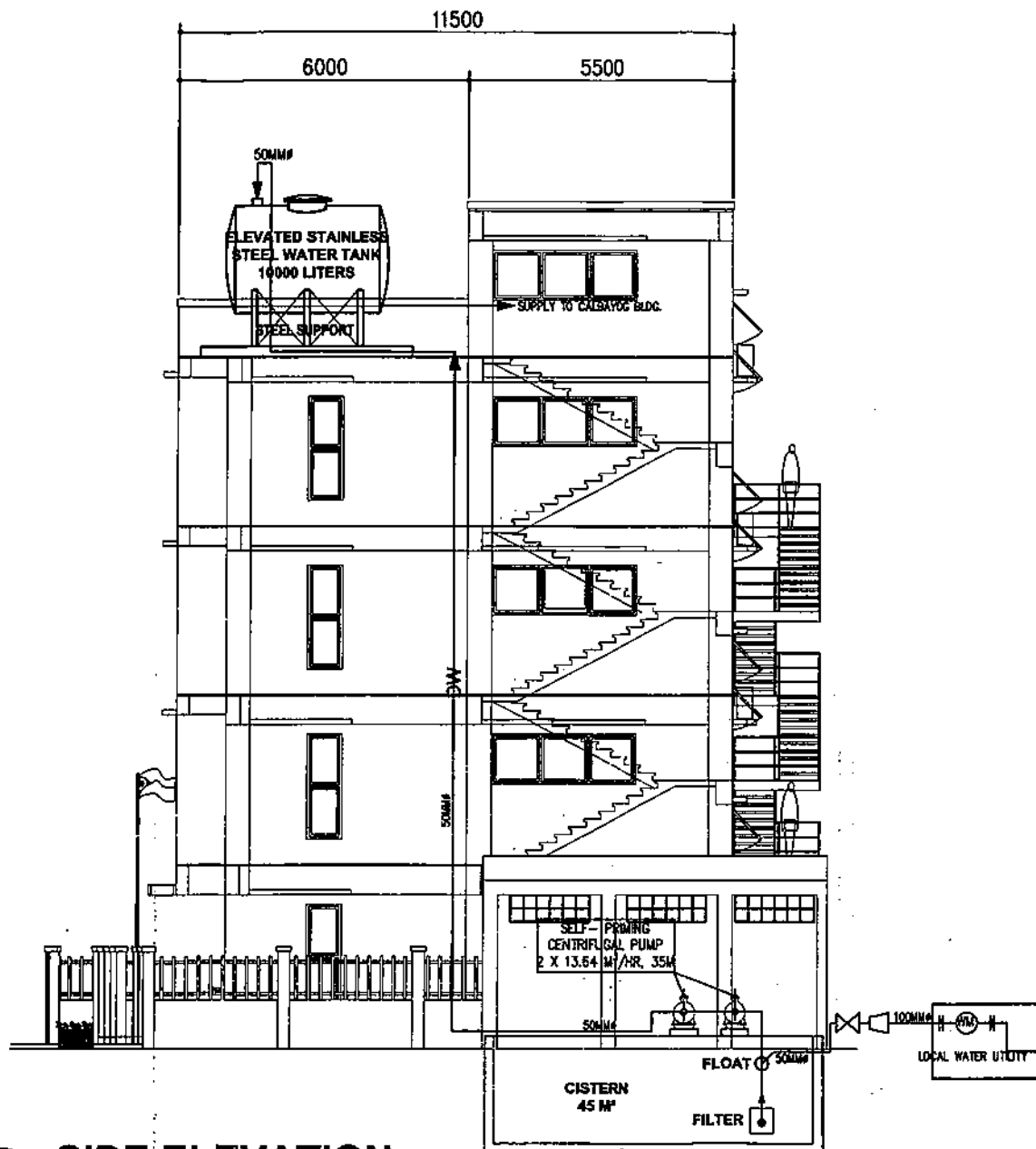
1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
4. PIPING LAID UNDERGROUND SHALL NOT BE LESS THAN 300MM FROM THE GROUND SURFACE TO THE BOTTOM OF PIPE.
5. FOR PIPES THAT CROSSES ROADWAYS, PIPE SLEEVE OF STEEL MATERIAL SHALL BE PROVIDED.
6. ALL PIPES, VALVES, VALVE BOXES, FITTINGS, AND PIPE SUPPORTS SHALL BE INSTALLED FOR THE EFFICIENT AND PROPER OPERATION OF THE SYSTEM.
7. ALL PIPES, VALVES AND OTHER EQUIPMENT BROCHURES/CATALOGUES SHALL BE SUBMITTED BY THE CONTRACTOR, FOR NPC'S REVIEW AND APPROVAL, PRIOR TO PROCUREMENT/INSTALLATION.
8. FINAL DETAILS AND ADJUSTMENT SHALL BE DONE IN THE FIELD BY THE CONTRACTOR DURING INSTALLATION TO SUIT ACTUAL SITE CONDITIONS. ALL WORKS SHALL BE EXECUTED IN CLOSE COORDINATION WITH ALL TRADES.

## LEGEND:

DW - DOMESTIC WATER LINE

X - HOSE BIBB

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: DOMESTIC WATER PIPING LAYOUT (ROOF DECK FLOOR)			
DESIGNED	BY	CHKD	DATE
DRAWN	LAOR		
REVIEWED	PRINCIPAL ENGR./ARCHT.		
CHKD/ARCHT			
ELEC.			
MECH.			
DWG. NO. COSC-BDM-15.009		SPECS. NO. VisP22Z1464Sc	
SCALE: 1:100		BID DRAWING	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPD.	







# NOTES:

1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
3. PIPING LAID UNDERGROUND SHALL NOT BE LESS THAN 300MM FROM THE GROUND SURFACE TO THE BOTTOM OF PIPE.
4. FOR PIPES THAT CROSSES ROADWAYS, PIPE SLEEVE OF STEEL MATERIAL SHALL BE PROVIDED.
5. ALL PIPES, VALVES, VALVE BOXES & FITTINGS, SHALL BE PROPERLY SUPPORTED/INSTALLED FOR THE EFFICIENT AND PROPER OPERATION OF THE SYSTEM.
6. ALL PIPES AND VALVES' BROCHURES/CATALOGUES SHALL BE SUBMITTED BY THE CONTRACTOR, FOR NPC'S REVIEW AND APPROVAL, PRIOR TO PROCUREMENT/INSTALLATION.
7. MAIN WATER PIPES/ LINES SHALL PREFERABLY BE INSTALLED/CONCEALED IN THE CEILING AND SHALL BE PROPERLY SUPPORTED PER MANUFACTURERS RECOMMENDATIONS AND OR AS REQUIRED BY THE PIPING CONFIGURATION.
8. FINAL DETAILS AND ADJUSTMENT SHALL BE DONE IN THE FIELD BY THE CONTRACTOR DURING INSTALLATION TO SUIT ACTUAL SITE CONDITIONS. ALL WORKS SHALL BE EXECUTED IN CLOSE COORDINATION WITH ALL TRADES.
9. ALL PP-R PIPE DIMENSIONS (CONFORMING TO PN 20 NOMINAL PRESSURE AND CLASS) SHOWN ARE IN NOMINAL DIAMETER (MM) WITH THE FOLLOWING EQUIVALENTS:

100MM (4")	= 110MM O.D. (OUTSIDE DIAMETER)
50MM (2")	= 63MM O.D.
40MM (1 1/2")	= 50MM O.D.
32MM (1 1/4")	= 40MM O.D.
25MM (1")	= 32MM O.D.
20MM (3/4")	= 25MM O.D.
15MM (1/2")	= 20MM O.D.

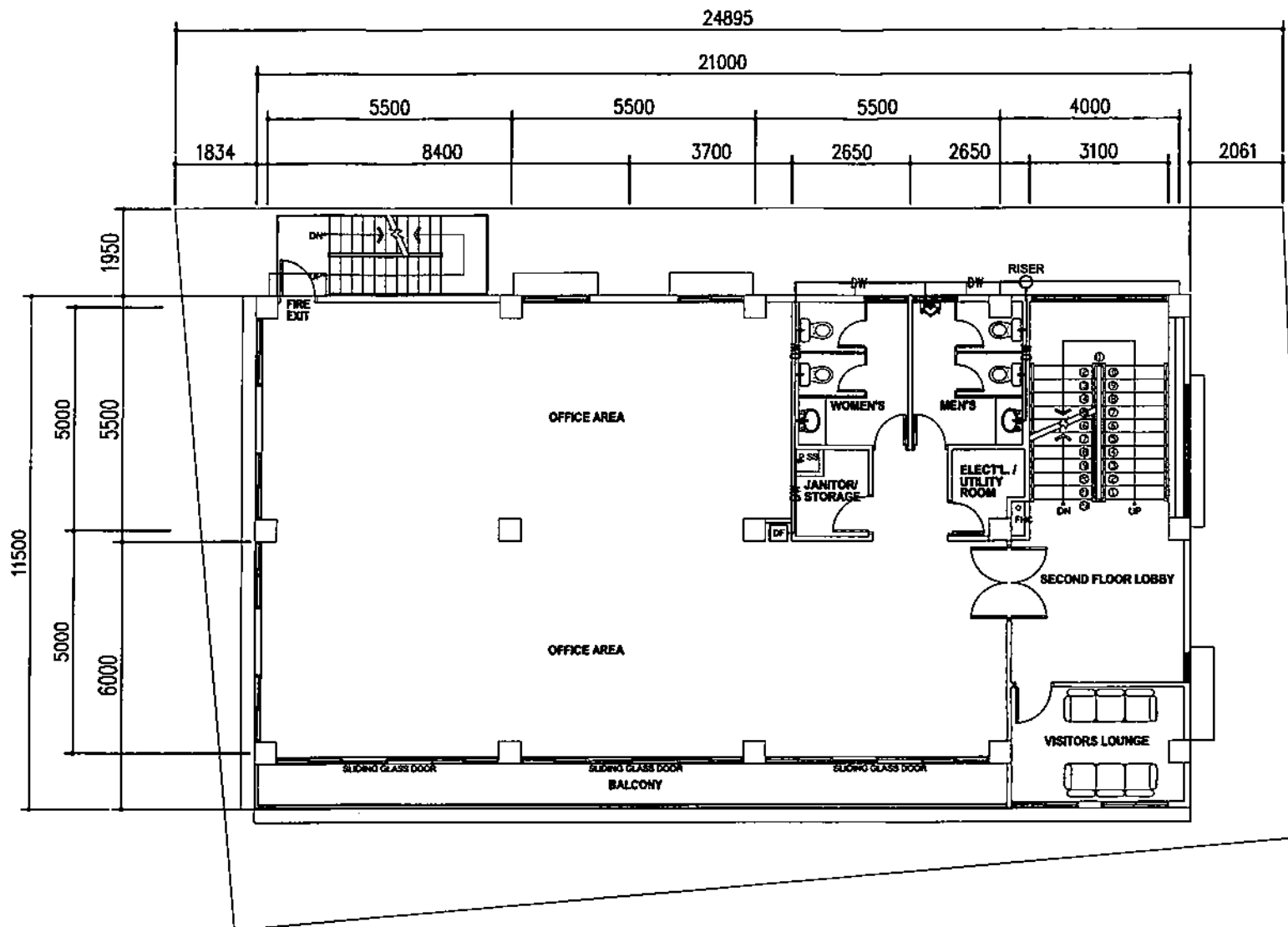
# LEGEND:

- — — DOMESTIC WATER LINE
- ⊗ — GATE VALVE
- ⊙ — WATER METER
- ⊘ — REDUCER

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: DOMESTIC WATER PIPING SYSTEM (SIDE ELEVATION)			
DESIGNED	BY	CHKD	DATE
DRAWN	LACR		
REVIEWED	PRINCIPAL ENGR. ARCHT.		
CIVIL/ARCHT			
ELEC			
MECH			
SUBMITTED:		 N. S. ESPAYOS Project Engineer	
RECOMMENDED:		 J. A. TABEL Manager	
APPROVED:		 N. S. ESPAYOS Manager, DOO	
DWG. NO. COSC-BDM-15.010		SPEC. NO. VisP22Z1464Sc	
SCALE: 1:100		BID DRAWING	
REV.		REV. 0	







## SECOND FLOOR PLAN

SCALE

1:100

### NOTES:

1. THIS DRAWING IS FOR BIDDING PURPOSES ONLY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
4. PIPING LAID UNDERGROUND SHALL NOT BE LESS THAN 300MM FROM THE GROUND SURFACE TO THE BOTTOM OF PIPE.
5. FOR PIPES THAT CROSS ROADS, PIPE SLEEVE OF STEEL MATERIAL SHALL BE PROVIDED.
6. ALL PIPES, VALVES, VALVE BOXES, FITTINGS, AND PIPE SUPPORTS SHALL BE INSTALLED FOR THE EFFICIENT AND PROPER OPERATION OF THE SYSTEM.
7. ALL PIPES, VALVES AND OTHER EQUIPMENT BROCHURES/CATALOGUES SHALL BE SUBMITTED BY THE CONTRACTOR, FOR NPC'S REVIEW AND APPROVAL, PRIOR TO PROCUREMENT/INSTALLATION.
8. FINAL DETAILS AND ADJUSTMENT SHALL BE DONE IN THE FIELD BY THE CONTRACTOR DURING INSTALLATION TO SUIT ACTUAL SITE CONDITIONS. ALL WORKS SHALL BE EXECUTED IN CLOSE COORDINATION WITH ALL TRADES.

### LEGEND:

- DW— DOMESTIC WATER LINE  
DF - DRINKING FOUNTAIN

OWNER:



**NATIONAL POWER CORPORATION**  
AGHAM ROAD, DILIMAN, QUEZON CITY

PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR

LOCATION: BAGACAY, CALBAYOG, SAMAR

TITLE: DOMESTIC WATER PIPING LAYOUT (SECOND FLOOR)

	BY	CHKD	DATE	
DESIGNED	LADR			SUBMITTED: N. P. EAPAYOS
DRAWN	LADR			RECOMMENDED: J. A. FABEL JR.
REVIEWED	WINDYAL ENGR. / ARCHT.			APPROVED: N. C. GARCIA
CIVIL/ARCHT				
ELEC.				
MECH.				

DWG. NO. COSC-BDM-15.013

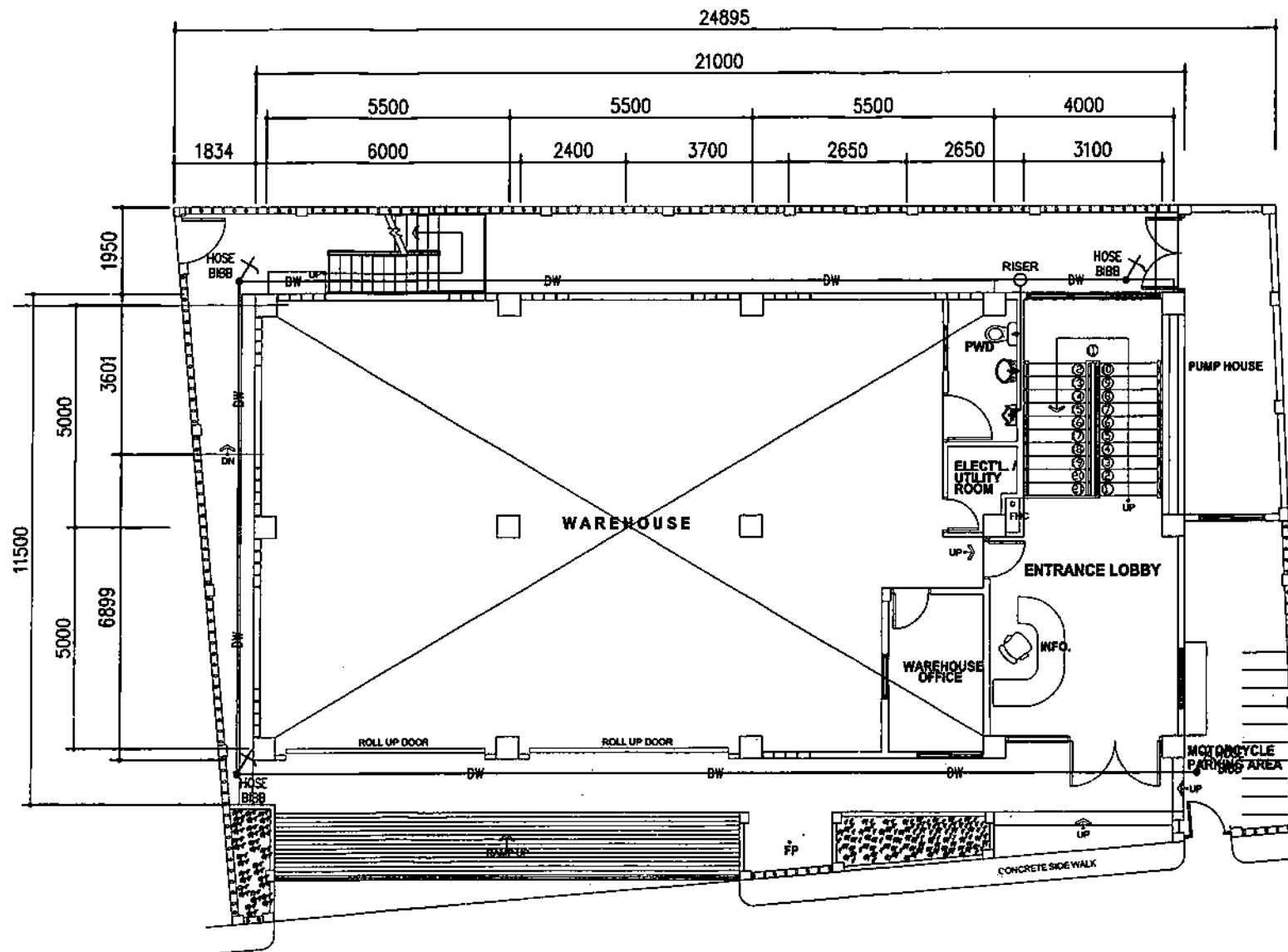
SPEC. NO. VisP22Z1464Sc

SCALE: 1:100

**BID DRAWING**

REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.



**GROUND FLOOR PLAN**  
SCALE 1:100

#### NOTES:

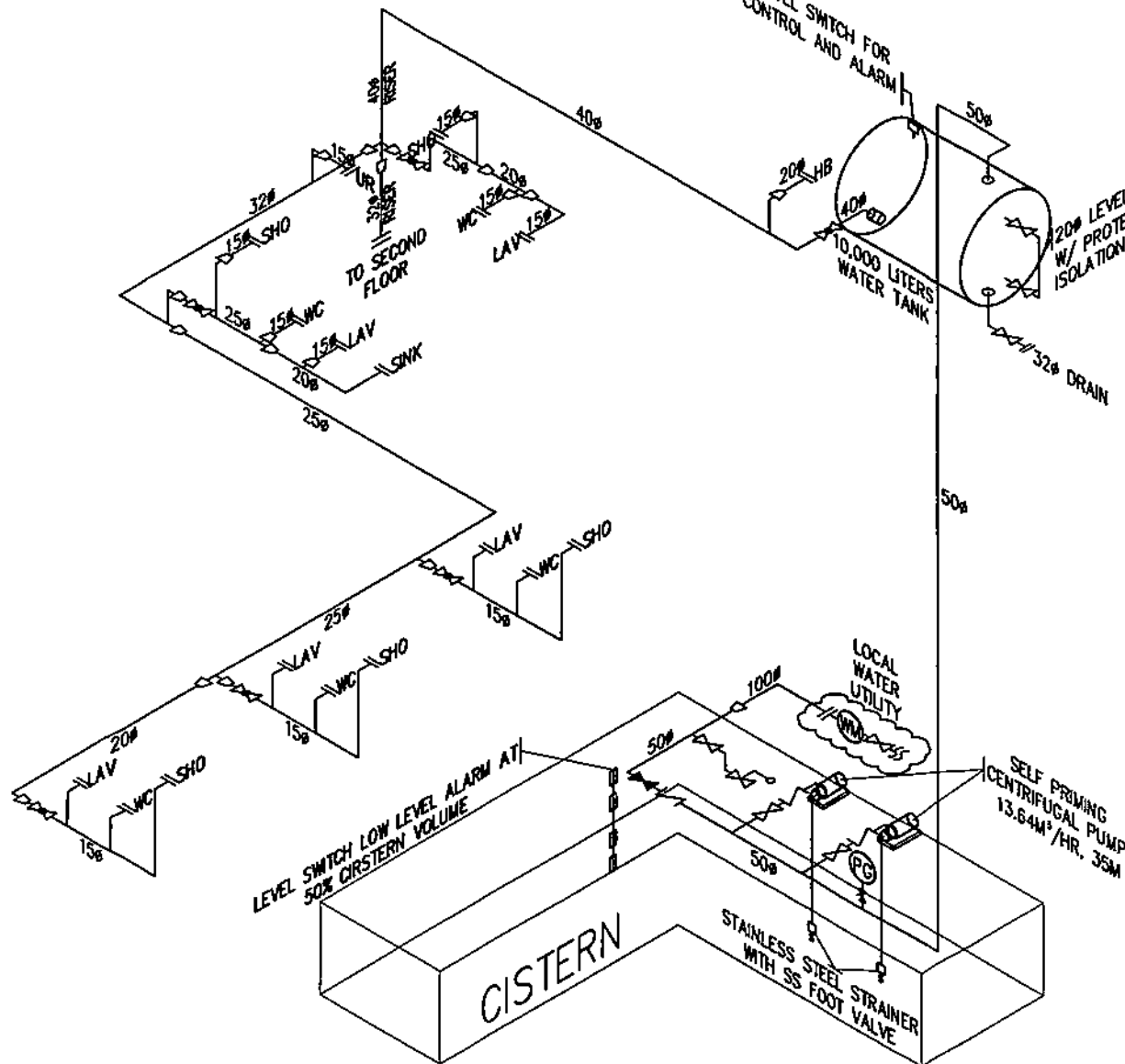
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3. ALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
4. PIPING LAID UNDERGROUND SHALL NOT BE LESS THAN 300MM FROM THE GROUND SURFACE TO THE BOTTOM OF PIPE.
5. FOR PIPES THAT CROSS ROADS, PIPE SLEEVE OF STEEL MATERIAL SHALL BE PROVIDED.
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7. ALL PIPES, VALVES AND OTHER EQUIPMENT BROCHURES/CATALOGUES SHALL BE SUBMITTED BY THE CONTRACTOR, FOR NPC'S REVIEW AND APPROVAL, PRIOR TO PROCUREMENT/INSTALLATION.
8. FINAL DETAILS AND ADJUSTMENT SHALL BE DONE IN THE FIELD BY THE CONTRACTOR DURING INSTALLATION TO SUIT ACTUAL SITE CONDITIONS. ALL WORKS SHALL BE EXECUTED IN CLOSE COORDINATION WITH ALL TRADES.

#### LEGEND:

- DW — DOMESTIC WATER LINE
- DF — DRINKING FOUNTAIN
- HB — HOSE BIBB

OWNER		<b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE		DOMESTIC WATER PIPING LAYOUT (GROUND FLOOR)	
DESIGNED	BY	CHKD	DATE
DRAWN	LACR		
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	
CHECKED		APPROVED	
MECH.			
DWG. NO. COSC-BDM-15.014		SPEC. NO. VisP2221464Sc	
SCALE: 1:100		BID DRAWING	
REV. 0			

4-POINT LEVEL SWITCH FOR  
PUMP'S CONTROL AND ALARM



**PUMP AREA AND THIRD FLOOR**

SCALE

NTS

# NOTES:


- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
- TALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
- PIPING LAD UNDERGROUND SHALL NOT BE LESS THAN 300MM FROM THE GROUND SURFACE TO THE BOTTOM OF PIPE.
- FOR PIPES THAT CROSSES ROADWAYS, PIPE SLEEVE OF STEEL MATERIAL SHALL BE PROVIDED.
- ALL PIPES, VALVES, AND FITTINGS, SHALL BE PROPERLY SUPPORTED/INSTALLED FOR THE EFFICIENT AND PROPER OPERATION OF THE SYSTEM.
- ALL PIPES AND VALVES' BROCHURES/CATALOGUES SHALL BE SUBMITTED BY THE CONTRACTOR, FOR NPC'S REVIEW AND APPROVAL, PRIOR TO PROCUREMENT/INSTALLATION.
- MAIN WATER PIPES/ LINES SHALL PREFERABLY BE INSTALLED/CONCEALED IN THE CEILING AND SHALL BE PROPERLY SUPPORTED PER MANUFACTURERS RECOMMENDATIONS AS REQUIRED BY THE PIPING CONFIGURATION.
- FINAL DETAILS AND ADJUSTMENT SHALL BE DONE IN THE FIELD BY THE CONTRACTOR DURING INSTALLATION TO SUIT ACTUAL SITE CONDITIONS. ALL WORKS SHALL BE EXECUTED IN CLOSE COORDINATION WITH ALL TRADES.
- ALL PP-R PIPE DIMENSIONS SHOWN ARE IN NOMINAL DIAMETER (MM) WITH THE FOLLOWING EQUIVALENTS:
 

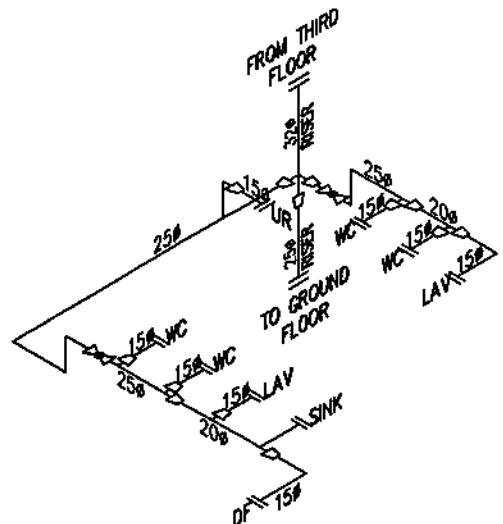
65MM (2 1/2")	= 75MM O.D. (OUTSIDE DIAMETER)
50MM (2")	= 63MM O.D.
40MM (1 1/2")	= 50MM O.D.
32MM (1 1/4")	= 40MM O.D.
25MM (1")	= 32MM O.D.
20MM (3/4")	= 25MM O.D.
15MM (1/2")	= 20MM O.D.
- THE CONTROL FOR THE TWO WATER TRANSFER PUMPS SHALL BE DESIGNED SUCH THAT WHEN ONE RUNNING PUMP TRIPS, THE NON-RUNNING PUMP SHALL START AUTOMATICALLY. CONTROL SWITCH TO START AND STOP THE PUMP SHALL BE DONE IN THE LOCAL PANEL INSTALLED WITHIN THE PUMP HOUSE. SUFFICIENT STATUS INDICATIONS AND ALARM SIGNAL IS INITIATED UPON LOSS OF PUMP OPERATION. PUMP OPERATION SHALL BE AS FOLLOWS:
 

A. WATER STORAGE TANK LEVEL HIGH : PUMP STOPS
B. WATER STORAGE TANK LEVEL HIGH HIGH: ANNUNCIATE HIGH LEVEL ALARM; TRIPS THE RUNNING PUMP
C. WATER STORAGE TANK LEVEL LOW: PUMP STARTS
D. WATER STORAGE TANK LOW LOW: ANNUNCIATE LOW LEVEL ALARM; TRIGGER THE OTHER PUMP TO START
E. CISTERN WATER LOW(MAINTAINING LEVEL AT 50%): PUMP TO STOP OR PUMP WILL NOT START

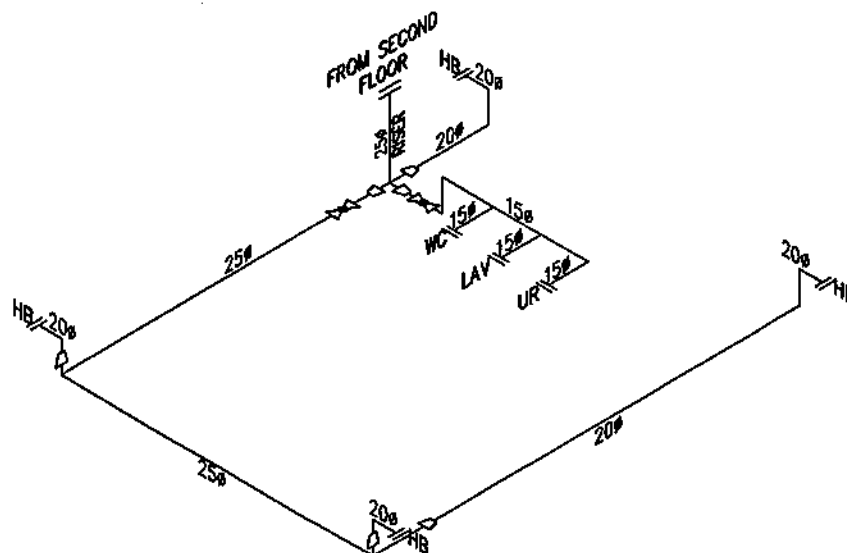
## LEGEND:

DF - DRINKING FOUNTAIN	DG - GATE VALVE (NORMALLY OPEN)
SHO - SHOWER	DM - GATE VALVE (NORMALLY CLOSE)
UR - URINAL	DR - REDUCER
LAV - LAVATORY	DA - ANGLE FLOAT VALVE
WC - WATER CLOSET	DM - GLOBE VALVE
HB - HOSE BIBB	DB - BALL VALVE
WM - WATER METER	CV - CHECK VALVE
PG - PRESSURE GAUGE	BF - BLIND FLANGE

OWNER: 		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: DOMESTIC WATER PIPING SYSTEM (ISOMETRIC DIAGRAM 1 OF 2)			
DESIGNED	BY: LACK	CHKD	DATE
DRAWN	BY: LACK	CHKD	DATE
REVIEWED	BY: PRINCIPAL ENGR. J. A. TAYLOR	CHKD	DATE
CHALMANT	BY: PRINCIPAL ENGR. J. A. TAYLOR	CHKD	DATE
ELC.	BY: PRINCIPAL ENGR. J. A. TAYLOR	CHKD	DATE
MECH.	BY: PRINCIPAL ENGR. J. A. TAYLOR	CHKD	DATE
DWG. NO. COSC-BDM-15.015		SPEC. NO. VIsP22Z1464Sc	
SCALE: NTS		BID DRAWING	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPD.	
REV. 0			



**SECOND FLOOR**  
SCALE NTS



**GROUND FLOOR**  
SCALE NTS




# NOTES:

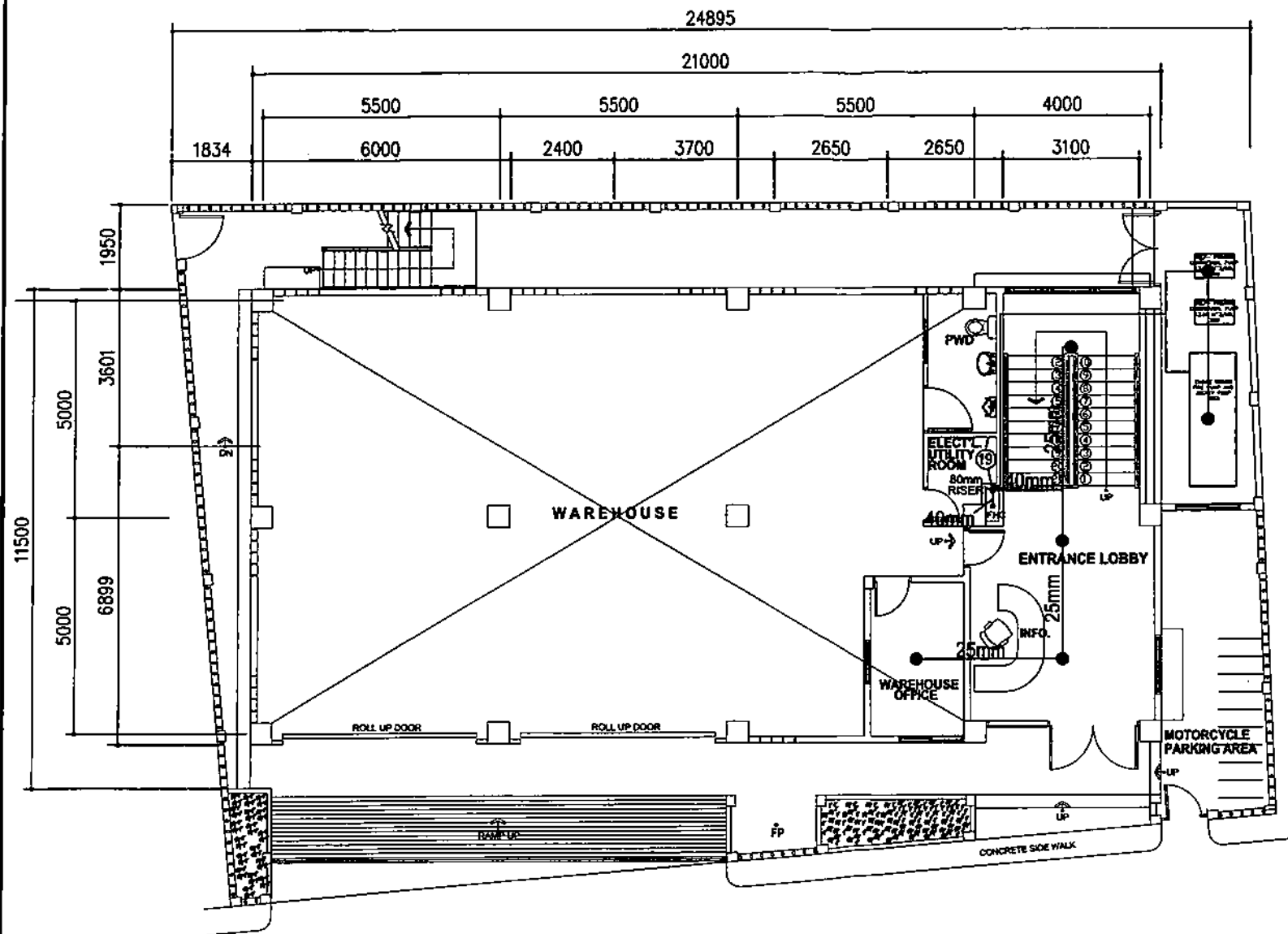
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. TALL WORKS SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
3. PIPING LAID UNDERGROUND SHALL NOT BE LESS THAN 300MM FROM THE GROUND SURFACE TO THE BOTTOM OF PIPE.
4. FOR PIPES THAT CROSS ROADS, PIPE SLEEVE OF STEEL MATERIAL SHALL BE PROVIDED.
5. ALL PIPES, VALVES, AND FITTINGS, SHALL BE PROPERLY SUPPORTED/INSTALLED FOR THE EFFICIENT AND PROPER OPERATION OF THE SYSTEM.
6. ALL PIPES AND VALVES' BROCHURES/CATALOGUES SHALL BE SUBMITTED BY THE CONTRACTOR, FOR NPC'S REVIEW AND APPROVAL, PRIOR TO PROCUREMENT/INSTALLATION.
7. MAIN WATER PIPES/ LINES SHALL PREFERABLY BE INSTALLED/CONCEALED IN THE CEILING AND SHALL BE PROPERLY SUPPORTED PER MANUFACTURERS RECOMMENDATIONS AS REQUIRED BY THE PIPING CONFIGURATION.
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9. ALL PP-R PIPE DIMENSIONS SHOWN ARE IN NOMINAL DIAMETER (MM) WITH THE FOLLOWING EQUIVALENTS:

65MM (2 1/2")	= 75MM O.D. (OUTSIDE DIAMETER)
50MM (2")	= 63MM O.D.
40MM (1 1/2")	= 50MM O.D.
32MM (1 1/4")	= 40MM O.D.
25MM (1")	= 32MM O.D.
20MM (3/4")	= 25MM O.D.
15MM (1/2")	= 20MM O.D.

## LEGEND:

- DF - DRINKING FOUNTAIN
- SHO - SHOWER
- UR - URINAL
- LAV - LAVATORY
- WC - WATER CLOSET
- HB - HOSE BIBB
- I - BLIND FLANGE
- D - REDUCER
- GV - GLOBE VALVE

OWNER: 		NATIONAL POWER CORPORATION AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: DOMESTIC WATER PIPING SYSTEM (ISOMETRIC DIAGRAM 2 OF 2)			
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	PRINCIPAL ENGR./ARCHT.		
CHECKED	PRINCIPAL ENGR./ARCHT.		
ELEC.	APPROVED: 		
MEDL.	APPROVED: 		
DWG. NO. COSC-BDM-15.016		SPECS. NO. VIsP22Z1464Sc	
SCALE: NTS		BID DRAWING	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPL.	








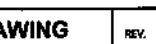

**GROUND FLOOR PLAN**  
SCALE 1:100

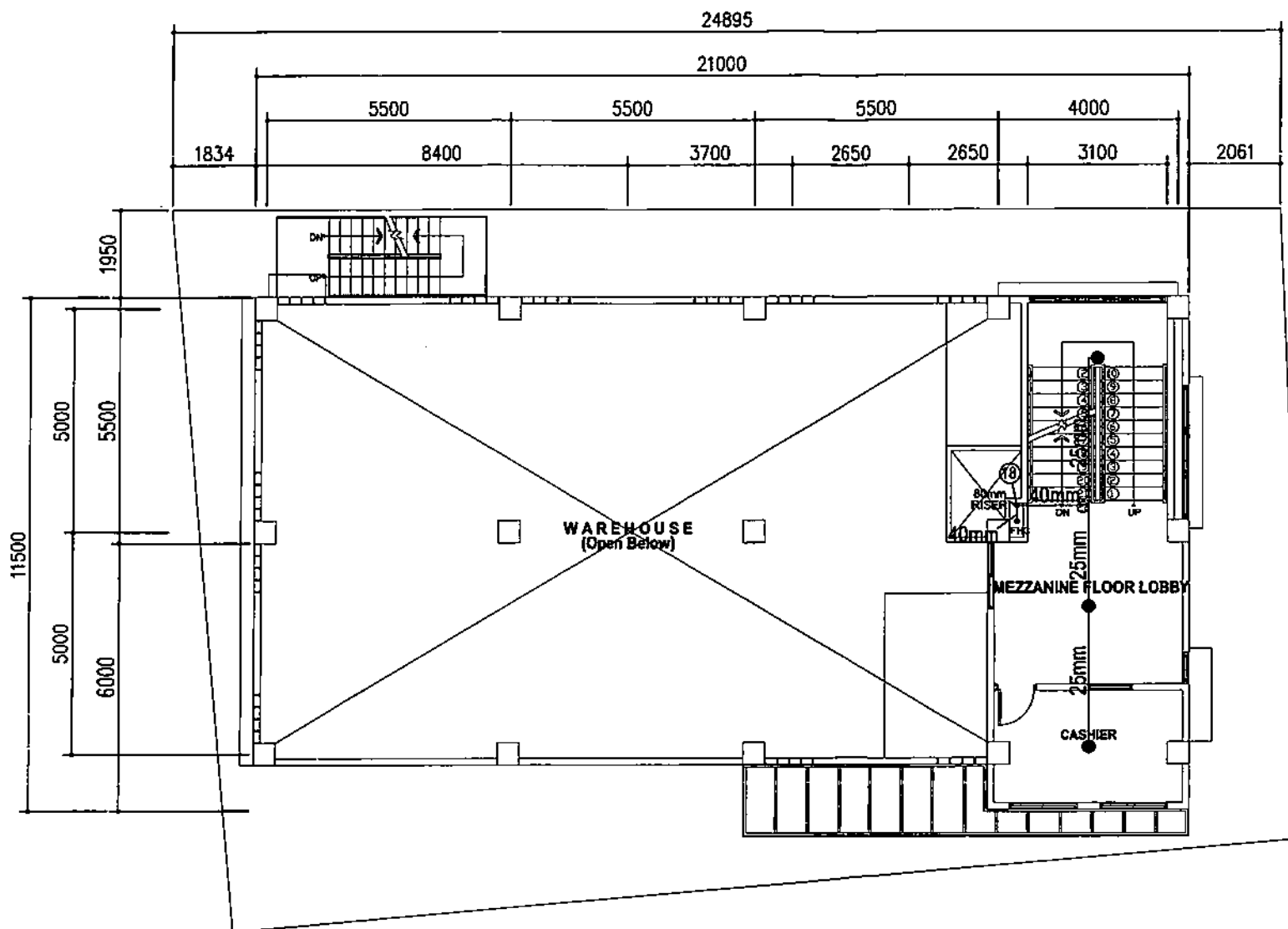
# NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. FINAL DETAILS AND ADJUSTMENTS SHALL BE DONE DURING INSTALLATIONS TO MAINTAIN CEILING PATTERNS.
3. NECESSARY PIPE SUPPORTS, RISER, SWAY BRACES, BRACKETS AND HANGERS SHALL BE PROVIDED BY THE CONTRACTOR AT APPROPRIATE LOCATIONS AND INTERVALS ALONG THE SPRINKLER PIPING SYSTEM.
4. THE CONTRACTOR SHALL ENSURE THAT INSTALLATIONS OF SPRINKLER NOZZLE HEADS ON CEILING BOARDS ARE PROPERLY ALIGNED WITH EACH OTHER.
5. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY APPURTENANCES OF THE SPRINKLER SYSTEM INCLUDING THOSE NOT SPECIFICALLY MENTIONED IN THE SPECIFICATIONS BUT CONSIDERED NECESSARY FOR THE SAFE AND RELIABLE OPERATIONS OF THE SYSTEM.
6. BROCHURES/CATALOGUES FOR PIPES, VALVES, SPRINKLERS AND OTHER EQUIPMENT/DEVICE SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC REVIEW AND APPROVAL PRIOR TO PROCUREMENT/INSTALLATION, INCLUDING HYDRAULIC CALCULATIONS, EQUIPMENT/PIPING LAYOUT AND DETAILED DRAWINGS TO CONFORM WITH LATEST EDITION OF THE APPLICABLE NFPA STANDARDS.
7. ACTUAL QUANTITY, SIZE AND ARRANGEMENT SHALL BE DETERMINED BY THE CONTRACTOR IN ACCORDANCE WITH THE DESIGN REQUIREMENTS DESCRIBED IN THE SPECIFICATIONS BUT IN NO CASE SHALL BE LESS THAN THOSE INDICATED IN THIS DRAWING.

## LEGEND:

- RECESSED PENDANT, METALLIC CHROME PLATED ESCUTCHEON
- FIRE LINE
- FHC — FIRE HOSE CABINET

OWNER:  <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR	
LOCATION: BAGACAY, CALBAYOG, SAMAR	
TITLE: <b>AUTOMATIC SPRINKLER SYSTEM (GROUND FLOOR)</b>	
DESIGNED BY: 	CHKD. DATE:
DRAWN BY: 	SUBMITTED: 
REVIEWED BY: 	RECOMMENDED: 
ENCL. NO. <b>COSC-BDM-15.017</b>	APPROVED: 
SPEC. NO. <b>VisP22Z1464Sc</b>	
SCALE: 1:100	BID DRAWING
REV. 0	




**MEZZANINE FLOOR PLAN**  
SCALE 1:100

# NOTES:

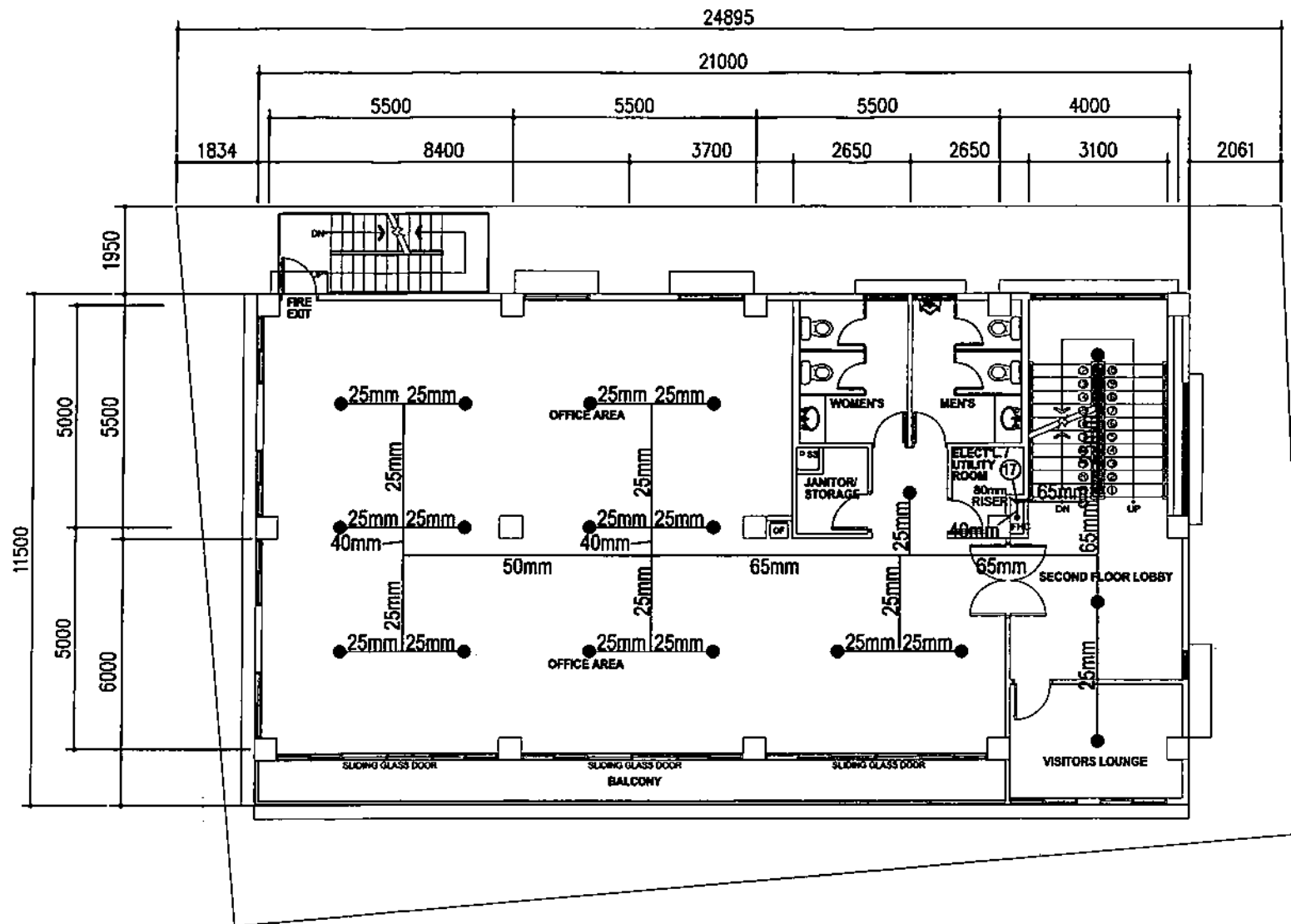
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. FINAL DETAILS AND ADJUSTMENTS SHALL BE DONE DURING INSTALLATIONS TO MAINTAIN CEILING PATTERS.
3. NECESSARY PIPE SUPPORTS, RISER SWAY BRACES, BRACKETS AND HANGERS SHALL BE PROVIDED BY THE CONTRACTOR AT APPROPRIATE LOCATIONS AND INTERVALS ALONG THE SPRINKLER PIPING SYSTEM.
4. THE CONTRACTOR SHALL ENSURE THAT INSTALLATIONS OF SPRINKLERS NOZZLE HEADS ON CEILING BOARDS ARE PROPERLY ALIGNED WITH EACH OTHER.
5. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY APPURTENANCES OF THE SPRINKLER SYSTEM INCLUDING THOSE NOT SPECIFICALLY MENTIONED IN THE SPECIFICATIONS BUT CONSIDERED NECESSARY FOR THE SAFE AND RELIABLE OPERATIONS OF THE SYSTEM.
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7. ACTUAL QUANTITY, SIZE AND ARRANGEMENT SHALL BE DETERMINED BY THE CONTRACTOR IN ACCORDANCE WITH THE DESIGN REQUIREMENTS DESCRIBED IN THE SPECIFICATIONS BUT IN NO CASE SHALL BE LESS THAN THOSE INDICATED IN THIS DRAWING.

## LEGEND:

- RECESSED PENDANT, METALLIC CHROME PLATED ESCUTCHEON
- FIRE LINE
- FHC - FIRE HOSE CABINET

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE:		AUTOMATIC SPRINKLER SYSTEM (MEZZANINE)	
DESIGNED	BY	CHKD	DATE
DRAWN	LACR		
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	
CONTRACT		APPROVED	
ELEC.			
MECH.			
DWG. NO. COSC-BDM-15.018		SPEC. NO. VisP22Z1464Sc	
SCALE: 1:100		BID DRAWING	
REV. 0			

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPD.




**SECOND FLOOR PLAN**  
SCALE 1:100

# NOTES:

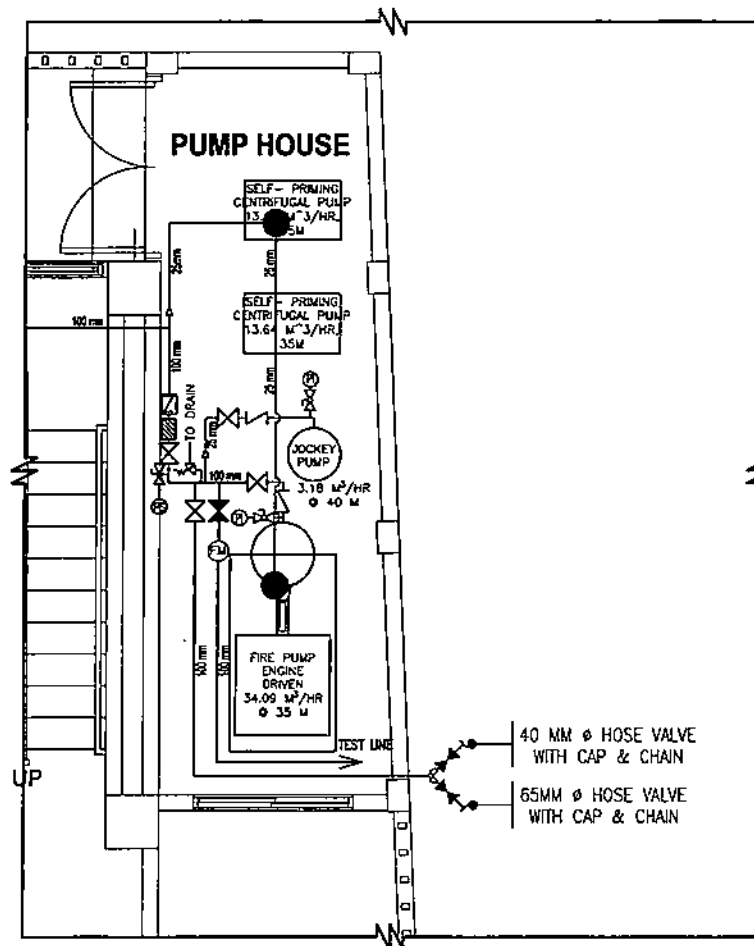
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4. THE CONTRACTOR SHALL ENSURE THAT INSTALLATIONS OF SPRINKLERS NOZZLE HEADS ON CEILING BOARDS ARE PROPERLY ALIGNED WITH EACH OTHER.
5. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY APPURTENANCES OF THE SPRINKLER SYSTEM INCLUDING THOSE NOT SPECIFICALLY MENTIONED IN THE SPECIFICATIONS BUT CONSIDERED NECESSARY FOR THE SAFE AND RELIABLE OPERATIONS OF THE SYSTEM.
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7. ACTUAL QUANTITY, SIZE AND ARRANGEMENT SHALL BE DETERMINED BY THE CONTRACTOR IN ACCORDANCE WITH THE DESIGN REQUIREMENTS DESCRIBED IN THE SPECIFICATIONS BUT IN NO CASE SHALL BE LESS THAN THOSE INDICATED IN THIS DRAWING.

## LEGEND:

- - RECESSED PENDANT, METALLIC CHROME PLATED ESCUTCHEON
- - FIRE LINE
- FHC - FIRE HOSE CABINET

OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR			
LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: AUTOMATIC SPRINKLER SYSTEM (SECOND FLOOR)			
DESIGNED	BY	CHKD	DATE
DRAWN	LACR		
REVIEWED	PRINCIPAL ENGR. / ARCHT.		
CIVIL/ARCHT			
ELEC			
MECH			
SUBMITTED:		N. S. EBERYOS	
RECOMMENDED:		J. A. TAPIL JR.	
APPROVED:		M. G. S. DIOSDADERA	
DWG. NO. COSC-BDM-15.019		SPECS. NO. VisP22Z1464Sc	
SCALE: 1:100		BID DRAWING	
REV. DATE		NATURE OF REVISION	
BY		CHKD. RECD. APPD.	






1  
A-1 **PUMPHOUSE**  
SCALE 1:50

# NOTES:

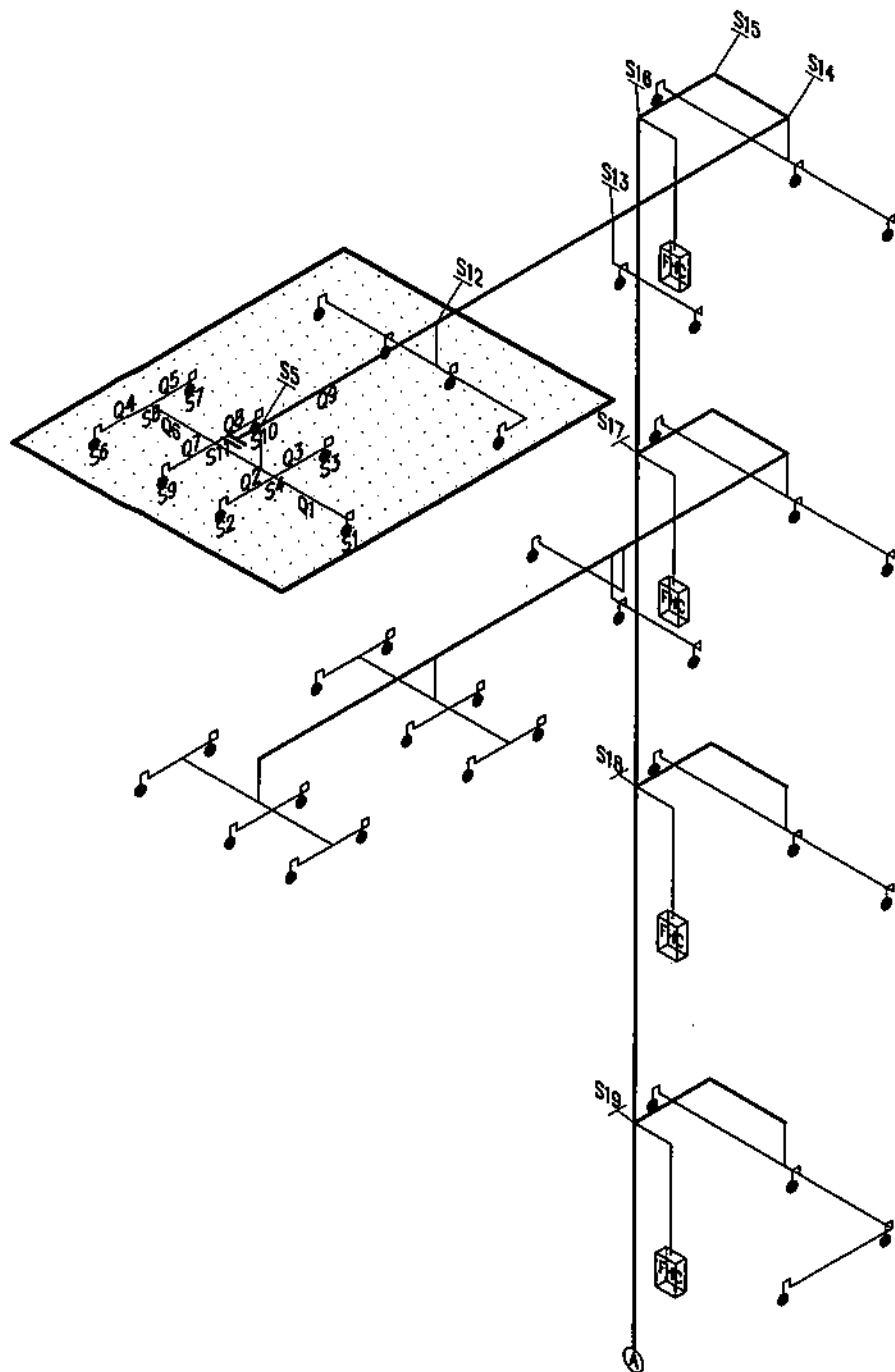
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4. THE CONTRACTOR SHALL ENSURE THAT INSTALLATIONS OF SPRINKLERS NOZZLE HEADS ON CEILING BOARDS ARE PROPERLY ALIGNED WITH EACH OTHER.
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7. ACTUAL QUANTITY, SIZE AND ARRANGEMENT SHALL BE DETERMINED BY THE CONTRACTOR IN ACCORDANCE WITH THE DESIGN REQUIREMENTS DESCRIBED IN THE SPECIFICATIONS BUT IN NO CASE SHALL BE LESS THAN THOSE INDICATED IN THIS DRAWING.

## LEGEND:

- - RECESSED PENDANT, METALLIC CHROME PLATED ESCUTCHEON
- - FIRE LINE
- ⋈ - GATE VALVE (NORMALLY OPEN)
- ⋈ - GATE VALVE (NORMALLY CLOSE)
- ▷ - REDUCER
- ⊞ - BALL VALVE
- ∇ - CHECK VALVE
- ⚡ - RELIEF VALVE
- Ⓟ - PRESSURE GAUGE
- Ⓢ - PRESSURE SWITCH
- Ⓜ - FLOW METER

OWNER:  <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT: CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR LOCATION: BAGACAY, CALBAYOG, SAMAR	
TITLE: <b>AUTOMATIC SPRINKLER SYSTEM (PUMPHOUSE)</b>	
DESIGNED: LACR	BY: CHD DATE: <i>[Signature]</i>
DRAWN: LACR	SUBMITTED: <i>[Signature]</i>
REVIEWED: PRINCIPAL ENGR. / ARCHT.	RECOMMENDED: <i>[Signature]</i>
CIVIL/ARCHT	APPROVED: <i>[Signature]</i>
ELEC	
MECH	
DWG. NO. <b>COSC-BDM-15.021</b>	SPECS. NO. <b>VisP22Z1464Sc</b>
SCALE: 1:50	<b>BID DRAWING</b>
REV.	REV. 0

REV.	DATE	NATURE OF REVISION	BY	CHKD	RECD	APPR.

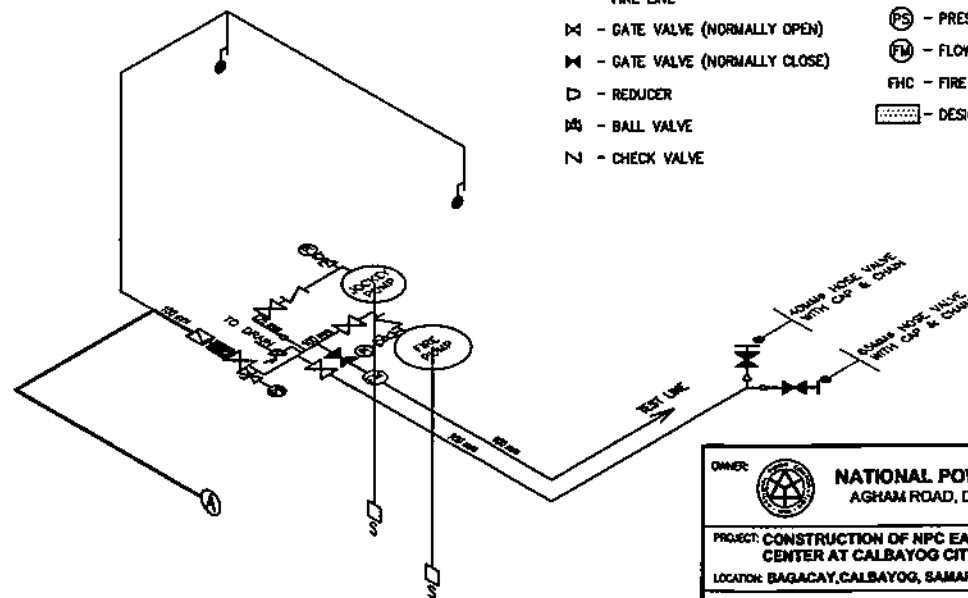



# NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. FINAL DETAILS AND ADJUSTMENTS SHALL BE DONE DURING INSTALLATIONS TO MAINTAIN CEILING PATTERS.
3. NECESSARY PIPE SUPPORTS, RISER SWAY BRACES, BRACKETS AND HANGERS SHALL BE PROVIDED BY THE CONTRACTOR AT APPROPRIATE LOCATIONS AND INTERVALS ALONG THE SPRINKLER PIPING SYSTEM.
4. THE CONTRACTOR SHALL ENSURE THAT INSTALLATIONS OF SPRINKLERS NOZZLE HEADS ON CEILING BOARDS ARE PROPERLY ALIGNED WITH EACH OTHER.
5. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY APPURTENANCES OF THE SPRINKLER SYSTEM INCLUDING THOSE NOT SPECIFICALLY MENTIONED IN THE SPECIFICATIONS BUT CONSIDERED NECESSARY FOR THE SAFE AND RELIABLE OPERATIONS OF THE SYSTEM.
6. BROCHURES/CATALOGUES FOR PIPES, VALVES, SPRINKLERS AND OTHER EQUIPMENT/DEVICE SHALL BE SUBMITTED BY THE CONTRACTOR FOR NPC REVIEW AND APPROVAL PRIOR TO PROCUREMENT/INSTALLATION, INCLUDING HYDRAULIC CALCULATIONS, EQUIPMENT/PIPING LAYOUT AND DETAILED DRAWINGS TO CONFORM WITH LATEST EDITION OF THE APPLICABLE NFPA STANDARDS.
7. ACTUAL QUANTITY, SIZE AND ARRANGEMENT SHALL BE DETERMINED BY THE CONTRACTOR IN ACCORDANCE WITH THE DESIGN REQUIREMENTS DESCRIBED IN THE SPECIFICATIONS BUT IN NO CASE SHALL BE LESS THAN THOSE INDICATED IN THIS DRAWING.

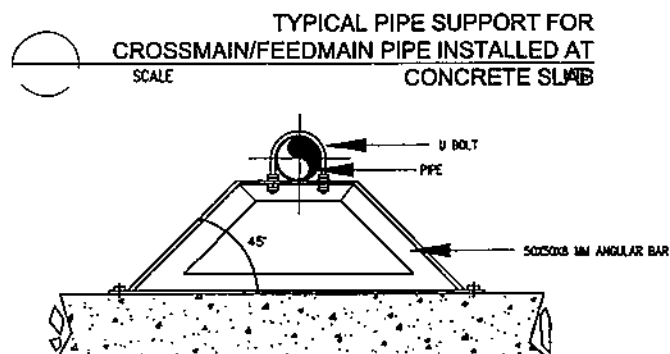
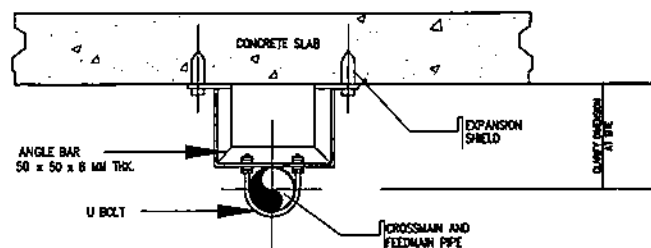
# LEGEND:

- - RECESSED PENDANT, METALLIC CHROME PLATED ESCUTCHEON
- - FIRE LINE
- ⋈ - GATE VALVE (NORMALLY OPEN)
- ⋈ - GATE VALVE (NORMALLY CLOSE)
- ◇ - REDUCER
- ⊞ - BALL VALVE
- ⌞ - CHECK VALVE
- ⌞ - RELIEF VALVE
- ⊞ - PRESSURE GAUGE
- ⊞ - PRESSURE SWITCH
- ⊞ - FLOW METER
- FHC - FIRE HOSE CABINET
- ▨ - DESIGN AREA

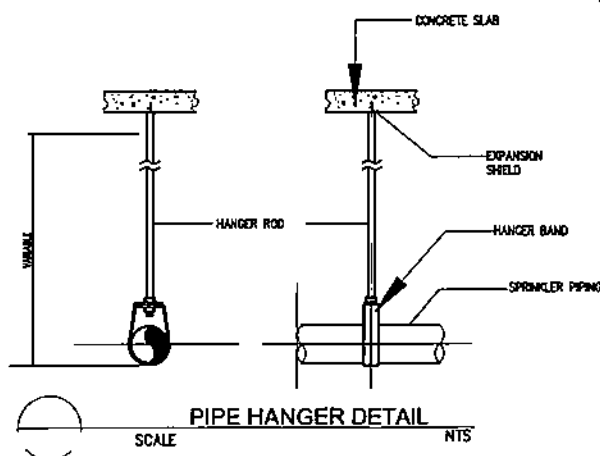


OWNER:		 <b>NATIONAL POWER CORPORATION</b> AGHAM ROAD, DILIMAN, QUEZON CITY	
PROJECT:		CONSTRUCTION OF NPC EASTERN VISAYAS OPERATION CENTER AT CALBAYOG CITY, WESTERN SAMAR	
LOCATION:		BAGACAY, CALBAYOG, SAMAR	
TITLE:		AUTOMATIC SPRINKLER SYSTEM (ISOMETRIC DIAGRAM)	
DESIGNED	BY	CHKD	DATE
DRAWN	BY	CHKD	DATE
REVIEWED	BY	CHKD	DATE
CHECKED	BY	CHKD	DATE
ELEC.	BY	CHKD	DATE
MECH.	BY	CHKD	DATE
DWG. NO. COSC-BDM-15.022		SPECS. NO. VisP22Z1464Sc	
SCALE: NTS		BID DRAWING	
REV. 0		REV. 0	

REV.	DATE	NATURE OF REVISION	BY	CHKD.	RECD.	APPR.

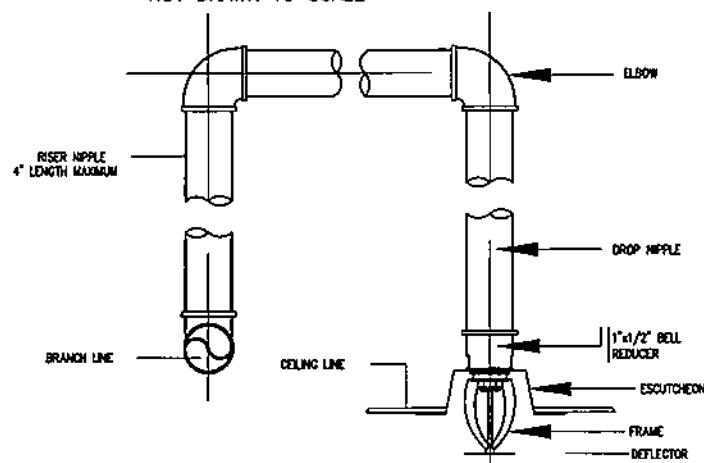


DETAIL OF RISER SWAY BRACE  
SCALE NTS



PIPE HANGER DETAIL  
SCALE NTS

NOT DRAWN TO SCALE




TYPICAL INSTALLATION OF 5MM BULB TYPE, 1/2" ORIFICE X 1/2" NPT, RECESSED PENDANT SPRINKLER, METALLIC CHROME PLATED ESCUTCHEON  
SCALE NTS

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5. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY APPURTENANCES OF THE SPRINKLER SYSTEM INCLUDING THOSE NOT SPECIFICALLY MENTIONED IN THE SPECIFICATIONS BUT CONSIDERED NECESSARY FOR THE SAFE AND RELIABLE OPERATIONS OF THE SYSTEM.

## PIPE HANGER DESIGN DATA

NORMAL PIPE SIZE	ROD DIA.
25mm	9.5
32mm	9.5
40mm	9.5
50mm	9.5
65mm	12.7
80mm	12.7
100mm	15.9

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LOCATION: BAGACAY, CALBAYOG, SAMAR			
TITLE: AUTOMATIC SPRINKLER SYSTEM (MECHANICAL DETAILS)			
DESIGNED	BY	CHKD	DATE
DRAWN	LAOR		
REVIEWED	PRINCIPAL ENGR./ARCHT.	RECOMMENDED	
CIVIL/ARCHT		APPROVED	
ELEC.			
MECH.			
DWG. NO. COSC-BDM-15.023		SPECS. NO. VisP22Z1464Sc	
SCALE: NTS		BID DRAWING	
REV.		REV. 0	