



University of the Philippines  
**OPEN UNIVERSITY**

# **PHILIPPINE BIDDING DOCUMENTS**

for

**Supply, Delivery and Installation of a Brand New 1-  
Unit 250kVA, 3Phase, 400V Generator Set - Silent  
Type with Accessories (including Housing) for the  
ICC**

**Sixth Edition  
July 2020**

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# ***Glossary of Terms, Abbreviations, and Acronyms***

**ABC** – Approved Budget for the Contract.

**ARCC** – Allowable Range of Contract Cost.

**BAC** – Bids and Awards Committee.

**Bid** – A signed offer or proposal to undertake a contract submitted by a bidder in response to and in consonance with the requirements of the bidding documents. Also referred to as *Proposal* and *Tender*. (2016 revised IRR, Section 5[c])

**Bidder** – Refers to a contractor, manufacturer, supplier, distributor and/or consultant who submits a bid in response to the requirements of the Bidding Documents. (2016 revised IRR, Section 5[d])

**Bidding Documents** – The documents issued by the Procuring Entity as the bases for bids, furnishing all information necessary for a prospective bidder to prepare a bid for the Goods, Infrastructure Projects, and/or Consulting Services required by the Procuring Entity. (2016 revised IRR, Section 5[e])

**BIR** – Bureau of Internal Revenue.

**BSP** – Bangko Sentral ng Pilipinas.

**CDA** – Cooperative Development Authority.

**Consulting Services** – Refer to services for Infrastructure Projects and other types of projects or activities of the GOP requiring adequate external technical and professional expertise that are beyond the capability and/or capacity of the GOP to undertake such as, but not limited to: (i) advisory and review services; (ii) pre-investment or feasibility studies; (iii) design; (iv) construction supervision; (v) management and related services; and (vi) other technical services or special studies. (2016 revised IRR, Section 5[i])

**Contract** – Refers to the agreement entered into between the Procuring Entity and the Supplier or Manufacturer or Distributor or Service Provider for procurement of Goods and Services; Contractor for Procurement of Infrastructure Projects; or Consultant or Consulting Firm for Procurement of Consulting Services; as the case may be, as recorded in the Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

**Contractor** – is a natural or juridical entity whose proposal was accepted by the Procuring Entity and to whom the Contract to execute the Work was awarded. Contractor as used in these Bidding Documents may likewise refer to a supplier, distributor, manufacturer, or consultant.

**CPI** – Consumer Price Index.

**DOLE** – Department of Labor and Employment.

**DTI** – Department of Trade and Industry.

**Foreign-funded Procurement or Foreign-Assisted Project** – Refers to procurement whose funding source is from a foreign government, foreign or international financing institution as specified in the Treaty or International or Executive Agreement. (2016 revised IRR, Section 5[b]).

**GFI** – Government Financial Institution.

**GOCC** – Government-owned and/or –controlled corporation.

**Goods** – Refer to all items, supplies, materials and general support services, except Consulting Services and Infrastructure Projects, which may be needed in the transaction of public businesses or in the pursuit of any government undertaking, project or activity, whether in the nature of equipment, furniture, stationery, materials for construction, or personal property of any kind, including non-personal or contractual services such as the repair and maintenance of equipment and furniture, as well as trucking, hauling, janitorial, security, and related or analogous services, as well as procurement of materials and supplies provided by the Procuring Entity for such services. The term “related” or “analogous services” shall include, but is not limited to, lease or purchase of office space, media advertisements, health maintenance services, and other services essential to the operation of the Procuring Entity. (2016 revised IRR, Section 5[r])

**GOP** – Government of the Philippines.

**Infrastructure Projects** – Include the construction, improvement, rehabilitation, demolition, repair, restoration or maintenance of roads and bridges, railways, airports, seaports, communication facilities, civil works components of information technology projects, irrigation, flood control and drainage, water supply, sanitation, sewerage and solid waste management systems, shore protection, energy/power and electrification facilities, national buildings, school buildings, hospital buildings, and other related construction projects of the government. Also referred to as *civil works or works*. (2016 revised IRR, Section 5[u])

**LGUs** – Local Government Units.

**NFCC** – Net Financial Contracting Capacity.

**NGA** – National Government Agency.

**PCAB** – Philippine Contractors Accreditation Board.

**PhilGEPS** - Philippine Government Electronic Procurement System.

**Procurement Project** – refers to a specific or identified procurement covering goods, infrastructure project or consulting services. A Procurement Project shall be described, detailed, and scheduled in the Project Procurement Management Plan prepared by the agency which shall be consolidated in the procuring entity's Annual Procurement Plan. (GPPB Circular No. 06-2019 dated 17 July 2019)

**PSA** – Philippine Statistics Authority.

**SEC** – Securities and Exchange Commission.

**SLCC** – Single Largest Completed Contract.

**UN** – United Nations.



## ***Section I. Invitation to Bid for***

Supply, Delivery and Installation of a Brand New 1-Unit 250kVA, 3Phase, 400V Generator Set - Silent Type with Accessories (including Housing) for the ICC

The UP Open University (UPOU), through the Government of the Philippines (GOP) Endowment Fund, intends to apply the sum of Twelve Million One Hundred Twenty Thousand Eight Hundred Sixty-Five Pesos and Seven Centavos (PhP12,120,865.07) being the Approved Budget for the Contract (ABC) to payments under the contract for “Supply, Delivery and Installation of a Brand New 1-Unit 250kVA, 3Phase, 400V Generator Set - Silent Type with Accessories (including Housing) for the ICC” (IB No. 24-03-001). Bids received in excess of the ABC shall be automatically rejected at bid opening.

The UPOU now invites bids for the above Procurement Project. Completion of the Works is required in one hundred eighty (180) calendar days. Bidders should have completed a contract similar to the Project. The description of an eligible bidder is contained in the Bidding Documents, particularly, in Section II (Instructions to Bidders).

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

Interested bidders may obtain further information from BAC Secretariat and inspect the Bidding Documents from 8:00 AM to 5:00 PM Monday to Friday at the UPOU Headquarters, Los Baños, Laguna.

A complete set of Bidding Documents may be acquired by interested bidders from the address below and upon payment of the applicable fee for the Bidding Documents, pursuant to the latest Guidelines issued by the GPPB, in the amount of **Twelve Thousand Pesos (PhP 12,000.00)** only. UPOU shall allow the bidder to present its proof of payment for the fees in person, by facsimile or through electronic means.

The UPOU will hold a **Pre-Bid Conference on 14 March 2024, 2:30 PM** at the UPOU Headquarters, Los Banos, Laguna and/or through video conferencing or any other means, which shall be open to prospective bidders.

Bids must be duly received by the BAC Secretariat through manual submission at the office address indicated below **on or before 27 March 2024, 9:00 AM.** Late bids shall not be accepted.

All bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in **ITB** Clause 16.

Bid opening shall be on **27 March 2024, 9:30 AM** at the given address below and/or via video conferencing or any other means. Bids will be opened in the presence of the bidders' representatives who choose to attend the activity.

The UPOU 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 Implementing Rules and Regulations (IRR) of RA No. 9184, without thereby incurring any liability to the affected bidder or bidders.

For further information, please refer to:

**MS. ELVY A. PAMULAKLAKIN**

Head, Bids and Awards Committee (BAC) Secretariat

UPOU Headquarters, Los Baños, Laguna

Telephone No.: (049) 536-6001-06 local 210-211

Telefax No.: (049) 536-5991

Email: **[bac@upou.edu.ph](mailto:bac@upou.edu.ph)**

You may visit the following websites:

For downloading of Bidding Documents:

*<https://www.upou.edu.ph/bids-and-awards-committee/>*

*29 February 2024*

**(SGD) Dr. PRIMO G. GARCIA**

Chair

Bids and Awards Committee

## ***Section II. Instructions to Bidders***

### **1. Scope of Bid**

The UPOU invites Bids for the **Supply, Delivery and Installation of a Brand New 1-Unit 250kVA, 3Phase, 400V Generator Set - Silent Type with Accessories (including Housing) for the ICC**, with Project Identification Number IB No. 24-03-001.

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

### **2. Funding Information**

2.1. The GOP through the source of funding as indicated below in the amount of PhP12,120,865.07.

2.2. The source of funding is Endowment Fund.

### **3. Bidding Requirements**

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

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

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

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

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

## 5. Eligible Bidders

- 5.1. Only Bids of Bidders found to be legally, technically, and financially capable will be evaluated.
- 5.2. The Bidder must have an experience of having completed a Single Largest Completed Contract (SLCC) that is similar to this Project, equivalent to at least fifty percent (50%) of the ABC adjusted, if necessary, by the Bidder to current prices using the PSA's CPI, except under conditions provided for in Section 23.4.2.4 of the 2016 revised IRR of RA No. 9184.  
  
A contract is considered to be "similar" to the contract to be bid if it has the major categories of work stated in the **BDS**.
- 5.3. For Foreign-funded Procurement, the Procuring Entity and the foreign government/foreign or international financing institution may agree on another track record requirement, as specified in the Bidding Document prepared for this purpose.
- 5.4. The Bidders shall comply with the eligibility criteria under Section 23.4.2 of the 2016 IRR of RA No. 9184.

## 6. Origin of Associated Goods

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

## 7. Subcontracts

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

The Procuring Entity has prescribed that Subcontracting is not allowed.

- 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, **UPOU Headquarters, Los Banos, Laguna** and/or through videoconferencing/webcasting as indicated in paragraph 6 of the **IB**.

## 9. Clarification and Amendment of Bidding Documents

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

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

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

## 11. Documents Comprising the Bid: Financial Component

- 11.1. The second bid envelope shall contain the financial documents for the Bid as specified in **Section VIII. Checklist of Technical and Financial Documents**.
- 11.2. Any bid exceeding the ABC indicated in paragraph 1 of the **IB** shall not be accepted.

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

## **12. Alternative Bids**

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

## **13. Bid Prices**

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

## **14. Bid and Payment Currencies**

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

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

## **15. Bid Security**

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

- 15.2. The Bid and bid security shall be valid and shall not exceed one hundred twenty (120) calendar days from the date of the opening of bids. Any bid not accompanied by an acceptable bid security shall be rejected by the Procuring Entity as non-responsive.

## **16. Sealing and Marking of Bids**

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

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

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

## **17. Deadline for Submission of Bids**

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

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

18.1. The BAC shall open the Bids in public at the time, on the date, and at the place specified in paragraph 9 of the **IB**. The Bidders' representatives who are present shall sign a register evidencing their attendance. In case videoconferencing, webcasting or other similar technologies will be used, attendance of participants shall likewise be recorded by the BAC Secretariat.

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

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

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

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

19.2. If the Project allows partial bids, all Bids and combinations of Bids as indicated in the **BDS** shall be received by the same deadline and opened and evaluated simultaneously so as to determine the Bid or combination of Bids offering the lowest calculated cost to the Procuring Entity. Bid Security as required by **ITB** Clause 16 shall be submitted for each contract (lot) separately.

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

## **20. Post Qualification**

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

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

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

## *Section III. Bid Data Sheet*

ITB Clause																	
5.2	For this purpose, contracts similar to the Project refer to contracts which have the same major categories of work.																
7.1	<i>No additional requirement.</i>																
10.3	<i>No further instructions.</i>																
10.4	<p>The key personnel must meet the required minimum years of experience set below:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;"><u>Key Personnel</u></th> <th style="text-align: center;"><u>General Experience</u></th> </tr> </thead> <tbody> <tr> <td>1. Resident Engineer</td> <td>Min. 5 yrs</td> </tr> <tr> <td>2. Project Civil Engineer</td> <td>Min. 5 yrs</td> </tr> <tr> <td>3. Project Registered Electrical Engineer</td> <td>Min. 5 yrs</td> </tr> <tr> <td>4. Project Registered Mechanical Engineer</td> <td>Min. 5 yrs</td> </tr> <tr> <td>5. Safety Officer/Engineer</td> <td>Min. 5 yrs w/ COSH Certificates</td> </tr> <tr> <td>6. Electrician</td> <td>Min. 5 yrs w/ NC2</td> </tr> <tr> <td>7. Genset Technician</td> <td>Min. 3 yrs (w/ Cert. of Training)</td> </tr> </tbody> </table> <p>Note: Personnel with multiple expertise and qualifications with at most three different positions mentioned above are allowed as long as he/she can provide the necessary documentation in support of his/her qualifications such as appropriate licenses, certificate of training, accreditation, and the like should be submitted separately for each position.</p>	<u>Key Personnel</u>	<u>General Experience</u>	1. Resident Engineer	Min. 5 yrs	2. Project Civil Engineer	Min. 5 yrs	3. Project Registered Electrical Engineer	Min. 5 yrs	4. Project Registered Mechanical Engineer	Min. 5 yrs	5. Safety Officer/Engineer	Min. 5 yrs w/ COSH Certificates	6. Electrician	Min. 5 yrs w/ NC2	7. Genset Technician	Min. 3 yrs (w/ Cert. of Training)
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10.5	<p>The minimum major equipment requirements are the following:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;"><u>Equipment</u></th> <th style="text-align: center;"><u>Quantity</u></th> </tr> </thead> <tbody> <tr> <td>1. Concrete Bagger Mixer</td> <td>Min. 1 unit</td> </tr> <tr> <td>2. Welding Machine (min. 400amp)</td> <td>Min. 2 units</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;"><u>Others</u></th> <th style="text-align: center;"><u>Quantity</u></th> </tr> </thead> <tbody> <tr> <td>1. PPE (Personal Protective Equipment) -includes hard hat, safety vest, safety shoes, safety harness, safety gloves</td> <td>Min. of 10pcs per item except safety harness (5pcs only)</td> </tr> </tbody> </table>	<u>Equipment</u>	<u>Quantity</u>	1. Concrete Bagger Mixer	Min. 1 unit	2. Welding Machine (min. 400amp)	Min. 2 units	<u>Others</u>	<u>Quantity</u>	1. PPE (Personal Protective Equipment) -includes hard hat, safety vest, safety shoes, safety harness, safety gloves	Min. of 10pcs per item except safety harness (5pcs only)						
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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>a. The amount of not less than <b>PhP 242,417.30 (2%) of ABC</b>, if bid security is in cash, cashier's/manager's check, bank draft/guarantee or irrevocable letter of credit;</li> <li>b. The amount of not less than <b>PhP 606,043.25 (5%) of ABC</b> if bid security is in Surety Bond.</li> </ol>																
19.2	Partial bids is not allowed.																
20	Valid PCAB License and Registration: Small B (minimum size range); General Building (GB1); Category C or D (minimum license category).																
21	The Bidder shall submit additional contract document relevant to the project such as Contractor's Letter-Certificate to UPOU.																

## ***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*

GCC Clause	
2	The <b>Intended Completion Date</b> is <b>one hundred eighty (180) calendar days from the starting date; the starting date being seven (7) calendar days from the issuance of the Notice to Proceed.</b>  <b>NOTE: The contract duration shall be reckoned from the start date and not from contract effectivity date.</b>
4.1	The UPOU shall give possession of all parts of the Site to the Contractor upon issuance of the Notice to Proceed.
6	The site inspection report shall be provided to the UPOU.
7.2	The warranty against Structural Defects/Failures, except those occasioned-on force majeure, shall cover a period of five (5) years.
10	No dayworks are applicable to the contract.
11.1	The Contractor shall submit the Schedule of Work to the Procuring Entity's Representative within ten (10) calendar days of delivery of the Notice of Award.
11.2	The amount to be withheld for late submission of an updated Program of Work is one tenth (1/10) of one percent (1%) per day of delay for the current progress billing.
13	The amount of the advance payment is fifteen percent (15%) of the total contract price subject to the requirements of the Revised IRR of RA 9184 and additional conditions, if any.
14	Materials and equipment delivered on the site but not completely put in place shall not be included for payment.
15.1	(a) The date by which operating and maintenance manuals are required is not later than thirty (30) calendar days prior to conducting the acceptance test.  (b) The date by which "as built" drawings are required is thirty (30) calendar days upon the project completion. (c) In addition, for every Progress of Work the contractor must submit an "As-Built" drawings as supporting document for the approval of Progress Payment.
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 two percent (2%) of the Contract Price or the non-issuance of the Retention Money.

## *Section VI. Specifications*

### **OUTLINE SPECIFICATIONS**

#### **GENERAL REQUIREMENTS**

1. This specification is intended to cover all labor and materials for the complete construction of all proposed projects as shown in the working drawing and described therein.
2. Materials and/or work not specifically mentioned in the specification, working drawings and other Contract Documents, but is implied and deemed necessary to complete the work shall be supplied by the Contractor, and executed in a work-manlike manner of appropriate number, location, size and the highest quality available without extra cost to the Owner.
3. The Owner reserves the right to alter and/or to omit any part of the plans, any extra charge must be submitted to the Architect and/or Engineer for approval of final acceptance.
4. The Contractor shall furnish for approval of the authorized representative with promptness, samples as specified or required work shall be in accordance with approved samples.
5. The Contractor shall guarantee the building except for works with specific guarantee for a period of one (1) year after the final acceptance by the Owner. He shall repair, replace and make good at his expense, all defects which may arise during the term of guarantee and warranty due to defective workmanship and/or inferior quality of materials.
6. All contractors submitting the proposal for this project shall first examine the site. All proposals shall take into consideration all such conditions that may affect the work under this contract. The specifications and plans shall form part as one. Anything mentioned on plans and not mentioned on the scope of work and specifications and vice versa shall be properly consulted to the Project Architect/Engineer for clarification.
7. The contractor shall coordinate his work with all parties to ensure proper phasing or comply with the approved schedule of work. The contractor shall engage under him, a registered Engineer or Architect to supervise his work. He shall remain at all times in the construction site.
8. Logbook shall be available at the site. It shall contain the daily activities in the site, including but not limited to weather condition, delivery, manpower and other matters pertaining to the condition of the project. It will also serve as the data for the contractor and the Project Inspector and shall be surrendered to the UPOU at the end of the project.
9. No alteration or additional work that will result in an additive or deductive cost change from the Contract shall be allowed without the approval of the chancellor.
10. The contractor shall submit at least three (3) options per item for approval. Complete specifications with product samples shall be submitted by the contractor to the Project Architect and end-user for evaluation. Inspection of the Project Architect/Engineer in-charge shall be required prior to installation of any item/material on the construction.

11. Existing conditions of the work site shall be documented by the contractor and photos shall be taken before commencement of work to ensure such status. Any damage to the areas due to the contractor's on-going work shall be restored at his expense.
12. The contractor shall provide a complete copy of "As built plans" of the project/unit concerned in A3 original sheets.
13. The contractor shall promptly remove from the premises all rubbish, trash, debris, and all superfluous building materials weekly. After the completion of all works, restore all areas that were damaged as affected by the construction works and leave the site clean to the satisfaction of the Project Inspector or his representative and End-user.
14. All materials removed from the unit shall be properly documented prior to turn-over to the End-user for proper safe keeping. The turn-over document shall be attached to the contractor's final billing.

## **CONCRETE WORKS**

### **Formworks**

The formwork shall be designed for the loads, lateral pressure and allowable stresses outlined in the "RECOMMENDED PRACTICE FOR CONCRETE FORMWORK (ACI 347). All formworks shall be made of sheet metal or phenolic board and supported by steel acro-post or equivalent.

### **Concrete Reinforcing - Reinforcement Steel Bars**

The minimum specified yield strength (Fy) for reinforcing bars with less than or equal to 12mm in diameter is 280 MPa and 414 MPa for reinforcing bars with diameters greater than 12mm. All reinforcements shall be weldable deformed bars, new and free from rust, oil, defect, grease or kinks. They shall conform to the latest revision of ASTM A615 "SPECIFICATION FOR BILLET STEEL FOR CONCRETE REINFORCEMENT". Strength of reinforcing bars for the structure shall conform and have a minimum grade of PNS Grade 60 for 16mm diameter bars and PNS Grade 40 for 12mm diameter bars. Welded wire fabric for concrete reinforcement shall conform to ASTM A185 "SPECIFICATION FOR WELDED STEEL WIRE FABRIC FOR CONCRETE REINFORCEMENT."

## **CAST-IN-PLACE CONCRETE**

### **Cement**

Portland Cement shall conform to the "SPECIFICATIONS FOR PORTLAND CEMENT" (ASTM C150 Latest Revision) for Type I Portland Unblended that produces less CO<sub>2</sub> during manufacturing and construction and has less clinker.

### **Admixture**

Admixture to be used in concrete, when required or permitted shall conform to the "SPECIFICATIONS FOR CHEMICAL ADMIXTURES FOR CONCRETE" (ASTM

C494) for water-reducing, retarding, air-entraining and accelerating admixture or to the SPECIFICATIONS FOR FLY ASH AND RAW OR CALCINED NATURAL POZZOLANS FOR USE IN PORTLAND CEMENT (ASTM C618) for Pozzolan admixtures.

### **Concrete Aggregates**

Concrete aggregates shall be well-graded, clean, hard particles of gravel, or crushed rock conforming to the "SPECIFICATIONS FOR CONCRETE AGGREGATES" (ASTM-C33 Latest Revision).

### **Sand**

Hard natural sand conforming to PNS 18, Type 1.

### **Water**

Shall be free, clean and free from injurious amounts of oil, acids, alkali, organic materials or other substances that may be deleterious to concrete or steel.

## **CONCRETE MASONRY UNIT – CONCRETE HOLLOW BLOCKS**

### **CHB Blocks**

Concrete hollow blocks shall be of standard manufactured machine-vibrated and shall have fine and even texture and well-defined edges. Minimum compressive strength of load bearing concrete hollow blocks shall be 1,100 psi (7.50 MPa) and 350 psi (2.41 MPa) for non-load bearing. Load bearing CHB shall have a unit weight of 150 pcf and non-bearing type concrete blocks shall have a unit weight not to exceed 60 pcf. Concrete hollow blocks to be used shall conform to the requirements of ASTM Specification C-90 and PNS 16. Dimensions and tolerances shall be as individually specified on plans.

### **Steel Reinforcement for CHB Blocks**

Shall conform to the schedule as given hereunder or as indicated in the construction notes, for CHB 4” thick shall be 10mm diameters minimum @ 400mm spacing and CHB 6” thick shall be 12mm diameters minimum @ 400mm spacing for both vertical and horizontal bars. All reinforcements shall be weldable deformed bars, new and free from rust, oil, defect, grease or kinks. They shall conform to the latest revision of ASTM A615 “SPECIFICATION FOR BILLET STEEL FOR CONCRETE REINFORCEMENT”. 4.1.3

### **Tie Wires**

Shall be Ga. #16 G.I. 4.1.4

### **Mortar**

#### **A. Cement**

Portland cement for concrete works shall conform to the requirements of the latest edition of the Standard Specifications for Portland Cement (ASTM C150) PNS 07, Type 1

Unblended that produces less CO2 during manufacturing and construction and has less clinker.

#### **B. Sand**

Hard natural sand conforming to PNS 18, Type 1.

### **WATERPROOFING SYSTEM**

#### **Roof Deck Waterproofing: Torch Applied Waterproofing**

Shall be a quality torch applied membrane composed of a reinforced polyester felt reinforcement covered on both sides with polymer modified bitumen mastic with mineral protection in light gray color used as a protective material, waterproofing membrane shall have a minimum thickness of 4mm for application. Follow manufacturer's standard application procedures. Note: For roof deck waterproofing provide 2 layer of 4mm thick torch applied membrane waterproofing

### **DOOR**

#### **Roll-up Door**

Shall be 2400mm x 2400mm, Gauge 18, 100mm solid continuous C-type galvalum steel slats with interior mounted metal guides and steel angular bottom bar, epoxy paint finish complete with hardware and accessories

### **WINDOW**

#### **Steel Louvered Window**

Shall be 1.2mm gauge 18 base-metal thickness, 45mm thick hollow metal window with 1.2mm thick GA. 18 x 45mm x 75mm Z profile full louver blades as shown in drawings, made of chromate-free electro galvanized steel sheet with zinc coating layer applied on base metal. Framing shall be fully-welded, 1.2mm thick gauge 16 x 45mm x 100mm, hollow metal frames. Window finish shall be in powder-coated finish. Complete with hardware and accessories. Submit sample color finish and sample section for Architect's approval.

Note: Relocation of Installed Steel Louvered Window from the original Utility Building to the Utility Building Extension and Demolition of existing zocalo.

### **CEILING FINISHES**

#### **Interior Exposed Ceiling 2**

Exposed Reinforced Concrete Slab Shall be concrete slab form finished, coated with semigloss 100% water-based acrylic latex paint with excellent hiding, durability and dirt pick-up resistance. Submit paint swatches for Architect's approval.

## **FLOORING FINISHES**

### **FF-1**

Shall be plain cement smooth steel trowel finish with concrete hardener coated with a high performance, two component water-based acrylic epoxy paint which has a superior chemical, solvent and stain resistance, odorless and UV resistant finish. It has the further excellence of brushability and easy water clean-up. Submit color swatches of paints for Architect's approval. Verify structural drawings for slab thickness.

## **WALL FINISHES**

### **Exterior Wall Finishes for Utility Building (Genset)**

#### **A. WF-1 Exterior CHB Wall Painted Finish**

Shall be 150mm thick CHB exterior wall with 25mm thick smooth trowel cement plaster finish coated with plain semi-gloss water-based 100% acrylic paint with high alkaline resistance and excellent gloss retention, highly resistant to airborne pollutants and dust and has good exterior durability. Submit color swatch and mock-up paint sample for Architect's approval. Final paint finish shall be on a plant-mixed procedure (by the manufacturer) before application.

#### **B. WF-2 Exterior Reinforced Concrete Column Painted Finish**

Shall be reinforced concrete column coated with plain semi-gloss water-based 100% acrylic paint with high alkaline resistance and excellent gloss retention, highly resistant to airborne pollutants and dust and has good exterior durability. Submit color swatch and mock-up paint sample for Architect's approval. Final paint finish shall be on a plant-mixed procedure (by the manufacturer) before application.

### **Interior Wall Finishes for Utility Building (Genset)**

#### **A. WF-3 Interior CHB Wall Painted Finish**

Shall be 150mm thick/100mm thick CHB interior wall with 25mm thick smooth trowel cement plaster finish coated with semi-gloss 100% water-based acrylic latex paint with excellent hiding, durability and dirt pick-up resistance. Submit color swatch and mock-up paint sample for Architect's approval.

## **PAINTINGS AND COATINGS**

### **Exterior Painting**

#### **A. Exterior Masonry Wall, Reinforced Concrete Wall, Build-up Walls, Columns & Parapet**

Shall be coated with fine texture semi-gloss water based 100% acrylic paint with high alkaline resistance and excellent gloss retention, highly resistant to airborne pollutants and dust and has good exterior durability. Painting schedule shall be:

- a. Prime surface – Flat Latex
- b. Fill hairline cracks and minor surface imperfections
- c. Spot prime puttied portions
- d. Apply 2-3 coats of Topcoat of desired sheen by brush, roller or spray.

Follow manufacturer's standard application procedures. Submit color swatch and mock-up paint sample for Architect's approval. Final paint finish shall be on a plant-mixed procedure (by the manufacturer) before application.

## **Interior Painting**

### **A. Interior Masonry, Reinforced Concrete Wall & Slab (Utility Building – Genset)**

Shall be plain cement smooth trowel finish with concrete hardener coated semi-gloss 100% water based acrylic latex paint with excellent hiding, durability and dirt pick-up resistance. Submit color swatch and mock-up paint sample for Architect's approval. Painting schedule shall be:

- a. 1 st coat: Concrete primer and sealer
- b. Putty: Concrete Putty
- c. 2 to 3 Coats: Top Coat

Follow manufacturer's standard application procedures. Submit color swatch and mock-up paint sample for Architect's approval.

### **B. Interior Concrete Flooring**

Shall be plain cement smooth trowel finish with concrete hardener coated with a high performance, two component water-based acrylic epoxy paint which has a superior chemical, solvent and stain resistance, odorless and UV resistant finish. It has the further excellence of brushability and easy water clean-up. Painting schedule shall be:

- a. Epoxy Primer
- b. Reducer for primer
- c. Top-coat with 1 part of its curing agent.

Follow manufacturer's standard application procedure. Submit color swatch and mock-up paint sample for Architect's approval. Verify structural for slab thickness.

## **ELECTRICAL**

### **Wiring Devices**

#### **A. Switches**

Shall be wide series with metallic black or metallic gray finish plate cover conforming to IEC/PNS standards for 1 gang, 2 gang and 3 gang switches, submit product catalog and sample for Architect's approval. Mounting height shall be 1375mm from center of device to floor finish level.

Refer to Electrical Drawings and ECE Drawings for Layouts. See Technical Specification Section 262726: Wiring Devices for standard requirements.

### **Lighting**

*Note: All lamps and lighting fixtures shall be CE, RoHs and U.L. approved brand. Submit certifications for Architect's approval*

#### **Interior Lighting**

2x20 watts, t-8 daylight led tube, with 302mm x 1218mm x 67mm height, mirrorized aluminum reflector and multi-lined satin finish aluminum louvers in powder-coated paint finish, zinc phosphate steel sheet housing, surface mounted

## **TECHNICAL SPECIFICATIONS**

### **I. GENERAL REQUIREMENTS**

#### **A. CONSTRUCTION AID**

##### **1. SUPPORT FACILITIES INSTALLATION**

1.1. General: Locate field offices, storage sheds, and other temporary construction and support facilities in designated areas as shown on the Contract Documents. The location of the trailers on the Drawings is diagrammatic in nature. Final placement of the trailers is to be approved by the Owner's Representative.

1.1.1. Maintain support facilities until Final Completion. Remove prior to Final Completion with permission from the Owner. Field Offices: Provide insulated, weather tight temporary offices of sufficient size to accommodate required office personnel at the Project Site. Keep all offices clean and orderly, sweep weekly and remove rubbish on a daily basis. Furnish and equip offices as follows:

1.2. The General Contractor shall provide an office for their own use and a method to contact them by e-mail and telephone at any point and time.

1.3 General Contractor Provided Field Offices/Equipment: The General Contractor shall provide an office for their own use and a method to contact them by e-mail and telephone at any point and time. The General contractor shall supply the Owner's Representative and the Owner office or trailer with a water cooler for hot and cold water.

1.4. Storage and Fabrication Sheds: Install storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on-site.

1.4.1. Storage sheds for tools, materials and equipment shall be weather tight with heat, lighting and ventilation for products requiring controlled conditions.

1.4.2. Remove temporary materials, equipment services and construction before Substantial Completion.

1.4.3. Clean and repair damage caused by installation or use of temporary facilities. Restore existing facilities used during construction to specified or original condition.

1.5. Temporary Roads and Paving:

1.5.1. Provide paving for pedestrian access and parking for field offices.

1.5.2. Coordinate temporary paving development with sub-grade grading, compaction, installation and stabilization of sub-base and installation of base and finish courses of permanent paving.

1.5.3. Install temporary paving to minimize the need to rework the installations and to result in permanent roads and paved areas without damage or deterioration when occupied by the Owner.

1.5.4. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration, and supervision.

1.6. Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 31 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations, and construction free of water.

1.7. Temporary Lifts, Hoists and Elevator Use:

1.7.1. Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

1.8. Temporary Project Identification Signs: Prepare project identification and other signs of size indicated. Install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.

1.9. Project Sign: Engage an experienced sign painter to apply graphics. Comply with details to be furnished by the Owner's Representative.

1.9.1. Project Sign: The General Contractor shall contact the Owner's Representative for the proper wording for the project sign.

1.10. Temporary Exterior Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.

1.11. Collection and Disposal of Waste and Cleaning:

1.11.1. Collect waste within the contract limit line from construction areas daily. Provide separate containers for proper waste recycling. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) days during normal weather or three (3) days when the temperature is expected to rise above 80° degrees F. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

1.11.2. Maintain areas under General Contractor control free of waste materials, debris and rubbish. Maintain a clean and orderly condition.

1.11.3. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces and other closed or remote spaces before closing the space.

1.11.4. Periodically clean interior areas before the start of surface finishing and continue cleaning on an as-needed basis.

1.11.5. Control cleaning operations so that dust and other particulates will not adhere to wet or newly coated surfaces.

1.12. Temporary Environmental Controls: Construction Manager is to provide the following controls.

1.12.1. Rodent and Pest Control: Before deep foundation work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Employ this service to perform extermination and control procedures at regular intervals so the Project will be free of pests and their residues at materials.

1.12.2. Dust Control (construction and demolition).

1.12.3. Noise Control.

1.12.4. Erosion and Sediment Control.

1.12.5. Pollution Control.

1.12.6 Traffic Control.

1.13. Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

## **2. TEMPORARY UTILITY INSTALLATION**

2.1. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.

2.1.1 Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.

2.1.2 Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.

2.1.3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.

2.1.4 Use Charges: If cost or use charges for temporary facilities are specified by this section to be borne by the Owner the cost or use charges for temporary facilities will be borne not longer than 30 days after final acceptance of the project.

2.2. Temporary Water Service and Distribution:

2.2.1. Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use. Sterilization: Sterilize temporary water piping prior to use.

2.2.2 Water for construction purposes may be taken from the existing service. The General Contractor shall provide connections, approved backflow prevention device, meter and pipe to the water main or nearest hydrant, subject to the approval of the Owner. Upon completion of work, the General Contractor shall remove the temporary connections and backfill if

necessary. If new water service is installed before construction is complete, the new system may be used provided it is returned to the Owner in as-new condition. The General Contractor shall pay for the water used, as metered.

2.2.3 Connect to existing facilities, through an approved backflow prevention device; extend branch piping with outlets so that water is available by use of hoses. Owner will pay for water used. The General Contractor shall not waste water or use faulty equipment. The General Contractor shall provide, at his own expense, all connections, extensions and other apparatus required for use of such services. Upon completion of the Contract, the General Contractor shall disconnect temporary extensions and return utility to its original condition.

### 2.3. Temporary Electric Power and Lighting Services:

2.3.1. Power and lighting may be taken from the power company's nearest pole with temporary poles, if needed, to extend the line to project. If permanent power lines have been installed before beginning the project, then temporary lines can be brought in from the last pole.

2.3.2. Provide service required for construction with branch wiring and distribution boxes located to provide power and lighting by construction-type extension cords. Meter shall be provided and installed by the General Contractor.

2.3.3. The General Contractor shall pay all costs of temporary power and light.

2.3.4 Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, ac 20 Ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

2.3.5. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

2.4. Temporary Telephone Service and Data: Provide temporary telephone service throughout the construction period for all personnel engaged in construction activities. Install telephone on a separate line for each temporary office and first aid station. The General Contractor shall provide telephone service in his office. It is preferred that the General Contractor use a cellular phone. Basic service and local calls will be paid for by the General Contractor. Toll calls will be paid for by the respective users.

2.4.1. Separate Telephone Lines: Provide additional telephone lines for the following: Where an office has more than two (2) occupants, install a telephone for each additional occupant or pair of occupants. Provide dedicated telephone lines for a separate fax machine.

2.4.2. At each telephone, post a list of important telephone numbers.

2.5. Temporary Sanitary Facilities, Including Drinking Water: Temporary sanitary facilities include temporary toilets, wash facilities, and drinking water fixtures. Comply with regulations and

health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.

2.5.1. Provide toilet tissue, wash basins with water, soap and paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material. The General Contractor shall maintain the facilities in a sanitary condition.

2.5.2. Toilets: Use of pit-type privies will not be permitted. Provide separate facilities for male and female personnel.

2.6. Storm and Sanitary Sewer: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully.

2.6.1. Filter out excessive amounts of soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.

2.6.2. Connect temporary sewers to the municipal system, as directed by sewer department officials.

2.7. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.

2.8. Storm Water Pollution Control: Provide earthen embankments and similar barriers in and around excavations and sub-grade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

**3. Temporary Enclosures:** Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.

3.1. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25-sq ft or less with plywood or similar materials.

3.2. Close openings through floor or roof decks and horizontal surfaces with load bearing, wood-framed construction.

3.3. Where temporary enclosure exceeds 100-sq ft in area, use UL-labeled, fire retardant-treated material for framing and main sheathing.

**4. Health and safety expenses, PPE, etc.**

## **5. EQUIPMENTS**

5.1. General: Provide new equipment. If acceptable to the Architect, the Construction Manager may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.

5.1.1. The General Contractor shall furnish tools, apparatus and appliances, hoists and/or cranes and power for same, scaffolding, runways, ladders, temporary supports and bracing and similar work or material necessary to insure convenience and safety in the execution of the Contract except where this is otherwise specified in any Specification Section. All such items shall meet the approval of the Owner but responsibility for design, strength and safety shall remain with the General Contractor. All such items shall comply with local regulations and applicable codes, statutes, rules and regulations, including compliance with the

requirements of the Accident Prevention in the Construction under the Labor Code of the Philippines.

## **II. EXTENSION OF UTILITY BUILDING**

### **A. Earthworks**

The work to be undertaken under this section shall include furnishing of all labor, equipment, materials and performing all operations in connection with the excavation and the removal from the site of all surplus excavated materials and debris, in strict accordance with the requirements under General Conditions of the Contract Documents, drawings and as specified herein:

1. Clearing and Grubbing, complete
2. Complete building excavation as per Specifications

2.1 All excavation shall be unclassified and shall include clay, silt, sand, gravel, hardpan, loose shale, loose stone in masses and any other materials of any character found within the excavation area.

2.2 The Contractor shall make the necessary excavation for foundations to lines and grades indicated in the drawings. Structural excavations shall be to be depths indicated reckoned either from the natural ground line or the finished grade, whichever is lower. The indicated depth is the minimum requirement for excavation. However, if in the opinion of the Engineer, the soil bearing pressure not attained at the indicated depth, the Contractor shall extend the excavations until the required soil bearing pressure is obtained. All excavations extended down to two (2) feet or less from the indicated depths shall be at the Contractor's expense. Excavations in excess of the two (2) feet limit shall be considered as extra work, whereby equitable adjustment in the contract price shall be made on the unit bid price of the item involved. No extra excavations shall be done without the written approval of the Engineer in no case shall footings rest on fill.

2.3 Machine foundations shall rest on a compacted base course conforming to the requirements of DPWH Standard Specifications, 1988 or as per details indicated on the plans and specifications.

2.4 Where concrete for walls or footings is to be placed without forms, trench sides shall be sharp and true.

2.5 If soil condition necessitates installation of side forms, all structural excavations shall be to a sufficient distance from walls and footings to allow for the proper erection and dismantling of forms, installation of service lines and for inspection.

2.6 In case suitable materials are encountered at elevations other than those specified or shown in the drawings, the Engineer at his discretion may direct in writing the variation of excavation depth above or below those indicated in the drawings. All excavation shall be inspected and approved by the Engineer or his representative before pouring any concrete, laying underground services or placing backfill materials.

2.7 The Contractor shall control the grading in the vicinity of all excavated areas to prevent surface drainage running into excavations. Adequate provisions shall be made for the prompt removal of water accumulated from any source whatsoever in the excavated portions of the site by the installation of adequate pumping facilities during the entire course of the Contract. Water which accumulates in excavated areas shall be removed before filling or pouring concrete.

2.8 Shoring and sheet piling, if required during excavation to protect banks, adjacent paving, structures and utilities shall be installed by the Contractor. Sketches of proposed shoring shall be submitted for approval to the Project Manager and no shoring work shall proceed until the Project Manager has granted approval of such sketches. Approval by the Project Manager, however, shall not be construed as to relieve the Contractor of the responsibility for the adequacy of the shoring and sheeting. It shall be the responsibility of the Contractor to ensure that the adjacent properties are not in any way damaged by these excavations. It shall be the Contractor's responsibility to repair any damage and/or compensate the owner of the adjacent properties should they suffer any damage whatsoever.

2.9 Trenches excavation for utilities shall be along the alignments and grade indicated on the drawings. Width of trenches shall be adequate to permit proper installation of utility lines. Where rock or any undesirable materials are encountered, it shall be removed to a depth of not less than 6 inches below trench bottom and the space filled with the selected material tamped and graded until uniformity is obtained.

2.10 Excavations for underground tanks, manholes and other similar structures shall be sufficient to leave between their outer surfaces and the embankment or shoring which may be used. Whenever unsuitable soil that is incapable of supporting the structure is encountered at the bottom of the excavation, such soil shall be removed to the depth necessary to obtain proper bearing. Unauthorized over excavation in unsuitable soil shall be filled with specified backfill materials to be supplied at the Contractor's cost.

3. Complete supply and application of backfilling and compaction of excavated materials, as per specifications.
4. Complete supply and application of gravel bedding as per plans, drawing details and specifications.
5. Complete supply and application of soil poisoning as per drawing details and specifications.
6. Disposal of excess soil/ materials, complete.

## **B. Concrete Works**

### **1. Formworks**

#### 1.1 GENERAL

1.1.1 Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

1.1.2 Design and construct to provide resultant concrete that conforms to design with respect to shape, lines, and dimensions.

1.1.3 Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

**Formworks: Materials Requirements** The materials used for smooth form finish shall be plywood, tempered concrete-form-grade hardboard, metal, plastic, paper or other acceptable materials capable of producing the desired finish for form-facing materials. Form-facing materials shall produce a smooth, uniform texture on the concrete. Form-facing materials with raised grain, torn surfaces, worn edges, patches, dents, or other defects that will impair the texture of concrete surfaces shall not be permitted. No form-facing material shall be specified for rough form finish.

1.2 FORMWORKS ACCESSORIES Formwork accessories that are partially or wholly embedded in concrete, including ties and hangers shall be commercially manufactured. The use of non-fabricated wire form ties shall not be permitted. Where indicated in the Contract, use form ties with integral water barrier plates in walls.

1.3 FORMWORKS RELEASE AGENTS Commercially manufactured formwork release agents shall be used to prevent formwork absorption of moisture, prevent bond with concrete, and hot stain the concrete surfaces. Capable of releasing forms from hardened concrete without staining or discoloration concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.

1.4 Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

1.5 Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to oversteering by construction loads.

1.6 Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

## **2. Reinforcing bars**

The work to be undertaken under this section shall comprise the furnishing of all labor, materials, equipment, plant and other facilities and the satisfactory performance of all reinforcing steel for use in reinforced concrete necessary to complete work indicated on the drawings and the General Conditions of the Contract Documents, as specified herein.

### **2.1 Quality Assurance**

2.1.1 Mill test certificates for supplied reinforcements, indicating physical and chemical analysis.

2.1.2 Submit for splice devices and bar supports

2.1.3. Certified Mill Test Reports

### **2.2 Welder qualification**

### **2.3. Products**

2.3.1 All reinforcement shall be weldable deformed bars, new and free from rust, oil, defect, grease or kinks. They shall conform to the latest revision of ASTM A615 "SPECIFICATION FOR BILLET STEEL FOR CONCRETE REINFORCEMENT."

2.3.2. For Ø 12 bars or small, use grade 40 of  $F_y = 280$  Mpa (40,000 psi) and for bars greater than Ø12, use grade 60 with  $F_y = 414$  Mpa (60,000 psi)

2.3.3. Welded wire fabric for concrete reinforcement shall conform to ASTM A185 "SPECIFICATIONS FOR WELDED STEEL WIRE FABRIC FOR CONCRETE REINFORCEMENT."

2.3.4. Tie Wire: Minimum gauge 16 annealed type.

2.4 Execution

2.4.1 Welding: When required or approved, welding of reinforcing steel shall conform to "REINFORCING STEEL WELDING CODE, AWS D12.1. No welding shall be done at the bend in a bar welding of crossing bars (tack welding) shall not be permitted except as authorized or directed by the Structural Engineer: The ASTM Specifications shall be supplemented by requirements assuming satisfactory weldability by this procedure.

2.4.2 Fabricating and Placing Tolerances: Bars used for concrete reinforcement shall meet the following requirements for fabricating tolerances:

- a. Sheared length - 25 mm
- b. Depth of truss bars - 0,-12 mm
- c. Overall dimensions of stirrups, ties and spirals  $\pm 12$  mm
- d. All other bend  $\pm 12$  mm

3.2.5 Bars shall be placed to the following tolerances:

d.1 Clear distance to formed surfaces  $\pm 6$  mm

d.2 Minimum Spacing between bars  $\pm 6$  mm

d.3 Top bars in slabs and beams

d.3.1 Members 200 mm deep or less  $\pm 6$  mm

d.3.2 Members more than 200mm but not over 600 mm deeps  $\pm 12$  mm

d.3.3 Members more than 600 mm deep  $\pm 20$  mm

d.3.4 Crosswise of members: spaced evenly within 50 mm.

d.3.5. Lengthwise of members  $\pm 50$  mm

2.4.3 Bars may be moved as necessary to avoid interface with other reinforcing steel conducts or embedded items. If bars are moved more than one bar, it shall be subject to approval by the Structural Engineer.

2.4.4 Placing: Minimum concrete protective covering for reinforcement shall be as follows:

3.3.1 Concrete deposited against ground - 75mm

3.3.2 Formed surfaces exposed to weather or in contact with ground.

A. Bars  $\geq \phi 20$  - 50 mm

B. Bars  $< \phi 20$  - 35 mm

3.3.3 Interior surfaces

A. Beams, girder and columns - 35 mm

B. Slab and walls - 20 mm

2.5 All reinforcement shall be supported and fastened together to prevent displacement, construction loads or the placing of concrete beyond the tolerances specified herein. On ground, where necessary, supporting blocks may be used. Over formwork, concrete, metal, or other approved bars, chairs and spacers shall be used.

2.6 Vertical bars in columns shall be offset at least one bar diameter at lap splices. To ensure proper placement, templates shall be furnished for all columns. All splices not shown in the plans shall be subject to approval by the Structural Engineer. Mechanical connectors for reinforcing bars may be used subject to approval of the Structural Engineer.

2.7 Unless permitted by the Structural Engineer reinforcement shall not be bent after being embedded in hardened concrete.

### **3. Installation of concrete**

The work to be undertaken under this section shall comprise the furnishing of all labor, materials, equipment, plant and other facilities and the satisfactory performance necessary to complete all cast-in-place concrete placement operations for slabs on grade, slabs on fill, structural building frame, and other concrete components indicated on the drawings and specifications conforming to the Contract Documents provisions. Unless otherwise indicated on the drawings or specified herein, all concrete work shall be done in accordance with the "SPECIFICATIONS FOR CONCRETE AND REINFORCED CONCRETE" as adopted by the National Structural Codes for Buildings, latest edition, and the current American Concrete Institute's "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" (ACI-318-89) insofar as they do not conflict, or are not inconsistent with the specified provisions herein.

#### **3.1 Design Requirements**

3.1.1 Comply with the construction notes and standard details as indicated in Structural Drawing, first page of the drawing, for the design provisions. Use high strength concrete for areas as designated in the construction notes, except, concrete works for slab on grade, curbs and as indicated on Drawings and notes.

3.1.2 Design and construct formwork, shoring and bracing to conform to Code requirements; resultant concrete to conform to required shape, line and dimension.

3.1.3 Provide expansion joints, control joints, construction joints, and isolation joints to prevent uncontrolled stress cracks in the structure and according to the latest engineering standards.

#### **3.2 Quality Assurance**

3.2.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions. Perform work in accordance with ACI301 and applicable referenced documents.

3.2.2 The Contractor shall select a qualified concrete supplier capable of meeting project requirements as specified herein. Concrete suppliers shall hold a valid certificate of conformance for concrete production facilities Philippine Concrete Industry Association and/or American Concrete Institute, ACI-RP.

3.2.3 Acquire cement and aggregate from the same source for all work.

3.2.4 Conform to ACI 305R or ACI 306R when concreting during hot or cold weather, as appropriate.

3.2.5 Provide continuous on-site monitoring by a qualified inspection agency during all phases of construction. Inspection agencies shall provide written reports of all inspections. Inspections shall be in conformance with the provisions of the Contract Documents.

### 3.3 DELIVERY, STORAGE AND HANDLING

3.3.1 Cement shall be stored in weather tight buildings, bins, or silos which will exclude moisture and contaminants.

3.3.2 Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of like aggregates. To ensure that this condition is met, any test for determining conformance to requirements for cleanliness and grading shall be performed on samples secured from the aggregates at the point of batching.

3.3.3 Natural or manufactured sand shall be allowed to drain until it has reached relatively uniform moisture content before it is used.

3.3.4 Admixture shall be stored in such a manner as to avoid contamination, evaporation, or danger. For those used in the form of suspension or non-stable solutions, agitating equipment shall be provided to assure thorough distribution of the ingredients. Liquid admixture shall be protected from freezing and from temperature changes which would adversely affect their characteristics.

## C. Masonry Works

This section shall include all management, labor, materials, tools, equipment and services required to furnish and install concrete masonry units as specified herein and shown in Drawings required to perform all works in accordance to the General Conditions of the Contract Documents.

### 1. Submittals

All submittals for approval as indicated herein shall be in accordance to the provisions under General Conditions of the Contract Documents.

1.1 Product Data: For each type of concrete masonry unit and accessory including certifications that each complies with specified requirements.

1.2 Shop Drawings:

A. For concrete masonry units, showing sizes, profiles, coursing, bond pattern, special shape locations, joint locations and embedded items.

B. For cast stone trim in form of cutting and setting drawings, showing sizes, profiles and locations of each stone trim unit required.

C. For joint reinforcement and steel reinforcing. Detail fabrication, bending and placement of unit masonry reinforcing bars. Comply with ACI 315 showing reinforcing bar schedules, stirrup spacing, and diagrams of bent bars and arrangement of masonry reinforcing.

D. Shop Drawings and/or manufacturer's catalog cuts of dovetail slots and other devices, if any, required for anchoring masonry to steel or other materials, including instructions for their proper use.

1.3 Samples: Samples for approval for each different type and shape of exposed masonry unit required, showing full range of exposed color, texture and dimensions to be expected in the finished Work. When required by 2.01 B.6, pefaced or ground face, submit concrete masonry unit samples for color selection or verification. Two sample sections of cast stone sills and coping, if any, showing color and texture of finish. Samples of accessories embedded in masonry.

1.4 Quality Control Reports: Submit copies of reports verifying compressive strength requirements of completed masonry, if required by the Engineer, within 7 calendar days of the date of each completed test.

## **2. QUALITY ASSURANCE**

2.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

2.2 Manufacturer Qualification shall be at least five (5) years of production experience, whose published literature clearly indicates general compliance of products with requirements of this section.

2.3 Single Source Responsibility Obtain exposed masonry units of uniform texture and color from a single manufacturer for each type of product required.

2.4 Mock-ups Where shown on the Contract Drawings, before masonry Work commences, construct a panel approximately 6 foot long by 4 foot high of each type of exposed concrete masonry unit, as directed by the Engineer, for approval. Use mortar of type and color to be used in the Work.

A. Protect mock-ups from the elements with a weather-resistant membrane.

B. Retain mock-ups during construction as standards for judging completed masonry Work. When directed by the Engineer, demolish mock-ups and remove them from Authority property.

C. Prepare a list of materials used to construct mock-ups, for information only, for Engineers. Include manufacturer and product names, generic materials, suppliers, colors, identifying lot or batch numbers and design mixes.

D. Where masonry is shown on the Contract Drawings to match existing, construct mock-up panels adjacent to and parallel to existing surfaces to be matched.

### **3. DELIVERY, STORAGE AND HANDLING**

3.1 Comply with product delivery requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

3.2 All materials shall be delivered, stored and handled so as to prevent the inclusion of foreign materials and damage of materials by water exposure and breakage. In stock piling concrete hollow blocks, measures shall be adopted to prevent the hollow blocks from resting directly on soil surface. These measures may include provision of pallets or beds of sand about 2" thick. Packaged materials shall be delivered and stored in original packages until ready for use. Packages or materials showing evidence of water exposure or other form of damage shall be rejected. All materials shall be of the respective qualities specified herein and packaged materials shall carry the manufacturer's labels thereon to permit identification.

### **4. WARRANTY**

Special written warranty for each material specified herein shall be submitted by Manufacturer/Contractor without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Failures are defined to include faulty workmanship or faulty materials.

### **5. PROJECT CONDITIONS**

Comply with field examination requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

### **6. PRODUCTS**

6.1 Specifications for the following materials are stated under section REINFORCED CONCRETE, and shall apply to this Masonry and Cement Work section as if written out in full.

6.2 Aggregates of different kinds and sizes shall be placed in different stock piles and positive means taken to prevent inclusion of foreign matter.

6.3 All cementitious materials must be kept dry until ready to be used; must be kept off the ground under cover, and away from sweating walls and other damp surfaces.

6.4 Cementitious materials that have hardened or partially set prior to actual use shall be removed from the site.

6.5 Unit Masonry - Concrete hollow block units shall be steam cured-weigh-batched units made. Concrete hollow block units shall be true to size, without cracks, chips, spawns, splits or other defects, which impair their strength or durability. They shall have three holes. All nonbearing type concrete blocks shall have a unit weight not to exceed 60 pcf, for load bearing type concrete blocks, a minimum compressive strength of 7.58 MPA (1,100 psi) shall be developed.

6.6 Steel Reinforcement The minimum steel reinforcement for concrete hollow block walls shall conform to the schedule as given hereunder or as indicated in the construction notes.

Minimum Vertical Reinforcement		Horizontal Reinforcement
4" CHB	10mm @ 0.4m	10mm @ 400mm
6" CHB	12mm @ 0.4m	10mm @ 400mm

All cores where vertical or horizontal reinforcements are placed shall be filled with mortar and shall thoroughly be worked inside the core to fill up to voids.

6.7 Tie Wires : Ga. #16 G.I

6.8 Concrete Lintels Lintels for openings shall be the height and thickness of existing hollow block or as detailed in the drawings. The minimum reinforcement shall be that shown in the drawings.

6.9 Mortar mix shall be 1 part Portland Cement and 3parts white sand. All materials for mortar shall be measured by volume. Sand and cement shall be mixed dry and then water added to bring to proper consistency for use. No mortar that has stood for more than 3/4 of an hour shall be used. Retempering of mortar shall not be permitted. Discard mortar which has begun to stiffen.

## **7. Masonry Units**

7.1 Lay all units plumb, true to line, level and accurately spaced.

7.2 Set in place anchors, wall plugs and accessories to masonry as erection progresses.

7.3 Bed solidly each course on Portland cement mortar with vertical joints breaking halfway over the course below.

7.4 Remove all loose mortar and thoroughly wet exposed joints not less than one hour before laying new work.

## **D. Roofing Works**

This section shall include all management, labor, materials, tools, equipment and services required to furnish and install modified bituminous sheet waterproofing membrane as specified herein and shown in Drawings required to perform all works in accordance to the General Conditions of the Contract Documents.

### **1. Submittals**

1.1 General: All submittals for approval as indicated herein shall be in accordance with the provisions under General Conditions of the Contract Documents.

1.2 Product Data: Provide current standard printed product literature indicating characteristics of membrane materials, flashing materials, components, accessories, product specifications and installation instructions.

1.3 Shop Drawings: Submit plans of the roof showing pitches and locations of details. Submit custom details for every condition, including drain sumps, overflow and scuppers, surface mounted counter flashings, equipment base flashings, also showing attachment of extensions and flashings for pipes and vent stacks as applicable.

1.4 Samples: Submit 300mm x 300mm samples of roofing membranes and accessories, with manufacturer's identification labels attached. Submit representative samples of each type of fastener, insulation and roofing accessory with manufacturer's identification labels attached.

1.5 Code Approvals: Submit written certification of compliance with the applicable standards.

1.6 Certificate of Analysis: Submit manufacturer's certificate of analysis for each production run of the cap sheet. If a production run is longer than 24 hours, a new lot number shall be assigned and a new Certificate of Analysis shall be generated.

1.7 Application Manual: Submit manufacturer's application manual, which describes completely the preparation of surfaces and application of specified materials, including details to suit all conditions.

1.8 Test Reports: Submit product test results showing compliance to performance requirements and standards.

## **2. QUALITY ASSURANCE**

2.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

2.2 Manufacturer's Qualifications: Provide primary products, including each type of roofing sheet, bitumen, flashings, vapor retarder if any, and cap sheet produced by a single manufacturer. Manufacturer Qualification shall be at least ten (10) years of production experience, whose published literature clearly indicates general compliance of products with requirements of this section.

2.3 Installer's Qualifications: Installer from the same manufacturer shall perform the work of this Section; and shall be a firm with not less than 3 years of successful experience in the installation of roofing systems specified in this section.

2.4 Provide the Owner with written certification from the manufacturer of the roofing system certifying that the installer is approved by the manufacturer for installation of the specified waterproofing system. Provide a copy of the certification to the Owner prior to award of the contract.

## **3. DELIVERY, STORAGE AND HANDLING**

3.1 Comply with product delivery requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

3.2 Manufactured materials shall be delivered in the original packages and containers bearing the name and brand of the manufacturer. Damaged or deteriorated materials shall be removed from the premises.

## **4. WARRANTY**

Special written warranty for each material specified herein shall be submitted by Manufacturer/Contractor without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Failures are defined to include faulty workmanship or faulty materials.

## **5. PROJECT CONDITIONS**

5.1 Comply with field examination requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

5.2 Weather Condition Limitations: Proceed with roofing work only when existing and forecasted weather conditions will permit work to be performed in accordance with the manufacturer's recommendations and warranty requirements.

5.3 Suspend all application and installation activities during inclement weather. Proceed with roofing work only when weather conditions comply with manufacturer's recommendations. Do not exceed temperature limitations recommended by the manufacturer.

## **6. PRODUCTS**

6.1 Shall be a quality torch applied membrane composed of a reinforced polyester felt reinforcement covered on both sides with polymer modified bitumen mastic with mineral protection in light gray color used as a protective.

6.2 Areas as designated in Drawings shall be applied with a quality torch applied membrane composed of a reinforced polyester felt reinforcement covered on both sides with polymer modified bitumen mastic with mineral protection in light gray color used as a protective material, waterproofing membrane shall have a minimum thickness of 4mm for application. Follow manufacturer's standard application procedures.

**Note:** For roof deck waterproofing provide 2 layer of 4mm thick torch applied membrane waterproofing

6.3 Recommended Equipment, unless otherwise required by Manufacturer:

6.3.1 LP Gas Filled Tank with Regulator and Gauge

6.3.2 Roofing Torch properly connected to pressure gauge of LPG Tank

6.3.3 Sharp Cutter or Knife

6.3.4 Trowel or Spatula with a rounded end to avoid unintentional puncturing of the membrane

6.3.5 Broom to clean and brush off dust and dirt

6.3.6 Gloves

6.3.7 Fire Extinguishers

## **7. Area Inspection**

All areas to be treated with Torch Applied Membrane Waterproofing shall be inspected jointly by client and manufacturer representative. All deficiencies such as mortar droppings, debris, construction materials, scaffolding or the like shall be closely coordinated and must be attended immediately by the client to ensure smooth workflow.

## **8. Surface Preparation**

8.1 After locating all possible cracks, rout-out all visible cracks. Minor cracks shall be treated by plugging, using a plug and cement, while major cracks with excessive seepages such as

construction joints shall be v-cutted up to a depth of a min. of 1” and shall be treated with bituminous sealant and will be restored by a membrane strip.

8.2 All termination of floor and wall on its entire perimeter shall also be rout-out and be treated with mortar re-bond. Angle filet must be at least 45 degrees on its surface.

8.3 All pipe stub-outs shall be treated with bituminous sealant and/or epoxy grout.

## **9. Application of Primer**

Application of primer can be done using a roller brush. Apply evenly on the surface (one coat only) including the flashing area. Coverage of application per pail will be 40-50.

## **10. Installation of Membrane Waterproofing**

10.1 Install all horizontal membranes first, starting with the drains. Always check alignment of membranes before installing it permanently.

10.2 After all horizontal membranes are installed, proceed with the installation of the flashing or up stand that will be 0.30m vertical and 0.30m horizontal. Always cut and 0.30m horizontal, always cut and installed up stand, crosswise and not lengthwise.

10.3 Always implement a 90 degree cut/lapping joints for all up stand corners.

## **11. Quality Inspection**

Perform a quality inspection first before proceeding with the flood test to ensure all lappings and joints are perfectly torched.

## **12. Flood Test**

12.1 When performing a flood test, all stub-outs or drains shall be blocked with a piece of PVC pipe or membrane scrap which will serve as overflow.

12.2 Area shall be flood tested again on a maximum of 24 hrs. After which the water will be removed and consequently hand-over the project to the owner/contractor for their final acceptance.

## **E. ROLLING EXTERIOR SHUTTERS (ROLL-UP DOORS)**

### **PART 1 GENERAL**

#### **1.1 SCOPE OF WORK**

This section shall include all management, labor, engineering, courier, printing, reproduction, materials, tools, equipment and services required to manufacture, assemble, deliver (including all import and export documents), and install all items necessary for the proper execution and completion of said items of work, as indicated in the General and Special Conditions of the Contract Documents, the drawings, as specified herein, and/or as required by job conditions to provide the complete installation for wooden flush doors and frames.

## **1.2 REFERENCES**

Comply with the quality assurance requirements under the General Conditions of the following standards from the part of this specifications to the extent referenced:

- 1.2.1 USBGC – U.S. Green Building Council
- 1.2.2 LEED – Leadership in Energy and Environmental Design
- 1.2.3 GBCI – Green Building Certification Institute
- 1.2.4 EU Directives (WEEE & Ro HS)
- 1.2.5 PSA – Product Standard Agency

## **1.3 SUBMITTALS**

- 1.3.1 General: All submittals for approval as indicated herein shall be in accordance to the provisions under General Conditions of the Contract Documents.
- 1.3.2 Shop Drawings: Submit shop drawings for roll-up doors and grilles frames/jamb. Drawings shall show all pertinent dimensioning, general construction, component connections, locations, and installation details, types of materials, jointing methods, hardware locations and finishes. Include manufacturer's technical and structural data and structural calculations to demonstrate that material proposed for use conform to load and deflecting requirements specified and as required by the Building code.
- 1.3.3 Product Data: Submit selected manufacturer's literature for Architect's review.
- 1.3.4 Samples: Submit sample section of stainless steel doors and grilles and guide rail to be used.

*Note: All Shop Drawings and Sample Sections shall be submitted prior to purchasing and installing of materials for review and approval of the Architect.*

## **1.4 QUALITY ASSURANCE**

- 1.4.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.
- 1.4.2 Manufacturer's Qualification  

Manufacturer shall provide evidence of having personnel and plant equipment capable of fabricating Heavy Duty Steel Roll-Up Door specified herein.
- 1.4.3 Qualification Criteria

Fabrication method and product quality shall meet the standard set by the specified manufacturer.

#### 1.4.4 Environmentally Safe

Provide roll-up door and grilles that are ecology friendly by restricting the use of certain hazardous substances pertaining to copper, mercury, cadmium, hexavalent chromium and bromine type flame retarding materials.

### 1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 Comply with product delivery requirements under General Conditions of Contract Documents and Manufacturer's instructions.

1.5.2 Accept roll-up doors and grilles on site in manufacturer's standard packaging. Inspect for damage.

1.5.3 Do not store in damp or wet areas. Acceptable humidity shall be no less than 25% nor greater than 55%. Any claim for warp, bow, twist or telegraphing may be denied if required humidity requirements are not maintained.

1.5.4 Protect all doors from exposure to natural and artificial light after delivery.

### 1.6 WARRANTY

Special written warranty for each material specified herein shall be submitted by Manufacturer/ Contractor without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Failures are defined to include faulty workmanship or faulty materials.

## PART 2 PRODUCTS

**2.1 Acceptable Manufacturer** – Company specializing in manufacturing products specified in Section with a minimum of ten (10) years documented experience.

### 2.2 Roll-up Door

Sizes and details as shown in drawings; *dimension, fabrication and installation of Doors shall be based on the actual measurements and conditions of the site.*

#### 2.2.1 Materials:

- a. Shall be electro galvanized steel sheet chromate-free coated. Special coating film or zinc coating layer applied on the base metal.

- b. Hot-dip galvanized steel sheet chromate-free coated. Special coating film on hot dip galvanizing applied on the base metal.

**2.2.2 Curtains:** Slats shall be C-100 type made of galvalum steel slots with 3 layers vision slots as per design specified. End locks shall be attached to the slats to maintain curtain alignment and prevent lateral movements and optional wind lock for extra strength.

**2.2.3 Bottom Bar:**

Shall be two equal steel angular welded with optional weather-stripping or extruded aluminum tubular section with locking system.

**2.2.4 Guides:**

Shall be bended steel shapes with minimum gauge # 18 thickness or extruded aluminum. Guides shall be fastened on walls by bolts and optional guide covers.

**2.2.5 Bracket:**

Brackets shall be steel plates to support the helical counterbalance spring or shaft assembly and hood. Minimum thickness of plate shall be gauge # 16 bolted on the wall or welded to reinforcing bars.

**2.2.6 Hood:**

Casing shall be provided with hood except when installation is inside the ceiling. Hood shall be gauge #24 minimum cold rolled sheet prime painted or galvanized steel. Intermediate support angles will be furnished to support hood where required on wider openings.

**2.2.7 Locking:** Shall be slide bolts, provision for padlocks.

**2.2.8 Finishes:** Shall be prime painted, powder-coated finish. Submit color swatches for Architect's approval.

**2.3 Operations**

**2.3.1 Manual or Push-up Type**

Manually operated doors have lift handles on the bottom part of the door. These doors are equipped with torsion springs for ease of operation. Pole with hook or puller is provided on every door. This type of operation is not recommended for a single panel of more than 16 square meters door area or maximum of 100 kilograms weight of door. Additional removable center guide/post can be introduced to divide the door into double panels.

**PART 3 EXECUTION**

**3.1 Manufacturer's Instruction**

Comply with manufacturer's product technical data, installation procedures and standards as per project requirement.

### **3.2 Preparation**

The manufacturer shall verify dimensions before proceeding with the fabrication. Obtain field measurements for work required to be accurately fitted to the other construction. Be responsible for the accuracy of each measurement and precise fitting and assembly of finished work.

### **3.3 Installation:**

Installation shall be in accordance with the manufacturer's shop drawings and instructions prepared by the specified manufacturer and or by its authorized representative.

## **F. Windows**

This section shall include all management, labor, engineering, courier, printing, reproduction, materials, tools, equipment and services required to manufacture, assemble, deliver (including all import and export documents), and install all items necessary for the proper execution and completion of said items of work, as indicated in the General and Special Conditions of the Contract documents, the Drawings, as specified herein, and/or as required by job conditions to provide the complete installation for windows.

### **1. SUBMITTALS**

1.1 General: All submittals for approval as indicated herein shall be in accordance with the provisions under General Conditions of the Contract Documents.

1.2 Submit shop drawings, brochures and installation instructions. Clearly show details of each frame type, elevation of each door and window type, conditions and opening with various wall thickness and materials, typical and special details of door construction, methods of assembling sections, location, reinforcements, and installation requirements for hardware, size, shape and thickness of materials.

1.3 A sample of window showing edges, top and or bottom construction, insulation, hinge reinforcement and face stiffening shall be submitted.

1.4 All samples submitted shall be of the production type and shall represent in all aspects the minimum quality of work to be furnished by the manufacturer, No work represented by the samples shall be started until the samples are approved and any downgrading of quality from what was demonstrated by the samples may be cause for rejection of the work.

1.5 Submit test reports and certificates for compliance to standards applicable to material quality as specified herein.

Note: All Shop Drawings and Sample Sections shall be submitted prior to purchasing and installing of materials for review and approval of the Architect.

## **1. QUALITY ASSURANCE**

2.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

2.2 Gauge of Components: The inspector shall verify that the thickness is specified.

2.3 Size of product: The inspector shall verify that the physical size of the window and frames are as specified.

## **2. DELIVERY, STORAGE AND HANDLING**

3.1 Comply with product delivery requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

3.2 The Contractor is responsible for receiving hollow metal door and frame product shall remove wraps of covers upon delivery at the building site and shall ensure that any scratches or disfigurement caused by shipping or handling are promptly cleaned and touched up with Manufacturer's recommended material.

## **3. WARRANTY**

Special written warranty for each material specified herein shall be submitted by Manufacturer/Contractor without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Failures are defined to include faulty workmanship or faulty materials.

## **4. Acceptable Manufacturer shall have at least 10 years reliable and reputable manufacturing experience.**

## **5. Powder Coated Hollow Metal Window**

Sizes and details as shown in drawings, dimension, fabrication and installation of Window shall be based on the actual measurements and conditions of the site.

7.1 W-4 - 1.2mm gauge 18 base-metal thickness, 45mm thk powder coated hollow metal window with 1.2mm thk ga. 18 x 45mm x 75mm Z profile full louver blades (3000mm x 1800mm)

## **G. Finishes**

### **1. Plastering**

This section shall include all management, labor, materials, tools, equipment and services required to furnish and install plastering as specified herein and shown in Drawings required to perform all works in accordance to the General Conditions of the Contract Documents. All masonry unit work or concrete work not specifically specified with a finish, exposed to view shall be cement plastered. Plastering work shall be coordinated properly with the work of other trades. The work of other trades shall be protected properly from damage during plastering operations. Floors and finished work shall be properly protected with a covering of polyethylene sheets or heavy kraft waterproof paper, with lapped and sealed joints. Scaffolding shall be amply strong, well braced, tied securely and inspected regularly. Overloading of scaffolding will not be permitted.

## **1.1 SUBMITTALS**

All submittals for approval as indicated herein shall be in accordance to the provisions under General Conditions of the Contract Documents.

## **1.2 QUALITY ASSURANCE**

Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

## **1.3 DELIVERY, STORAGE AND HANDLING**

1.3.1 Comply with product delivery requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.3.2 Manufactured materials shall be delivered in the original packages and containers bearing the name and brand of the manufacturer. Cement and lime shall be stored off the ground under watertight cover, and away from sweating walls and damp surfaces, until ready for use. Damaged or deteriorated materials shall be removed from the premises.

## **1.4 WARRANTY**

Special written warranty for each material specified herein shall be submitted by Manufacturer/Contractor without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Failures are defined to include faulty workmanship or faulty materials.

## **1.5 EXECUTION**

1.5.1 Mixing of plaster: Except where hand mixing of small patches is approved, mechanical mixers of an approved type shall be used for the mixing of plaster. Materials shall be accurately measured in a device that will maintain the specified proportions within a plus or minus tolerance not in excess of 5 percent by volume. Caked or lumped materials shall not be used. Mechanical mixers, mixing boxes, and tools shall be cleaned after mixing each batch and kept freely of plaster from previous mixes. Plaster shall be thoroughly mixed with the proper amount of water, until uniform in color and consistency. Re-tempering will not be permitted, and all plaster that has begun to stiffen shall be discarded.

1.5.2 Proportioning of plaster: Portland cement plaster shall be a two-coat application. Each coat shall be proportioned as follows:

One (1) part Portland Cement

Three (3) parts Sand; and

One-fifth (1/5) part Lime Putty

1.5.3 Application of plaster: Base coats shall be applied with sufficient pressure and the plaster shall be sufficiently plastic to provide good bonds on masonry or concrete base. Plaster work shall be finished level, plumb, square and true, within a tolerance of 3mm in 3m, without eaves, cracks, blisters, pits, grazing, discoloration, projections or other

imperfections. Plasterwork shall have no visible junction marks where one day's work adjoins another. Finished work shall be covered and protected in an approved manner to prevent damage.

1.5.4 Portland Cement Plaster: Shall be applied in two coats double-up method on masonry or concrete to a thickness of not less than 12mm. Base coats shall be applied with sufficient pressure and excessive evaporation during hot or drying weather conditions. Care shall be taken to prevent staining the finished plaster.

1.5.5 Patching and pointing: Upon completion of the building and when directed, all loose, cracked, damaged, or defective plastering shall be cut out and re-patch in a satisfactory and approved manner. All point-patching of plastered surfaces, and plaster work abutting or adjoining any other finish work, shall be done in a neat and workmanlike manner. Plaster droppings or splattering shall be removed from all surfaces. Exposed plastered surfaces shall be left in a clean unblemished condition ready to receive paint or other finish. Protective coverings shall be removed from floors, other surfaces, and all rubbish and debris shall be removed from the building.

## **H. Electrical Works**

### **1. 600 VOLTS WIRE AND CABLE**

Provide 600 volt Wire and Cable in accordance with the Contract Documents.

#### **1.1 STANDARDS**

Comply with the provisions under General Conditions of the Contract Documents and to the following standards as applicable:

1.1.1 Philippine Standard, PS

1.1.2 Philippine Electrical Code, PEC (Part 1:2017, Part 2: 2017)

1.1.3 Rubber Insulated Wire and Cables: IPCEA S – 19-81, NEMA WC 3, and UL 44

1.1.4 Thermoplastic Insulated Wire and Cables: IPCEA S – 61-402, NEMA WC 3, and UL8

1.1.5 Annealed Copper Wire for Conductors: ASTM B-3

#### **1.2 QUALITY ASSURANCE**

1.2.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

1.2.2 Wires and cables shall be of the same manufacturer.

#### **1.3 SUBMITTALS**

1.3.1 General: All submittals for approval as indicated herein shall be in accordance with the provisions under General Conditions of the Contract Documents.

1.3.2 Manufacturer's product data sheet showing each cable type and rating.

1.3.3 Samples

1.3.4 Field Test Reports/ Factory Test Reports

#### **1.4 FIELD TESTING**

1.4.1 Comply with the provisions under General Conditions of the Contract.

1.4.2 Inspect splices and terminations and make mechanically and electrically tight prior to final acceptance of the work.

1.4.3 Feeder and branch circuit insulation shall be tested after installation, and before connection to fixtures and appliances. A. Tests shall be performed with a 1000 Volt-Megger, and conductors shall test free from short circuits and grounds. Submit calibrate certificate of instrument to be based prior to testing for Engineers approach. B. Conductors shall be tested phase-to-phase and phase-to-ground.

1.4.4 Demonstration: Subsequent to wire and cable installation and connection, energize circuits and demonstrate functioning in accordance with contract requirements. Correct deficiencies and retest to demonstrate compliance.

#### **1.5 ACCEPTABLE MANUFACTURERS**

Shall have at least 10 years reliable and reputable manufacturing experience. Shall be ISO 9001 certified company.

1.5.1 Wires and Cable • low voltage cable • 2 hours fire rated cable

1.5.2 Connectors • Wire size 2.0mm<sup>2</sup> through 10mm<sup>2</sup>: hand or tool applied • Wire size 16mm<sup>2</sup> through 35mm<sup>2</sup> tool applied: One hole compression type. • Wire size 50mm<sup>2</sup> through 240mm<sup>2</sup> tool applied: two hole compression type

1.5.3 Electrical Tape: • Scotch type

#### **1.6 Wires and Cable**

1.6.1 General: A. 600V minimum insulation rating.

1.6.2 Conductor: A. Electrical grade, annealed copper, tinned if rubber insulated, and fabricated in accordance with ASTM and IPCEA Standards. Minimum size number 3.5 mm<sup>2</sup>. B. Aluminum conductors are not permitted.

1.6.3 Standing and Number of Conductors: A. Size 3.5 mm<sup>2</sup> and 5.5 mm<sup>2</sup> stranded. B. Larger than 8.0mm<sup>2</sup> and larger, stranded ASTM Class B. C. Control wires stranded in accordance with ASTM Class B stranding designations. D. Cables for low voltage systems shall be multi conductor type unless otherwise noted.

1.6.4 Insulated Single Conductors A. Type THW or THWN – Flame retardant, moisture and heat resistant thermoplastic with nylon jacket or equivalent, maximum operating

temperature 75 °C. B. Type THHN- Flame retardant and heat-resistant thermoplastic insulation, with nylon jacket or equivalent, maximum operating temperature of 90 °C.

#### 1.6.5 Color coding:

A. Wiring shall be color coded as follows:

1 Phase, 2 wire + Ground Phase A – Red

Neutral – White

Ground - Green

3 Phase, 3 wire + Ground

Phase A – Red

Phase B – Yellow

Phase C – Blue

Neutral – White

Ground - Green

B. Control wiring shall be color coded in accordance with manufacturer's recommendations.

### 1.7 EXECUTION

1.7.1 Provide minimum 5.5 mm<sup>2</sup> wiring for 220 volt 20A, branch circuits exceeding 30 meters in length from panel board to furthest outlet.

1.7.2 Do not install wire until raceway systems are complete.

1.7.3 Provide cable supports for vertical risers.

1.7.4 Wire size shall be uniform for the entire length of the circuit unless noted otherwise.

1.7.5 Do not splice feeders or dedicated branch circuits unless otherwise indicated.

1.7.6 Make connections, splices, taps and joints with solderless devices, mechanically and electrically secure.

1.7.7 Lubricate cables to facilitate pulling. Lubrication material shall be inert to cable and raceways.

1.7.8 Install compression connectors with hydraulic die, embossing die code into connector. Connect to the bus with Belleville type washers for positive pressure over the complete contact area. Insulate with heat shrink tubing.

1.7.9 Provide a separate neutral for dimmer branch circuits, ground fault interrupter branch circuits, lighting branch circuits serving electronic ballasts and branch circuits serving isolated ground and isolated ground surge suppressor type receptacles.

## 2. RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

Provide raceways and boxes in accordance with the Contract Documents

### 2.1 STANDARDS

- A. PS
- B. PEC
- C. ANSI
- D. UL
- E. NEMA

## **2.2 SUBMITTALS**

### **A. Conduit, Boxes, Wireways and Auxiliary Gutters:**

1. Manufacturer's product data sheets
2. Samples

## **2.3 IDENTIFICATION**

A. Mark junction box covers with permanent stencil identification of panel board and circuit numbers of wiring contained within.

B. Paint fire alarm and life safety system boxes red.

## **2.4 ACCEPTABLE MANUFACTURERS**

Shall have at least 10 years reliable and reputable manufacturing experience.

## **2.5 CONDUIT AND FITTINGS**

### **A. Intermediate Metal Conduit:**

1. Rigid conduit, heavy wall, hot dipped galvanized inside and out, threaded ends.
2. Threaded type fittings.

### **B. Electrical Metallic Tubing:**

1. Continuous, seamless steel tubing galvanized or sherardized on exterior, coated on interior with smooth hard finish of lacquer, varnish or enamel.
2. Steel, set screw or compression type fittings. Provide concrete type fittings where required.

### **C. Flexible Steel Conduit:**

1. Single strip, continuous, flexible interlocked double-wrapped steel, hot dip galvanized inside and out forming smooth internal wiring channels.
2. Steel, compression type fittings.

### **D. Liquid Tight Flexible Conduit:**

1. Same as flexible steel conduit except with tough, inert, watertight plastic outer jackets.

2. Fittings shall be cast malleable iron body and gland nut, cadmium plated with one-piece brass grounding bushings threaded to interior of conduit. Spiral molded vinyl sealing ring between gland nut and bushing and nylon insulated throat.

**E. Rigid Non-metallic Conduit:**

1. Schedule 40 polyvinyl chloride suitable for 90C.

2. Solvent cemented type fittings.

**F. Cable Tray/Trunking/Ladder:**

1. Cable tray systems shall consist of straight sections, fittings, and required and classified as equipment grounding conductors. Provide radiused elbows, tees, crosses, splice plates, wall and overhead supports, and other fittings necessary for a complete, continuously grounded system.

2. Pre-Galvanized Steel: Straight sections and fitting side rails and rungs shall be made from steel meeting the minimum mechanical properties of ASTM A446, Grade A and mill galvanized in accordance with ASTM A525, Coating Designation G90. Splice plates shall be manufactured from high strength steel, using ribbed carriage bolts and serrated flange lock nuts.

3. Ladder: Ladder type trays shall consist of two longitudinal members (side rails) with transverse members (rungs) welded to the side rails. Rungs shall be spaced 15 cm on center. Rung spacing in radiused fittings shall be 22 cm measured at the center of the trays width. Rungs shall have a minimum cable bearing surface of 20 mm with radiused edges. No portion of the rings shall protrude below the bottom plane of the side rails.

G. Loading capacity shall meet include weight of cables installed plus a safety factor of 1.5

**2.6 WIREWAYS AND AUXILIARY GUTTERS**

A. Sizes and shapes as indicated and/or as required. Gauge 16 minimum.

B. Provide necessary elbows, tees, connectors, adapters, etc.

C. Continuous removable cover secured with screws and keyhole slots. Hinged covers were installed above the suspended ceiling.

D. Provide wire retainers at not greater than 30 cm on center.

**2.7 OUTLET, JUNCTION, AND PULL BOXES**

A. Cast Type Boxes:

1. Ferrous alloy box with inside threaded hubs for rigid steel conduit.

2. Aluminum box with inside threaded hubs for rigid aluminum conduit.
3. Ferrous alloy box with compression or inside threaded hubs with adapter for electrical metallic tubing.
4. Cast raised cover, size matched to contour of box.
5. Tapered threads for hubs.

**B. Galvanized Pressed Steel Type Boxes:**

1. General:

a. Pressed steel, galvanized or cadmium-plated, 10 cm minimum deep type octagonal or square with galvanized cover or extension ring as required. Gauge 16 minimum.

2. Concrete Box:

a. 10 cm minimum octagonal with removable back-plate. Depth of box shall allow for a minimum of 25 mm of concrete to be poured around the backplate.

3. Lighting Fixture Box:

a. 10 cm minimum deep type octagon. Gauge 16 minimum.

b. Where fixtures are mounted on or in an accessible type ceiling and a modular wiring system is not used, provide a junction box and extend flexible steel conduit to each fixture.

4. Provide 10 mm no bolt fixture studs where required.

**C. Sheet Steel Boxes:**

1. No. 12 gauge sheet steel for boxes with maximum side less than 1 meter, and maximum area not exceeding 6,500 square cm; riveted or welded 20 mm flanges at exterior corners.

2. No. 10 gauge sheet steel for boxes with maximum side 1 meter to 1.5 meters, and maximum area 6,500 to 10,000 square cm; riveted or welded 20 mm flanges at exterior corners.

3. No. 10 gauge sheet steel riveted or welded to 40 mm x 40 mm x 6 mm welded angle iron framework for boxes with maximum side exceeding 1.5 meter and more than 10,000 square cm in area.

4. Covers: a. Same gauge steel as box. b. Subdivided single covers so no section of cover exceeds 23 kg. c. Machine bolts or machine screws threaded into tapped holes.

5. Paint: a. Rust inhibiting primer, ANSI 61 gray enamel finish coat.

## **2.8 EXECUTION**

A. Provide raceways for all systems. Provide insulated grounding conductors in metallic or non-metallic raceways. Minimum conduit size shall be 15 mm. Wiring of each type and system shall be installed in separate raceways.

B. Branch circuit conduits or wiring device conduits for miscellaneous systems shall not be installed below slab on grade or embedded within floor slabs in tenant areas.

C. Locate raceways so that the integrity of structural members is not affected and they do not conflict with the services of other trades. Draw up couplings and fittings full and tight. Protect threads from corrosion after installation with zinc chromate or equivalent protection.

D. Conceal raceways except at surface mounted cabinets and freestanding equipment. Provide flashing and counter-flashing for waterproofing of raceways which penetrate the roof. Route exposed raceways and raceways above suspended ceilings parallel or perpendicular to building lines with right angle turns and symmetrical bends. Provide sleeves in concrete walls, floor slabs and partitions. Waterproof sleeved raceways where required.

E. Provide raceway expansion joints for exposed and concealed raceways at expansion joints and between structures to compensate for differential movement. Provide bonding conductor.

F. Provide one empty 20 mm inch raceway for each three spare unused poles or spaces of flush-mounted panelboards. Terminate conduit in an accessible location for future extension.

G. Provide raceways with appropriate seal-offs, explosion-proof fittings, etc. in special occupancy areas as required. Provide conduit seal-offs where portions of an interior raceway system pass through walls, ceiling or floors which separate adjacent rooms having substantially different maintained temperatures, refrigeration, or cold storage rooms.

H. Provide pull cord in empty raceways. Tag both ends noting destination.

I. Clear the raceway of all obstructions and dirt prior to pulling in wires or cables. Use ball mandrel (diameter approximately 85% of conduit inside diameter) followed by close fitting wire brush and wad of felt or similar material. This assembly may be pulled with, but ahead of cable being installed. Clean empty raceways similarly. Clear or replace any raceway which rejects ball mandrel.

J. Secure raceway clamps or supports to masonry materials with toggle bolts, expansion bolts, or steel inserts. Install raceway on steel construction with approved clamps which do not depend on friction or set-screw pressure alone.

K. Raceways Above Suspended Ceilings:

1. Single runs of 15 mm or 20 mm raceways may be supported from ceiling support wires where permitted by the rating of the ceiling system.

2. Provide independent support of raceways larger than 20 mm. Provide independent support of multiple raceways (more than one). Provide unistrut support and threaded rod to structure above. Attachment to ceiling support wires is not permitted.

3. Provide independent support of raceways installed above fire rated ceilings. Attachment to ceiling support wires is not permitted.

4. Install conduit 30 cm minimum above top of ceiling.

L. Conduit connected to rotating or vibrating equipment shall be flexible metal conduit or liquid tight flexible conduit.

## 2.9 WIREWAYS AND AUXILIARY GUTTERS

A. Install wireways above suspended ceilings such that the cover will hinge upward from the side.

B. Provide 30 mm clear from wireway cover when in open position.

## 2.10 OUTLET, JUNCTION, AND PULL BOXES

A. Provide outlet, junction, and pull boxes as indicated and as required for a complete installation and to facilitate proper pulling of wires and cables. Boxes shall be sized per electrical code as minimum. Plug open knockouts.

B. The exact location of outlets and equipment is governed by field conditions. Where necessary, relocate outlets so that fixtures and equipment are symmetrically located in accordance with the room layout and will not interfere with other work or equipment. Verify the final location of outlets, fixtures, and equipment with the Architect.

C. Back-to-back outlets in the same wall or "through-wall" type boxes are not permitted. Provide 30 mm minimum spacing for outlets shown on opposite sides of a common wall. Provide acoustical potting compound on outlet boxes installed in private offices and conference rooms.

D. Fit outlet boxes in finished ceilings or wall with appropriate covers, set flush with the finished surface. Where more than one switch or device is located at one point, use multiple gang boxes and covers. Provide tile box or a 10 mm square box with tile ring in masonry walls not plastered or furred. Where drywall material is utilized, provide plaster rings. Provide outlet boxes of type and size suitable for the specific application. Provide barriers where required for voltage or systems separation.

E. Provide pull boxes so that an individual run of conduit does not contain more than the equivalent of 4 ninety degree bends (360 degrees total).

## 2.11 APPLICATION OF BOXES OUTLET, JUNCTION AND PULL BOXES

A. Cast Type Boxes:

1. Where connected to rigid steel, intermediate metal, rigid aluminum conduit and liquid tight flexible conduit, 30 mm and smaller.

2. Exposed conduit installations within 3 meters above finished floor. 3. Where exposed to moisture and outdoors.

**B. Galvanized Pressed Steel Type Boxes:**

1. Where connected to electrical metallic tubing and flexible steel conduit, 30 mm and smaller.

2. Dry locations.

3. Where concealed in walls and above suspended ceilings.

**C. Sheet Steel Boxes:**

1. Where connected to conduit larger than 32mmØ.

**2.12 SLEEVES**

A. Sleeves shall be 10 cm rigid steel nipples. Extend floor sleeves a minimum of 10 cm above and below the finished floor. Extend wall sleeves a minimum of 10 cm on either side of the wall. Sleeve ends shall be threaded.

B. Provide sleeves between floors of telecommunication closets as in quantities and locations shown on the Drawings.

C. Fire seal floor sleeves and sleeves in fire rated walls to maintain fire rating of wall after telephone cables are installed.

**3. CONDUIT FOR ELECTRICAL SYSTEMS**

**3.1 SUMMARY**

3.1.1 The Contractor shall be responsible for coordination with the Agency and Others for proper handling, transfer, and storage of products supplied by theirs.

3.1.2 The Contractor shall be responsible for coordination with the Agency and Others for proper handling, transfer, and storage of products supplied by Others.

**3.2 REFERENCES**

3.2.1 American National Standard Institute (ANSI).

a. C80.1 Specifications for Rigid Steel Conduit, Zinc coated;

b. C80.3 Specifications for Electrical Metallic Conduit.

c. National Electrical Manufacturers Association (NEMA)

3.2.2 National Fire Protection Association (NFPA).

- a. National Electrical Code (NEC).

### **3.3 DEFINITIONS**

3.3.1 Conduit (General) – A rigid or flexible tubular raceway of circular cross section with associated couplings, fabricated from moisture and corrosive resistant material, designed for the purpose of housing and protecting electrical conductors between locations as well as plumbing applications.

3.3.2 Conduit Fittings – Devices used to connect to each other, to enclosures, manholes, pull boxes, or other devices.

### **3.4 SUBMITTALS**

3.4.1 Refer to Section 01 33 01, Submittals and the Contract Documents. Submit catalog cuts on the following:

- a. Conduits.
- b. Fittings.
- c. Metallic joint compounds, caulking and sealing compounds.
- d. Pull cords.
- e. Conduits tags and labels.
- f. Conduit mandrels and brushes.
- g. Warning tape.
- h. Conduit end caps and plugs.

3.4.2 Submit mandrel log sheets upon installation.

3.4.3 Submit Red-Line Markups depicting the actual location of conduit route including depth of underground installations (noted every ten feet on the plan). Include conduit numbering and descriptive name to identify the system it serves and protects. Schematic representation of the conduit route is not acceptable. 3.4.4 Submit Material Design Data and Certificate of Compliance. F. Submit Manufacturer's Installation Instructions

### **3.5 WARRANTY**

3.5.1 Refer to Section 01 78 01, Warranty and Bonds, for general requirements and procedures.

3.5.2 Provide a minimum one (1) year warranty on defective workmanship and material.

### **3.6 SYSTEM START-UP**

3.6.1 Contractor shall not install any conduit, fittings, or support until approved by the Architect.

3.6.2 Conduits must be labeled and inspected prior to System Startup. Failure to provide labels, tags, and red-line markups may delay System Startup. PART 2

### **3.7 MANUFACTURERS**

3.7.1 Conduit, fittings, and labels shall be produced by established Manufacturers in the regular business of producing such products as specified. 3.7.2 Conduits shall be listed and labeled by a nationally recognized electrical safety testing organization.

### **3.8 PRODUCTS**

3.8.1 Conduits provided shall be of common sizes with available fittings.

3.8.2 Contractor shall notify the Project Manager of any long lead time products affecting delivery of the Work.

### **3.9 MATERIALS**

3.9.1 Galvanized Rigid Steel (GRS) conduits

a. Provide GRS conduits conforming to ANSI C80.1, hot-dip galvanized inside and out. Threaded ends to be galvanized using a zinc metalizing process which sprays or blasts molten or semi-molten zinc on the threaded area. Minimum size to be  $\frac{3}{4}$  inch, unless otherwise indicated in the Contract Documents.

3.9.2 Electrical Metallic Tubing (EMT) conduits

a. Provide EMT conduits conforming to ANSI C80.3. Minimum size to be 1 inch, unless otherwise indicated in the Contract Documents.

3.9.3 FRE conduit a. Provide composite or fiberglass conduit as manufactured.

### **3.10 ACCESSORIES**

3.10.1 GRS Conduit Fittings

a. Provide conduit fittings fabricated from steel, which is hot-dip or mechanically galvanized.

b. Provide bushings and grounding bushings with molded phenolic or "Nylon" insulating collars. Grounding bushings to have a "lay-in" tin-plated copper lug.

c. Provide expansion fittings for exposed conduit runs of the weatherproof type with external bonding jumper, providing up to inches longitudinal movement with bushed conduit ends.

d. Provide watertight split couplings or three-piece couplings.

e. Provide locknuts two inches and smaller of galvanized steel. Provide locknuts larger than two inches of galvanized malleable iron. 6. Provide hubs of galvanized

steel or galvanized malleable iron, with insulating inserts and sealing rings. Hubs to provide watertight conduit connections to boxes and enclosures.

f. Provide conduit outlet bodies cast ferrous alloy, with gasketed ferrous alloy cover, hot-dip or mechanically galvanized.

### 3.10.2 EMT Conduit Fittings

a. Provide fittings for EMT conduits conforming with ANSI C80.3. EMT conduit fittings to be set screw type, steel.

### 3.10.3 Flexible Metal Conduit Fittings

a. Flexible Metal Conduit Fittings. Galvanized malleable iron or steel squeeze type, set screw fittings with insulated throat.

b. Liquidtight Flexible Metal Conduit Fittings. Galvanized steel compression fittings, watertight and oil-tight, with O-ring, conduit ferrule, and insulated throat.

### 3.10.4 Conduit Tags and Labels

a. Provide tags and labels made from nonferrous metals with raceway designations on all conduits and stamped by steel dies.

### 3.10.5 Conduit Mandrels and Brushes

a. Use conduit brushes with round wire bristles for maximum cleaning of sand, grit, and obstructions from the conduit. Provide a pulling eye on one end and a smaller twisted eye on the other end, allowing for bi-directional pulling.

b. Provide conduit mandrels of the flexible type for cleaning out mud, dirt, and light obstacles from ducts before the installation of cable and for pulling around tight bends. Use a tapered profile, which allows pulling in either direction. Provide pulling eyes on each end. Fabricate the mandrel from polyurethane, or an approved equal material not to damage conduit inner walls.

c. Conduit mandrels and brushes not to damage any conduit interior coating.

d. Conduit brushes and mandrels to be manufactured for the purpose by a company regularly engaged in the production of electrical equipment. Mandrels not to be fabricated by the Contractor in the shop or field.

3.10.6 Warning Tape Provide warning tape made of heavy-gauge, yellow, plastic resistant to corrosive soil and suitable for direct burial, six inch minimum width for use in trenches containing electric and power circuits. Tape to have printed warning that an electric circuit is located below the tape.

3.10.7 Pull Cord Provide pull cord of ¼ inch diameter twisted or braided nylon cordage in each active and spare conduit with a minimum tensile strength of 1000 pounds.

### **3.11 MIXES**

Contractor shall not mix different conduit materials through the use of adaptors or connectors.

### **3.12 FABRICATION**

3.12.1 Provide an equal number of spare conduits as quantity installed.

3.12.2 Conduit shall be limited to a maximum of 270 degrees of bend. No single bend point shall be greater than 90 degrees.

### **3.13 FINISHES**

Exposed metal conduit at Transfer Centers that can't be effectively concealed shall be painted to match existing finish as directed by the Project Manager.

### **3.14 SOURCE OF QUALITY CONTROL**

3.14.1 Refer to Section 01 45 01, Quality Control, for general requirements and procedures.

3.14.2 Conduits provided shall be listed and labeled by a nationally recognized electrical safety testing organization.

### **3.15 EXECUTION**

#### **3.15.1 INSTALLERS EXAMINATION**

A. Contractor shall verify site conditions and be responsible for coordinating and implementing the Work.

#### **3.15.2 PREPARATION**

A. Conduit types for specific locations to be as indicated in the Contract Documents. Where conduit types are not indicated, the type to be as indicated herein; Conduits are considered "subject to damage" in any of the following locations:

- a. Exposed installations within 48 inches of finished floor or final grade;
- b. Exposed installations where the area is subject to vehicular traffic, within 4 feet of established drive lanes or parking areas unless the area is protected by bollards or other structure. Height of affected area to be 8 feet or maximum height of vehicles whichever is greater;
- c. Exposed installations where the area is subject to maintenance activity, including electrical and mechanical equipment rooms. Height of the affected area to be eight feet above the finished floor.
- d. For interior, dry installations above ground, exposed or concealed in construction, and where subject to damage, provide uncoated galvanized rigid steel conduits. For equipment requiring flexible connections, provide flexible metal conduits;

e. For interior, wet or damp installations above ground, provide EMT conduit colored gray. For equipment requiring flexible connections, provide liquidtight flexible metal conduits;

f. For exterior wet, damp, or dry installations, exposed four feet above ground, whether or not subject to damage, provide FRE conduit colored gray. For equipment requiring flexible connections, provide liquid-tight flexible metal conduits;

g. For exterior exposed conduits below four feet, use super strength ¼ inch wall thickness FRE conduit.

B. Sleeves Provide all sleeves of the GRS types unless otherwise indicated.

a. Install, in advance of pouring concrete, all sleeves where indicated.

b. Terminate sleeves flush with the surface of the concrete with a coupling.

### **3.16 ERECTION**

3.16.1 Contractor shall provide structural design calculations for proposed surface mounting of conduit support system.

3.16.2 Conduits Stubbed-up through floors, walls, footings or foundations

a. Install at such depth that the exposed conduit is vertical, and no curved section of the elbow is visible.

b. Provide GRS conduits for stub-up through floors, walls, footings, or foundations unless otherwise indicated in the Contract Documents.

### **3.17 INSTALLATION**

3.17.1 Conduit size shall not exceed 40% fill or the fill requirements of NESC and NEC, whichever is most restrictive.

3.17.2 Certain conduits will remain empty with conductors to be installed at a later date. Provide all conduits for future use with a nylon pull-cord secured at each end with slack placed inside empty conduit and plug.

3.17.3 Install conduits with not more than a total of 270 degrees of bend, in each run between pull boxes and raceway terminations.

3.17.4 Provide a minimum conduit size of 1 inch for inside buildings or in a building slab, and one inch for underground conduits.

3.17.5 Install all conduits concealed unless otherwise indicated.

3.17.6 Cut conduit ends square, deburr and extend maximum distance into all couplings and connectors. Tighten all fittings securely.

3.17.7 Ensure that metallic conduit joints are electrically continuous by use of conductive joint compounds.

3.17.8 Install manufactured end caps or plugs on all conduit ends immediately after installation to prevent the entrance of liquids or foreign materials.

3.17.9 Bends in GRS, EMT and FRE conduits to be factory cells or field bent. Perform field bending using one-shot or segment benders which do not decrease the conduit cross-section void of kinks and sharp bends in accordance with manufacturer's instructions.

3.17.10 Unless otherwise indicated, perform minimum bend radius for conduits within structures in accordance with Table 346-10 in the National Electrical Code. National Electrical Code Table 346-10, Exception, not to be used to determine conduit bend radius for any part of this Contract unless approved by the Agency.

3.17.11 Route conduits to avoid structural obstructions and to minimize crossovers. Should any core drilling or installation of sleeves not indicated be desired by the Contractor, the Contractor to submit such proposed concrete penetrations to the Agency for approval prior to any core drilling or sleeving.

3.17.12 Install expansion fittings complete with grounding jumpers where conduits cross expansion joints, construction joints, and saw joints, and where indicated.

3.17.13 Make all connections watertight except for non-liquid tight flexible metal conduit.

3.17.14 Route all exposed conduits installed in buildings and canopies parallel or perpendicular to building lines except where otherwise indicated. Form bends in adjacent conduits to match radius and center of bends.

3.17.15 Install all ground bushings and incidentals.

3.17.16 EMT and GRS conduits and fittings require special installation methods. Install in strict accordance with the manufacturer's instructions. Provide boot to cover all exposed threads. Touch-up minor slice, nick, or abrasion damages to the coatings with patching compound approved by the conduit manufacturer. Slices more than ten mils in depth, and nicks and abrasions more than ten mils in depth or ¼ inch in diameter are considered major damage. Patching compounds shall not be used to correct major damage. Replace conduits and fittings with major damage. The Agency will be the sole judge of whether coating damage is minor or major.

3.17.17 Install feeder conduits flush with the catenary foundation. Trim and grout around conduits to provide an acceptable installation.

### **3.18 APPLICATION**

3.18.1 Communications

a. Use Liquid tight flexible conduit between equipment junction boxes.

b. All fiber-optic jumpers installed within a communication, electrical, or equipment room must be encased in a non-metallic flexible inner-duct.

### **3.19 CONSTRUCTION**

3.19.1 Contractor shall be responsible for coordination of the Work at the point of interface with other construction.

#### **3.19.2 Conduits Installed Underground**

- a. Slope conduits entering pull boxes and handholes to drain towards them. Slope conduits to drain away from buildings.
- b. Install conduits a minimum of 4 feet below final grade unless otherwise indicated.
- c. Dewater all excavations and conduits in accordance with Section 31 23 19 Dewatering.
- d. If the trench is not backfilled the same day conduit is installed, leave one end of the conduit free until backfilling is restarted, or install an expansion joint in the conduit run.
- e. Install yellow warning tape in accordance with Paragraph 2.4, F of this Section.
- f. Encase and embed direct buried conduits with 4 inches of clean sharp sand on all sides of the conduit.

#### **3.19.3 Sealing Conduit Penetrations**

- a. Exterior wall surfaces above grade: Seal around all penetrations with silicone caulking. For concrete construction above ground level, cast conduit penetrations in walls.
- b. Exterior surfaces below grade: Cast conduit into wall, (or floor) or if core drilling or sleeves are used for conduit penetrations, install a thru wall and floor seal fitting.
- c. Fire rated floors, walls, ceilings/roofs: In concrete or masonry, seal around conduit penetration with Dow Corning 3-6548 silicone.
- d. Where conduits are installed in other openings or blockouts, hard pack with mortar made of a mixture of equal parts of sand and cement.

#### **3.19.4 Conduit Mandrelling and Cleaning**

- a. Maintain a log of all conduits mandrelled with the following information in tabular format for each conduit mandrell:
  - Conduit designation;
  - Conduit endpoints;
  - Conduit size;
  - Date mandrell;

- Pass/fail for specified mandrel.

b. After final assembly is in place, thoroughly clean and mandrel all conduits smaller than 2 inches as follows:

- Pulling through the conduits a wire brush and mandrel sized 1/4 inch maximum less than the inside diameter of the conduit for 1-1/2, 1-1/4 and 1 inch conduits;

- Pulling through the conduits a cloth rag or conductor bundle sized 1/4 inch maximum less than the inside diameter of the conduit for 1-1/2, 1-1/4 and 1 inch conduits;

- At the completion of cleaning and mandrelling, and before final acceptance, install pull cord (in accordance with Paragraph 2.03.O) in each empty conduit. The pull cord remains accessible from each end at all times.

c. Unless otherwise indicated, cleaning and mandrelling to be done in the presence of the Agency. Notify the Agency 7 days in advance of mandrelling.

d. Where conduits are stubbed and capped, extend the pull cord through a drilled hole in the cap.

e. Conduits which cannot meet the requirements for mandrelling to be deemed defective and to be replaced as directed by the Agency.

### 3.19.5 Labeling

a. Identify each exposed conduit at each end with tags inscribed or stamped with the conduit number. Attach the tag to the conduit with a sunlight resistant nylon tie.

### 3.20 REPAIR/RESTORATION

Contractor shall replace any repair loose or damaged conduits and cables that directly result from workmanship, inadequate support systems, or material defect within the Warranty period. Unless otherwise specified, the Warranty period shall be one year from the date of substantial completion.

### 3.21 REINSTALLATION

Contractor shall replace conduits that fail mandrel testing.

### 3.22 CLEANING

Contractor shall clean conduits around glued couplings for a neat appearance and as well as remove mud, glue, debris from final installation providing clean appearance.

### 3.23 DEMONSTRATION

3.23.1 Provide testing reports as indicated in Section 01 33 01, Submittals, Section 01 45 01, Quality Control, and the Contract Documents.

3.23.2 Contractor shall certify all conduits were successfully mandreled and sealed in accordance with installation requirements.

3.24 PROTECTION Protect field cut threads and reamed ends in metallic conduit protected from corrosion immediately after cutting, reaming, and cleaning by application of a zinc rich coating.

### 3.25 SCHEDULES

3.25.1 Contractor shall submit a red-line markup schedule of conduits installed including the following details:

- a. Conduit designation
- b. Conduit endpoints
3. Conduit size E

## 4. PANELBOARDS

### 4.1 DESCRIPTION

- A. Provide panelboards in accordance with the Contract Documents.
- B. Panelboards include both branch panelboards and distribution panels.

### 4.2 QUALITY ASSURANCE

- A. Panelboards shall be the same manufacturer as the switchboards.
- B. Provide sizes rated overcurrent protection devices where required by results of short circuit study.

### 4.3 STANDARDS

- A. Panelboards
  1. PS
  2. PEC
  3. IEC
  4. NEMA PB-1
  5. UL 50 and 67
- B. Circuit Breakers:
  1. PS
  2. PEC
  3. IEC
  4. NEMA AB-1
  5. UL 489 1.4

### 4.4 SUBMITTALS

- A. General:
  1. Manufacturers produce data sheets, electrical ratings, coordination of tripping curves between main & branches circuit breaker, and installation instructions.

2. Support locations and types.

B. Branch Panelboards:

1. Detailed description and layout of each panelboard, showing physical dimensions, circuit breaker ratings and layout, identification nameplate, and cable lugs.

C. Distribution Panels:

1. Dimensioned layout and elevation drawings showing physical overcurrent protection housekeeping pads

2. Detailed description of each distribution panel, showing overcurrent protection device ratings and layout, identification nameplate, and cable lugs, and fuse clip sizes.

D. Seismic restraint calculations

E. Manufacturer Certification of Busbar Current Density.

#### **4.5 IDENTIFICATION**

A. Provide an identification nameplate for each panelboard, each main, and each feeder overcurrent protection device. The nameplate should include voltage and source of power for each panel.

B. Provide a typewritten directory card indicating load served by type and location for each branch circuit in each branch panelboard. Mount directory in frame on inside of branch panelboard door.

C. Panelboard series connected ratings shall be displayed and current ratings of overcurrent protection devices shall be displayed on the device.

#### **4.6 ACCEPTABLE MANUFACTURERS**

Shall have at least 15 years reliable and reputable manufacturing experience.

#### **4.7 RATINGS**

A. Panelboards shall be of the ratings and configurations of 22 KAIC mains, and 10 KAIC branches. Panel board shall be gauge 18 G.I. powder-coated finish oven-baked metal casing with lock and catch key handles for panel board doors.

B. Panelboards and overcurrent protection devices shall have a minimum short circuit rating as specified herein or greater where indicated on the Electrical Drawings.

C. Branch Panelboards:

1. Branch panelboards are identified with the prefix LP as shown on the Drawings.

2. Maximum allowable physical dimensions: 50cm wide by 15 cm deep.

3. Branch panelboards (LP): 10,000 RMS symmetrical amperes minimum interrupting capacity, unless noted otherwise.

D. Distribution Panels:

1. Distribution panels are identified with the prefix DP as shown on the Drawings.

2. Maximum allowable physical dimensions: 50 cm wide by 20 cm deep.

3. Distribution panel (DP): 25,000 RMS symmetrical amperes minimum interrupting capacity, unless noted otherwise.

#### **4.8 CONSTRUCTION**

A. Enclosures shall be corrosion resistant galvanized (zinc finished) sheet steel. Fronts shall be cold rolled steel, finish coated with ANSI 61 grey enamel over a rust inhibitor. Panels locks shall be keyed alike. Recessed flush mounted panels shall have overlapping front.

B. Panelboards to be installed indoors should be NEMA 2 (IP-31) while outdoor type panelboards shall be NEMA 3R (IP-65).

C. Doors for branch panelboards shall be one piece bolt on front with a lockable hinged door over the overcurrent protection devices.

D. Space for future devices shall include all necessary bus, supports and connections.

#### **4.9 PLUG-IN UNITS**

A. Plug in units shall be circuit breaker type. Plug in units shall be mechanically interlocked to prevent installation or removal while the switch is in the ON position and shall be equipped with an interlock to prevent the cover from being opened while the switch is in the ON position and to prevent accidental closing of the switch while the cover is open. Handle shall be capable of being padlocked in both the ON and OFF positions.

B. The plug in unit enclosure shall make positive ground connection to the bus duct housing before the stabs make contact with the bust bars. Provide grounding lug in plug in unit bonded to grounding system.

C. The plug-in unit shall have an ampere rating as indicated in the drawing; 42,000 RMS symmetrical amperes minimum interrupting capacity, and shall be compatible with the existing Feeder (Riser) busduct.

#### **4.10 OVERCURRENT PROTECTION DEVICES**

A. Overcurrent protection types:

1. Branch panelboards (LP): Molded case circuit breakers.

2. Distribution panels (DP): Molded case circuit breakers.

B. Molded case circuit breakers:

1. Completely sealed enclosure. Bolt-on type Toggle type operating handle. Trip ampere rating and ON/OFF indication clearly visible.
  2. Thermal-magnetic trip-free, trip-indicating, quick-make, quick-break, with inverse time characteristic. Single-handle and common tripping on multiple breakers. External handle shall be suitable for locking in the OFF position.
  3. Silver alloy contacts with auxiliary arc-quenching devices.
  4. Breakers for lighting circuits shall be SWD rated.
  5. Provide main breakers in panelboards served from transformers unless separate transformer secondary protection is provided.
  6. Shunt trip breakers shall be supplied with 220V AC coils.
- C. Ground Fault Interrupters Ground fault interrupter branch circuit breakers shall be as indicated on the Drawings. Circuit breakers shall be circuit interrupting which will operate manually for normal switching functions and automatically under overload, short circuit, and 0.005 amp line-to-ground fault conditions. The operating mechanism shall be entirely trip free so that contact cannot be held close against an abnormal overcurrent, short circuit, or ground fault condition. The device shall be bolt-on type with insulated case construction and shall be interchangeable with standard single pole breakers utilized in the panelboard.

#### **4.11 INSTALLATION**

- A. Mount panels 1.8 meters above finished floor to top unless otherwise noted.
- B. Connect feed-through panels to the main feeder by insulated parallel gutter taps.
- C. Where panelboards are mounted recessed flush in wall, maintain fire integrity of wall. Provide one empty 20 mm IMC conduit stubbed up into the nearest accessible ceiling location for every three spare or space positions.
- D. Neatly arrange wiring and tie together in each gutter with nylon tie wraps at minimum 10 cm intervals.
- E. Provide plugs on open knockouts.
- F. Provide filler plates for unused spaces in panelboards.
- G. Provide cabinet lock with key. All panelboards shall be keyed alike.

#### **4.12 TOUCH UP AND CLEANING**

- A. Backboxes shall be clean, dry, and free of construction debris and fireproofing overspray prior to installation of panelboard interior.
- B. Vacuum backboxes clean of debris after installation and wiring of branch circuits.
- C. Repair and touch up paint damaged surfaces.

#### **4.13 FIELD QUALITY CONTROL**

A. Measure steady state load current at each panelboard feeder. Should the difference at any panelboard between phases exceed 10 percent, rearrange circuits in the panelboard to balance the phase loads within 10 percent. However, proper phasing for multi-wire branch circuits should be maintained.

B. Inspect for physical damage, proper alignment, anchorage and grounding. Check proper installation and tightness of connection for circuit breakers, fusible switches and fuses.

### **5. WIRING DEVICES**

#### **5.1 DESCRIPTION**

A. Provide wiring devices in accordance with the Contract Documents.

#### **5.2 QUALITY ASSURANCE**

A. Switches and receptacles shall be of the same manufacturer.

**5.3 STANDARDS** A. PS B. PEC C. Switches and Receptacles: NEMA WD-1, and UL 498. C. Ground Fault Interrupter Receptacles: UL 943 Class A.

#### **5.4 SUBMITTALS**

A. Manufacturer's product data sheets.

B. Sample for each wiring device and cover plate.

#### **5.5 COLORS**

A. Device and cover plate colors shall be as selected by the Architect.

**5.6 ACCEPTABLE MANUFACTURERS** Shall have reliable and reputable manufacturing experience. Shall be 10 years of experience.

#### **5.7 SWITCHES**

A. General:

1. Switches shall be of the type indicated on the Drawings.

2. Switches shall be commercial specification grade, 10A, 220V, back and side wired, silent handle operation.

B. Lighting Switches:

1. Rocker handle type:

a. Single pole

b. Double pole

c. 3 way

d. 4 way

C. Illuminated Handle Switches:

1. Rocker handle type:

a. Single pole.

b. 3 way.

- D. Transfer Fan Switches:
  - 1. Rocker handle type, single pole: Cover Plate engraved FAN.
- E. Momentary Contact Switches:
  - 1. Rocker handle type, center off.
- F. Pilot Light Switches:
  - 1. Rocker handle type, single pole, neon pilot light.
- G. Key Switches: 1. Single pole.
- H. Weatherproof Switches:
  - 1. Weatherproof handle/coverplate.
- I. Spring Wound Timer Switches:
  - 1. 30 minute maximum time cycle.

## **5.8 RECEPTACLES**

- A. General:
  - 1. Receptacles shall be of the type indicated on the Drawings.
  - 2. Receptacles shall be commercial specification grade, 220V, grounding type, back and side wired.
- B. Receptacles:
  - 1. Single, 15A. 2. Duplex, 15A.
- C. Isolated Ground Receptacles:
  - 1. Single, 15A.
  - 2. Duplex, 15A.
- D. Isolated Ground Surge Suppressor Receptacles:
  - 1. Single, 15A. 2. Duplex, 15A.
- E. Ground Fault Interrupter Receptacles:
  - 1. Single, 15A.
  - 2. Duplex, 15A.
- F. Special purpose receptacles: Rating as indicated on the Drawings.
- G. Clock Receptacles:
  - 1. Single, 15A.
- H. Weatherproof Receptacles:
  - 1. Duplex, weatherproof cover plate with hinged door.

## **5.9 COVER PLATES**

- A. Provide thermoplastic cover plates for wiring devices. Provide multiple gang cover plates where multiple devices are installed in a common location.

## **5.10 EXECUTION**

- A. General:
  - 1. Verify the exact location of wiring devices with the Architect.
  - 2. Devices mounted above counters shall be 1 cm above the top of the backsplash to the bottom of the cover plate.
  - 3. Provide an individual grounding conductor from the device grounding terminal to the panelboard ground bus.
- B. Switches:

1. Mount switches vertically with the ON position on top.

2. Mount switches on the strike side of doors.

C. Receptacles:

1. Mount receptacles vertically with the grounding pin on bottom.

D. Cover plates:

1. Install device plates in full contact with the wall surface. Plates shall not project out from the wall.

2. Cover plates for multiple gang wall dimmers shall be continuous flush type tailored to match wall dimmer physical dimensions.

3. Provide stainless steel, smooth face cover plates in equipment rooms. Provide thermoplastic, smooth face cover plates in all other spaces.

4. Color of cover plates should be referred to the Architect for approval.

## **6. LIGHTING**

### **6.1 DESCRIPTION**

Provide luminaries and accessories in accordance with the Contract Documents.

### **6.2 QUALITY ASSURANCE**

6.2.1 Comply with quality assurance requirements under General Conditions of the Contract Documents and Manufacturer's instructions.

6.2.2 Lamps shall be of the same manufacturer.

6.2.3 Ballasts shall be the same manufacturer.

6.2.4 Occupancy sensors shall be certified for operation with specific ballasts utilized in controlled lighting fixtures.

6.2.5 Equipment shall meet local energy ordinances.

### **6.3 EXTRA STOCK**

6.3.1 Lamps: 1 percent of quantity furnished; minimum of 2 of each size and type.

6.3.2 Lenses/ Louvers: 1 percent of quantity furnished; minimum of 2 of each size and type.

6.3.3 Ballasts: 0.25 percent of quantity furnished; minimum of 2 of each size and type

### **6.4 ACCEPTABLE MANUFACTURERS**

6.4.1 The Lighting Manufacturer shall have ten (10) years prior experience in lighting systems. Local Distributors shall have five (5) years of lighting experience.

## **6.5 LAMPS**

6.5.1 Provide a complete set of new lamps in each luminaire.

6.5.2 Lamps shall be as follows unless otherwise noted on the luminaire schedule on the details:

OPTION 1: Dimensions: 1205 mm fixing hole distance Wattage: 20 watts LED Lumens: 1,600 lumens Rated Lifetime: 30,000 hrs Voltage: 220-240V Electrical Characteristic: with Energy Savings Lighting Fixtures: for Recessed/Surfaced/Suspended Mounted LEDtube Lamp/Luminaires

OPTION 2: Dimensions:1200mm length Wattage: 16 watts LED Lumens: 1,600 lumens Rated Lifetime: 40,000 hrs Voltage: 220-240V Electrical Characteristic: with Energy Savings Lighting Fixtures: for Recessed/Surfaced/Suspended Mounted LEDtube Lamp/Luminaires

## **6.6 MATERIALS AND FABRICATION**

6.6.1 Luminaires shall be completely factory assembled and wired, and equipped with necessary lamp holders, ballasts, wiring, shielding, reflectors, channels, lenses, and other parts necessary to complete the luminaire installation.

6.6.2 Luminaire hardware shall be concealed. Weld exposed metal at the joint, fill with weld material, grind smooth, and make free from light leaks. Gasket LED luminaires with overlapping trim. Weld ballasts support studs, socket saddle studs, and reflector support studs to the luminaire body; self-threading screws are not acceptable. Ventilate ballast compartments and firmly secure ballast to conduct metal surface. Luminaires shall be designed for bottom re-lamping, unless otherwise noted.

6.6.3 Construct luminaires with a minimum number of joints. Unexposed joints shall be welded, screwed or bolted; soldered joints are not acceptable. Do not use self tapping methods or rivets for fastening removable parts used to gain access to electrical components requiring service or replacement, or for fastening electrical components or their supports.

6.6.4 Cast or extruded parts of luminaires shall be close grained and free from imperfections or discolorations, rigid, true to pattern, of ample weight and thickness, and properly fitted, filed, ground, and buffed to provide finished surfaces and joints free of imperfections.

6.6.5 Housing for LED T8 and High Bay luminaires shall be designed to make electrical components easily accessible and replaceable, without removing the luminaire body from its mounting.

6.6.6 Luminaire housing materials shall be as per the details:

- Troffer Lighting: Surface Mounted LEDtube Lamp  
Fitting: Louver Type Troffer Lighting  
Zone: See Ceiling Layout  
IP Rating: 20  
Colour Temp.: 6000K, Daylight  
Light Source: 2 x 20 watts, 1200mm LED T8

Cap Type: G13  
Life Span: 40,000 to 50,000 hrs  
Voltage: 220-240V  
Dimensions: 302mm x 1218mm x 75mm height  
Mounting: Surface mounted  
Fixture Construction Details: Mirrorized aluminum reflector and multi-lined satin finish aluminum louvers in powder-coated paint finish, zinc-phosphate steel sheet housing

## **6.7 FINISHES**

6.7.1 Luminaire finishes shall provide a durable, wear resistant surface. Surfaces shall be chemically cleaned and treated with corrosion inhibiting (phosphating) material to assure positive paint adhesion. Exposed metal surfaces (brass, bronze, aluminum, etc.) and finished castings (except chromium plated or stainless steel parts) shall have an even coat of high grade methacrylate lacquer or transparent epoxy. Anodize exposed aluminum surfaces in a 20 minute bath for corrosion resistance. Sheet steel luminaire housings, and iron steel parts which have not received phosphating treatment, or which are to be utilized in exterior applications, shall be zinc or cadmium plated, or hot dip zinc galvanized after completion of all forming, welding, and drilling operations.

6.7.2 Screws, bolts, nuts, and other fastening or latching hardware shall be cadmium plated.

6.7.3 Provide luminaires with a high temperature baked enamel coating of selected color and finish, unless otherwise noted. White baked enamel finished surfaces shall have a minimum reflectance of 86%, unless otherwise noted.

## **I. PRIME RATED DIESEL ELECTRIC GENERATOR**

### **PART 1 GENERAL**

#### **1.1 GENERAL REQUIREMENTS**

1.1.1 Provide and install diesel electric generating unit with accessories, auxiliary equipment, including testing, commissioning, and associated work as specified.

#### **1.2 SUBMITTAL**

1.2.1 General: All submittals for approval as indicated herein shall be in accordance with the provisions under General Conditions of the Contract Documents.

1.2.2 Furnish certificate(s) within 30 days after award certifying that not less than two engines of identical number of cylinders and cylinder size, identical rotative speed, and identical or higher BMEP, and of the same basic configuration (in-line or Vee) as the engine to be furnished, shall have driven generators which have produced in satisfactory operation not less than 2,000 kW hours of electricity for each kW of generator nameplate capability within a two year period. Certificate(s) shall include:

A. A list of at least single engine installation meeting the experience requirements set forth in paragraph entitled "Operating Experience Requirements."

- B. Owner and location of each such installation.
- C. Date of initial operation at each such installation.
- D. Number of kW hours produced per kW of generator rated capability of each installation.
- E. Horsepower rating, kW rating, and rotative speed of each unit.
- F. Brake-mean effective pressure rating of each engine.
- G. Design characteristics of each unit, such as bore and stroke, number of cylinders, and configuration (in-line or Vee).

### 1.2.3 Factory Tests and Inspections

Perform factory tests and inspections on each diesel engine, and generator and switchgears and all related electrical equipment prior to shipment. Provide certified copies of all manufacturer's test data and results. Notify Owner before performing tests. Test procedures shall conform to ASME, IEEE, and ANSI Standards, and to DEMA standard practices section on testing, as appropriate and applicable. The manufacturer conducting the tests shall provide equipment necessary for the tests, and all measuring and indicating devices shall be certified correct or correction data furnished for the device. Tests shall indicate satisfactory operation and attainment of guarantees and specified performance. If satisfactory, equipment tested will be given a tentative approval. Following installation of all permanent equipment within the power plant, perform further tests to insure satisfactory operation. Contractor shall not ship equipment without approval by the Owner of the shop test reports.

#### 1.2.3.1 Generating Unit Shop Tests

Perform customary commercial factory tests on each engine, including, but not necessarily limited to, the following:

- A. Perform hydrostatic test on water jackets to assure that water seals and water jackets are watertight. Test report shall indicate pressure at which test was made and the results.
- B. Place generating unit in continuous operation without stoppage for a period of not less than 8 hours. Operate not less than one hour at each load point ( $\frac{1}{2}$ ,  $\frac{3}{4}$ , and full load) and 2 hours at 110 percent of rated load at either 0.80 or 1.0 power factor. If stoppage becomes necessary during this period, repeat the 8-hour run. Also record the following data at the start, at 15-minute intervals, and at the end of each load run. Fuel consumption (correct fuel consumption results to guarantee conditions); exhaust temperatures; and jacket water temperatures, lube oil temperature and pressures, crankcase vacuum, and any other data of importance.

### 1.2.3.2 Generator Tests

Temperature tests on the generator shall be performed by the manufacturer of that equipment in his plant prior to installation on the generating unit-mounting base. Temperature tests shall be in accordance with IEEE 115. Generator tests shall include insulation resistance, dielectric resistance, open circuit saturation, short circuit saturation, zero power factor, 60 Hz saturation curve, direct-axis transient reactance, negative sequence reactance tests. All test data shall be submitted to the Owner. Calculations of the sub transient reactance using test values shall be included in the test report.

### 1.2.3.3 Shop Drawings

As soon as practicable, after notice to proceed and before commencement of placement of orders for materials and equipment, submit shop drawings listed below.

- A. Drawings pertaining to the diesel-generating unit and auxiliary equipment, including the following:
  - a. Certified outline, general arrangement (setting plan), and anchor bolt details. Drawings shall show the total weight and center of gravity of the assembled equipment on the mounting skid.
  - b. General arrangement and detailed piping of exhaust and air intake-piping systems.
  - c. Dimensional drawings of exhaust silencers.
  - d. General arrangement drawings location of all auxiliary equipment in relation to the diesel-generating unit.
  - e. Piping schematics for fuel oil, lubricating oil, jacket water, and cooling water.
  
- B. Drawings for general arrangement, and anchoring detail drawings, electrical elemental, schematics and wiring diagrams.

### 1.2.4 Manuals

Provide three (3) sets of operation and maintenance manuals for equipment as listed. Identification symbols for all replaceable parts and assemblies shall be included. Information in manuals shall be comprehensive and specific. Provide manuals for the following equipment:

- a. Diesel-electric generating units and associated equipment. Manual shall include fuel adjustment procedure and maximum tolerances of wear on bearings and other rubbing surfaces that will require corrective measures.

b. Battery Charger

c. Battery Inspection and Maintenance

#### 1.2.5 Factory Test Reports

Submit within 10 days after completion of tests.

#### 1.2.6 Tools, Testing Equipment, and Spare Parts

Submit a recommended list for each item of equipment. Include all special tools and wrenches required for erection, maintenance, and operation of the equipment, and the necessary testing equipment to perform routine tests on lubricating oil for acidity, viscosity, and dirt. The list shall consider the total number of identical items of equipment in the plant, location of the plant, and availability of spares from the factory. Include part number, drawings number, current unit prices, and source of supply. The foregoing shall not relieve the Contractor of any responsibilities under the guarantee.

#### 1.2.7 Posted Operating Instructions

Shall be laminated between matter-surface thermoplastic sheets and placed adjacent to applicable equipment.

#### 1.2.8 Proposal Data Sheets

Submit the following performance data and guarantees pertaining to each engine and to the auxiliary equipment proposed to be furnished:

##### 1.2.8.1 Diesel Generating Unit Data:

- a. Make of engine \_\_\_\_\_
- b. Type or model of engine \_\_\_\_\_
- c. Gross bhp rating of engine \_\_\_\_\_
- d. Net bhp rating of engine \_\_\_\_\_
- e. Strokes per cycle \_\_\_\_\_
- f. Number of cylinders \_\_\_\_\_
- g. Bore and stroke, inches \_\_\_\_\_
- h. Engine speed, rpm \_\_\_\_\_
- i. Piston speed, fpm \_\_\_\_\_
- j. Brake mean effective pressure \_\_\_\_\_  
at full load

- k. KW rating of generator \_\_\_\_\_
- l. kVA rating of generator \_\_\_\_\_
- m. Gross kW rating of generating unit \_\_\_\_\_
- n. Net kW rating of generating unit \_\_\_\_\_
- o. Make of turbocharger/s \_\_\_\_\_

Gross rating shall be the total rated power output before deducting power requirements of any electric motor-driven equipment. Net ratings shall be equal to gross ratings minus the total power requirements of electric motor-driven accessories normally constituting part of "Engine Assembly" as defined in DEMA Standard Practices.

#### 1.2.9 Diesel Generating Unit Guarantees

(Fractional loads shall be calculated on basis of net ratings unless otherwise called for.)

a. Fuel Consumption at 0.80 pf (Btu per net kWh):

1/2 Load \_\_\_\_\_

3/4 Load \_\_\_\_\_

Full Load \_\_\_\_\_

b. Fuel Consumption at 1.00 pf (Btu per net kWh):

1/2 Load \_\_\_\_\_

3/4 Load \_\_\_\_\_

Full Load \_\_\_\_\_

c. Fuel Consumption (Btu per gross bhp-hr):

1/2 Load \_\_\_\_\_

3/4 Load \_\_\_\_\_

Full Load \_\_\_\_\_

d. Generator Efficiency (%)

At 0.80 power factor:

1/2 of net rated load \_\_\_\_\_

3/4 of net rated load \_\_\_\_\_

Full net rated load \_\_\_\_\_

At 1.00 power factor:

1/2 of net rated load \_\_\_\_\_

3/4 of net rated load \_\_\_\_\_

Full net rated load \_\_\_\_\_

#### 1.2.10 Diesel Engine Data

a. Indicated hp at full load \_\_\_\_\_

b. Mechanical efficiency at full load (%) \_\_\_\_\_

c. Minimum cylinder pressure, psig \_\_\_\_\_

d. Starting air pressure, (psig) \_\_\_\_\_

e. Approximate exhaust temperature (F)

25% Load \_\_\_\_\_

50% Load \_\_\_\_\_

75% Load \_\_\_\_\_

Full Load \_\_\_\_\_

110% Load \_\_\_\_\_

f. Weight of exhaust gas at full load

(1B OER hr) \_\_\_\_\_

g. Weight of intake air at full load

(1b per hr) \_\_\_\_\_

h. Total heat rejected at full load

(Btu per hr) \_\_\_\_\_

1. To jacket water systems \_\_\_\_\_

2. To lubricating oil systems \_\_\_\_\_

3. To intercooler system \_\_\_\_\_
4. Total to cooling system \_\_\_\_\_
- i. Optimum jacket water temperature \_\_\_\_\_  
to engine (°F) at 100% load
- j. Optimum jacket water temperature \_\_\_\_\_  
from engine (°F) at 100% load
- k. Maximum safe jacket water \_\_\_\_\_  
temperature from engine (°F)
- l. Optimum lubricating oil \_\_\_\_\_  
temperature to engine (°F) at  
100% load
- m. Optimum lubricating oil \_\_\_\_\_  
temperature from engine (°F) at  
100% load
- n. Maximum safe lubricating oil \_\_\_\_\_  
temperature from engine (°F)
- o. Lubricating oil flow through \_\_\_\_\_  
lubricating oil heat exchanger at  
110% rated full load at \_\_\_\_\_°F  
to heat exchanger, \_\_\_\_\_°F  
from heat exchanger (gpm)
- p. Head loss through lubricating oil \_\_\_\_\_  
heat exchanger at flow listed above  
in o (psi)
- q. Cooling water flow through lubricating \_\_\_\_\_  
oil heat exchanger at 110% rated full

load at \_\_\_\_\_°F to heat exchanger \_\_\_\_\_°F

from heat exchanger (gpm)

r. Head loss through lubricating \_\_\_\_\_

oil heat exchanger at flow listed

above in q (psi)

s. Jacket water flow through \_\_\_\_\_

engine at full load at \_\_\_\_\_ °F to

engine, \_\_\_\_\_ °F from engine (gpm)

t. Head loss through engine at flow \_\_\_\_\_

listed above in s (psi)

u. Cooling water flow through \_\_\_\_\_

intercooler (gpm)

v. Lubricating oil consumption in \_\_\_\_\_

gallons per hour at full load (estimated)

w. Recommended grade and type of \_\_\_\_\_

lubricating oil

1.2.11 Generator and Exciter Data:

a. Make of generator proposed \_\_\_\_\_

b. Generator short circuit ratio \_\_\_\_\_

c. Generator over speed limit (%) \_\_\_\_\_

d. Generator flywheel effect (1b-ft<sup>2</sup>) \_\_\_\_\_

e. Test Voltage:

1. Generator stator \_\_\_\_\_

2. Generator rotor \_\_\_\_\_

3. Exciter \_\_\_\_\_

### **1.3 SAFETY REQUIREMENTS**

Comply with ANSI B15.1.

### **1.4 DELIVERY AND STORAGE**

Deliver paints and paint material in original sealed containers plainly showing designated name, specification number, batch number, color, and date of manufacture, manufacturer's directions, and name of manufacturer. Store paint at project site in sealed and labeled containers, or segregate at the source of supply, and make available for sampling not less than 30 days in advance or required approval for use to allow sufficient time for testing.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

#### **2.1.1 Standard Products**

Use materials and equipment essentially the standard cataloged products of manufacturers regularly engaged in production of such materials or equipment and the manufacturer's latest standard design that complies with specification requirements. Where two units of the same class of equipment are required, these units shall be products of a single manufacturer; however, component parts of the system need not be products of the same manufacturer. Each major component of equipment shall have manufacturer's name address, and model and serial number on a nameplate securely affixed in a conspicuous place; nameplate of the distributing agent will not be acceptable.

#### **2.1.2 Materials and Equipment**

Furnish new material of high quality, which will give long life and reliable operation. Equipment shall not have been in prior service except as required by factory tests. Workmanship shall be of highest quality in every detail.

### **2.2 DIESEL-ELECTRIC GENERATING UNITS AND AUXILIARY EQUIPMENT**

The generating unit shall consist of a diesel engine direct-connected to an alternating current generator with brushless revolving field solidstate excitation system and all necessary accessories and auxiliary equipment resulting in complete self-contained unit. The generating unit shall be from a reference manufacturer of long-term operation (minimum of 10 years of experience), technically proficient and experienced in this trade and has accomplished works similar to the project specifications.

#### **2.2.1 Equipment Rating and Capability**

The diesel-electric generating unit shall have a net **prime rating 250 KVA** capacity as indicated in the plans at **0.8 power factor**. Gross Kw rating of each diesel-generating unit shall be not more than the figure obtained by multiplying the delivered shaft horsepower rating of the engine by 0.746 and by the over-all efficiency of the generator at the corresponding load. The over-all efficiency of the generator shall allow for power required to operate the exciter, including power

consumed in losses and in windings and friction for generator and rotating exciter. Rated net capacity of the generating unit is defined as gross electrical power output of the generator minus total electrical power requirements of electric motor driven engine accessories normally constituting part of "engine assembly" as defined in DEMA publication "Standard Practices for Stationary Diesel and Gas Engines". All auxiliary equipment furnished shall be designed for continuous duty at 110 percent of rated net capacity of the generating unit.

### **2.2.2 Critical Speeds**

The diesel-electric generating unit shall be free of critical speeds of either a major or minor order that will endanger satisfactory operation of the unit, or cause undue vibration in any part of plant equipment or structure. Satisfactory operation will be considered endangered if torsional vibration stresses exceed 5,000 psi within 10 percent above or below rated engine speed. Submit copies of a summary of computations on critical speeds to the Owner.

### **2.2.3 Mounting Base**

Factory mount diesel generating unit and its auxiliaries, except the fuel oil day tank and exhaust silencer on a common base fabricated of structural steel sections. The structural base shall be of the skid type and shall have adequate strength and rigidity to maintain alignment of the equipment mounted thereon without dependence on a concrete foundation. Field erect exhaust silencer as indicated. Provide all necessary piping, etc., to make a complete installation. Steel used in fabrication of the mounting base shall be free from sharp bend and corners. Provide base with suitable lifting attachments. Locate attachments so that, when the equipment is hoisted, adequate clearance will exist between lifting slings and all exterior parts of the equipment. A diagram showing the lifting attachments shall be inscribed in a copper or zinc base alloy plate securely fastened to the outside of the unit with the lifting capacity of each attachment marked thereon. Provide a silhouette of the equipment showing the center of gravity. Overall limiting dimensions shall be 1.83 m wide x 4.30 m long x 2.24 m high. Provide foundation for permanently installed generating units. Fuel day tank capacity shall be 662 liters.

### **2.2.4 Diesel Engines and Accessories**

Engines, 4-cycle, turbo-charged, after cooled, vertical "V" type. Design

and construct each engine so as to eliminate undue heating, vibration, and wear. Engines shall be capable of burning diesel fuel oil. Characteristics of the engine shall be as follows:

- a. Brake mean effective pressure, 226 psi: 1558.2 kPa;
- b. Engine speed, rpm: 1,800;
- c. Piston speed, 9.1m/s;

d. Number of cylinders: Minimum 12; Maximum 16. Base the rating of each engine on plant site elevation of 100 meter above mean sea level and an atmospheric temperature of 40°C.

#### **2.2.4.1 General Construction**

Construct the engine rigid, neat in appearance, and allow easy access to various parts for maintenance purposes. Frame shall be heavy construction. Enclose all parts to prevent throwing or dripping oil. Main bearings and connecting rod bearings shall be of ample size and shall have removable shells. Where design permits, provide removable oil proof covers to permit access to bearings. Crank shaft shall have a rigid or flexible coupling for connection to the flywheel and/or generator. Provide adequate crankcase explosion relief doors. Arrange pistons for oil cooling. Flywheel shall be solid-type, arranged to facilitate barring over the engine if not located in the generator.

#### **2.2.4.2 Assembly**

Completely shop assembled the engine. Mount turbocharger, intercooler and all piping integral with the engine, on the engine.

#### **2.2.4.3 Turbocharger**

Turbine-type driven by exhaust gas from engine cylinders, and direct-connected to the blower supplying air to the engine intake manifold. Turbocharger shall be pressure-lubricated. Provide all necessary support and connections.

#### **2.2.4.4 Intercoolers**

Tubular heat exchanger type for cooling intake air from turbochargers. Limit capacity and size to capability of the cooling water system provided. Cooling water may be engine jacket water obtained from the radiator if design permits or may be a separate closed system utilizing a separate section in the radiator to obtain cooling water. The circulating water pump shall be a built-on pump driven from the engine crankshaft or camshaft. Provide all necessary intercooling equipment, including valves, controls, and integral piping.

#### **2.2.4.5 Engine Lubricating Oil System**

Provide the engine with a full pressure lubricating oil system arranged to distribute oil to all moving parts of the engine and to cool the pistons. Systems shall include a positive displacement pump, pressure regulating valves, oil filter, oil level indicator, and crankcase ventilation if design requires, and the necessary piping and fittings. Provide all necessary stop, check, pressure relief, and pressure control valves. Maintain temperature of lubricating oil entering the engine distribution system at the optimum value as recommended by the engine manufacturer for the best engine life with the engine operating continuously at any load within the engine rating and under

the conditions specified herein. System shall include the following major items of equipment, all mounted on the engine or on the mounting base. All equipment complete with stop valves, check valve, pressure and temperature control valves as required for a complete system shall be included and pre-piped as an integral system prior to shipment. Blank off connections for external piping with wood blind flanges or plugs.

- a. Lubricating oil circulation pump shall be driven from the engine crankshaft or camshaft and shall be of positive displacement type. Pump shall have ample capacity to circulate the amount of lubricating oil and cooling oil required by the engine. Equip pump with a bypass relief valve.
- b. Lubricating Oil Filtration: Provide each engine with a full flow filter and a full flow strainer.
  1. Full Flow Strainer: Shall be provided in the piping downstream from the full flow filter and immediately ahead of the engine bearing supply header. Strainer baskets shall be 300-mesh having free area not less than four times the area of its body piping connections.
  2. Lubricating Oil Filter: Shall be of base mounted spin-on design with integral full flow, throw-away type element. Filter assembly shall be capable of passing the full flow engine circulating rate and removing not less than 90 percent of the particles 10 microns and larger. Provide two spare sets of replacement elements for each filter with each unit.
- c. Lubricating Oil Cooler: Provide one cooler for each engine. Coolers shall have ample capacity to remove the total amount of heat rejected to the lubricating oil from the engine at 110 percent rated full load. Coolers shall limit the temperature of the lubricating oil entering the engine to the optimum temperature recommended by the engine manufacturer when supplied with engine jacket cooling medium from the radiator. Temperature rise of the engine jacket cooling medium across the cooler shall be limited so that temperature of the cooling medium leaving the cooler will not be higher than the optimum temperature as recommended by the engine manufacturer for water to the engine water jackets. Coolers shall be single or multiple passes, shell, and tube heat exchangers of the channel type. Design the cooler for the engine jacket cooling medium through the tubes. Pressure drop across the cooler on either the tube side or shell side shall not exceed 10 psi.
- d. Thermostatic Control Valve: Provide valves in the lubricating oil system to maintain a constant lubricating oil temperature to the engine. Valve shall be modulating type utilizing self-contained thermostats equipped with three-way valve action. Valve shall be capable of passing the total lubricating oil flow requirement of the engine as determined by the engine manufacturer with a pressure drop across the valve not to exceed 5 psi. Provide a valve with one or more interchangeable thermostatic elements. Thermostat shall be non-adjustable and factory-set at the temperature recommended by the engine manufacturer. Design valve to fail-safe, permitting oil flow through the engine. Thermostat housings shall be all-bronze construction.

#### **2.2.4.6 Engine Fuel Oil System**

Shall conform to NFPA 30 and 37 and the requirements herein. Employ a mechanical fuel injection system using a common rail system or an individual pump system. Injection pumps shall be an integral part of the engine and shall be operated by the engine camshaft. Provide suitable adjustments for timing and for balancing of cylinder pressures.

- a. Fuel Oil Supply Pump: Provide a built-on positive displacement pump driven from the engine crankshaft or camshaft. Pump capacity shall suit engine requirements under the maximum load condition.
- b. Fuel Oil Priming Pump: Provide a suitable positive displacement pump for priming the fuel system, if required, to assure quick starting, and arranged to operate with the automatic starting system.
- c. Fuel Oil Filters: Provide and install a filter in the piping ahead of the injection pumps. Provide generator units with a parallel filter arrangement having built-in changeover valves allowing either filter to be used independently and designed to allow changeover to be made during operation. Filter arrangement shall be such as to allow replacement of elements in one filter while the other filter is in operation.

#### **2.2.4.7 Engine Starting System**

Shall be of the type, which will enable instantaneous starting of the diesel engine with ambient temperatures between 29.4 and 34.4°C. Arrange system to automatically start the engine and be integrated in sequence with the automatic controls. The starting system shall be of the following:

- a. Electric Starting System: Shall utilize a 24-volt direct current electric circuit, with negative polarity grounded, energized by storage batteries. Cranking motor shall be heavy-duty type with adequate capacity to crank the engine repeatedly to start within 5 minutes in an ambient temperature of 34.4°C (94°F). Design the drive mechanisms for engaging the starting motor with the engine flywheel to inherently engage and release without binding.
1. Engine Starting Battery: Batteries shall be provided, per ARP 1817-84, adequate to supply the engine starting system. Battery shall be heavy-duty industrial type. Battery shall have a voltage rating of not less than 24 volts and shall employ the multi-tubular positive plate construction. The voltage and ampere-hour rating of the battery shall be sufficient to provide not less than 5 minutes of cranking at 34.4°C (94°F) while retaining a battery voltage of 1.0 volt or more per cell. Specific gravity shall not exceed 1.250. Battery shall be complete with connectors and cable terminals and shall be firmly anchored in racks in a battery compartment. Racks and compartment shall be finished in a manner to permanently resist acid corrosion. Insulate compartment. Provide all electrical wiring, cable, and wiring accessories as necessary to interconnect the dc apparatus to the batteries. The engine

starting battery shall not be used for governor control, switchgear control, alarm system and similar devices.

2. **Battery Charger:** The engine starting battery charger shall be enclosed, wall-mounted, constant-voltage, heavy-duty, industrial type designed for operation from a 240-volt, single-phase, 60-hertz, a.c. supply. Charger shall be suitable for keeping the diesel engine starting batteries in a charged condition during periods when the engine is idle. Rectifier elements shall be silicon diodes capable of continuous operation at full rated load (12 amperes) with convection cooling in ambient temperatures up to 120°F. Control the charger output by a magnetic amplifier or semiconductor devices which shall maintain 2.20 volts per cell within plus or minus one percent, from zero to full load current, when operating at the float voltage setting, and during variations in supply voltage of plus or minus 10 percent. Charger output shall be continuously adjusted automatically from zero to 12 amperes, depending on state of charge of battery. Provide voltmeter and ammeter to show charger output. Voltmeter dial shall have red markings to show lower and upper limits of the normal operating range. Provide a 0-24 hour range timer for equalizing charges. When timer is manually turned on, charger output shall be automatically adjusted to 2.33 volts per cell. When timer runs out, charger output shall be automatically restored to normal floating voltage. Equip charger with protective relays to be interlocked with engine starting circuit, to disconnect the ac supply to the charger during engine cranking and to ensure against charger failure upon resumption of charging following a cranking operation. Charger enclosure shall be of corrosion-resistant material.

#### **2.2.4.8 Engine Cooling System**

Shall be a closed system including an engine driven jacket water pump, radiator, expansion tank, thermostatic control valve and all piping valves, and fittings necessary for interconnecting all items of equipment.

- a. **Jacket Water Pump:**

Shall be centrifugal type built-on the engine and driven from the engine crankshaft or camshaft. Pump shall have ample capacity to circulate the required flow of engine jacket water through the radiator to remove the total heat rejected from the engine to the jacket water, lubricating oil and intercooler at 110 percent rated load while maintaining the optimum jacket water temperature leaving and entering the engine as recommended by the engine manufacturer.

- b. **Intercooler Water Pump:** Shall be as specified for jacket water pump except capacity shall be that required to circulate the required flow from the radiator through the intercooler to remove the total heat rejected from the intercooler to the circulating water at 110 percent rated load.

- c. **Radiator:**

Provide engine sub base mounted radiators of the forced draft type with horizontal air discharge as standard with the engine manufacturer. The radiator shall be in accordance with the engine manufacturer's standard design for the engine furnished except that the tube cores shall be non-ferrous metal other than aluminum. Radiator unit shall have ample capacity to remove not less than the total Btu per hour of heat rejected by its respective engine at 110 percent full-rated load to the jacket water, lubricating oil, and intercooler systems. Rate radiator capacity of optimum temperature of the cooling medium leaving the engine as recommended by the engine manufacturer with a dry bulb air temperature of 34°C (94°F) and at a plant elevation of 100 meter above mean sea level. Sizing shall be based on water as the cooling medium. Pressure drop through the radiator shall not exceed 0.56 kg/sq.cm. when circulating the maximum required water flow.

d. Thermostatic Control Valve:

Provide valve for installation in the jacket water system of the engine to maintain constant jacket water temperature to the engine. Thermostatic valve shall be modulating type utilizing self-contained thermostats without use of external bulb, and equipped with three-way valve action. Valve shall be capable of passing water flow as, determined by the engine manufacturer, with a reasonable pressure drop across the valve. Provide valve with one or more interchangeable thermostatic elements. Thermostat shall be non-adjustable type and operating temperature factory-set at the temperature recommended by the engine manufacturer. Design valve so that in event of thermostatic element failure it will fail-safe, permitting water flow through the engine. Thermostat housings shall be all-bronze construction.

e. Expansion Tank:

Provide a separate expansion tank of adequate size if the radiator does not contain adequate provisions to handle the amount of expansion of the cooling water in the system, which will be experienced from a cold start to normal operating condition. Construct a tank of not less than 4.7 mm steel plates with welded joints and necessary stiffeners. Provide a tank with a gage glass and petcock assembly.

f. Flexible Connectors:

Flexible hose for connecting piping to radiator shall be same size as the connecting pipe. Hose shall be non-collapsible type when under a vacuum and suitable for maximum working pressure of 50 psig with water at temperature of 180°F. Inside face of the hose shall be non-porous rubber and smooth. Outer cover shall be tough fabric, which resists aging, sun-checking, and moderate abrasion. Provide ends of flexible hose with steel pipe nipples, flanges, and clamps to suit type of connections on radiator and connecting piping.

#### **2.2.4.9 Governing System**

Provide the diesel-electric generating unit with a speed governing system and an independently driven overspeed limit engine shutdown device. Provide an electronic type governor and shall maintain specified stability without hunting, cycling, or other irregularities. Governor shall include provisions for adjusting speed droop, and speed while unit is in operation. Governor characteristics shall conform to the following:

- a. Minimum range of speed changer (expressed as percent of rated speed): -15 to +5.
- b. Observed speed band shall not exceed (expressed as percent deviation of rated speed):  $\pm 0.25$ .
- c. Transient speed deviation shall not exceed (expressed as percent deviation for sudden addition or removal of 25 percent load):  $\pm 3.0$ .
- d. Time to return to limits of (b) above must not exceed (after sudden load change of (c) above): 3 sec.
- e. Minimum manual speed regulation range adjustment (expressed as percent of rated speed): 0 to 5.

#### **2.2.4.10 Engine Protective Devices**

Provide the engine with protective devices as follows:

- a. Engine Shutdown: Equip the engine with shutdown devices as listed herein. These devices shall shut down the engine by shutting off the fuel supply to the engine. Shutdown devices shall be positive and direct in action and independent of the governor. Shutdown devices shall also actuate a shutdown relay on the switchgear, which shall disable the engine starting circuit until manually reset. Shutdown devices shall have adjustable set points and shall be equipped with auxiliary electrical contacts, which close when the device operates. Auxiliary contacts shall be suitable for 24-volt D.C. service and shall be used for opening the generator main circuit breaker. Provide the following shutdown devices:
  1. Overspeed device that operates if engine speed exceeds normal synchronous speed by 10 percent. Device shall require manual reset.
  2. Pressure switch, which operates if lubricating oil pressure to turbocharger, drops below a preset value.
  3. Pressure switch, which operates if lubricating oil pressure, drops below a preset value.
  4. Temperature switch, which operates if jacket water temperature exceeds a preset value.
  5. Other shutdown devices as recommended by the engine manufacturer.

- b. Electrical Interlocks: Equip throttle valve or starting mechanism with two sets of auxiliary contacts for interlocking with generator main breaker control circuit. With the throttle valve open, one set of auxiliary contacts shall be open and one set closed. Auxiliary contacts shall be suitable for 24-volt D.C. service.

#### **2.2.4.11 Engine Alarm Contact Devices**

Equip the engine with alarm devices, relays, and auxiliary contacts, as required, to actuate the alarm system on the associated generator switchgear panel. Auxiliary contacts shall be suitable for 24-volt D.C. service. Alarm devices shall have adjustable set points. Provide the following alarm contact devices:

- a. Pressure switch in engine lubricating oil system from engine to operate if pressure drops below a preset value.
- b. Pressure switch in turbocharger lubricating oil system piping to operate if pressure drops below a preset value.
- c. Temperature switch in the jacket water discharge piping from the engine to operate if temperature exceeds a preset value. Devices shall have an adjustable range between 100° and 212°F.
- d. Temperature switch in lubricating oil-piping manifold leaving the engine to operate if temperature exceeds a preset value.
- e. Low-level switch in the engines' day tank.
- f. Other alarm devices as recommended by the engine manufacturer.

#### **2.2.4.12 Engine Accessories**

Provide the following accessories for the engine where design permits:

- a. Anchor bolts, nuts, and vibration isolators for mounting the generating unit mounting skid to a concrete sub-base.
- b. Exhaust manifold
- c. Air intake manifold
- d. All necessary piping normally attached to the engine.
- e. Indicating thermometers on cooling water inlet to engine and outlet from engine.
- f. Hand operated barring gear in accordance with DEMA Standard.
- g. Indicating thermometers on lubricating oil inlet and outlet.

- h. Indicating thermometer on turbocharger lubricating oil outlet.

#### **2.2.4.13 Air Intake and Exhaust Systems**

Provide the engine with air intake and exhaust systems. Include piping, fittings, and expansion joints necessary to interconnect equipment with the engine.

- a. **Air Intake Filter:** Provide the engine with a dry type filter. Filter shall be capable of removing dirt and abrasives from intake air to the degree of cleanliness required by the engine. Size the filter to suit engine requirements at 110 percent of rated full load. Design unit to permit easy access to the filter for maintenance purposes. Connection on the engine shall be suitable for engine mounted filter remote installation of filter.
- b. **Air Intake Silencers:** Provide the engine, if required, to limit noise of the intake air system to a level below the audible mechanical noise level of the engine. Silencers shall be as recommended by the silencer manufacturer for the engine furnished.
- c. **Exhaust Silencers:** Provide industrial grad silencers.
- d. **Expansion Joints:** Provide suitable sections of multiple corrugated stainless steel expansion joints with liner in the engine exhaust piping for each engine to absorb expansion strains and vibration in the piping. Air intake expansion joints shall be as specified for the exhaust or may be metal reinforced rubber type. Joints shall be of the same size as the pipe.

#### **2.2.4.14 Piping Requirements**

Piping integral with the engine shall be of the material normally utilized by the engine manufacturer. Piping required to connect auxiliary equipment into the engine fuel oil, cooling water, and lubricating oil system shall be steel, Schedule 40 conforming to ASTM A53, Grade A. Except for lubricating oil service, fittings 50 mm or smaller shall be of malleable iron conforming to ANSI B16.3, 136 kg standard threaded type. Fittings 50 mm or smaller for fuel oil and lubricating oil service shall be B 136 kg forged steel socket welding, conforming to ANSI B16.11. Fittings larger than 50 mm shall be ANSI 68 kg standard steel butt-welding, conforming to ANSI B16.9. Flanges shall be ANSI 68 kg standard slip-on welding flanges material conforming to ASTM A181. Gate valves 50 mm and smaller shall be double disk, rising stem, inside screw type, 68 kg class bronze gate larger than 50 mm shall be double disk, parallel seat type, hydraulic-rated, 14 kg/cm<sup>2</sup> class, outside screw and yoke type with flanged ends and brass trim. Globe valves 50 mm and smaller shall be 57 kg class bronze valves, larger than 50 mm shall be 57 kg class cast iron, flanged ends, and bronze trim. All globe valves shall have renewable composition discs suitable for the service encountered. Check valves shall be swing check type. Plug valves shall be lubricated taper plug type, 57 kg class. All plug valves shall be wrench operated. Plug valves one inch and smaller shall have screwed ends, larger than one inch shall have flanged ends. Piping for instruments shall be copper

tubing suitable for solder type or flared-tube fittings. Fittings shall be wrought copper type. Valves shall be ANSI 57 kg standard brass with screwed-ends. Use flexible pipe, or other approved means, to connect system piping from auxiliary equipment to the engine to minimize transmission of vibration.

#### **2.2.4.15 Engine Gage Panel**

Provide panels complete with cabinet and accessories for the engine. Cabinet shall be enclosed type fabricated or not lighter than 11-gage sheet steel. Construct a cabinet with an angle iron framework, if required, for proper stiffness and support. Size the cabinet to accommodate the equipment specified herein when arranged in an orderly and approved manner. Factory-mount gage panel on the engine unit base. Use isolation mounting material between the base and the control panel to isolate the panel from engine vibrations. Provide all panel-mounted instruments and gauges with suitable nameplates of laminated black gloss-finished plastic with white engraved lettering. Provide piping and tubing as required to connect gages. Furnish and install the following apparatus on the gage panel:

- a. Pressure Gages: ANSI B40.1, and have the pressure detecting class, 114 mm nominal diameter, with silver or white dials and black markings. Duplex gages shall be of the two Bourdon tube style; gages for all other services shall be single Bourdon tube style. Provide gages with shutoff needle valves and suitable pressure snubbers. Provide gages for the following instructions:
  1. Fuel oil pressure to engine (duplex gage across the duplex filter);
  2. Jacket water pressure to engine.
  3. Lubricating oil pressure to engine (duplex gage across the full flow filter)
  4. Lubricating oil pressure to turbocharger
- b. Indicating Tachometer: Shall be driven by the crankshaft through a flexible shaft. Indicator shall be direct-reading type with 100 mm diameter dial and graduated in revolutions per minute. Instrument shall be accurate within 2 percent plus or minus over the entire range of engine speed permitted by the governor. Tachometer face shall be marked to indicate the synchronous rpm.

### **2.2.5 Generator, Excitation and Voltage Regulation Systems:**

#### **2.2.5.1 Generator**

Provide 250KVA, 230 volts, three-phase, 60-hertz, 0.80 power factor, synchronous, ac, brushless-excited, revolving field, aircooled, self-ventilated unit. Generator speed shall be that of the engine. Generator shall be capable of carrying continuously a 0.80 power-factor load equal to the gross kW rating of the diesel generating unit, and a 0.80 power-factor load 10 percent in excess of the gross kW rating of the diesel generating unit for 2 continuous hours out of any period of 24 consecutive hours at normal

voltage with temperature rise of not more than 80°C as measured by resistance and based on 40°C ambient temperature. Enclosures shall be general-purpose open type with ventilating openings covered with removable screen having a mesh not larger than ½ inch. Generator shall conform to ANSI C50.10, ANSI C50.13, and to NEMA MG-1. Generators shall have form-wound coils and Class H insulation. Arrange stator winding for "wye" connection, with both line and neutral leads of each of the three phase windings brought out of the bottom of the generator frame, and the neutral ungrounded. Mount the generator rotor on an extended shaft coupled rigidly to the engine crankshaft. Mount impellers on rotor for cooling the generator. Rotor shall be capable of safe operation at a speed 25 percent in excess of its rated synchronous speed. Generator armature, field, and ground leads shall have clamp or crimp-type lugs or connectors for electrical connections. Terminal markings shall conform to NEMA MG-1.

**2.2.5.2 Excitation and Voltage Regulation Systems** Comply with IEEE 421.1. Parallel operation with other exciters shall not be utilized. Excitation systems shall be designed to provide a continuous current rating of not less than the generator's excitation current required when the generator operates at 105 percent rated voltage under the continuous rating condition requiring maximum field current. Match the voltage rating of the system generator field. Provide an excitation system response ratio of not less than 0.5 and a ceiling voltage of not less than 120 percent of rated voltage.

#### **2.2.5.2.1 Exciter**

Integral with the generator and of the synchronous, rotating armature, rotating rectifier type. Exciter field shall be stationary. Provide a permanent magnet generator (PMG) type pilot exciter with a rotating permanent magnet field on the generator shaft and with a stationary ac winding. Exciter ac output shall be three-phase and shall be rectified by full-wave solid-state rotating rectifier mounted on the generator shaft. Rotating rectifier shall consist of hermetically sealed diodes connected between the exciter and generator field without intervening brushes, slip rings, or commutators. Electrically isolate the exciter field from the rest of the generator. Provide a device or relay to monitor the excitation and de-energize the exciter field, if the field current is maintained at a level, which would damage the machine. The acceptable ratio of exciter ceiling voltage to exciter nominal voltage shall be not less than three to two. Exciter shall be equipped with surge protection devices.

#### **2.2.5.2.2 Semiconductor Devices**

Semiconductor devices used to supply dc power to the alternator field shall be designed to provide a peak inverse voltage rating of not less than 10 times the rated dc nominal generator field voltage which is the dc field voltage applied at the normal ambient temperature of the generator stabilized at rated output. Utilize 3-phase full-wave solid-state rectifier bridge devices and provide surge voltage protection.

### **2.2.5.3 Voltage Regulator, IEEE Device 90**

Provide a completely solid-state voltage regulator for control of the generator voltage by control of the exciter field. No vacuum tubes or electromechanical relays shall be used in the voltage regulator. Regulator shall be designed for three-phase voltage sensing from two switchgear-mounted dedicated voltage transformers. Parallel provisions shall be an inherent part of the regulator and the unit shall be wired for the crosscurrent compensation mode. Provide overload protection for power semiconductors in the regulator and for regulator accessories.

- a. **Regulator Control Features:** Control generator exciter field as required maintaining a constant and stable generator output voltage within plus or minus 1/2 of one percent of nominal for steady-state loads from no-load to full-load including a 5 percent variation in frequency and the effects of field heating. Regulator response time shall be less than 17 milliseconds. Regulator drift shall be less than plus or minus 1/2 percent for 40 degrees C temperature change including warm up. The PMG pilot exciter in conjunction with the voltage regulator shall provide 300 percent rated generator current for at least 10 seconds to provide short-circuit current adequate to operate circuit protective devices.
- b. **Regulator Accessories:** Provide the following regulator accessories manufactured or approved for associated use by the regulator manufacturer. Accessories may be integral with the regulator or in a separate module as appropriate or as standard with the manufacturer. Mount devices along with the voltage regulator in the generator switchgear, unless noted otherwise.
  1. Provide two dedicated voltage transformers constructed to withstand under frequency/over voltage operation encountered in the generator.
  2. Provide equipment to protect against under frequency/ over-voltage conditions by reducing the regulator output during under-speed warm-up or prime mover maintenance periods and to automatically remove power input to the voltage regulator, whenever the voltage exceeds 140 percent of nominal voltage.
  3. Provide one dedicated current transformer to permit parallel reactive load division.
  4. Provide a manual voltage setting control system with a manual voltage adjusting rheostat or variable autotransformer and a manual-automatic off switch. Install devices on the control switchboard.

### **2.2.6 Low-Voltage Engine-Generator Unit Protection and Support**

Provide an engine generator microprocessor based control system.

#### **2.2.6.1 Engine Generator Control Panel**

Provide an enclosed panel fabricated of not lighter than 14-gage sheet steel in compliance with NEMA 250, Type 12. Construct a cabinet with an angle iron framework, if required, for proper stiffness and support. Size the cabinet to accommodate the equipment specified herein. Panel shall be factory-mounted on the engine unit sub base. Use isolation mounting material between the sub base and the panel to isolate the panel from engine vibrations. Provide panel-mounted devices with suitable nameplates of laminated black gloss-finished plastic with white engraved lettering. Provide connecting piping, tubing, and wiring installed in conduit where not otherwise enclosed.

#### **2.2.6.2 Engine Control Panel**

Provide devices of the type standard with the manufacturer utilizing minimum 50 mm (2 inch) nominal diameter gauges. Instruments subject to rapid pressure surges shall be provided with dampening devices to give a steady reading. Provide the following panel-mounted devices as a minimum:

- a. Engine Controls: Engine controls shall be installed on the generator control panel.
- b. Engine Instrumentation:
  1. Fuel oil pressure gage;
  2. Lube oil pressure gage;
  3. Coolant temperature gage;
  4. Elapsed time meter.
- c. Engine Safety Circuit Devices: Provide the following devices to stop the engine-generator set and to simultaneously open the engine-generator set main circuit breaker. Stop switch may be connected to the safety circuit if recommended by the manufacturer. Source of energy for the engine safety circuit devices shall be the starting battery.
- d. Engine Instrumentation:
  1. Over cranking;
  2. Overspeed;
  3. Excessive coolant temperature;
  4. Dangerously low lubricating oil pressure.

#### **2.2.6.3 Generator Control Panel**

Install these controls in the engine-generator control panel Generator controls and instrumentation shall be provided as follows.

- a. Generator Controls:
  1. Voltage regulator and associated controls; and
  2. Governor remote control switch.
- b. Generator Instrumentation and Metering:
  1. Voltmeter and control switch; and
  2. Ammeter and control switch;
  3. Wattmeter.
  4. Watt-hour meter;
  5. Three current and three voltage potential transformers.
- c. Engine starting and Stopping Controls and Protective Equipment
  1. Engine starting switch.
  2. Engine cranking relay;
  3. Engine shutdown relay.
- d. Local Alarm Panel: Provide a microprocessor based local alarm panel suitable for operation on the starting battery voltage. Provide with pre-alarm and shutdown alarms in accordance with NFPA 99. Provide the following alarms with pre-alarms provided only for temperature and pressure conditions and shutdown alarms for all conditions.
  1. High jacket coolant temperature;
  2. High lubricating oil temperature;
  3. Low lubricating oil pressure;
  4. Low fuel oil pressure;
  5. Engine shutdown due to overspeed;
  6. Engine starting failure
  7. Normal voltage supply failure;
  8. Restoration of normal supply voltage;

9. Control battery summary alarm;
10. Other engine-generators set abnormal conditions as recommended by the manufacturer.

## **2.3 FUEL STORAGE TANK**

2.3.1 General: Provide a packaged design fuel bulk storage tank with 5,000 liters capacity. Tank shall be made of 4mm thick fully-banded, heavy gauge pressure tested steel of double cylinder construction with the following components:

- A. Welded steel channel base suitable for bolt attachment to concrete pad with lifting eyes or forklift pockets.
- B. A removable manway to provide access for access into the inner tank.
- C. Interior of the tank shall have a corrosion inhibitor to deter corrosion prior to installation and use. Apply heavy-duty industrial anti-corrosion coating for tank exterior as per Manufacturer's instructions.
- D. Provide schedule 40, ASTM A 53, black iron pipe connections to day tank and fuel refilling stub-out as shown in Drawings and as per Manufacturer's standard requirement. Make all connections to fixed installed pipe with pipe unions to facilitate tank service/removal.
- E. Fuel oil level gauge sensors and switches to activate the transfer pump. Fire rated shut off ball valves on pump inlets.
- F. Pump to be directly driven, positive displacement, internal gear type with mechanical shaft seal and cast iron body, machined steel gears as per Manufacturer's requirement.
- G. Pump check valve, spring-type, cast iron construction.
- H. Refer to dimension and details of fuel storage tank as shown in drawings.

## **PART 3 EXECUTION**

### **3.1 General**

All installations shall conform to the requirements of the Code and manufacturer's standard procedures.

### **3.2 Installation**

Use cribbing and shoring as required, to protect construction from moving-in damage. Protect flooring and finished surfaces by heavy planking. Obtain approval of methods and materials used from the Contracting Officer before moving equipment across shored floors. After equipment has been moved in, remove shoring and repair damage to floors and other parts of the building. Furnish the services of one or more diesel-generator representatives or technicians, experienced in the installation and operation of the type of systems being provided, to supervise the installation.

### **3.2.1 Mechanical Equipment**

Installation shall be in accordance with manufacturer's instructions. Furnish a competent and experienced erecting engineer to directly supervise unloading, moving, and erection of equipment. Provide labor, tools, and equipment, for erection and installation of the equipment.

**3.2.1.1 Erection of Engine-Generator Units/ Sub base Mounting** Erect sub base-mounted engine-generator units on concrete foundation, utilizing isolators specified. Carefully level structural sub base isolators prior to grouting in accordance with both the engine manufacturer's and the vibration isolator manufacturer's recommendations.

#### **3.2.1.2 Equipment Supports**

Provide devices to support equipment, not supported on concrete foundations, in the indicated position. Fabricate the required supports of structural steel sections, plates, or rods; and arrange to provide rigid and sturdy support. Provide connections and fasteners required between equipment supports and building structures.

#### **3.2.1.3 Anchor Bolts and Sleeves**

Provide anchor bolts and sleeves for equipment installed on concrete foundations or concrete bases. Anchor bolts and sleeves shall be type, size, and metallurgy recommended by the manufacturer of equipment. Placement of anchor bolts and sleeves for the engine generator unit shall be in strict accordance with details provided by the manufacturer of the engine.

#### **3.2.1.4 Equipment Cleaning**

Before assembly or erection, thoroughly clean equipment. Remove temporary protective coatings and foreign materials. After erection of equipment, clean external surfaces. Remove oil, grease, dirt, and foreign material. Touch up shop paint as necessary.

#### **3.2.1.5 Grouting:**

a. Engine-Generator Unit: Provide epoxy resin compound mixture of the type recommended by the engine manufacturer for grouting the engine rails, generator sole plate, and outboard bearing support. Mix and apply grout in accordance with instructions provided by the grout manufacturer.

b. Other Equipment: Grout equipment bedplates or bases on the foundations with a non shrink Portland cement grout. Grout shall have a minimum thickness of 25 mm one inch. Mix grout in accordance with the manufacturer's instructions and apply in a manner to ensure complete filling of spaces between the foundation and equipment base plates.

#### **3.2.1.6 Instruction of Operators**

During the period of erection, inform plant superintendent and operators as to placement and assembly of equipment. After equipment is ready to be placed in

service, fully instruct plant operators in operation and maintenance of the equipment.

### **3.2.2 Piping**

Fabricate, assemble, weld, solder, braze and visually examine piping to ensure that piping work conforms to ASME B31.1. Shop fabrication of piping 100 mm and larger is permitted. If shop fabrication is chosen, provide detailed fabrication drawings or isometrics and submit for approval before work is started. Field erect fabricated piping to provide a workable arrangement, with convenient access to valves and specialty items. Maintain adequate clearance between runs of piping to permit access around adjacent pipe for dismantling, repair, and maintenance of valves. Piping shall be straight, plumb, and run direct as possible. Locate groups of pipes parallel to each other, with adequate spacing. Do not install piping over electrical equipment. Competent and skilled workmen shall install piping.

#### **3.2.2.1 Identification of Materials**

Paint identifying numbers on sections of prefabricated piping corresponding to identifying numbers shown on shop fabrication detail drawings.

#### **3.2.2.2 Shop Fabrication**

Shop fabricate pipe in the largest sections practical for shipping and field assembly. After fabrication, remove loose scale, sand, weld spatter, cutting chips, and other foreign materials by mechanically driven cleaning tools or wire brush. Before shipment, apply one coat of paint to shop fabrications, valves, fittings, and flanges using painting materials of metallic pigment type free of asphalt base. Plug ends of piping and openings prior to shipment to plant site

#### **3.2.2.3 Welding**

Preparing, bending and cleaning and welding of joints in piping shall conform to ASME B31.1. Welds shall be visually examined and meet acceptance standards of ASME B31.1

#### **3.2.2.4 Taps**

Taps for thermometer separable sockets shall be in locations which permit installation of thermometers for convenient observation from the floor or platform elevations and which minimize obstruction of the flow in the pipe. Make taps before fitting main piping in place. Burning of holes after piping is fitted is prohibited

#### **3.2.2.5 Field Cleaning**

Before placing in position, clean the inside of black steel pipe by rapping along its full length to loosen sand, mill scale, and other foreign matter. Pipe, 50 mm and larger, shall have a wire brush of a diameter larger than that of the inside of the pipe drawn through its entire length several times. Before final connections are made to apparatus, wash out interior of piping with water, except air, fuel, and lubricating oil lines. Blow out air, fuel, and lubricating oil lines with 551-to 689-kPa psi dry air

or nitrogen. Sterilize potable-water piping by means of liquid chlorine or lime in accordance with AWWA C651 before being placed in service

### **3.2.2.6 Pickled Piping**

Clean steel lubricating oil and fuel oil piping and pickl internally by chemical cleaning. Cleaning process shall remove grease, oil, dirt, mill scale, lacquer, and corrosion products. Clean piping either by circulating the cleaning solution through the completed piping systems or by soaking prefabricated piping sections in a tank of the solution. Provide and remove after use, pumps, temporary piping connections, tanks, heaters, and other equipment required accomplishing cleaning of piping. After completing cleaning, thoroughly flush, drain, and dry piping and take precautions to prevent re-rusting before the pipe is used. While cleaning, remove or isolate instrumentation, valves, and equipment installed in the piping, which contain bronze or brass. Cleaning solution shall not come in contact with bronze or brass. Cleaning solution shall not be circulated through the engine, engine lubricating-oil sump, lubricating oil cooler, or pumps in the oil piping systems. Provide cleaning solution of the type recommended by a reputable chemical manufacturer for the specific purpose

### **3.2.2.7 Provisions for Expansion**

Provide for expansion of piping subject to temperature change by using compatible expansion joints, bends, ball joints, offsets, and loops in a manner that shall prohibit development of excessive stresses between anchor points or at equipment connections. Use bends, loops, and offsets wherever practical to prevent overstressing of piping systems due to thermal expansion and to provide adequate flexibility. A piping system may be cold sprung by an amount no greater than 50 percent of the total linear expansion to alleviate end thrusts and moments. Method of cold springing shall be as approved

### **3.2.2.8 Connections to Equipment**

Make piping connections to equipment shown and provide reducers, increasers, unions, valves, and strainers required to make a complete installation. Make connections to equipment with unions or flanged joints. Valves shall be the same size as the piping in which installed.

### **3.2.2.9 Joints**

a. Flanged Joints: Face pipe flanges true to line and clean before assembly. Gasket faces shall be free of burrs or bruises. Make up flanged joints prior to completing the last weld in connecting piping. Coat bolt threads with a mixture of equal parts of graphite and boiled linseed oil or with an approved commercial coating.

b. Screwed Joints: Use graphite pipe-joint compound; apply to male threads only. Red or white lead and zinc compounds may be used, except lead compounds are prohibited in potable water lines. Piping shall be free of fins and burrs. Ream pipe ends or file out to size of bore; remove chips

### **3.2.2.10 Pipe Sleeves**

Provide where pipes and tubing pass through masonry or concrete walls, floors, roofs, and partitions. Provide galvanized steel pipe sleeves in outside walls above grade, in floor, or in roof slabs. Sleeves in partitions shall be zinc-coated sheet steel having a nominal weight of not less than 4.42 kg per square meter. Space between pipe, tubing, or insulation and the sleeve shall be not less than 6.35 mm, except sleeves in the plant operating floor shall be 50 mm larger in diameter than the pipe. Hold sleeves securely in proper position and location before and during construction. Sleeves shall be of sufficient length to pass through the entire thickness of walls, partitions, or slabs. Sleeves in floor slabs shall extend 75 mm above the finished floor. Firmly pack space between the pipe or tubing and the sleeve with oakum and calk on both ends of the sleeve with elastic cement, except for sleeves in the plant-operating floor, which shall be free of packing and elastic cement. Where piping passes through steel grating, band the opening with 25 by 3 mm thick steel edge bands welded to the grating bars

### **3.2.2.11 Wall Pipes**

Provide cast-iron wall pipes for piping passing through underground exterior walls and install in a manner to ensure a watertight connection between the wall and casting. Wall pipes for use with salt water shall be cement lined. Wall pipes shall have flanged ends conforming to ASME/ANSI B16.1, Class 125. Extend flanged ends beyond wall to permit bolting of flanges to connecting piping

### **3.2.2.12 Flashing**

Flashing for pipes passing through exterior walls above ground and through roof shall conform to details as indicated

### **3.2.2.13 Anchors, Guides, and Supports**

Anchor and support piping in a manner such that expansion and contraction shall take place in the desired direction. Prevent vibration by use of vibration dampers and prevent undue strains on equipment served. Hangers used for support of piping of 50 mm nominal pipe size and larger shall be the type permitting adequate adjustment after erection while still supporting the load. Use wall brackets where pipes are adjacent to walls or to other vertical surfaces, which may be used for supports. Provide supports to adequately carry weight of lines and to maintain proper alignment. Provide inserts and sleeves for supports in concrete where necessary, and in new construction places before concrete is poured. Provide insulated piping with a pipe-covering protection saddle at each support. Provide auxiliary structural steel members, other than building structural steel, required for supporting or anchoring piping and accessories. Provide longitudinal and lateral seismic sway bracing to restrain piping when subjected to the lateral forces generated by the seismic zone involved. In accordance with procedures approved by the Contracting Officer, drill holes, provide bolting materials, and perform welding to fasten auxiliary structural steel to building steel. Provide pipe guides and anchors of approved type at points where necessary to keep pipes in accurate alignment, to direct expansion movement, and to prevent buckling and swaying and undue strain. Provide pipe guides for alignment of pipe connected to the free,

unanchored end of each expansion joint. Support pipe rollers in concrete trenches by manufactured preformed steel hanger units. Hanger units, supports, hangers, inserts, rollers, and similar items shall be hot-dipped galvanized after fabrication. Space pipe supports to provide adequate support

### **3.2.3 Electrical Equipment**

Install equipment in accordance with the standards, and codes, and in conformance with manufacturer's instructions and recommendations.

## **3.3 Painting**

Ensure that the manufacturer paints equipment and equipment assemblies specified under this section before factory testing. Ensure that the manufacturer cleans and retouches as required after factory testing and before shipment. The Contractor shall retouch damaged painted surfaces after field installation and testing. Retouching shall be done with the exact color and type of paint used by the manufacturer.

## **3.4 Field Tests and Inspections**

Perform all field tests and trial operations, and conduct all field inspections (except final field inspection). Provide all labor, equipment, and incidentals required for the tests, including water, fuel, and lubricants. Submit prior to the test, the manner and procedure of testing, list of testing equipment, and the list personnel involved in the test. Owner will witness all field tests and trial operations and will conduct final field inspections. Give the Owner ample notice of the dates and times scheduled for tests, trial operations, and inspections which requires the presence of the Owner. All deficiencies found shall be rectified and work affected by such deficiencies shall be completely retested at the Contractor's expense.

### **3.4.1 Piping Tests**

Test piping systems after lines have been cleaned and before any insulation covering has been applied. Test piping systems at a pressure of one-half times the design working pressure, and in no case less than 50 psig. Test oil, and gas lines with clean, dry air. In all tests, remove gages, traps, and other apparatus that may be damaged by the test pressure, or valve off before the tests are made. Install a calibrated test pressure gauge in the system to observe any loss in pressure. Brush all joints in piping systems tested with air with a soapy water solution to check for leaks. Maintain the required test pressure for a minimum of one hour to enable inspection of all joints and connections. Rectify all defects that will be developed during testing, and retest the piping system until they show no defect or weakness and are tight.

### **3.4.2 Preliminary Operation**

Place into operation all equipment provided and installed, except as specifically noted otherwise. Make all necessary adjustments to equipment to ensure proper operation as instructed by the manufacturers of the equipment. Lubricate equipment prior to operation in accordance with the manufacturer's instructions. The Owner will provide lubricants. Dry out all motors before operation as required to develop and maintain proper and constant insulation resistance. Upon approval by the Owner

or his authorized representative, operate diesel electric generating units under the supervision of the supervising erector at varying loads throughout the load range for a sufficient time to demonstrate that operation is proper and that all pressures and temperatures are normal and within the specified limits. Operate engine for a period of time sufficient to assure that the unit is ready to carry the test loads specified in paragraph entitled "Diesel Generating Unit Acceptance Tests" without damage to any of the engine parts. During this preliminary operation, check the operation of all auxiliary equipment furnished under this contract to determine that it is functioning properly, and make necessary adjustments to all equipment to place it in first-class operating condition in conformance with the contract requirements.

### **3.4.3 Electrical Equipment and Materials Tests**

Except as specified otherwise, test procedures, inspections, and sampling shall be as specified in the specifications referenced herein, and as noted below:

a. **Phase Relationship Tests:**

Check connections to all equipment for proper phase relationship. During such check, disconnect all devices, which could be damaged by the application of voltage or reserved phase sequence.

b. **Insulation Resistance Tests:**

Perform on cables and equipment as listed herein. Make tests with motor-driven or rectifier type insulation resistance testers having ranges of 500 and 2,500 volts D.C. Disconnect all solid-state and other equipment, which may be damaged by such tests before tests are made. Tests shall measure insulation resistance from line to ground. Test 600-volt class circuits and equipment, including current transformer and potential transformer secondary circuits and equipment, with the 500-volt tester range. Minimum acceptable values of insulation resistance of circuits and equipment shall be as recommended by the manufacturer. Provide for the Owner or his authorized representative, test reports listing test equipment used, person or persons performing the tests date tested, circuits or equipment tested, and results of all tests.

### **3.4.4 Diesel Generating Unit Acceptance Tests**

When installation is complete and in first-class operating condition, it notifies the Owner in writing that the generating units and auxiliary equipment are ready for final field tests. The Owner or his authorized representative will witness final acceptance tests. Perform other tests as necessary or desirable to make certain that all equipment is functioning properly. Test shall include the following:

a. Submitted copy of the standard test performed by the Manufacturer shall be submitted.

b. Local factory test (to be witnessed by BSP representative/s): Operational test of one (1) hour each at 50%, 75%, 100%, 110%.

c. On site test: Field test on site after installation shall be made at varying loads of the facility for at least eight (8) hours of operation to include two (2) hours at 100% of the facility load. Fuel required for these tests shall be shouldered by the Contractor.

### **3.4.5 Test Reruns**

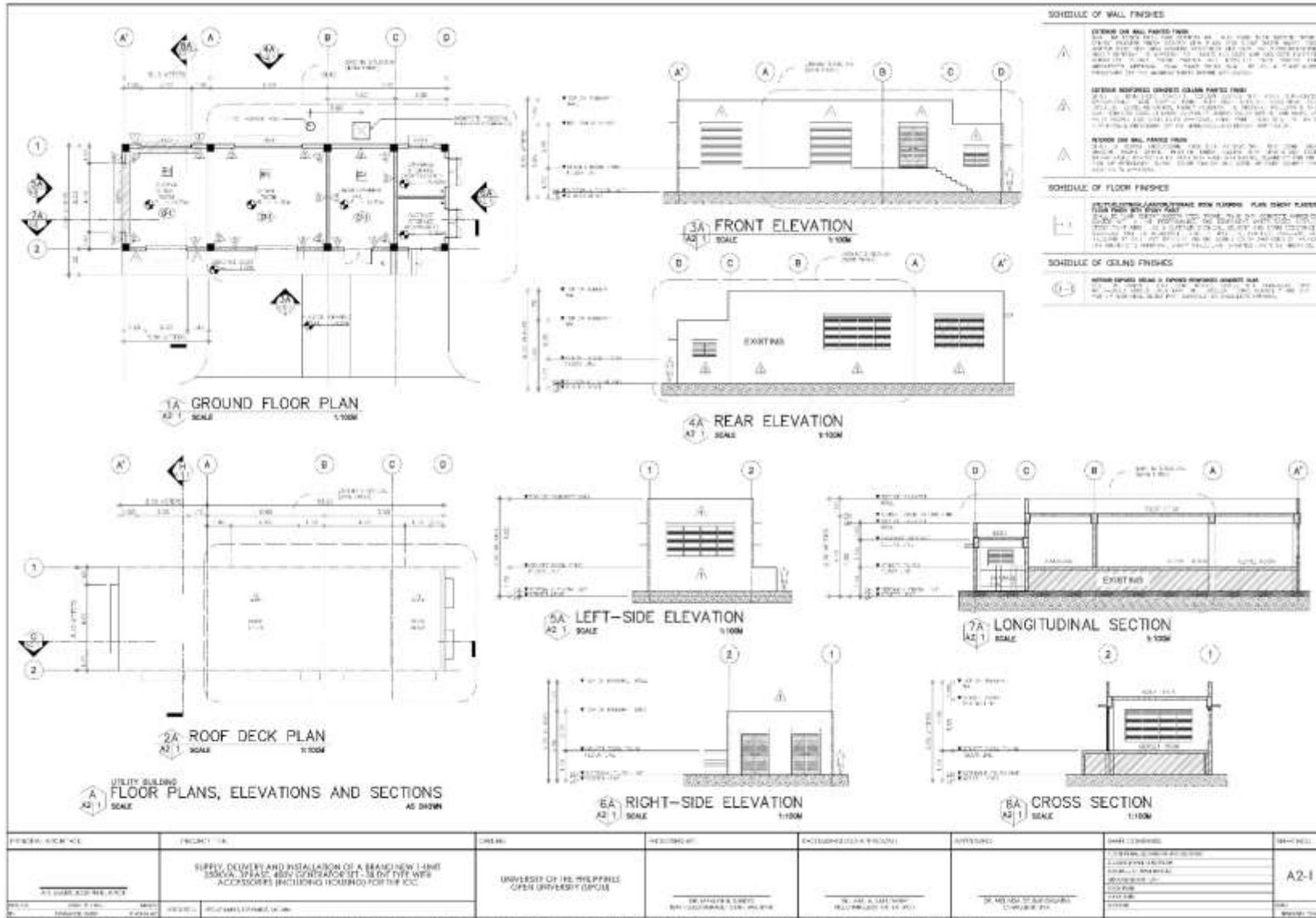
If the specified performance is not indicated by these tests, make such adjustments and changes, as necessary, and conduct additional tests, as necessary, to further check the performance of the equipment. Contractor shall bear all costs of such additional tests, including the cost of fuel used.

### **3.3.5.1 Failure to Meet Requirements**

In the event any of the equipment fails to meet specified performance or fails to operate satisfactorily, the Owner shall have the right to operate the equipment until the defects have been corrected. Any equipment proved to be faulty and inadequate for the service specified would be rejected, the Owner shall have the right to operate the rejected equipment until such time.

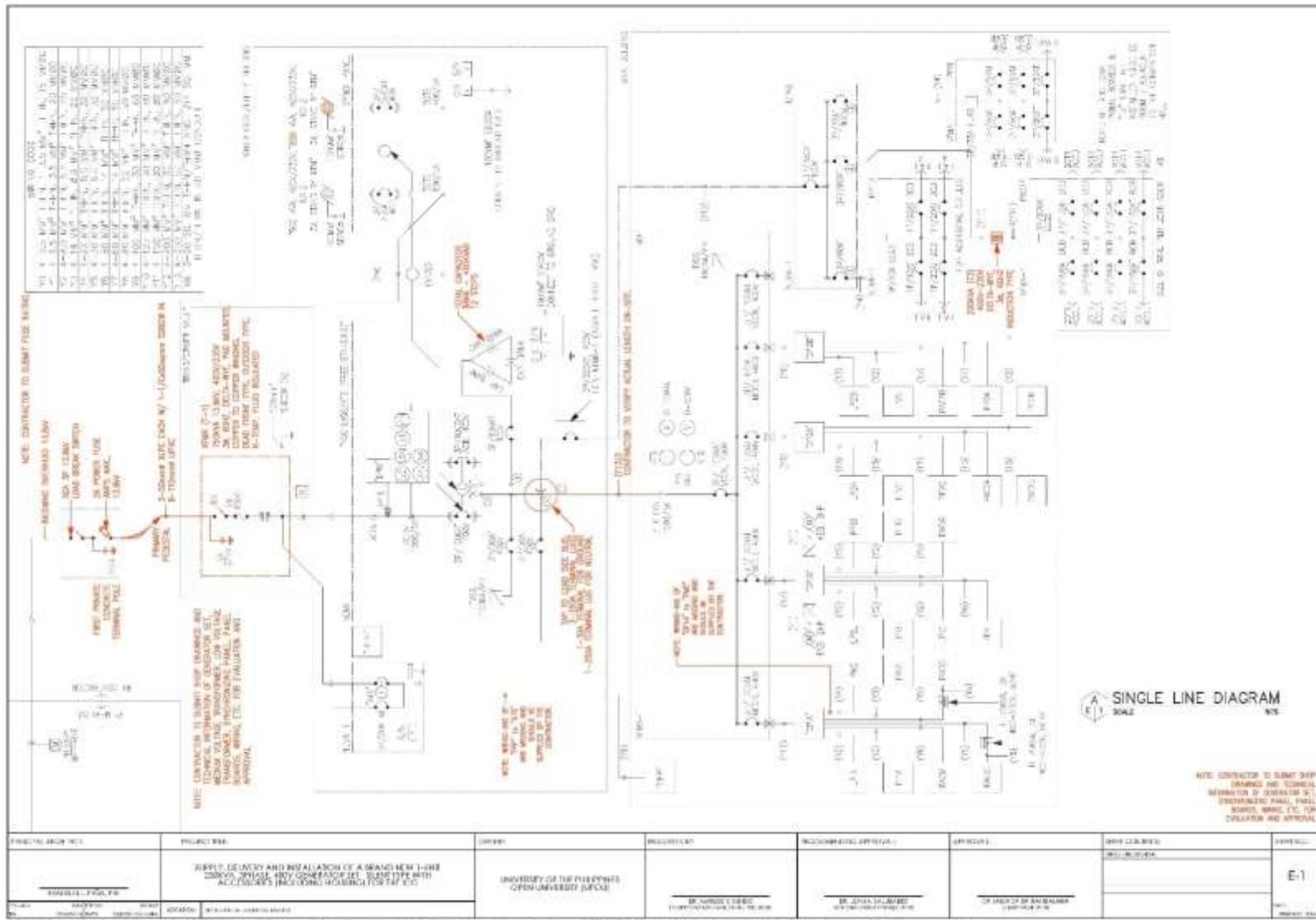
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# Section VII. Drawings









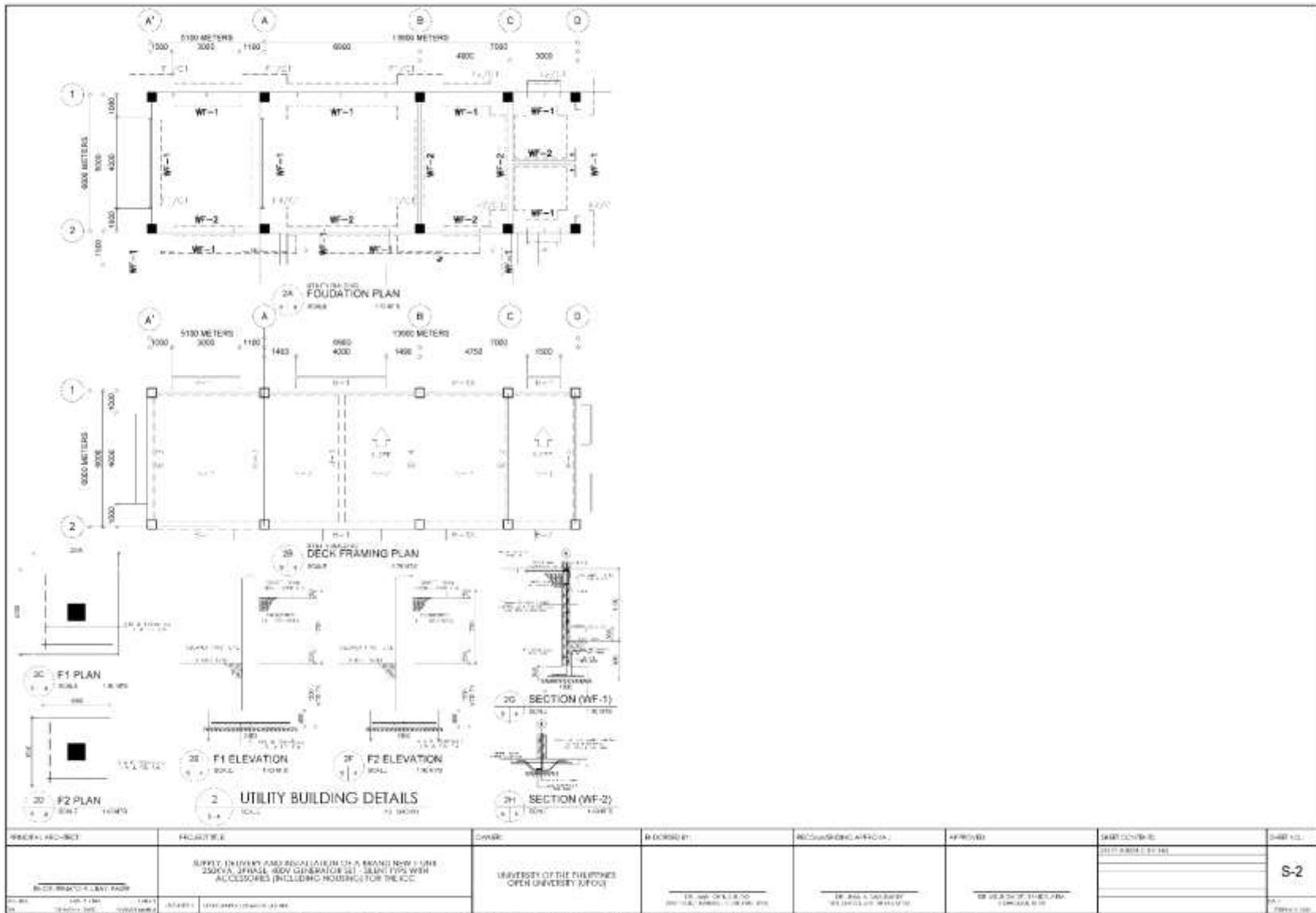


**NOTES ON MASONRY AND CONCRETE BLOCKS**

- ALL BLOCKS SHALL BE MANUFACTURED TO THE REQUIREMENTS OF THE BRICKMAKERS' ASSOCIATION OF AMERICA (BMA) OR THE CONCRETE BLOCK INSTITUTE (CBI).
- ALL BLOCKS SHALL BE OF THE FULL STRENGTH TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL HEIGHT TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL LENGTH TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL WIDTH TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL DEPTH TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL WEIGHT TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL SURFACE TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL TEXTURE TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL COLOR TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL FINISH TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL GRADE TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL SPECIFICATION TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL COMPLIANCE TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL APPROVAL TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL CERTIFICATION TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL REGISTRATION TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL LICENSING TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL INSURANCE TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL BONDING TYPE UNLESS OTHERWISE SPECIFIED.
- ALL BLOCKS SHALL BE OF THE FULL SURETY TYPE UNLESS OTHERWISE SPECIFIED.

**CONSTRUCTION NOTES & STANDARD DETAILS**

DATE	PROJECT	OWNER	DESIGNED BY	SECONDARY ENGINEER	APPROVED	SCALE	REVISIONS						
15/08/2023	SUPPLY, DELIVERY AND INSTALLATION OF A BRAND NEW 1.5M <sup>2</sup> BRAND NEW 400V CAPACITOR, 500V TYPE WITH ACCESSORIES INCLUDING HANGING FOR USE I.C.	UNIVERSITY OF THE PLYMOUTH (PLMUNIVERSITY) (P) (C)	DR. JAMES J. O'NEILL	DR. JAMES J. O'NEILL	DR. JAMES J. O'NEILL	1:1	<table border="1"> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>DATE</th> </tr> <tr> <td>1</td> <td>ISSUED FOR TENDER</td> <td>15/08/2023</td> </tr> </table>	NO.	DESCRIPTION	DATE	1	ISSUED FOR TENDER	15/08/2023
NO.	DESCRIPTION	DATE											
1	ISSUED FOR TENDER	15/08/2023											
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# Section VIII. Bill of Quantities

DETAILED CONSTRUCTION ESTIMATE WORKSHEET (DCEW)

Project :	SUPPLY, DELIVERY AND INSTALLATION OF A BRAND NEW 1-UNIT 250KVA, 3 PHASE, 400V GENERATOR SET - SILENT TYPE WITH ACCESSORIES (INCLUDING HOUSING) FOR THE ICC	Prepared / Estimated by:		Submitted by:		Date:	
Location :	UPOU Headquarters, Maahas, Los Baños, Laguna	Certified Correct:	Name w/ Signature & Designation		Address of Bidder		
Subject :	BILL OF MATERIALS AND COST ESTIMATES (DETAILED CONSTRUCTION ESTIMATE WORKSHEET)		Name & Signature of General Manager		Estimated Project Cost		0.00
				No. of Days to Complete:		180 CALENDAR DAYS	

ITEM NO.	ITEM OF WORK	UNIT	QTY.	DIRECT COST				SUB-TOTAL DIRECT COST	UNIT COST (PHP)
				MATERIALS		LABOR			
				PER UNIT	MATL. COST	PER UNIT	LABOR COST		
<b>I. GENERAL REQUIREMENTS</b>									
A. Construction Aid									
	1. Temporary Office, Sheds, Storage etc.	lot	1.00		0.00		0.00	0.00	0.00
	2. Temporary Power and Water Supply	lot	1.00		0.00	-	-	0.00	0.00
	3. Temporary Fence and Barricades	lot	1.00		0.00		0.00	0.00	0.00
	4. Health and Safety expenses, PPE, etc.	lot	1.00		0.00	-	-	0.00	0.00
	5. Tools and equipment	lot	1.00		0.00	-	-	0.00	0.00
<b>II. EXTENSION OF UTILITY BUILDING (GENSET HOUSING)</b>									
A. Earthworks									
	1. Clearing and Grubbing, complete	sq.m.	35.72	-	-		0.00	0.00	0.00
	2. Complete building excavation as per Specifications	cu.m.	19.20		0.00		0.00	0.00	0.00
	3. Complete Supply and Application of Backfilling & Compaction of Excavated Materials, as per Specifications	cu.m.	15.36		0.00		0.00	0.00	0.00
	4. Complete Supply and Installation of Gravel Bedding as per Plans, Drawing Details and Specifications	cu.m.	5.55		0.00		0.00	0.00	0.00
	5. Complete Supply and Application of Soil Poisonong as per Drawing Details and Specifications	sq.m.	33.66		0.00		0.00	0.00	0.00
	6. Disposal of Excess Soil/Materials, complete	cu.m.	3.84		0.00		0.00	0.00	0.00
B. Concrete Works									
	1. Complete Supply and Installation of Formworks as per Plans, Drawing Details and Specifications								
	a. Foundation	sq.m.	9.68		0.00		0.00	0.00	0.00
	b. Slab on Grade	sq.m.	8.32		0.00		0.00	0.00	0.00
	c. Column	sq.m.	27.10		0.00		0.00	0.00	0.00
	d. Beam	sq.m.	23.17		0.00		0.00	0.00	0.00
	e. Suspended & Cantilever Slab	sq.m.	42.08		0.00		0.00	0.00	0.00
	2. Complete Supply and Installation of Reinforcing Bars including tie wires as per Plans, Drawing Details and Specifications								
	a. Foundation								
	a.1. Grade 60	kgs	318.53		0.00		0.00	0.00	0.00
	b. Slab on Grade								
	b.1. Grade 40	kgs	430.62		0.00		0.00	0.00	0.00
	c. Column								
	c.1. Grade 60	kgs	401.34		0.00		0.00	0.00	0.00
	c.2. Grade 40	kgs	389.40		0.00		0.00	0.00	0.00
	d. Beam								
	d.1. Grade 60	kgs	241.33		0.00		0.00	0.00	0.00
	d.2. Grade 40	kgs	224.92		0.00		0.00	0.00	0.00
	e. Suspended & Cantilever Slab								

ITEM NO.	ITEM OF WORK	UNIT	QTY.	DIRECT COST				SUB-TOTAL DIRECT COST	UNIT COST (PHP)
				MATERIALS		LABOR			
				PER UNIT	MATL. COST	PER UNIT	LABOR COST		
	e. 1. Grade 40	kgs	831.17		0.00		0.00	0.00	0.00
	3. Complete Supply and Installation of Concrete as per Plans, Drawing Details and Specifications								
	a. Foundation	cu.m.	3.52		0.00		0.00	0.00	0.00
	b. Slab on Grade	cu.m.	6.31		0.00		0.00	0.00	0.00
	c. Column	cu.m.	2.71		0.00		0.00	0.00	0.00
	d. Beam	cu.m.	2.67		0.00		0.00	0.00	0.00
	e. Suspended & Cantilever Slab	cu.m.	6.31		0.00		0.00	0.00	0.00
	C. Masonry Works								
	1. Complete Supply and Installation of Concrete Hollow Blocks (CHB) as per Plan, Drawing Details and Specifications								
	a. 100mm/150mm / 4"6"Thk. CHB, Including Steel Reinforcement, Mortar and Tie Wires, complete	sq.m.	101.57		0.00		0.00	0.00	0.00
	2. Complete Supply and Installation of Zocalo as per Plan, Drawing Details and Specifications								
	a. 100mm/150mm Zocalo	l.m.	17.82		0.00		0.00	0.00	0.00
	3. Complete Supply and Installation of Lintel Beam as per Plan, Drawing Details and Specifications								
	a. 100mm/150mm Lintel Beam	l.m.	11.68		0.00		0.00	0.00	0.00
	4. Complete Supply and Installation of Stiffener Beam as per Plan, Drawing Details and Specifications								
	a. 100mm/150mm Stiffener Beam	l.m.	17.82		0.00		0.00	0.00	0.00
	5. Complete Supply and Installation of Stiffener Column as per Plan, Drawing Details and Specifications								
	a. 100mm/150mm Stiffener Column	l.m.	18.81		0.00		0.00	0.00	0.00
	D. Roofing Works								
	1. Roof Deck Waterproofing: Torch Applied Waterproofing	sq.m.	33.30		0.00		0.00	0.00	0.00
	E. Doors & Windows								
	1. D-1 2400mm x 2400mm Roll-up Door, Gauge 18, 100mm solid continuous C-type galvalum steel slats with interior mounted metal guides and steel angular bottom bar, epoxy paint finish complete with hardware and accessories.	set	1.00		0.00		0.00	0.00	0.00
	2. W-1 - 1.2mm gauge 18 base-metal thickness, 45mm thk powder coated hollow metal window with 1.2mm thk ga. 18 x 45mm x 75mm Z profile full louver blades (3000mm x 1800mm)	set	1.00		0.00		0.00	0.00	0.00
	3. Relocation of Installed Louvered Metal Window from the original Utility Building to the Utility Building Extension and Demolition of existing zocalo.	lot	1.00		0.00		0.00	0.00	0.00
	F. Finishes								
	Complete Supply and Installation of Ceiling Finishes as per Plan, Drawing Details and Specifications								
	1. CF-1 Interior Exposed Ceiling 2 concrete slab form finished, coated with semi-gloss 100% water-based acrylic latex paint with excellent hiding, durability and dirt pick-up resistance	sq.m.	116.28		0.00		0.00	0.00	0.00
	Complete Supply and Installation of Floor Finishes as per Plan, Drawing Details and Specifications								
	1. Non-skid floor cement finish w/ grooveFF-1 Plain Cement Smooth Steel Trowel finish with concrete hardener coated with a high performance, two component water based acrylic epoxy paint which has a superior chemical solvent and stain resistance	sq.m.	120.00		0.00		0.00	0.00	0.00
	Complete Supply and Installation of Wall Finishes complete up to plastering and painting works if needed as per Plan, Drawing Details and Specifications								

ITEM NO.	ITEM OF WORK	UNIT	QTY.	DIRECT COST				SUB-TOTAL DIRECT COST	UNIT COST (PHP)
				MATERIALS		LABOR			
				PER UNIT	MATL. COST	PER UNIT	LABOR COST		
1.	WF-1 Exterior CHB Walls Painted Finish - shall be 150mm thick CHB exterior wall with 25mm thick smooth trowel cement plaster finish coated with plain semi-gloss water-based 100% acrylic paint with high alkaline resistance and excellent gloss retention, highly resistant to airborne pollutants, dust and good exterior durability	sq.m.	207.84		0.00		0.00	0.00	0.00
2.	WF-2 Exterior Reinforced Concrete Column Painted Finish - shall be reinforced concrete column coated with plain semi-gloss water-based 100% acrylic paint with high alkaline resistance and excellent gloss retention, highly resistant to airborne pollutants, dust and good exterior durability	sq.m.	10.03		0.00		0.00	0.00	0.00
3.	WF-3 Interior CHB Walls Painted Finish - shall be 150/100mm thick CHB exterior wall with 25mm thick smooth trowel cement plaster finish coated with semi-gloss 100% water-based acrylic paint with excellent hiding, durability and dirt pick-up resistance	sq.m.	102.24		0.00		0.00	0.00	0.00
<b>G. Electrical Works</b>									
1. Conduit Pipes & Fittings									
	a. 1/2 PVC Pipe, coupling, locknut and bushing	lot	1.00		0.00		0.00	0.00	0.00
2. Outlet Boxes									
	a. PVC Junction Box	pcs	4.00		0.00		0.00	0.00	0.00
	b. PVC Utility Box	pc	1.00		0.00		0.00	0.00	0.00
3. Wires & Cables									
	a. 5.5 mm <sup>2</sup> THHN (black)	lm	32.00		0.00		0.00	0.00	0.00
	b. 3.5 mm <sup>2</sup> THHN (green)	lm	120.00		0.00		0.00	0.00	0.00
4. Wiring Devices									
	a. Switch, 1-Gang	pv	1.00		0.00		0.00	0.00	0.00
5. Testing of All Installed Electrical Wirings (i.e. Megger or Insulation Testing)									
	6. Lighting Fixtures								
	a. 2x20 watts, 1-8 daylight led tube, with 302mm x 1218mm x 87mm height, mirrored aluminum reflector and multi-lined satin finish aluminum louvers in powder-coated paint finish, zinc-phosphate steel sheet housing, surface mounted	sets	4.00		0.00		0.00	0.00	0.00
<b>III. GENSET</b>									
A.	Supply, Delivery and Installation of 400KVAR, 400V, 3P Capacitor Bank, complete with wires & cables, conduits, fittings and accessories, complete (see as per plan)	lot	1.00		0.00		0.00	0.00	0.00
B.	Supply, Delivery and Installation of Generator Synchronizing Panel, complete with wires & cables, conduits, fittings and accessories, complete (see as per plan)	lot	1.00		0.00		0.00	0.00	0.00
C.	Supply, Delivery and Installation of Brand New 250KVA, 3P, 400V Generator Set - silent type, complete with generator circuit breaker, wires & cables, conduits, fittings and accessories, complete (see as per plan)	lot	1.00		0.00		0.00	0.00	0.00
D.	Testing and Commissioning	lot	1.00	-	-		0.00	0.00	0.00

ITEM NO.	ITEM OF WORK	UNIT	QTY.	DIRECT COST				SUB-TOTAL DIRECT COST	UNIT COST (PHP)
				MATERIALS		LABOR			
				PER UNIT	MATL. COST	PER UNIT	LABOR COST		
	<b>INITIAL GRAND TOTAL</b>				0.00		0.00	0.00	

**SUMMARY OF BREAKDOWN OF TOTAL LUMP SUM BID PRICE**

Project : **SUPPLY, DELIVERY AND INSTALLATION OF A BRAND NEW 1-UNIT 250KVA, 3 PHASE, 4000V GENERATOR SET - SILENT TYPE WITH ACCESSORIES (INCLUDING HOUSING) FOR THE ICC**

<b>A.</b>		<b>ESTIMATED DIRECT COST</b>			
A.1.	Materials and Equipment Cost ( exclusive of VAT )	P	0.00		
A.2.	Labor Cost and Equipment Rental ( exclusive of VAT )	P	0.00		
SUB - TOTAL ( EDC )					0.00
A.3.	Mobilization and Demobilization ( 1 % of EDC )	P			0.00
TOTAL A		P			0.00
<b>B.</b>		<b>INDIRECT COST</b>			
B.1.	Mark-up				
B.1.1.	Overhead expenses, unforeseen contingencies miscellaneous expenses [(A) * OCM%]	P			
B.1.2.	Contractor's profit [(A) * P%]	P			
SUB-TOTAL (B.1.)					0.00
B.2.	Taxes				
B.2.1.	12% VAT of [(A) + (B.1)]	P	0.00		
B.2.2.	Municipal Tax ( per Municipal Tax of Los Baños )	P			
SUB-TOTAL (B.2.)					0.00
TOTAL B		P			0.00
<b>TOTAL APPROVED BUDGET FOR CONSTRUCTION</b>		P			<b>0.00</b>
( Amount in words )					

Submitted by:

(Name of Bidder)

(Date)

Legend:

-should be filled-up

# *Section IX. Checklist of Technical and Financial Documents*

## I. TECHNICAL COMPONENT ENVELOPE

### *Class “A” Documents*

#### Legal Documents

- (a) Valid PhilGEPS Registration Certificate (Platinum Membership) (all pages) in accordance with Section 8.5.2 of the IRR;

#### Technical Documents

- (b) Statement of the prospective bidder of all its ongoing government and private contracts, including contracts awarded but not yet started, if any, whether similar or not similar in nature and complexity to the contract to be bid (UPOU BAC Form No. 1); **and**
- (c) Statement of the bidder’s Single Largest Completed Contract (SLCC) similar to the contract to be bid, except under conditions provided under the rules. The SLCC should be at least 50% of the ABC. (UPOU BAC Form No. 2);  
 “The prospective bidder must have completed an SLCC that is similar to the contract to be bid, and whose value, adjusted to current prices using the PSA consumer price indices, must be at least fifty (50%) of the ABC to be bid: *Provided however*, That contractors under Small A and Small B categories without similar experience on the contract to be bid may be allowed to bid if the cost of such contract is not more than the Allowable Range of Contract Cost (ARCC) of their registration based on the guidelines as prescribed by the PCAB.”**and**
- (d) Special PCAB License in case of Joint Ventures; **and** registration for the type and cost of the contract to be bid; **and**
- (e) Original copy of Bid Security. If in the form of a Surety Bond, submit also a certification issued by the Insurance Commission; **or** Original copy of Notarized Bid Securing Declaration (UPOU BAC Form No. 3); **and**
- (f) Project Requirements, which shall include the following:
  - a. Organizational chart for the contract to be bid;
  - b. Key personnel Letter Certificate to UPOU to be assigned to the contract to be bid, with their complete qualification (Bio-Data) and experience data (COE):

<b><u>Key Personnel</u></b>	<b><u>General Experience</u></b>
1. Resident Engineer	Min. 5 yrs
2. Project Civil Engineer	Min. 5 yrs
3. Project Registered Electrical Engineer	Min. 5 yrs
4. Project Registered Mechanical Engineer	Min. 5 yrs
5. Safety Officer/Engineer	Min. 5 yrs w/ COSH Certificates
6. Electrician	Min. 5 yrs w/ NC2
7. Genset Technician	Min. 3 yrs (w/ Cert. of Training)

Note: Personnel with multiple expertise and qualifications with at most three different positions mentioned above are allowed as long as he/she can provide the necessary documentation in support of his/her qualifications such as appropriate licenses, certificate of training, accreditation, and the like should be submitted separately for each position.

- c. List of contractor’s major equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership or certification of availability of equipment from the equipment lessor/vendor for the duration of the project, as the case may be; **and**

<b>Equipment</b>	<b>Quantity</b>
1. Concrete Bagger Mixer	Min. 1 unit
2. Welding Machine (min. 400amp)	Min. 2 units

<b>Others</b>	<b>Quantity</b>
1. PPE (Personal Protective Equipment) -includes hard hat, safety vest, safety shoes, safety harness, safety gloves	Min. of 10pcs per item except safety harness (5pcs only)

- (g) Original duly signed Omnibus Sworn Statement (OSS) (UPOU BAC Form No. 4); **and** if applicable, Original Notarized Secretary’s Certificate (UPOU BAC Form No. 5) in case of a corporation, partnership, or cooperative; or Original Special Power of Attorney (UPOU BAC Form No. 6) of all members of the joint venture giving full power and authority to its officer to sign the OSS and do acts to represent the Bidder.

Financial Documents

- (h) The prospective bidder’s computation of Net Financial Contracting Capacity (NFCC) (UPOU BAC Form No. 7).

**Class “B” Documents**

- (i) If applicable, duly signed joint venture agreement (JVA) in accordance with RA No. 4566 and its IRR in case the joint venture is already in existence (UPOU BAC Form No. 8).  
**or**  
duly notarized statements from all the potential joint venture partners stating that they will enter into and abide by the provisions of the JVA in the instance that the bid is successful.

**II. FINANCIAL COMPONENT ENVELOPE**

- (j) Original of duly signed and accomplished Financial Bid Form (UPOU BAC Form No. 9); **and**

Other documentary requirements under RA No. 9184

- (k) Duly signed Detailed Construction Estimates Worksheet (DCEW); **and**  
(l) Duly signed Summary of Breakdown of Total Lump Sum Bid Prices; **and**  
(m) Cash Flow by Quarter and Payments Schedule.

Notes:

The prescribed documents in the checklist are mandatory to be submitted in the Bid.

**STATEMENT OF ALL ONGOING GOVERNMENT & PRIVATE CONTRACTS INCLUDING CONTRACTS AWARDED BUT NOT YET STARTED**

Business Name : \_\_\_\_\_

Business Address : \_\_\_\_\_

Name of Contract	Date of Contract	Duration of Contract	a. Owner's Name	Nature of Work	Contractor's Role		a. Total Contract Value at Award	% of Accomplishment		Value of Outstanding Works
			b. Address		Description	%	b. Total Contract Value at Completion	Planned	Actual	
			c. Telephone Nos.				c. Date of Completion			
<u>Government</u>										
<u>Private</u>										
<b>Total Cost</b>										

Note: This statement shall be supported with:

1. Project Owner's Certificate of Final Acceptance issued by the Owner other than the Contractor or the Constructors Performance Evaluation System (CPES) Final Rating, which must be at least satisfactory.
2. Notice of Award and/or Notice to Proceed

Submitted by : \_\_\_\_\_  
(Printed Name & Signature)

Designation : \_\_\_\_\_

Date : \_\_\_\_\_

**STATEMENT OF BIDDER’S SINGLE LARGEST COMPLETED CONTRACT (SLCC) SIMILAR TO THE CONTRACT TO BE BID**

Business Name : \_\_\_\_\_

Business Address : \_\_\_\_\_

Name of Contract	Date of Contract	Duration of Contract	a. Owner's Name b. Address c. Telephone Nos.	Nature of Work	Contractor’s Role		a. Total Contract Value at Award b. Total Contract Value at Completion c. Date of Completion	% of Accomplishment		Value of Outstanding Works
					Description	%		Planned	Actual	
<u>Government</u>										
<u>Private</u>										
<b>Total Cost</b>										

- Note: This statement shall be supported with:
1. Project Owner’s Certificate of Final Acceptance issued by the Owner other than the Contractor or the Constructors Performance Evaluation System (CPES) Final Rating, which must be at least satisfactory.
  2. Notice of Award and/or Notice to Proceed

Submitted by : \_\_\_\_\_  
(Printed Name & Signature)

Designation : \_\_\_\_\_

Date : \_\_\_\_\_

## Bid Securing Declaration Form

REPUBLIC OF THE PHILIPPINES)  
CITY OF \_\_\_\_\_) S.S.

### **BID SECURING DECLARATION** **Project Identification: IB No. 24-03-001**

To: *[Insert name and address of the Procuring Entity]*

I/We, 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 procurement 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 RA No. 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; and
  - c. I am/we are declared the bidder with the Lowest Calculated Responsive Bid, and I/we have furnished the performance security and signed the Contract.

IN WITNESS WHEREOF, I/We have hereunto set my/our hand/s this \_\_\_\_ day of *[month]* *[year]* at *[place of execution]*.

*[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]*

*[Insert signatory's legal capacity]*

Affiant

*[Jurat]*

*[Format shall be based on the latest Rules on Notarial Practice]*

## Omnibus Sworn Statement (Revised)

REPUBLIC OF THE PHILIPPINES )  
CITY/MUNICIPALITY OF \_\_\_\_\_ ) S.S.

### AFFIDAVIT

I, [Name of Affiant], of legal age, [Civil Status], [Nationality], and residing at [Address of Affiant], after having been duly sworn in accordance with law, do hereby depose and state that:

1. *[Select one, delete the other:]*

*[If a sole proprietorship:]* I am the sole proprietor or authorized representative of [Name of Bidder] with office address at [address of Bidder];

*[If a partnership, corporation, cooperative, or joint venture:]* I am the duly authorized and designated representative of [Name of Bidder] with office address at [address of Bidder];

2. *[Select one, delete the other:]*

*[If a sole proprietorship:]* As the owner and sole proprietor, or authorized representative of [Name of Bidder], I have full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached duly notarized Special Power of Attorney;

*[If a partnership, corporation, cooperative, or joint venture:]* I am granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached [state title of attached document showing proof of authorization (e.g., duly notarized Secretary's Certificate, Board/Partnership Resolution, or Special Power of Attorney, whichever is applicable)];

3. [Name of Bidder] is not "blacklisted" or barred from bidding by the Government of the Philippines or any of its agencies, offices, corporations, or Local Government Units, foreign government/foreign or international financing institution whose blacklisting rules have been recognized by the Government Procurement Policy Board, by itself or by relation, membership, association, affiliation, or controlling interest with another blacklisted person or entity as defined and provided for in the Uniform Guidelines on Blacklisting;
4. Each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;
5. [Name of Bidder] is authorizing the Head of the Procuring Entity or its duly authorized representative(s) to verify all the documents submitted;

6. *[Select one, delete the rest:]*

*[If a sole proprietorship:]* The owner or sole proprietor is not related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree; *[If a partnership or cooperative:]* None of the officers and members of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

*[If a corporation or joint venture:]* None of the officers, directors, and controlling stockholders of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

7. *[Name of Bidder]* complies with existing labor laws and standards; and

8. *[Name of Bidder]* is aware of and has undertaken the responsibilities as a Bidder in compliance with the Philippine Bidding Documents, which includes:

- a. Carefully examining all of the Bidding Documents;
- b. Acknowledging all conditions, local or otherwise, affecting the implementation of the Contract;
- c. Making an estimate of the facilities available and needed for the contract to be bid, if any; and
- d. Inquiring or securing Supplemental/Bid Bulletin(s) issued for the *[Name of the Project]*.

9. *[Name of Bidder]* did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.

10. In case advance payment was made or given, failure to perform or deliver any of the obligations and undertakings in the contract shall be sufficient grounds to constitute criminal liability for Swindling (Estafa) or the commission of fraud with unfaithfulness or abuse of confidence through misappropriating or converting any payment received by a person or entity under an obligation involving the duty to deliver certain goods or services, to the prejudice of the public and the government of the Philippines pursuant to Article 315 of Act No. 3815 s. 1930, as amended, or the Revised Penal Code.

**IN WITNESS WHEREOF**, I have hereunto set my hand this \_\_\_ day of \_\_\_, 20\_\_ at \_\_\_\_\_, Philippines.

*[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]*

*[Insert signatory's legal capacity]*

Affiant

***[Jurat]***

*[Format shall be based on the latest Rules on Notarial Practice]*

SECRETARY'S CERTIFICATE

I, \_\_\_\_\_, a duly elected and qualified Corporate Secretary of \_\_\_\_\_, a corporation duly organized and existing under and by virtue of the law of the \_\_\_\_\_, DO HEREBY CERTIFY, that:

I am familiar with the facts herein certified and duly authorized to certify the same;

At the regular meeting of the Board of Directors of the said Corporation duly convened and held on \_\_\_\_\_ at which meeting a quorum was present and acting throughout, the following resolutions were approved, and the same have not been annulled, revoked and amended in any way whatever and are in full force and effect on the date hereof:

RESOLVED, that \_\_\_\_\_ be, as it hereby is, authorized to participate in the bidding for "Supply, Delivery and Installation of a Brand New 1-Unit 250kVA, 3Phase, 400V Generator Set - Silent Type with Accessories (including Housing) for the ICC", Project Identification IB No. 24-03-001 by the UP Open University and that if awarded the project shall enter into a contract with the UP Open University; and in connection therewith hereby appoint \_\_\_\_\_, acting as duly authorized and designated representatives of \_\_\_\_\_, are granted full power and authority to do, execute and perform any and all acts necessary and/or to represent \_\_\_\_\_ in the bidding as fully and effectively as the \_\_\_\_\_ might do if personally present with full power of substitution and revocation and hereby satisfying and confirming all that my said representative shall lawfully do or cause to be done by virtue hereof;

RESOLVED FURTHER THAT, the \_\_\_\_\_ hereby authorizes its President to:

- (1) execute a waiver of jurisdiction whereby the \_\_\_\_\_ hereby submits itself to the jurisdiction of the Philippine government and hereby waives its right to question the jurisdiction of the Philippine courts;
(2) execute a waiver that the \_\_\_\_\_ shall not seek and obtain writ of injunctions or prohibition or restraining order against the AFP or any other agency in connection with this project to prevent and restrain the bidding procedures related thereto, the negotiating of and award of a contract to a successful bidder, and the carrying out of the awarded contract.

WITNESS the signature of the undersigned as such officer of the said \_\_\_\_\_ this \_\_\_\_\_.

\_\_\_\_\_  
(Corporate Secretary)

ACKNOWLEDGMENT

SUBSCRIBED AND SWORN to before me this \_\_\_\_ day of \_\_\_\_\_, 20\_\_ affiant exhibited to me his/her Government Issued ID No. \_\_\_\_\_ issued on \_\_\_\_\_ at \_\_\_\_\_, Philippines.

Notary Public
Until 31 December 20\_\_
PTR No. \_\_\_\_\_
Issued at: \_\_\_\_\_
Issued on: \_\_\_\_\_
TIN No. \_\_\_\_\_

Doc. No. \_\_\_\_\_
Page No. \_\_\_\_\_
Book No. \_\_\_\_\_
Series of \_\_\_\_\_.

**SPECIAL POWER OF ATTORNEY**

I, \_\_\_\_\_, President of \_\_\_\_\_, a corporation incorporated under the laws of \_\_\_\_\_ with its registered office at \_\_\_\_\_, by virtue of Board Resolution No. \_\_\_\_\_ dated \_\_\_\_\_, has made, constituted and appointed \_\_\_\_\_ true and lawful attorney, for it and its name, place and stead, to do, execute and perform any and all acts necessary and/or represent \_\_\_\_\_ in the bidding of \_\_\_\_\_ as fully and effectively as corporation might do if personally present with full power of substitution and revocation and hereby confirming all that said representative shall lawfully do or cause to be done by virtue hereof.

IN WITNESS WHEREOF, I have hereunto set my hand this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_ at \_\_\_\_\_.

\_\_\_\_\_  
Affiant

Signed in the Presence of:

\_\_\_\_\_

**ACKNOWLEDGMENT**

REPUBLIC OF THE PHILIPPINES)  
QUEZON CITY )SS.

BEFORE ME, a Notary Public for and in Quezon City, Philippines, this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, personally appeared:

<u>NAME</u>	<u>Government Issued ID NO.</u>	<u>ISSUED AT/ON</u>
_____	_____	_____
_____	_____	_____

known to me and known to be the same person who executed the foregoing instrument consisting of \_\_\_\_\_ ( ) pages, including the page whereon the acknowledgments is written and acknowledged before me that the same is his free and voluntary act and deed and that of the Corporation he represents.

WITNESS MY HAND AND NOTARIAL SEAL, at the place and on the date first above written.

Notary Public  
Until 31 December 20\_\_\_\_  
PTR No. \_\_\_\_\_  
Issued at: \_\_\_\_\_  
Issued on: \_\_\_\_\_  
TIN No. \_\_\_\_\_

Doc. No. \_\_\_\_\_  
Page No. \_\_\_\_\_  
Book No. \_\_\_\_\_  
Series of \_\_\_\_\_

**NET FINANCIAL CONTRACTING CAPACITY**

The computation of a prospective bidder’s Net Financial Contracting Capacity (NFCC) must be at least equal to the ABC to be bid (PhP12,120,865.07), calculated as follows:

ABC: PhP12,120,865.07	Year 20__
Current Assets	
Minus: Current Liabilities	
Sub Total	
Multiplied by value of K	
Sub Total	
Minus: Value of outstanding services under ongoing contracts including awarded contracts yet to be started coinciding with the contract to be bid	
NFCC	

NFCC = [(current asset minus current liabilities) (15)] minus value of all outstanding or uncompleted portions of the projects under ongoing contracts including awarded contracts yet to be started coinciding with the contract to be bid.

NFCC = PhP \_\_\_\_\_

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

Submitted by:

\_\_\_\_\_  
Name of Supplier / Distributor / Manufacturer

\_\_\_\_\_  
Signature of Authorized Representative

Date : \_\_\_\_\_

**NOTE:**

1. If Partnership or Joint Venture, each Partner or Member Firm of Joint Venture shall submit the above requirements.

**JOINT VENTURE AGREEMENT**

KNOW ALL MEN BY THESE PRESENTS:

That this JOINT VENTURE AGREEMENT is entered into by and between \_\_\_\_\_, of legal age, \_\_\_\_\_ owner/proprietor of \_\_\_\_\_ (civil status) and a resident of \_\_\_\_\_.

- and -

\_\_\_\_\_, of legal age, \_\_\_\_\_, owner/proprietor of \_\_\_\_\_ (civil status) \_\_\_\_\_ a resident of \_\_\_\_\_.

THAT both parties agree to join together their manpower, equipment, and what is need to facilitate the Joint Venture to participate in the Eligibility, Bidding and Undertaking of the here-under stated project to be conducted by the UP Open University.

NAME OF PROJECT

CONTRACT AMOUNT

That both parties agree to be jointly and severally liable for the entire assignment.

That both parties agree that \_\_\_\_\_ and/or \_\_\_\_\_ shall be the Official Representative of the Joint Venture, and is 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 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 Project until terminated by both parties.

Done this \_\_\_\_\_ day of \_\_\_\_\_, in the year of our Lord \_\_\_\_\_.

**ACKNOWLEDGMENT**

SUBSCRIBED AND SWORN to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_ affiant exhibited to me his/her Government Issued ID No. \_\_\_\_\_ issued on \_\_\_\_\_ at \_\_\_\_\_, Philippines.

Notary Public  
 Until 31 December 20\_\_\_\_  
 PTR No. \_\_\_\_\_  
 Issued at: \_\_\_\_\_  
 Issued on: \_\_\_\_\_  
 TIN No. \_\_\_\_\_

Doc. No. \_\_\_\_\_  
 Page No. \_\_\_\_\_  
 Book No. \_\_\_\_\_  
 Series of \_\_\_\_\_.

## BID FORM

Date : \_\_\_\_\_

Project Identification No. : \_\_\_\_\_

To: *[name and address of Procuring Entity]*

Having examined the Philippine Bidding Documents (PBDs) including the Supplemental or Bid Bulletin Numbers *[insert numbers]*, the receipt of which is hereby duly acknowledged, we, the undersigned, declare that:

- a. We have no reservation to the PBDs, including the Supplemental or Bid Bulletins, for the Procurement Project: *[insert name of contract]*;
- b. We offer to execute the Works for this Contract in accordance with the PBDs;
- c. The total price of our Bid in words and figures, excluding any discounts offered below is: *[insert information]*;
- d. The discounts offered and the methodology for their application are: *[insert information]*;
- e. The total bid price includes the cost of all taxes, such as, but not limited to: *[specify the applicable taxes, e.g. (i) value added tax (VAT), (ii) income tax, (iii) local taxes, and (iv) other fiscal levies and duties]*, which are itemized herein and reflected in the detailed estimates,
- f. Our Bid shall be valid within a period stated in the PBDs, and it shall remain binding upon us at any time before the expiration of that period;
- g. 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, or a Performance Securing Declaration in lieu of the the allowable forms of Performance Security, subject to the terms and conditions of issued GPPB guidelines<sup>12</sup> for this purpose;
- h. 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;
- i. 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
- j. We understand that you are not bound to accept the Lowest Calculated Bid or any other Bid that you may receive.
- k. 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 *[Name of Project]* of the *[Name of the Procuring Entity]*.

1. We acknowledge that failure to sign each and every page of this Bid Form, including the Bill of Quantities, shall be a ground for the rejection of our bid.

Name: \_\_\_\_\_

Legal Capacity: \_\_\_\_\_

Signature: \_\_\_\_\_

Duly authorized to sign the Bid for and behalf of: \_\_\_\_\_

Date: \_\_\_\_\_

**CONSTRUCTOR’S ORGANIZATIONAL CHART FOR THE CONTRACT**

Submit Copy of the Organizational Chart that the Constructor intends to use to execute the Contract if awarded to it. Indicate in the chart the names of the **All Key Personnel for the Project**.

**Attach the required Proposed Organizational Chart for the Contract as stated above**

*Note: This organization chart should represent the “Constructor’s Organization” required for the Project, and not the organizational chart of the entire firm.*

**CONTRACTOR’S LETTER-CERTIFICATE TO PROCURING ENTITY**

*[Date of Issuance]*

**Dr. PRIMO G. GARCIA**

Chair, Bids and Awards Committee (BAC)

UP Open University

UPOU Headquarters, Los Baños, Laguna

Dear Sir:

Supplementing our Organizational Chart for the Contract, we have the honor to submit herewith, and to certify as true and correct, the following pertinent information:

1. That I/we have engaged the services of       (Name of Employee/Key Personnel)      , to be the       (Designation)       of the       (Name of Contract)      , who is a       (Profession)       with Professional License Certificate No.        issued on        and who has performed the duties in the construction of the Contracts enumerated in the duly filled Form       .
2. The said Engineer/Employee/Key Personnel shall be designated by us as our       (Designation)       to personally perform the duties of the said position in the above-mentioned Project, if and when the same is awarded in our favor.
3. That said Engineer/Employee/Key Personnel shall employ the best care, skill and ability in performing his duties in accordance with the Contract Agreement, Conditions of Contract, Plans, Specifications, Special Provisions, and other provisions embodied in the proposed contract.
4. That said Engineer/Employee/Key Personnel shall be personally present at the jobsite to supervise the phase of the construction work pertaining to this assignment as       (Designation)      , all the time.
5. That, in order to guarantee that said Engineer/Employee/Key Personnel shall perform his duties properly and be personally present in the Job Site, he is hereby required to secure a certificate of appearance for the Procuring Entity Engineer/Authorized Representative at the end of every month.

That, in the event that I/we elect or choose to replace said       (Designation)       with another Engineer/Employee/Key Personnel, the Procuring Entity will be accordingly notified by us in writing at least twenty one (21) days before making the replacement. We will submit to the Procuring Entity, for prior approval, the name of the proposed new       (Designation)      , his qualifications, experience, and list of projects undertaken and other relevant information.

6. That any willful violation on my/our part of the herein conditions may prejudice my/our standing as a reliable contractor in future bidding of the Procuring Entity.

Very truly yours,

\_\_\_\_\_  
*(Name and Signature of Authorized Representative of Bidder)*

CONCURRED IN:

\_\_\_\_\_  
*(Name and Signature of Employee/Key Personnel)*

\_\_\_\_\_  
*(Address)*

**QUALIFICATION OF KEY PERSONNEL PROPOSED TO BE ASSIGNED TO THE CONTRACT**

Bidder's Name: \_\_\_\_\_

Bidder's Address: \_\_\_\_\_

	Resident Engineer	Project Civil Engineer	Project Registered Electrical Engineer	Project Registered Mechanical Engineer	Safety Officer/Engineer	Electrician	Genset Technician			
Name										
Address										
Date of Birth										
Employed Since										
Experience										
(a) Total Experience (Years)	Required									
	Actual									
(b) Experience in Similar Project (Years)	Required									
	Actual									
Previous Employment										
Education										
PRC Registration & License/ Accreditation/ Certification (as required)										

Note: This form is applicable to all required List of Key Personnel for the Contract to Bid

Submitted by: \_\_\_\_\_

*(Printed Name & Signature)*

Designation: \_\_\_\_\_

Date: \_\_\_\_\_

## BIO-DATA OF KEY PERSONNEL

Give the detailed information of the following personnel who are scheduled to be assigned as full-time field staff for the project. **Fill out a form for each person.**

- Authorized Managing Officer / Representative

- Sustained Technical Employee

1. Name: \_\_\_\_\_

2. Date of Birth: \_\_\_\_\_

3. Nationality: \_\_\_\_\_

4. Education and Degrees: \_\_\_\_\_

5. Specialty: \_\_\_\_\_

6. Registration: \_\_\_\_\_

7. Length of Service with the Firm: \_\_\_\_\_ Year from \_\_\_\_\_ (months) \_\_\_\_\_ (year)  
to \_\_\_\_\_ (months) \_\_\_\_\_ (year)

8. Years of Experience: \_\_\_\_\_

9. If Item 7 is less than ten (10) years, give name and length of service with previous employers for a ten (10)-year period (attached additional sheet/s), if necessary:

Name and Address of Employer	Length of Service
_____	_____ year(s) from _____ to _____
_____	_____ year(s) from _____ to _____
_____	_____ year(s) from _____ to _____

10. Experience:

This should cover the past ten (10) years of experience. (Attached as many pages as necessary to show involvement of personnel in projects using the format below).

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/Key Personnel

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)

\_\_\_\_\_  
(Bidder's Authorized Representative)



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 (Name of the Procuring Entity) bidding or employment with any Contractor doing business with the (Name of the Procuring Entity) .

\_\_\_\_\_  
(Signature)

**DRY SEAL**

**Republic of the Philippines)**  
\_\_\_\_\_ ) S.S.

SUBSCRIBED AND SWORN TO before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_ affiant exhibiting to me his Government Issued ID No. \_\_\_\_\_ issued on \_\_\_\_\_ at \_\_\_\_\_.

Notary Public  
Until December 31, 20\_\_

Doc. No. \_\_\_\_\_;  
Page No. \_\_\_\_\_;  
Book No. \_\_\_\_\_;  
Series of \_\_\_\_\_;

**List of contractor’s major equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership or certification of availability of equipment from the equipment lessor/vendor for the duration of the project, as the case may be:**

<b>A. Equipment</b>	<b>Minimum Quantity</b>	<b>Available Quantity</b>
1. Concrete Bagger Mixer	1 unit	
2. Welding Machine (min. 400amp)	2 units	
<b>Others</b>		
1. PPE (Personal Protective Equipment) -includes hard hat, safety vest, safety shoes, safety harness, safety gloves	10pcs per item except safety harness (5pcs only)	

Note: This statement shall be supported with Proof of ownership such as Certified copy of the Official Receipt of each item listed or an Affidavit of ownership.

Certified Correct:

\_\_\_\_\_  
Signature Over Printed Name of the Authorized Representative

**LIST OF CONTRACTORS EQUIPMENT, OWNED OR LEASED AND/OR UNDER PURCHASE AGREEMENTS**

Bidder's Name: \_\_\_\_\_

Bidder's Address: \_\_\_\_\_

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.							

List of minimum equipment required for the Project:

Submitted by : \_\_\_\_\_

*(Printed Name & Signature)*

Designation : \_\_\_\_\_

Date : \_\_\_\_\_

**CASH FLOW BY QUARTER AND PAYMENT SCHEDULE**

PARTICULAR	% WT.	1 <sup>ST</sup> QUARTER	2 <sup>ND</sup> QUARTER	3 <sup>RD</sup> QUARTER	4 <sup>TH</sup> QUARTER
ACCOMPLISHMENT					
CASH FLOW					
CUMULATIVE ACCOMPLISHMENT					
CUMULATIVE CASH FLOW					

SUBMITTED BY:

\_\_\_\_\_

Name of Bidder

\_\_\_\_\_

(Printed Name and Signature of Authorized Managing Officer)

\_\_\_\_\_

Date

\_\_\_\_\_

Date

### **CERTIFICATE OF SITE INSPECTION**

This is to certify that this Company, through its authorized representative, \_\_\_\_\_, has conducted the inspection of the site for the project “\_\_\_\_\_” located at UP Open University Headquarters, Los Baños, Laguna, on this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_, in connection with our desire to participate in the bidding for the above project.

\_\_\_\_\_

(Printed Name & Signature of Bidder)

*Sealing and Marking of Bids:*

**Submission of hard copies to the BAC Secretariat Address:**

**One Original Copy of the Technical Components and Financial Components**

**PROCEDURE:**

1. The Technical Components (TC) of the Bid should be enclosed in envelope and must be labelled, sealed and signed as follows:

SUPPLY, DELIVERY AND INSTALLATION OF A BRAND NEW 1-UNIT 250KVA, 3PHASE, 400V GENERATOR SET - SILENT TYPE WITH ACCESSORIES (INCLUDING HOUSING) FOR THE ICC – TECHNICAL COMPONENT

[NAME AND ADDRESS OF THE BIDDERS]  
BIDS AND AWARDS COMMITTEE SECRETARIAT  
UP OPEN UNIVERSITY  
UPOU HEADQUARTERS, LOS BAÑOS, LAGUNA  
REFERENCE NO. IB No. 24-03-001  
“DO NOT OPEN BEFORE 27 March 2024, 9:30 AM”

2. The Financial Components (FC) of the Bid should be enclosed in another envelope and must be sealed and signed;

SUPPLY, DELIVERY AND INSTALLATION OF A BRAND NEW 1-UNIT 250KVA, 3PHASE, 400V GENERATOR SET - SILENT TYPE WITH ACCESSORIES (INCLUDING HOUSING) FOR THE ICC – FINANCIAL COMPONENT

[NAME AND ADDRESS OF THE BIDDERS]  
BIDS AND AWARDS COMMITTEE SECRETARIAT  
UP OPEN UNIVERSITY  
UPOU HEADQUARTERS, LOS BAÑOS, LAGUNA  
REFERENCE NO. IB No. 24-03-001  
“DO NOT OPEN BEFORE 27 March 2024, 9:30 AM”

3. The TC and FC envelopes should be enclosed in one mother envelope and must be labelled, sealed and signed as follows:

SUPPLY, DELIVERY AND INSTALLATION OF A BRAND NEW 1-UNIT 250KVA, 3PHASE, 400V GENERATOR SET - SILENT TYPE WITH ACCESSORIES (INCLUDING HOUSING) FOR THE ICC

[NAME AND ADDRESS OF THE BIDDERS]  
BIDS AND AWARDS COMMITTEE SECRETARIAT  
UP OPEN UNIVERSITY  
UPOU HEADQUARTERS, LOS BAÑOS, LAGUNA  
REFERENCE NO. IB No. 24-03-001  
“DO NOT OPEN BEFORE 27 March 2024, 9:30 AM”

