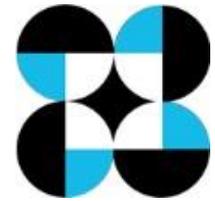


Republic of the Philippines
Department of Science and Technology
Philippine Science High School System



PHILIPPINE SCIENCE HIGH SCHOOL – BICOL REGION CAMPUS

Procurement for the CONSTRUCTION of MATERIALS RECOVERY FACILITY



Preface

These Philippine Bidding Documents (PBDs) for the procurement of Infrastructure Projects (hereinafter referred to also as the “Works”) through Competitive Bidding have been prepared by the Government of the Philippines for use by all branches, agencies, departments, bureaus, offices, or instrumentalities of the government, including government-owned and/or -controlled corporations, government financial institutions, state universities and colleges, local government units, and autonomous regional government. The procedures and practices presented in this document have been developed through broad experience, and are for mandatory use in projects that are financed in whole or in part by the Government of the Philippines or any foreign government/foreign or international financing institution in accordance with the provisions of the 2016 revised Implementing Rules and Regulations (IRR) of Republic Act (RA) No. 9184.

The PBDs are intended as a model for admeasurements (unit prices or unit rates in a bill of quantities) types of contract, which are the most common in Works contracting.

The Bidding Documents shall clearly and adequately define, among others: (i) the objectives, scope, and expected outputs and/or results of the proposed contract; (ii) the eligibility requirements of Bidders; (iii) the expected contract duration; and (iv) the obligations, duties, and/or functions of the winning Bidder.

Care should be taken to check the relevance of the provisions of the PBDs against the requirements of the specific Works to be procured. If duplication of a subject is inevitable in other sections of the document prepared by the Procuring Entity, care must be exercised to avoid contradictions between clauses dealing with the same matter.

Moreover, each section is prepared with notes intended only as information for the Procuring Entity or the person drafting the Bidding Documents. They shall not be included in the final documents. The following general directions should be observed when using the documents:

- a. All the documents listed in the Table of Contents are normally required for the procurement of Infrastructure Projects. However, they should be adapted as necessary to the circumstances of the particular Project.
- b. Specific details, such as the “*name of the Procuring Entity*” and “*address for bid submission*,” should be furnished in the Instructions to Bidders, Bid Data Sheet, and Special Conditions of Contract. The final documents should contain neither blank spaces nor options.
- c. This Preface and the footnotes or notes in italics included in the Invitation to Bid, BDS, General Conditions of Contract, Special Conditions of Contract, Specifications, Drawings, and Bill of Quantities are not part of the text of the final document, although they contain instructions that the Procuring Entity should strictly follow.
- d. The cover should be modified as required to identify the Bidding Documents as to the names of the Project, Contract, and Procuring Entity, in addition to date of issue.

- e. Modifications for specific Procurement Project details should be provided in the Special Conditions of Contract as amendments to the Conditions of Contract. For easy completion, whenever reference has to be made to specific clauses in the Bid Data Sheet or Special Conditions of Contract, these terms shall be printed in bold typeface on Sections I (Instructions to Bidders) and III (General Conditions of Contract), respectively.
- f. For guidelines on the use of Bidding Forms and the procurement of Foreign-Assisted Projects, these will be covered by a separate issuance of the Government Procurement Policy Board.

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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



Invitation to Bid for *the Construction of Materials Recovery Facility*

1. The *Philippine Science High School-Bicol Region Campus*, through the *General Appropriations Fund 2021* intends to apply the sum of **One Million Eight Hundred Three Thousand Four Hundred Ten Pesos (Php 1,803,410.00)** being the Approved Budget for the Contract (ABC) to payments under the contract for **Construction of Materials Recovery Facility**. Bids received in excess of the ABC shall be automatically rejected at bid opening.
2. The *Philippine Science High School-Bicol Region Campus* now invites bids for the above Procurement Project. Completion of the Works is required *within ninety (90) calendar days*. Bidders may 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).
3. 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.
4. Interested bidders may obtain further information from *Philippine Science High School-Bicol Region Campus* and inspect the Bidding Documents at the address given below from 7:30AM-4:30PM.
5. A complete set of Bidding Documents may be acquired by interested bidders on *October 1, 2021* from given address and website/s 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 Five thousand pesos (Php 5,000.00)*. The Procuring Entity shall allow the bidder to present its proof of payment for the fees *in person, or through electronic means*.
6. The *Philippine Science High School-Bicol Region Campus* will hold a Pre-Bid Conference¹ on *October 8, 2021, 10AM* at the Conference Hall, Administration Building, PSHS-BRC, Goa, Camarines Sur and/or through videoconferencing/webcasting *via Google Meet at meet.google.com/qzg-wfsf-aah*, which shall be open to prospective bidders.

¹ May be deleted in case the ABC is less than One Million Pesos (PhP1,000,000) where the Procuring Entity may not hold a pre-bid conference.

6. Bids must be duly received by the BAC Secretariat through (i) manual submission at the office address as indicated below, (ii) online or electronic submission as indicated below, or (iii) both} on or before *October 21, 2021, 10AM*. Late bids shall not be accepted.
7. All bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in **ITB** Clause 15.
8. Bid opening shall be on *October 21, 2021, 10 AM* at the given address below and/or through *Google Meet (link shall be sent to bidders who intended to join)*. Bids will be opened in the presence of the bidders' representatives who choose to attend the activity.
9. *Eligible bidders shall submit a certified true copy of Valid PCAB license for Size Range-Small B-License Category C and D and the Contractor's registration certificate from DPWH.*
10. The *Philippine Science High School-Bicol Region campus* 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.
11. For further information, please refer to:

JOY MELGA B. OLAZO
BAC Secretariat Chairperson
Philippine Science High School-Bicol Region
Tagongtong, Goa, Camarines Sur
Email ad: bac@brc.pshs.edu.ph
School Website: brc.pshs.edu.ph

12. You may visit the following websites:

For downloading of Bidding Documents: *PhilGEPS, brc.pshs.edu.ph*

For online bid submission: *bac@brc.pshs.edu.ph*

October 1, 2021

SEVEDEO J. MALATE
BAC Chairperson or Authorized Representative

Section II. Instructions to Bidders

1. Scope of Bid

The Procuring Entity, *Philippine Science High School-Bicol Region Campus* invites Bids for the Construction of Materials Recovery Facility, with Project Identification Number Infra-2021-03.

2. Funding Information

2.1. The GOP through the source of funding as indicated below for Calendar Year 2021 in the amount of One Million Eight Hundred Three Thousand four Hundred Ten Pesos (Php 1,803,410.00).

2.2. The source of funding is:

- a. NGA, the National Expenditure Program.

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 or 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:
[*Select one, delete other/s*]

- a. Subcontracting is allowed. The portions of Project and the maximum percentage allowed to be subcontracted are indicated in the **BDS**, which shall not exceed fifty percent (50%) of the contracted Works.
 - b. Subcontracting is not allowed.
- 7.1. [*If Procuring Entity has determined that subcontracting is allowed during the bidding, state:*] The Bidder must submit together with its Bid the documentary requirements of the subcontractor(s) complying with the eligibility criteria stated in **ITB** Clause 5 in accordance with Section 23.4 of the 2016 revised IRR of RA No. 9184 pursuant to Section 23.1 thereof.
 - 7.2. [*If subcontracting is allowed during the contract implementation stage, state:*] The Supplier may identify its subcontractor during the contract implementation stage. Subcontractors identified during the bidding may be changed during the

implementation of this Contract. Subcontractors must submit the documentary requirements under Section 23.1 of the 2016 revised IRR of RA No. 9184 and comply with the eligibility criteria specified in **ITB** Clause 5 to the implementing or end-user unit.

- 7.3. 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 *{[insert if applicable]}* 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 IX. 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 IX. 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:*
 - a. Philippine Pesos.

15. Bid Security

- 15.1. The Bidder shall submit a Bid Securing Declaration or any form of Bid Security in the amount indicated in the **BDS**, which shall be not less than the percentage of the ABC in accordance with the schedule in the **BDS**.
- 15.2. The Bid and bid security shall be valid until *One Hundred Twenty-One calendar days*. 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

Bid Data Sheet

| ITB Clause | | | | | | | | | | | | | | | | | | | |
|------------------------------|---|----------------------------|---------------------------|----------------------------|------------------------------|--|---------|----------------|--|---------|--------------------|--|---|-----------------|--|---|---------|--|---|
| 2.1 | The GOP through the source of funding as indicated below for Calendar Year 2021 in the amount of One Million Eight Hundred Three Thousand pesos Four Hundred Ten Pesos (Php 1,803,410.00). | | | | | | | | | | | | | | | | | | |
| 5.2 | For this purpose, contracts similar to the Project refer to contracts which have the same major categories of work, which shall be: <i>Construction of material Recovery Facility</i> | | | | | | | | | | | | | | | | | | |
| 7.1 | <i>Subcontracting is not allowed.</i> | | | | | | | | | | | | | | | | | | |
| 8 | <i>Pre-bid conference will be held on October 8, 2021 at 10:00 AM at the Conference Hall, Administration Bldg., PSHS-BRC Goa, Camarines Sur and /or through video conferencing/webcasting via Google Meet meet.google.com/qzg-wfsf-aah.</i> | | | | | | | | | | | | | | | | | | |
| 10.3 | <i>Eligible bidders shall submit a Certified True Copy of valid PCAB license for Size Range-Small B- License Category C and D and the contractor's registration certificate from DPWH.</i> | | | | | | | | | | | | | | | | | | |
| 10.4 | The key personnel must meet the required minimum years of experience set below: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Key Personnel</u></th> <th style="text-align: left;"><u>General Experience</u></th> <th style="text-align: left;"><u>Relevant Experience</u></th> </tr> </thead> <tbody> <tr> <td>a. Registered Civil Engineer</td> <td></td> <td>2 years</td> </tr> <tr> <td>b. Foreman</td> <td></td> <td>2 years</td> </tr> <tr> <td>c. Skilled Workers</td> <td></td> <td></td> </tr> </tbody> </table> | <u>Key Personnel</u> | <u>General Experience</u> | <u>Relevant Experience</u> | a. Registered Civil Engineer | | 2 years | b. Foreman | | 2 years | c. Skilled Workers | | | | | | | | |
| <u>Key Personnel</u> | <u>General Experience</u> | <u>Relevant Experience</u> | | | | | | | | | | | | | | | | | |
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| b. Foreman | | 2 years | | | | | | | | | | | | | | | | | |
| c. Skilled Workers | | | | | | | | | | | | | | | | | | | |
| 10.5 | The minimum major equipment requirements are the following: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Equipment</u></th> <th style="text-align: left;"><u>Capacity</u></th> <th style="text-align: left;"><u>Number of Units</u></th> </tr> </thead> <tbody> <tr> <td>Concrete Mixer</td> <td></td> <td>1</td> </tr> <tr> <td>Delivery Truck</td> <td></td> <td>1</td> </tr> <tr> <td>Concrete Vibrator</td> <td></td> <td>1</td> </tr> <tr> <td>Welding Machine</td> <td></td> <td>1</td> </tr> <tr> <td>Backhoe</td> <td></td> <td>1</td> </tr> </tbody> </table> | <u>Equipment</u> | <u>Capacity</u> | <u>Number of Units</u> | Concrete Mixer | | 1 | Delivery Truck | | 1 | Concrete Vibrator | | 1 | Welding Machine | | 1 | Backhoe | | 1 |
| <u>Equipment</u> | <u>Capacity</u> | <u>Number of Units</u> | | | | | | | | | | | | | | | | | |
| Concrete Mixer | | 1 | | | | | | | | | | | | | | | | | |
| Delivery Truck | | 1 | | | | | | | | | | | | | | | | | |
| Concrete Vibrator | | 1 | | | | | | | | | | | | | | | | | |
| Welding Machine | | 1 | | | | | | | | | | | | | | | | | |
| Backhoe | | 1 | | | | | | | | | | | | | | | | | |
| 15.1 | The bid security shall be in the form of a Bid Securing Declaration or any of the following forms and amounts: <ul style="list-style-type: none"> a. The amount of not less than Php 36,068.20, if bid security is in cash, cashier's/manager's check, bank draft/guarantee or irrevocable letter of credit; b. The amount of not less than Php 90,170.50 if bid security is in Surety Bond. | | | | | | | | | | | | | | | | | | |
| 15.2 | The bid and bid security shall be valid until One Hundred Twenty (120) calendar days | | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | | | |

| | |
|------|---|
| | Each bidder shall submit (1) original and (3) copies of the first and second components of its bid. |
| 17 | Deadline for submission of bids is October 21, 2021 @ 10:00AM. |
| 19.2 | Partial bids are not allowed. |
| 20 | <i>Bidder shall submit/present all required licenses and permits relevant to the project.</i> |
| 21 | Additional contract documents relevant to the Project that may be required by existing laws and/or the Procuring Entity, such as construction schedule and S-curve, manpower schedule, construction methods, equipment utilization schedule, construction safety and health program approved by the DOLE, and other acceptable tools of project scheduling. |

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

Special Conditions of Contract

| GCC Clause | | | | | | | | | | | | | |
|-------------------------------------|--|----------------------------|---------------------------|----------------------------|-------------------------------------|--|----------------|-------------------|--|----------------|---------------------------|--|--|
| 2 | <i>Intended completion of days is 90 calendar days.</i> | | | | | | | | | | | | |
| 3.1 | <i>The Procuring Entity shall give possession of all parts of the Site to the Contractor upon NTP.</i> | | | | | | | | | | | | |
| 4 | <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 30%;"><i>Key Personnel</i></th> <th style="text-align: left; width: 35%;"><i>General Experience</i></th> <th style="text-align: left; width: 35%;"><i>Relevant Experience</i></th> </tr> </thead> <tbody> <tr> <td><i>a. Registered Civil Engineer</i></td> <td></td> <td style="text-align: center;"><i>2 years</i></td> </tr> <tr> <td><i>b. Foreman</i></td> <td></td> <td style="text-align: center;"><i>2 years</i></td> </tr> <tr> <td><i>c. Skilled Workers</i></td> <td></td> <td></td> </tr> </tbody> </table> | <i>Key Personnel</i> | <i>General Experience</i> | <i>Relevant Experience</i> | <i>a. Registered Civil Engineer</i> | | <i>2 years</i> | <i>b. Foreman</i> | | <i>2 years</i> | <i>c. Skilled Workers</i> | | |
| <i>Key Personnel</i> | <i>General Experience</i> | <i>Relevant Experience</i> | | | | | | | | | | | |
| <i>a. Registered Civil Engineer</i> | | <i>2 years</i> | | | | | | | | | | | |
| <i>b. Foreman</i> | | <i>2 years</i> | | | | | | | | | | | |
| <i>c. Skilled Workers</i> | | | | | | | | | | | | | |
| 6 | <i>The site investigation reports: Site Inspection</i> | | | | | | | | | | | | |
| 7.2 | <i>Warranty against structural defects: Fifteen (15) years.</i> | | | | | | | | | | | | |
| 10 | <i>a. Dayworks are applicable at the rate shown in the Contractor's original Bid.</i> | | | | | | | | | | | | |
| 11.1 | <i>The Contractor shall submit the Program of Work to the Procuring Entity's Representative within <i>fourteen (14)</i> days of delivery of the Notice of Award.</i> | | | | | | | | | | | | |
| 11.2 | <i>The amount to be withheld for late submission of an updated Program of Work is _____</i> | | | | | | | | | | | | |
| 13 | <i>The amount of the advance payment is <i>15% of the total contract price and schedule of payment.</i></i> | | | | | | | | | | | | |
| 14 | <i>Materials and equipment delivered on the site but not completely put in place shall be included for payment.</i> | | | | | | | | | | | | |
| 15.1 | <i>The date by which operating and maintenance manuals are required is <i>before full payment of the contract.</i></i> | | | | | | | | | | | | |
| 15.2 | <i>The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals by the date required is <i>still to be determined.</i></i> | | | | | | | | | | | | |

Section VI. Specifications

I.INTENT AND APPLICATION OF THE PROVISIONS OF THIS SECTION

- A. The Scope of Work covered with in these Specifications is the construction of the **MATERIAL RECOVERY FACILITY** for Philippine Science High School.
- B. This section is prepared in a concise manner, the intention of which is to save time and effort in locating important contents within these Specifications.
- C. Execution of this Section shall be coordinated and harmonized to each corresponding elaborated section of these same specifications.
- D. **In case discrepancies exist between this Section and its corresponding elaborated sections, notify the Procuring Entity immediately for clarification; their decision shall be final.**
- E. The Contractor shall bear the responsibility of checking all the numbers and units as indicated in the Bill of Quantities. It is understood that the Contractor shall supply and install the required units in accordance with the Plans and the Specifications.
- F. In their bid proposal, the bidders may propose materials or equipment or makes other than those specified in the BOQ and/or Specifications, provided they are of equivalent specifications and functionalities.
- G. During project implementation, the winning bidder/contractor may propose substitution of material so equipment or makes other than those specified in the Contract documents shall be subject to the approval of the Procuring Entity for the following reasons only:
 - 1. That the materials or equipment proposed for substitution is equal or superior to the materials or equipment specified in construction efficiency and utility provided that any and all costs relative there of shall be shouldered by the Contractor.
 - 2. Or that the materials or equipment specified cannot be delivered to the job site on time to complete the work of the other Contractors due to conditions beyond the control of the Contractor.
 - 3. In case of a price difference, the Procuring Entity shall receive all benefits of the difference in cost involved in any substitution and the Contract shall be altered by Change Order to credit the Procuring Entity with any savings so obtained.

- H. *To receive consideration, request(s) for substitution shall be accompanied by documentary proof of equality or difference in price and delivery, if any, in the form of certified quotations and guaranteed date of delivery from suppliers of either the proposed substituted materials or equipment.*

II. GENERAL CONDITIONS OF PLANS AND SPECIFICATIONS

The execution of this Specification, Plans and other related Contract Documents shall be subjected to the rules and regulations as provided in the General Conditions of the Contract. **The Plans and specifications shall be interpreted by the Procuring Entity and or his/her representative.** The Contractor is enjoined to confer with the Procuring Entity on items for clarification before submitting his bid. No excuses shall be entertained for misinterpretation of the Plans and specifications after the award of contract. All work as deemed required by the Procuring Entity shall be carried out properly by the Contractor.

- A. The Contractor shall consult the Procuring Entity on portion of the work not mentioned in the Specification and not illustrated on the Plans. He shall not work without proper instruction or detailed plans approved by the Procuring Entity, otherwise he shall be responsible for the in acceptance of the work done without details. In such case, the Contractor shall make good the work at his own expense.
- B. No alteration or addition shall be allowed without the consent and proper documentation approved by the Procuring Entity, even such change is ordered by the Procuring Entity. The Contractor shall bring the case to the Procuring Entity. Request for approval of such changes, alteration, deviation of work shall not be done without the consent of the Procuring Entity. Changes may be presented to the Procuring Entity in the form of shop drawings.

TWO (2) SET of clean Plans and specification shall always be kept at the job site to be available to the Procuring Entity or their representative upon his request during the constructio

III. SCOPE OF WORK

- A. The Contractor shall conduct thorough inspection of the existing jobsite conditions.
- B. The scope of work shall include all additions necessary in order to implement the whole set of approved Plans, Working Drawings and Specifications.
- C. The Contractor shall secure and do all the leg work necessary for all pertinent permits needed for the Procuring Entity to occupy and use the building,
- D. The Contractor shall construct All Architectural, Structural, Electrical, Sanitary/Plumbing, Mechanical/Fire Protection works in accordance with the Plans and Specifications. All items shown on the Plans but not mentioned in the Specifications shall be included. Discrepancies shall be verified with the Procuring Entity.

- E. The Contractor shall submit details and shop drawings, templates, and schedules required for the coordination of the work of the various trades. Drawings should include information on all working dimensions, arrangement and sectional views, connections and materials.
- F. **Final Cleaning As Pre-requisite To Final Acceptance:** Final cleaning of the work by a reputable building maintenance company shall be employed by the General Contractor prior to the Procuring Entity's final inspection for certification of final acceptance. Final Cleaning shall be applied on each surface or unit of work and shall be of condition expected for a first class building cleaning and maintenance program.
- G. The Contractor shall be responsible for the safety and safe working practices of its respective employees, servants and agents.
- H. The Procuring Entity may at anytime without invalidating the Contract make changes by altering, adding to or deducting from the work as covered by the drawings, specifications, and general scope in written instructions. Provisions under General Conditions of the contract cover such circumstances.
- I. This section shall include mobilization and demobilization of Contractor's plant, equipment material and employee to the site; construction of the Contractor's office and facilities; compliance with the contract requirements. This section shall include the furnishing of labor, materials, transportation, tools, supplies plant, equipment and appurtenance to complete satisfactorily the construction of the proposed subproject.
- J. Mobilization/ Demobilization
The contractor upon receipt of the notice to proceed shall immediately mobilize and transport his plant, equipment, materials and employees to the site and demobilize or remove the same at the completion of the project.
- K. Temporary Field Office
During the performance of the contract, the Contractor shall construct and maintain a field office and facilities at the site of the work at which he or his authorized agent shall be holding office and all times, while the work is in progress. The location, dimensions and layout of such field office shall be subject to approval of the Procuring Entity.
- L. Temporary Light and Power
The Contractor shall provide and maintain temporary electrical service including installation of temporary power and lighting within the construction site. The electrical service shall be adequate in capacity to supply power to construction tools and equipment without over-loading the temporary equipment and wiring for power and lighting shall be in accordance with the applicable provisions of the local governing cods, At the completion of the construction work all temporary wiring, lighting, equipment and devices shall be removed.
- M. Temporary Toilet
The Construction shall provide and maintain is sanitary condition enclosed toilet for the use of all construction personnel located within the contract limits, complete with fixtures, water and sewer connections and all appurtenances. Installation shall be in accordance with all applicable codes and regulations of the local authorities having jurisdiction thereof. Upon

completion of the work, temporary toilet and their appurtenances shall be removed.

N. Temporary Water Connection

The Contractor shall provide and maintain temporary water supply services, complete with necessary connections and appurtenances. Installed water supply lines shall be used as a source of water for construction purposes subject to the approval of the Project Manager. The Contractor shall pay the cost of operation, maintenance and restoration of the water system. All temporary water service including equipment and piping shall be removed upon completion of work and all worn out and damaged parts of the permanent system shall be replaced and restored in first class condition equal to new.

O. Site Security

The Contractor shall provide sufficient security in the construction site to prevent illegal entry or work damaged during nights; holidays and other period when work is not executed; and during working hours. The Contractor shall take ample precautions against fire by keeping away flammable materials, and ensure that such materials are properly handled and stored.

P. Prior to start of any definable feature of the work, the Contractor must perform the necessary inspection to include as follows:

- (1) Review of Contract Documents to make sure that material, equipment and Products have been tested, submitted and approved.
- (2) Physical examination of materials and equipment to assure its conformity to the Specification, plans, shop drawing and other data.
- (3) As soon as the work has been started the Contractor shall conduct initial Inspection to check and review the workmanship in compliance with the contract Requirements for a particular item of work.
- (4) The Contractor shall perform these inspections on a regular basis to assure Continuing compliance with the contract requirements until completion of a Particular type of work.

Q. Progress Reports

The Contractor shall prepare and submit progress reports to the procuring entity's Supervising Civil Engineer every 30 days after the start of the project up to its completion, showing the work completed, work remaining to be done, status of construction equipment and materials at the site.

R. Construction Progress Photographs

The Contractor shall take photographs during the process of the work once a month, all taken where directed by the Project Manager of the procuring entity. At the completion of the project, photographs shall be sent to the Project Manager of the procuring entity. The photographs shall be neatly labeled, dated and identified in a little box in the lower right hand corner, showing the date of exposure, project name, location and direction of view.

S. Survey Data

The Contractor shall layout his work from established base lines and benchmark indicated in the drawing and shall be responsible for all measurement in connection therewith. The Contractor shall furnished, at his own expense, all stakes, templates, platforms, equipment, tools, materials and labor as may be required in laying out any part of the work, out of established base lines and bench mark. It shall be the responsibility of the Contractor to maintain and preserve all stakes and other marks until he is authorized to remove them. If the Contractor through his negligence prior to the authorized removal destroys such marks, they shall be replaced at the expense of the Contractor.

T. Cleaning-Up

The Contractor shall at all times keep the construction area including storage area used by him, free from accumulations of waste material or rubbish. Upon completion of construction, the Contractor shall leave the work and premises in clean, neat workmanlike conditions.

U. Documents to be Submitted

The Contractor shall submit the following documents prior to final payment and before issuance of final certificate of payment in accordance with the provisions of the contract.

- (1) The guarantee required by the Conditions of Contract and any other extended guarantees stated in the technical sections of the specifications.
- (2) A set of As-Built drawing shall be submitted showing accurate record of changes or deviations from the contract documents and the shop drawings indicating the work as actually installed. Records shall be arranged in order, in accordance with various sections of the specifications and properly indexed with certifications of endorsement thereof, that each of the revised print of drawings and specifications are complete and accurate. Prior to the application for final payment, and as a condition to its approval by the Project Manager of the procuring entity, the Contractor shall deliver the records, drawings and specifications arranged in proper order, indexed and endorsed herein specified.

3.0 CONCRETE

3.1 Scope of Work

The work includes construction of concrete structures complete in accordance with the standard specifications and conformity with the lines, grades, thickness and typical cross-section shown on the plan.

3.2 Reference Standards

The latest edition of the following standards shall be from apart of this specification:

| | |
|-----|-----------------------------|
| ACI | American Concrete Institute |
|-----|-----------------------------|

| | |
|--------|--|
| 211-01 | Standard Practice for Selecting Proportions for Normal and |
|--------|--|

Heavyweight Concrete

| | |
|------|--|
| 301 | Concrete, Structural for Building |
| 309R | Standard Practice for Consolidation of Concrete |
| 318 | Building Code Requirements for Reinforced Concrete |

AASHTO American Association of State Highway and Transport Officials M173 Concrete Joint Sealer, Hot-Poured Elastic Type Performed Expansion Joint Filler Concrete

| | |
|------|--|
| ASTM | American Society for Testing Materials |
| C33 | Concrete Aggregates |

C31 Standard Practice for Making, Curing Concrete Test Specimen in the Field

| | |
|-----|---|
| C39 | Comprehensive Strength of Cylindrical Concrete Specimen |
| C42 | Obtaining and Testing Drilled Cores and Sawed Beams of |

Concrete C94 Standard Specification for Ready-Mixed Concrete

| | |
|------|--|
| C143 | Standard Test Method for Slump of Portland Cement Concrete |
| C150 | Portland Cement, Specification for |
| C309 | Liquid Membrane-Forming Compounds for Curing Concrete |

DPWH Blue Book Vol. III (1995)

3.3 Material Requirement

3.3.1 General Concrete shall be composed of Portland cement; fine and coarse aggregates, water and admixture as specified all thoroughly mixed and brought to proper consistency, uniformity and temperature for final placement.

3.3.2 Cement

Concrete shall be Portland cement of a brand approved by the Project Manager and conforming to ASTM Specification C150, Type I of Type II. 8

3.3.3 Water

Water shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or steel. 3.3.4 Admixtures shall be subject to prior approval by the Project Manager. The admixtures shall be capable of maintaining essentially the same composition and performance throughout the work.

3.3.4 Admixtures

Admixtures shall be subject to prior approval by the Project Manager. The admixtures shall be capable of maintaining essentially the same composition and performance throughout the work.

3.3.5 Fine Aggregates

Fine aggregates shall consist of natural sand, manufactured sand, or a combination thereof. If the fine aggregate shall be a combination of separately processed sizes, or if batching shall result in a combination of natural and manufactured sand, the different components shall be batched separately. Fine aggregates shall consist of hard, tough, durable, uncoated particles. The specified percentages of fines in the sand may be obtained either by the processing of natural sand or by the production of suitably graded manufactured sand. The shape of particles shall be generally rounded or cubical and reasonably free from flat or elongated pieces. The use of beach sand shall be prohibited. The fine aggregate shall conform to the following specific requirements:

| <u>Std</u> | <u>Sieve Designation</u> <u>U.S Std., Square Mesh</u> | <u>Cumulative Percentage by</u> <u>Weight Passing</u> |
|------------|--|--|
| 9.5 mm | 3/8 | 100 |
| 4.75 mm | No.4 | 95-100 |
| 2.36 mm | No.8 | 80-100 |
| 1.18 mm | No.16 | 45-80 |
| 300 micron | No. 50 | 10-30 |
| 150 micron | No.100 | 2-10 |

In addition to the grading limits shown above, the fine aggregates, as delivered to the mixer, shall have a fineness modulus not less than 2.3 more than 3.0 and during normal operations, the grading of the fine aggregate shall be controlled so that the fineness modulus of at least nine (9) out of ten (10) test samples of fine aggregate as delivered to the mixer shall not vary by more than 0.20 from the average fineness modulus can be determined by dividing 100 the sum of the cumulative percentages retained on U.S. Standard Sieves Nos. 4, 8, 16, 50 and 100.

3.3.6 Coarse Aggregates

Coarse Aggregates Coarse aggregate shall consist of washed gravel, crushed stone or rock, or a combination thereof conforming to ASTM C33. The coarse aggregate, as delivered to the batching plant, shall have uniform and stable moisture content. The approval of deposits shall not be

construed as constituting the approval of all materials taken from the deposits, and the Contractor shall be held responsible for the specified quality of all such materials used in the work. Coarse aggregate shall consist of hard, tough, durable, clean and uncoated particles. All foreign materials and dust shall be removed by adequate shall be generally rounded or cubical, and the coarse aggregate shall be reasonably free from flat and elongated particles. A thin, flat and elongated particle can be as defined as a particle having a maximum dimension greater than five times the minimum dimension. The coarse aggregate shall be graded from fine too coarse. It shall be separated into size groups. The grading of the aggregate within the separated size groups as delivered to the mixer shall be as follows:

| Sieve Sizes <u>Std (MM)</u> | Percent by Weight | | Passing Individual 1-1/2 <u>Size</u> |
|--------------------------------|---------------------------|---------------|---|
| | <u>U.S Std., Sq. Mesh</u> | <u>¾ Size</u> | |
| 50 | 2" | | 100 |
| 37.5 | 1-1/2" | | 90-100 |
| 25 | 1" | 100 | 20-55 |
| 19 | ¾" | 90-100 | 0-15 |
| 9.5 | 3/8" | 20-55 | 0-5 |
| 4.75 | No. 4 | 0-10 | |

Use 19-mm (3/4") coarse aggregate for slab on grade, columns, beams, suspended slabs and tie beams.

Use 38 mm (1 ½") coarse for footings

3.3.7 Reinforcing Steel

Reinforcing steel shall be locally manufactured, deformed billet steel bars conforming to Philippine Standard, Grade 275, Intermediate grade (40, 000 psi).

3.3.8 Forms Concrete

form shall be wood, plywood, steel or other suitable materials. Form surfaces requiring standard or special finish shall be plywood or a non-absorptive hand pressed fiberboard or other suitable materials. Plywood shall not be less than 12 mm thick and shall be free from irregularities, dents and sags. Forms shall be coated with non-staining form coating compound such as form oil of the approved make.

3.3.9 Storage of Materials

(1) Cement

Cement in bags shall be stored in a suitable weatherproof structure as airtight as practicable. Floors shall be elevated above the ground, sufficient to prevent the absorption of moisture. Bags shall be stocked close together to reduce circulation of air but shall not be stocked against outside walls. The manner of storage shall permit easy access for inspection and identification of each shipment. Cement that has been stored for so long that there may be doubt of its quality shall be tested by standard mortar tests to determine its suitability for use, and shall not be used without approval of the Project Manager.

(2) Aggregates

Aggregate shall be stored in such a manner as to avoid the inclusion of foreign materials. Aggregates of different sizes shall be stored in separate plies. Stockpiles of coarse aggregate shall be built in horizontal layers not exceeding 1200 mm in depth to avoid segregation. Should the coarse aggregate become segregated, it shall be remixed to conform to the grading requirements here on before. Sufficient stockpiles shall be maintained at all times to permit continuous placement of concrete at the rate specified.

(3) Reinforcing Steel

Reinforcing steel shall be stored in a manner to avoid excessive rusting or being coated with grease, oil, dirt and other objectionable materials.

3.4 Construction Requirements

3.4.1 Concrete Proportion

The proportion of all materials in concrete shall be subject to the approval of the Project Manager. The Contractor shall employ at his own expense an approved testing laboratory, which shall design the mix proportions in accordance with ACI 211.01. Strength requirements shall be 20.7 Mpa (3000 psi) for footing, columns, beams, slabs and stairs lavatory counter, wash basin; 17.2 Mpa (2500 psi) for ramp, slab on grade, water meter box, grease trap; and 13.8 Mpa (2000 psi) for lean concrete or as required by the Project Manager. The adequacy of this test shall be verified by a test on a minimum of 6 cylinders; 3 tested at 7 days, 3 at 38 days, in accordance with ASTM C39. If, at any time during construction, the concrete resulting from the approved mix design proves to be unsatisfactory for any reason such as too much water, lack of sufficient plasticity to prevent segregation, honeycomb, etc., or insufficient strength, the Contractor shall notify the testing, laboratory and the Project Manager. The laboratory shall modify the design, subject to the approval of the Project Manager until satisfactory concrete is obtained.

3.4.2 Concrete Samples and Testing

Sampling and testing of concrete shall be done by and at the expense of the Contractor. Throughout the period that the concrete is being poured into cylinder shall be taken from fresh concrete from the forms. The tests shall be made for each 10 cu. m. of concrete or fraction thereof for each portion of structure as may required by the Project Manager as follows:

1. Compression Tests:

At least two (2) sets of samples consisting of three (3) concrete cylinder specimens per set shall be made. Fresh concrete shall be placed inside standard 150 x 300 mm cylindrical mould in three (3) separate equal layers and rodded separately with 25 strokes with a 16 mm diameter. Surface shall be leveled with trowel and samples are to be labeled to identify the class, strength of concrete, date taken and part of structure samples are taken. The samples shall be cured in accordance with ASTM

C31. One set of cylinders shall be tested at the age of seven (7) days, and one set at the age of twenty-eight (28) days, in accordance with ASTM C39. Additional cylinder samples may be molded in reserve for further tests, if the results of the twenty-eight (28)-day-test do not meet the requirements.

2. Slump Tests

Slump tests shall be performed to determine the consistency or workable fluidity of freshly mixed concrete in the field. At least two slump tests shall be made and the sample of concrete from which the test specimens are made shall be representative of the entire batch and shall conform to the procedures are specified in ASTM C143. Freshly mixed concrete shall be placed in the slump cone 100 x 200 mm x 300 mm in three (3) equal layers. Each layer shall be rodded with 25 strokes of the 16-mm diameters tamping rod with the tamping end rounded to a hemispherical tip of the same diameter.

The mold shall be leveled and lifted at once and then measure the slump action immediately by getting the difference in height between the height of the mould and the top of the slumped concrete. The slump tests shall be performed to determine the consistency or workable fluidity of freshly mixed concrete in the files. At least two slump tests shall be made and the sample of concrete from which test specimens are made shall be representative of the entire batch and shall conform to the procedures as specified in ASTM C143. The slump for vibrated concrete shall be 50 mm minimum and 100 mm maximum, provided that the required strength of concrete is obtained.

3. Test Reports

The testing laboratory shall submit four (4) copies of its cylinder which are to include as far as applicable, the following items: Location of pour in the structure, concrete design mix number, concrete design strength, type and manufacturer of cement, amount of any admixture used, slump tests, date of sampling, cylinder application number, days cured in the field, days cured in the laboratory, age and time of testing, crushing stress, type of failure, who made the samples, who shipped the samples to the laboratory and whether concrete strength meets the specifications.

4. Additional Tests

If, in the opinion of the Project Manager, based on the cylinder reports, concrete with strengths below specification requirements has been placed, the Project Manager, at the expense of the Contractor shall make additional tests. Additional tests may be compression test on cored cylinder, ASRM C42, and/or load tests as outlined in ACT 318 Sec. 202.

3.4.3 Mixing Concrete

Mixing shall be thoroughly mixed in a mixer of an approved size and type to insure a uniform distribution of the materials throughout the mass:

1. Site Mixed Concrete

All structural concrete shall be machine-mixed for at least 1 ½ minutes after all materials including water are in the mixing drum. The time elapse between the introduction of the mixing of water to the cement and aggregate and placing of the concrete in final position shall not exceed 45 minutes. Placing of the material in the mixer shall be done in such a way that the first batch of concrete materials in the

mixer shall contain sufficient excess cement, sand and water to coat the inside of the drum without reducing the cement content of the mix to be discharged. The retempering of concrete, placing additional cement, aggregate or water during mixing period shall not be permitted. No hand mixing shall be allowed, except in case of emergency of breakdown during pouring operations, subject to the approval of the Project Manager.

2. Ready-Mixed Concrete

Ready-mixed concrete, when shall be batched, mixed and delivered from a plant approved by the Project Manager, and shall be in strict compliance with the requirements set forth in ASTM C94. The rate of delivery of the mixed concrete shall be such that the interval between placing of successive batches shall not exceed thirty (30) minutes. The elapsed time between the introduction of mixing water to the cement and aggregate, and completion of discharge shall not exceed one (1) hour, or not more than 1 ½ hours if retarder is used. It should be kept constantly agitated during the transit period. Delivery tickets shall contain data on the weight of sand, gravel and amount of cement and water added. The Contractor shall keep legible copies available for examination of the Project Manager. Retempering of concrete shall not be permitted. The Contractor shall mix only quantities required for immediate use and mixture, which has developed setting, shall not be used. Concrete, which has partially hardened, shall not be retempered.

3.4.4 Concrete Placing

Concrete shall be placed only after all formworks, materials to be embedded, and preparation of surface involved in the placing have been inspected and approved by the Project Manager. The Contractor shall provide equipment and shall employ methods that will minimize separation of aggregates from the concrete mix. Water shall be removed from excavation before concrete is deposited. Flow of water shall be diverted through proper side drains to a pump, or removed by other approved methods

to avoid washing over freshly deposited concrete. Hardened concrete, debris and foreign materials shall be removed from the interior of forms and from inner surfaces of mixing and conveying equipment. Reinforcements shall be secured in position, inspected and approved before pouring concrete. Runways shall not be provided for wheeled concretehandling equipment's, such equipments shall not be wheeled over reinforcement nor shall runways be supported by reinforcements. Concrete shall be handled from the mixer to the place of final deposits as rapidly as practicable by methods, which shall prevent segregation or loss of the ingredients. It shall be deposited in the forms in approximately layers and as nearly as practicable in its final position to avoid re-handling. Conveying or handling of concrete by the use of inclined chutes or pipes of more than three (3) meters shall not be permitted. Dumping of concrete into buggies, buckets or wheelbarrows with a free fall of more than one (1) meter shall not be permitted. When placing operations would involve dropping of concrete more than 1 ½ meters, it shall be deposited through a sheet metal or other approved conveyor. AS for practicability, the conveyor shall be kept full of concrete during placing and their lower ends shall be kept buried in the newly placed concrete. After the initial set of concrete, the forms shall not be jarred and no strain shall be placed on the ends of the reinforcing bar, which are being projected. Concrete in columns shall be placed in one continuous operation. Concrete in girders, beams and slabs in superstructures shall be poured in a monolithic and continuous manner. No construction joint shall be allowed on any part of the structure without the approval of the Project Manager. Consolidate all concrete in

accordance with provisions of ACI 309R. Consolidate each layer of concrete greater than 4 inches in depth with high frequency, interval, mechanical equipment supplemented by hand spading and tamping. Consolidate concrete slab 4 inches or less in depth by wood tampers, spading and settling with a heave leveling straight edge. Operate vibrators with vibratory element submerged in the concrete, with a minimum frequency of not less than 6000 impulses per minute when submerged. Insert and withdraw vibrators approximately 18 inches apart. Penetrate the previously place lift with the vibrator when more than one lift is required. Place concrete in 180-inch maximum vertical lifts. Limit duration of vibration to time necessary to produce satisfactory consolidation without causing segregation of aggregates. Provide adequate number of units and power source at all times. Maintain spare units on hand to ensure adequacy. If in the opinion of the Project Manager the equipment being used is not adequate to accomplish proper consolidation, the Project Manager may order delay in further placement of concrete until such equipment is available for use at the location of placement of concrete.

3.3.4 Protection and Curing

1. General Concrete surfaces exposed to conditions causing premature drying shall be protected as soon as possible with canvas, straw, burlap and or other satisfactory material and kept moist; or if the surfaces are not covered they shall be kept moist by flushing or sprinkling, as directed by the Project Manager. All concrete shall be moist cured for a period of not less than seven (7) consecutive days after placing by an approved method or combination of methods applicable to local conditions.
2. Moist Cutting The surface of the concrete shall be kept continuously wet water for a period of seven (7) days, by spraying or covering with burlap or other approved material thoroughly saturated with water and keeping the covering wet by spraying or intermittent hosing. Water for curing shall be generally lean and free from any element, which might cause objectionable staining or discoloration of the concrete.

3.4.5 Repairs to the Concrete

All imperfections on concrete surfaces are corrected to produce concrete surfaces that conform to the requirements of this section. Unless otherwise approved by the Project Manager, patching with the cement mortar shall repair imperfections on formed surfaces. Cement mortar for patching shall be the same composition as used in the concrete, except for exposed surfaces; part of the cement shall be white cement to provide a finish color matching the surrounding concrete. Honeycomb or otherwise defective areas shall be cut out from solid concrete to a depth of not less than 25 mm. the edges of the cut shall be perpendicular to the surface of the concrete. The area to be patched, at least 15 mm adjacent thereto shall be saturated with water before placing the mortar. The mortar shall be mixed approximately one (1) hour before placing and shall be remixed occasionally during this period with trowel without adding water. A grout of cement and water, mixed to a consistency of paint, shall then be brushed onto the surface to which the mortar is to be bonded. The mortar shall be compacted into place and screened slightly higher than the surrounding surface. Patches on exposed surfaces shall utilize plywood forms, after the removal of forms, shall not be plastered, unless other wise directed by the Project Manager. All joint marks on the formwork shall be reworked to a smooth surface to match adjacent areas and to present a new appearance.

3.4.7 Forms

(1) General

Forms shall be used whenever necessary to confine the concrete and shape it to the required lines and dimensions, or to protect the concrete from contamination. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall be maintained rigidly in correct position. Forms shall be sufficiently tight to prevent loss of mortar from the concrete. Forms for exposed surface shall be lined with form grade plywood. Bolts and rods used for interval ties shall be so arranged that when the forms are removed, they shall not be less than two (2) centimeters from the formed surface. Removal of forms or shoring is subject to approval by the engineer, and under no circumstances shall bottom form and shoring be removed until after the members have acquired sufficient strength to support their weight and the load thereon. Forms shall remain in place for a minimum time as follows:

| | |
|--|---------------|
| Columns, sides of beams, shear and bearing walls | ----- 3 days |
| Beams | ----- 14 days |

Reshore immediately after stripping beams and girders that support subsequent formwork.

(3) Cleaning and Oiling Forms

Before placing concrete, the contact surface of the forms shall be cleaned of incrustations of mortar, grout or other foreign material. Forms shall be coated with standard form oil that can effectively prevent sticking and will not stain the concrete surfaces.

(4) Removal of Forms

Forms shall be removed in a manner, which shall prevent damage to concrete structures. Forms shall not be removed without prior approval of the Project Manager. Any repairs of the surface imperfections shall be performed at once and curing shall be started as soon as the surface is sufficiently hard to permit it without further damage. The minimum time period for removal of forms shall govern where it exceeds the minimum specified curing period. Where the formwork for one element supports the formwork for another element, the greater time period shall apply to both elements. Forms shall not be removed before the expiration of the minimum time specified below:

| <u>Element</u> | <u>Time Period</u> | |
|---|-------------------------|------------------------|
| Walls columns, sides of beams and girders, and slabs on grade | 1 | |
| Pan joist forms (side only): 76 cm (30 inches) wide or less over 76 cm (30 inches) wide | 3 | |
| Where design live: | less than the dead load | greater than dead load |
| Joist, beam or girder, soffits: (Clear span between structural support): | | |
| Under 3.00 m (10 ft.) | 7 | 4 |
| 3.00 m (10 ft) to 6.00 m (20 ft.) | 14 | 7 |
| Over 6.00 m (20 ft) | 21 | 14 |

One-way floor slabs: (Clear span between structural supports)

| | | |
|---------------------------------|----|---|
| Under 3.00 m (10 ft) | 4 | 4 |
| 3.00 m (10 ft) to 6.00m (20 ft) | 7 | 4 |
| Over 6.00m (20 ft) | 10 | 7 |

Sufficient shoring members to support dead loads including construction loads on beams and slabs shall be provided for a period of eight (8) days in addition to the seven (7) days specified thereto. The time for removal of forms for structures not included thereto shall be as directed by the Project Manager. Concrete work shall be protected from damage during construction.

3.4.8 Reinforcing Steel

(1) General

Steel reinforcement shall be provided together with all the necessary wire tie chairs, spacers, support and other necessary devices.

(2) Cutting and Bending

Reinforcing steel shall be accurately cut and bent in accordance with the approval detailed reinforcement drawings. Reinforcing steel shall not be straightened or re-bend in a manner that will injure the material. Bars with kink or with bends not shown on the approved detailed reinforcing drawings or with cracks or splits of the bends shall not be used. All the bars shall be bent cold. If Contractor elects to have reinforcing steel cut and bent off the site, he shall provide, maintain and operate a small cutting and bending shop on the site and maintain and representative stock of steel. This provision is to take care of minor revisions and additions in an expeditious manner. The Project Manager may require the contractor to prepare and submit bar cutting schedule prior to fabrication of reinforcing steel bars.

(3) Placing Reinforcement

Reinforcing steel shall be accurately placed in accordance with approved detailed reinforcement drawings and shall be adequately secured against displacement by using specified tie wires or approved clips at all intersections. After it has been installed, reinforcing steel shall be inspected by the Project Manager for compliance with requirements as to size, shape, length, splicing, position and number. Reinforcing steel shall be supported by concrete or metal supports, spacers or metal hangers, except for surfaces exposed to the ground or to the weather, where supports shall be concrete. Wooden support spreaders shall not be used. At surfaces where attractive appearance is requires, the supports shall be of the type, which shall not cause subsequent staining or marring of the exposed surface.

3.4.9 Joints in Concrete

(1) Construction Joints

Construction joints shall be provided where indicated in the drawing or as directed by the Project Manager. Joints not indicated on the drawings shall be constructed and located as not to impair the strength of structures. When a construction joint is to be made, the surface of the hardened concrete shall be thoroughly cleaned and all laitance removed. In addition, the joint shall be thoroughly wetted and sloshed with a coat of neat cement grout immediately prior to placing of new concrete.

(2) Expansion and Contraction Joints

Expansion and contraction joints shall be provided where indicated and shall be in accordance with details.

(3) Preformed Strips

Preformed strips shall be placed before the adjoining concrete is poured. The joint scalier shall be applied after concrete on both sides of the joint have poured and after the joint lines have been trued.

3.5 INSPECTION: Concrete shall be proportioned, mixed and placed only in the presence of the Engineer or his representative.

Structural works

A. Reinforcing bars for concrete exposed to weather shall be protected with at least 75mm clear distance and in no case less 40mm concrete. This condition may be waived when adequate waterproofing is provided.

B. Reinforcing bars shall be deformed conforming to ASTM A615 billet steel as follows:

i. 16mm \emptyset bars and larger shall be high grade with minimum $F_y = 414\text{MPa}$ (6000PSI).

ii. 12mm \emptyset bars and smaller shall be intermediate grade with minimum $F_y = 276\text{MPa}$ (4000PSI).

if bending and welding are important, deformed bar shall conform to ASTM A706 low alloy grade 414 steel bar.

C. All concrete works shall be done in accordance ACI-318-95 building code for reinforced concrete and all structural steel works shall be done in accordance with the AISC specifications as it does not conflict with the national structural code of the Philippines (NSCP – 1) requirements.

D. Slab on fill must not be placed unless fill has been properly compacted clean coarse sand bed except driveways where it shall be 150mm. Backfill of all excavated areas and the preparation of sub-base shall be well compacted at least 95% of the standard proctor density before well compacted clean coarse sand are laid.

E. The contractor shall coordinate with the AR, ME, SE, and EE plans as to the exact sizes and location of the holes thru floors slab and walls.

F. Concrete Mixes & Placing

○ Unless otherwise indicated in plans or noted in the structural specification, the minimum 28 days compressive cylinder strength shall be as follows:

1. Suspended slabs, beams, and girders – 21MPA (3000PSI)
2. Columns and pedestal – 21MPA (3000PSI)
3. Retaining walls – 21MPA (3000PSI)
4. Footing Tie beams – 21MPA (3000PSI)
5. Parapet walls and Gutter – 21MPA (3000PSI)
6. Other Structural Elements – 21MPA (3000PSI)
7. Slab on grade, Curtain walls – 17MPA (3000PSI)
8. Bedded slab, Sidewalks - 17MPA (3000PSI)
9. Non- Structural Elements - 17MPA (3000PSI)

○ Concrete shall be deposited in its final position without segregation, re handling or flowing. Placing shall be done properly with buggies, bucket, or wheel – borrows, no chutes shall exceed six (6) meter aggregate length.

○ No depositing of concrete shall be allowed without the use of vibrators unless authorized by the Architect/Engineer in charge of PSHS – MRC.

G. Concrete Slabs

○ All reinforcement shall be provided with 20mm clear concrete covert except for slab on grade where reinforcement should be placed at the center of the slab thickness.

○ Unless otherwise detailed in continuous slabs having same reinforcement running in one direction, reinforcing bars shall be bent up or extended.

○ For two-way slabs, bars along the shorter span shall be placed below the longer span bars at center and above of the longer span bars at the supports. The spacing of bars at the column strip shall be 1.5 times the spacing in the middle strip but in any case, greater than 2.5 the slab thickness or 450mm.

○ Temperature bars of suspended slab shall be placed above the main reinforcement at midspan and shall be below the main reinforcement at the support.

| TABLE 1. SCHEDULE OF TEMPERATURE BARS | |
|---------------------------------------|-------------------------|
| THICKNESS | MINIMUM TEMP. BARS |
| 100mm | 10mm ϕ @ 400mm O.C |
| 125mm | 10mm ϕ @ 300mm O.C |

- Unless otherwise noted, all bends shall be reinforced with 100mm ϕ at 0.25 MOC EW at center of slab. Slab construction joints shall not be more than 3.0m.
- Whenever required, drop slab shall be additionally reinforced. o Extra reinforcements shall be provided at corner slab.
- Unless noted in the plan, all openings shall be reinforced all around by 2-16mm ϕ bar at the top and bottom of the slab.

H. Concrete Beams and Girders

- Unless otherwise noted in the specification, camber all beams and girders at least 6mm for every 4.5mm of span except cantilevers for which cambers shall be noted in the plans or as ordered by the Architect/Engineers in charge of PSHS – MRC but in case less than 20mm for every 3m of span.
- Typical bar bending and cutting details for intermediate beams and girders are shown in approved drawings. Main reinforcing bars shall have a standard hook of 90-degree bend plus 12 times the diameter of the bar extension at its free end.
- If beam reinforcement end in a wall, the clear distance from the bar to the farthest face of the wall shall not be less than 50mm, minimum embedment length shall be shown in Table 2.
- If there are two or more layers of reinforcing bar, use separators of size equal to the bar diameter but not less than 25mm spaced at 900mm on centers. In no case shall be less than two separators between layers of bars.

| | |
|-------|-------------------------|
| 150mm | 10mm ϕ @ 200mm O.C |
|-------|-------------------------|

- When Beam crosses a girder, rest beam bars on top of the girder bars. Reinforcing bars shall be symmetrical about the centerline whenever possible. Upper bars shall be placed directly above those bars in the bottom layers.
- No splices shall be permitted on beams where critical bending occurs. Length of lap splice where permitted shall be shown in the approved drawings, not more than 50% of the bars at any one section shall be allowed to splice therein. A typical welded splice detail is shown in the approved drawing.

- For all beams, always fit the reinforcement in one layer whenever possible. Whenever beams are supporting a planted column, bottom bar at midspan of the beam shall continue up to the supports.
- For girders, hoops shall be used within the distance twice of the girder depth. Beyond it, stirrups with seismic hooks may be used within the spliced length, 10mm \emptyset hoops shall be provided at 0.10M O.C. o Individuals bars within a bundle shall terminate at different points with at least 40 times the bar diameter stagger.

Table 2. Development Length

| BAR Size ASTM A615 | BAR IN TENSION | | | | | | | | | | | | BAR IN COMPRESSION | | | | | |
|-----------------------------|------------------|------|-------------|------|-------------|------|-----------------|------|-------------|------|-------------|------|--------------------|------|------|------------------|------|------|
| | FOR Fy = 275 MPA | | | | | | FOR Fy = 414MPA | | | | | | FOR Fy = 275 MPA | | | FOR Fy = 275 MPA | | |
| | fc = 21 MPA | | fc = 28 MPA | | fc = 35 MPA | | fc = 21 MPA | | fc = 28 MPA | | fc = 35 MPA | | fc = | fc = | fc = | fc = | fc = | fc = |
| | CASE | CASE | CASE | CASE | CASE | CASE | CASE | CASE | CASE | CASE | CASE | CASE | 21 | 28 | 35 | 21 | 28 | 35 |
| | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | MPA | MPA | MPA | MPA | MPA | MPA |
| 10mm \emptyset | 300 | 450 | 250 | 375 | 250 | 350 | 450 | 650 | 400 | 575 | 350 | 500 | 200 | 200 | 200 | 250 | 200 | 200 |
| 12mm \emptyset | 350 | 550 | 300 | 450 | 300 | 400 | 550 | 800 | 475 | 700 | 425 | 625 | 200 | 200 | 200 | 300 | 250 | 250 |
| 16mm \emptyset | 475 | 750 | 425 | 600 | 375 | 550 | 750 | 1050 | 650 | 925 | 575 | 825 | 250 | 250 | 250 | 350 | 350 | 300 |
| 20mm \emptyset | 600 | 900 | 525 | 750 | 475 | 700 | 900 | 1300 | 800 | 1150 | 700 | 1025 | 300 | 300 | 250 | 450 | 400 | 350 |
| 25mm \emptyset | 900 | 1375 | 800 | 1200 | 700 | 1050 | 1375 | 2050 | 1200 | 1800 | 1050 | 1600 | 400 | 350 | 300 | 550 | 500 | 450 |
| 28mm \emptyset | 1025 | 1650 | 900 | 1325 | 800 | 1200 | 1550 | 2300 | 1325 | 2000 | 1200 | 1800 | 450 | 400 | 350 | 650 | 550 | 500 |
| 32mm \emptyset | 1175 | 1750 | 1000 | 1525 | 900 | 1350 | 1750 | 2625 | 1525 | 2275 | 1350 | 2050 | 500 | 450 | 400 | 750 | 650 | 550 |

NOTES: 1. For reinforcing bars in tension with stand hook at its end. Development length may be divided by 2.50

2. Case 1 is for bars with the clear spacing not less than the bar diameter or either less than 25mm otherwise Case 2 shall be used

I. Concrete Column

- Beam-column joints shall be provided by a hoop at 0.1 M O.C, the number of sets for such hoops shall be the same in the confined region as scheduled.
- Where column changes in sized, vertical reinforcement shall be offset at a slope of not more than 1.6 and extra 10mm \emptyset hoops at 0.10M O.C. shall be provided throughout than offset region.
- Splice shall be allowed only within the center half of the clear column height. Splice length shall be provided with a hoop spaced at 0.10M O.C, Splice length shall be considered as tension splice as presented in approved drawings.

- Column ties and spiral shall be provided with minimum clear concrete cover of 40mm. Vertical bars shall have a clear distance of 1.5 times bar diameter or 40mm whichever is larger.
- Confined region shall be equal to the larger of the following:
 - **0.450MM**
 - **Bigger Column Dimension**
 - **(Clear Column Height)/16**

J. Foundations

- All footing where designed based on the allowable soil bearing capacity of 150KPA. The contractor shall report in writing to the designer the actual condition at the level of footing and confirm the actual soil bearing capacity before depositing concrete.
- No footing shall rest on uncompact fill nor loose soil. All footings should rest at least 1.0 below the ground. The minimum concrete protection for reinforcement shall be 75mm clear.
- All column reinforcement shall rest above the bottom reinforcements of the footing with 90-degree bend plus 12 times bar diameter extension at the free end but not less than 300mm. Hoops in the column shall continue below the top of the footing at 0.10M O.C.

3.6 Methods of Measurement and Basis of Payment

The Project Manager shall be in accordance with the dimension in the plan or as otherwise direct the measurement of completed work. The quantities to be paid for under this section shall be measured as follows:

- a. The volume to be paid for under this item shall be the number of cubic meters of concrete placed and accepted. Payment for concrete shall be constructed to include the cost of forms, false works, curing, fasteners and accessories necessary to complete this item of work.
- b. The quantities for reinforcing steel to be paid for shall be the final quantity placed and accepted in the completed structure. No measurement for payment shall be made for splices added by the Contractor for his convenience. Payment for the accepted quantities for reinforcing steel shall be deemed to include the cost tie wires, separators, wire, supports, hangers, chairs and other materials necessary to complete the work.

The quantities measured as provided above shall be paid for at the contract price for each of the pay item, which price and payment shall be full compensation for furnishing and placing all materials, labor, equipment, tools and incidentals necessary to complete the work.

4.0 MASONRY

4.1 Scope of Work

The work includes furnishing and placing of concrete masonry units in conformity with the lines, grades and cross-sections shown on the drawings and in accordance with the specifications.

4.2 Applicable Documents

the latest edition of the following specifications and standards shall form part of this specification to the extent required by the references thereto.

| | |
|--------|---|
| ASTM | America Society for Testing Materials |
| C144 | Standard Specification for Aggregate for Masonry Mortar |
| PSA | Product Standards Agency Publications (Philippines) |
| PNS 16 | Specification of Concrete Hollow Blocks |

4.3 Material Requirements

4.3.1 Concrete Hollow Blocks

Concrete hollow blocks shall be a standard product of recognized manufacturer to PNS 16, as indicated on the drawings. Exterior and interior masonry units shall be non-load bearing

units. However, load-bearing units may be provided in lieu of non-load bearing units. For non-load bearing units, the required compressive strength shall be 25 kg/cm² or 2.48 Mpa.

4.3.2 Cement, Reinforcing Steel and Water

Cement, reinforcing steel and water shall be as specified in Section 3.0.

4.4 Construction Requirements

4.4.1 Workmanship

Masonry walls shall be placed level and plumb all around. One section of the walls shall not be placed in advance of the others, unless specifically approved. Unfinished work shall be stepped back for joining with the new work; tooting shall not be permitted. Heights of masonry work shall be checked with an instrument at sills and heads of openings, to maintain the level of the walls. Door and window frames, louvered openings, anchors, pipes and conduits shall be installed carefully and neatly as the masonry work progresses. Spaces around door frames shall be filled solidly with mortar. Drilling, cutting, fitting and patching to accommodate the work of others, shall be performed by skilled workers. Bolts, anchors, inserts, plugs, ties and miscellaneous metal work specified elsewhere shall be placed in position as the work progress. Chases of approved dimensions for pipes and other purposes shall be provided, where indicated or necessary. Top of exposed walls and partitions, not being worked on, shall be covered with a waterproof membrane, well secured in place. Wall and partitions shall be structurally bonded or anchored to each and to concrete wall beams, and columns.

4.4.2 Mortar Mixing

Mortar materials shall be measured in approved container to insure that the specified proportions of materials are controlled and accurately maintained during the progress of the work. Unless specified otherwise, mortar shall be mixed in such a manner that the materials will be disturbed uniformly throughout the mass. A sufficient amount of water shall be added gradually and the mass further mixed, not less than 3 minutes, until a mortar of the plasticity required for the purpose intended shall be obtained. The mortar shall be mixed in a manner such that the quality of water can be controlled accurately and uniformly. Mortar boxes, pans of mixing drums shall be kept clean and free of debris or dried mortar. The mortar shall be used before the initial setting of the cement has taken place; retempering of mortar in which cement has started set shall not be permitted.

4.4.3 Proportion of Mortar Grout

Fine mortar grout shall be mixed in the volumetric proportion of one part Portland cement, ¼ part hydrated lime and 3 parts sand. Coarse grout shall be mixed in proportion of one part Portland cement, ¼ hydrated lime, 3 parts sand and 3 parts pea gravel passing a 3/8-inch sieve.

4.4.4 Use of Fine and Coarse Grout

Fine grout shall be used in grout spaces less than 50 mm in any horizontal dimension or when clearance between reinforcement and masonry is more than 17mm.

4.4.5 Mortar Joints

Mortar joint shall be uniform in thickness, and the average thickness of any three consecutive joints shall be 9.50 mm. "Gage rods" shall be made and approved prior to starting the work and shall be used throughout the work. Changes in coursing or bonding after the work has started shall not be permitted. The jointer shall be slightly larger than the width of the joints, so that complete contact is made along the edge of the units, compressing and sealing the surface of the joint. Joints in masonry, which will not be exposed, shall be stuck flush. Joints shall be brushed to remove all loose and excess mortar. All horizontal joints shall be on level and vertical joints shall be plumbed and aligned from the top to the bottom of the wall with a tolerance of plus or minus 12 mm.

4.4.6 Concrete Masonry Unit

The first course of concrete masonry unit shall be laid in full bed of mortar, for the full width of the unit; the succeeding courses shall be laid with broken joints. Concrete masonry units with the cells verticals shall have bed-joints formed by applying the mortar to the entire top of the surface of the inner and outer face shall, and the head joints formed by applying mortar of a width of about 25 mm to the ends of the adjoining units lay previously. The mortar for joints shall be smooth, not furrowed, and shall be of such thickness that it will be forced out of joints as the units are being placed in position. Where anchors, bolts, ties and reinforcing bars occur within the cell of the units, such cells shall be solidly filled with mortar or grout as the work progress.

4.4.7 Reinforcement

Horizontal tie reinforcement shall be provided where indicated. Reinforcement shall be continuous and provided in the longest available lengths. Reinforcement above and below openings shall extend and be embedded into the columns, unless otherwise shown on the drawings. Splices shall overlap not less than 150 mm. Reinforcement shall be embedded in the mortar joints in the manner that all parts shall be protected by mortar. The two top courses of filler block walls shall have their cores filled with grout when placed in position.

Unless otherwise shown on the drawings, the size and spacing of bars shall be as follows:

For Vertical Bars:

150 mm (6") CHB - 12 mm (1/2") dia. At 600 mm (24") on centers

100 mm (4") CHB - 10 mm (3/8") dia. At 600 mm

For horizontal bars: - 12 mm (1/2") dia at 600 mm (24") on center (every third Course) for 150 mm (6") and 100 mm (4") CHBs.

4.4.8 Bounding and Anchoring

Masonry walls and partitions shall be accurately anchored or bonded at points where they intersect, and where they abut or adjoin the concrete frame of the building. All anchors shall be completely embedded in mortar

4.4.9 Grout Placement

Grout shall be performed on the interior side of wall, except as approved otherwise, sills, ledges, offsets and other surfaces to be left exposed shall be protected from grout falling on such surfaces and be and shall be removed immediately. Grout shall be stirred before placing to avoid segregation of the aggregate and shall be sufficiently fluid to flow into joints and around the reinforcement without leaving any voids. Grout shall be placed by pumping or pouring from buckets equipped with spouts, in lifts not exceeding 1.2 meters high. Grout shall be puddle thoroughly to eliminate voids without displacing the masonry units from its original position. Masonry units displaced by grouting operation shall be removed and re-laid to its proper alignment using fresh mortar grout.

4.4.10 Tests and Test Reports

The testing requirements stated herein or incorporated in referenced contract documents may be waived provided certified copies of report of tests from approved laboratories performed on previously manufactured materials are submitted and approved. Test reports shall be accompanied by notarized copies from the manufacturer certifying that the previously tested material is of the same type, quality manufacturer, and make those

4.5 Method of Measurement and Basis of Payment

In measuring the quantity of masonry units for payment, the dimensions to be used shall be as shown on the plans or as directed by the Project Manager in writing. Projections extended beyond the faces of the wall shall not be included. The area to be paid for in this section shall be the number of square meters of concrete masonry wall and partition placed and accepted in accordance with the plans and specifications. Payment of accomplished work shall be deemed to include the cost of mortar grout, reinforcing steel, tie wires, false work and other necessary works to complete this item. The quantity of concrete masonry walls and partition shall be paid for at the contract unit price shown in the bid schedule, which payment shall be full compensation for furnishing and placing all materials, labor, equipment, tools and incidentals necessary to complete the work.

5.0 STEELWORKS

5.1 Scope of Work

The work includes the furnishing, fabrication, erection or installation of structural steel roof framing, Handrails and miscellaneous metal work in accordance with this specification and as shown in the drawings.

5.2 Applicable Specifications & Standard

The latest edition of the following specifications and standards referred to hereinafter by basic designation only, shall form part of the specification:

| | |
|----------|--|
| ASTM | American Society for Testing and Materials |
| A36/A36M | Specification for Structural Steel |
| A53 | Steel Pipe Zinc Coated Welded and Seamless Black and Hot-Dip |
| A307 | Bolts and Studs, 60, 000 psi Tensile Strength |
| A325 | Standard Specification, high Strength Bolts for Joints |
| A570 | Hot-rolled Carbon Steel Sheet and Strip, Structural Quality |
| A611 | Steel, Cold-Rolled Steel, Carbon, Structural Quality |

| | |
|----------|--|
| ASTM | American Society for Testing and Materials |
| A36/A36M | Specification for Structural Steel |
| A53 | Steel Pipe Zinc Coated Welded and Seamless Black and Hot-Dip |
| A307 | Bolts and Studs, 60, 000 psi Tensile Strength |
| A325 | Standard Specification, high Strength Bolts for Joints |
| A570 | Hot-rolled Carbon Steel Sheet and Strip, Structural Quality |
| A611 | Steel, Cold-Rolled Steel, Carbon, Structural Quality |
| AWS | American Welding Society |

| | |
|------|--|
| D1.1 | Structural Welding Code, Steel |
| AISC | American Institute of Steel Construction, Specification for the Design, Fabrication, Erection of Structural Steel for Buildings. |
| AISI | American Iron Steel Institute, Specification for the Design of Light Gage Cold-Formed Steel Structural Members |

5.3 Material Requirement

5.3.1 Structural Steel Shapes Plates and Bars

Unless otherwise shown or specified on the drawing, structural steel shapes plates and bars shall conform to ASTM specification A36/A6M.

5.3.2 Hot-Formed Steel Sheet and Strip

Unless otherwise shown or specified on the drawings, hot-formed steel and strip shall conform steel and strip shall conform to ASTM A570.

5.3.3 Bolts, Nuts and Washer

It shall conform to specification STM A370, with a minimum yield point of 33, 000 psi, unless otherwise shown in the drawings. Heavy hexagonal structural bolts, heavy hexagonal nuts and hardened washers, shall be quenched and tarpapered medium-carbon steel bolts, nuts and washers complying with ASTM A325.

5.3.4 Screw and Expansion Bolts

Screw and Expansion bolts be of standard commercial grade, and of the sizes and types indicated as approved by the project manager.

5.3.5 Electrodes

Electrodes for arc welding shall be E60, or E70, AWS D1.1

5.3.6 Galvanizing

Unless otherwise specified, galvanizing shall be of standard quality, hot-dipped process of 1.25 ounces per square foot of coating. Galvanized surface that are damaged prior to final acceptance shall be repaired using and approved repair compound to the satisfaction of the Project Manager.

5.3.7 Railings/Handrails

3" dia. stainless steel pipe shall be used for hand rails and vertical railings properly installed as indicated in the plans. Joints and surfaces that are damaged prior to final acceptance shall be repaired using and approved repair compound to the satisfaction of the Project Manager.

5.3.8 Miscellaneous Metals

Miscellaneous metals including fastenings, anchorage's and incidentals not specifically mentioned herein or in other section of this specifications but are required to complete the work, for which there are no detailed drawings, shall be provided and installed in accordance with standard practice of the trades as approved by the Project Manager.

5.3.9 Delivery, Storage and Handling

Fabricated materials delivered to job site shall be stored in clean and protected dry areas in manufacturer's protective package. Structural steel materials to be stored shall be placed on skids above the ground. It shall be kept clean and properly drained. Skids placed near enough together to prevent injury from deflection shall support long members, such as purlins and chords. The Contractor shall check the quantity and quality of materials turned over to him against the delivery list and report promptly in writing any shortage or damage discovered.

5.4 Construction Requirements

5.4.1 General

Fabrication and erection of structural steel shall be in accordance with AISC specification for the design. Fabrication and erection of structural steel for buildings, except as specified herein. The Contractor shall submit to the Project Manager for approval shop drawings showing the proposed method of fabrication and installation of all metal work. No work shall be started until the shop drawings have been approved. And all work shall conform to the approved shop drawings.

5.4.2 Fabrication of Steel Structure

The work shall be well formed at the shape and size shown and assemblies as detailed. Structural members shall be fabricated and assemblers in the shop to the greatest extent as possible. Shearing and punching shall be produced in clean, true lines and surfaces with burrs removed. Nuts shall be drawn up tight. Joints, which ate to be exposed to the weather, shall be waster lights. Hole shall be cut, drilled or punched at right angles to the surface of the metal and shall not burning enlarge made ort. Holes in base or bearing plates shall be drilled.

| | |
|--|--|
| 1) Welding | |
| Structural steel shall be welded in accordance with the standard code of Arc and Gas | |
| Welding in Building Construction of the American Welding Society. Qualified welders | |
| shall perform all welding work only. | |

| | |
|--|--|
| 2) Shop Painting | |
| Unless otherwise specified or indicated in the drawings, all structural steel work (except | |
| galvanized surfaced and surfaces that will be painted with epoxy) shall be given a shop | |
| coat of red lead or zinc chromate primer. | |

5.4.3 Erection

The steel structure shall be erected true to line and grades. Bracing's and supports shall be introduced whenever necessary to take care of all the loads to which the structure may be subjected. Such bracings shall be left in place as long as may be required for safety. As erection progress, the work shall be securely bolted to take care of all the dead loads, wind and erection stresses. No reaming of undersize bolt holes shall be permitted, and erection bolts shall not be used for lining up members.

(1) Rift Pins

Drift pins may be used only to bring together several parts; they shall not be used in such a manner as to distort or damage the metal.

(2) Gas Cutting

The use of gas cutting torch in the fields for correcting fabrication errors shall not be permitted on any major member in the structural framing. Its use may be permitted only when the member is not under stress, and subject to the approval of the Project Manager.

(3) Base Plates and Bearing Plates

Base plates and large bearing plates shall be supported in steel wedges or shims until the supported members have been plumbed, following which the entire bearing area shall be grouted with no-shrink cement grout.

(4) Grouting Mortar for Setting Base Plates

Concrete grout shall be a non-shrinking type grouting mortar. The mortar subject to the approval by the Project Manager can either be a mixture of Portland cement, well graded fine aggregate, aluminum powder; and water or an approved commercial grouting mortar containing non-metallic chemical oxidizing agent. If adopted, the approved product shall be delivered to the site of the work in original sealed container bearing the trade name of the manufacturer. Surfaces to receive the mortar shall be clean and shall be clean and shall be moistened thoroughly before placing the mortar. Exposed surfaces of mortar shall be water cured with burlap for at least seven (7) days.

(5) Setting Up

Steel shall be erected plumb, level and properly guyed. In setting or erecting structural steel, the individual piece shall be considered plumb or level where the error does not exceed 1 to 500.

(6) Inspection

The Contractor shall give the Project Manager at least fifteen (15) days notice prior to the start of work at the mill shop, so that the required inspection may be made. The term "mill" means any rolling mill, shop or foundry where material for the work is to be manufactured or fabricated. No materials shall be rolled or fabricated until the said inspection has been provided. The Contractor shall furnish the Project Manager with copies of the certificate mill reports of the structural steel structure preferably before but not later than the delivery of steel structure to the job site. The Contractor shall furnish all facilities for inspection and the Project Manager shall be given free access to the mill or shop and premises at all times. The Contractor shall furnish without charge all labor; machinery, materials and tools necessary to prepare test specimens. Inspection at the mill or shop is intended as a means of facilitating work and avoiding errors. It is expressly understood that it will not relieve the Contractor from any responsibility for imperfect materials or workmanship and the necessity for replacing the same. The acceptance of any materials or furnished member at the mill or shop by the Project Manager shall be preclude their subsequent rejections if found defective before final acceptance of the work. Inspection of welding works will be in accordance with the provision of Section 5 of the "Standard Code for Arc and Gas Welding in Building Construction" of the American Welding Society.

5.5 Method of Measurement and Basis of Payment

1. The quantity of structural steel roof framing to be paid for shall be the number of kilos completed in place and accepted. Payment for the accepted quantities shall be deemed to include the cost of steel plates, anchor bolts buckles, sag rods, cross bracing, purlins mounting accessories and other works necessary to complete this work item.
2. The quantity to be paid for stair nosing and railing shall be the number of linear meter placed and accepted. Payment shall be construed to include the cost of false work, anchors, and other materials used in mounting this item. The quantity determined as provided above shall be paid for the contract price for each of the pay item listed in the bid schedule, which price and payment shall be full compensation for furnishing and placing all materials, labor, equipment, tools and incidentals necessary to complete the work.

6.0 CARPENTRY AND JOINERY

6.1 Scope of Work

This section includes all rough and finish carpentry and joinery works, as shown in the drawings and in accordance with this specification.

6.2 Material Requirements

6.2.1 Lumber

All lumber shall be in accordance with the accepted commercial standard and shall be of the approved quality of each kind and shall be of the following species and grades as shown in the drawings.

| Use | Specie | Grade |
|--|-------------|-------|
| Lumber in contract with Concrete, masonry and Cement plasters | Yakal | Good |
| Jambs, Transoms, mullions Headers, sills, frames and Wood base of detachable Partition | Yakal | Clear |
| Ceiling joist, studs, roof | Apitong | Good |
| Framing and nailers | or Tanguile | |
| Wood trims, wooden Planks and wood vent And frames | Tanguile | Clear |
| | | |

1. Quality of Lumber

All lumber shall be of the approved quality of each kind required for the various parts of the work, well seasoned, thoroughly dry and free from large, loose or unsound knots, saps, shakes and other imperfections impairing its strength, durability and appearance.

Jambs, transoms, mullions, headers, sills, frames and wood base shall be air dried and well seasoned for at least two (2) months before use.

2. Substitutions

Any lumber equally for the purpose any may be substituted for the kinds specified, provided that the substitution shall be acceptable to the Project manager.

3. Moisture Content

Except where otherwise specified, lumber shall be sun-dried, or kiln-dried. At time of installation, the maximum moisture content, expressed as a percentage of the oven-dry wood, shall be as follows:

a. Rough Carpentry and Framing

Framing lumber 2 inches and less in thickness: 19 percent

Framing lumber over 2 inches thick: 25 percent

Boards: 19 percent

b. Interior millwork, finish and trim: 17 percent

6.2.2 Plywood/Fiber Cement Board

Ceiling and partition shall be to 6-mm thick marine plywood or 9mm fiber cement board as specified in the plans or in the scope of work. For interior walls or partitions as shown in the plans or as required, fiber cement board shall be installed in accordance with the manufacturers specifications: Wall Framing (galvanized steel section) Standard materials are C-Stud, U-Track, Rivet or wafer screw, expansion bolt 6mm, drywall screw 25, 38, 40mm, corner metal bead or corner super bead.

6.2.3 Framing

Wooden frames for detachable partitions shall be kiln-dried, tanguile.

6.2.4 Fasteners

Fasteners shall be of the type and size best suited for the purpose as shown in the drawing. Fasteners shall be zinc coated regular commercial size as indicated and shall conform to ASTM specification A307.

6.3 Construction Requirements

6.3.1 Workmanship

Lumber for framing and other carpentry or metal framing shall be fitted closely, set accurately to the required lines and levels, and shall be secured in a place in a rigid and substantial manner. Spiking, nailing and bolting shall be done in an approved manner. Spikes, nails and bolts shall be of the proper size, and care shall be taken so as not to split the members. All frames coming in contact with concrete or masonry shall be anchored by means of nails metal screws with tox spaced sufficiently apart all around the contact surfaces. Bolt holes shall be drilled accurately and shall have a diameter of 3 mm more than the bolt size. All exposed wood surfaces shall be smoothly dressed and if so required, shall be well sand papered to an even smooth surface ready for finishing.

6.3.2 Finish Framing

Grades and species of wood shall be as specifies. Interior finish shall be set plumb, level, square and in true alignment and joints shall be tight and formed to conceal shrinkage. All finish framing, shall be done as much as possible with carefully fitted mortise and tendon joints as much as possible, if not possible locate them in inconspicuous places where nailing is permitted on wood surfaces. Nailing and blocking shall be provided as necessary.

6.3.3 Rough Framing

Framing and other rough carpentry shall be fitted closely and set accurately to the required line and levels and shall be secured in place in a rigid and substantial manner. Framing members shall not be spliced between bearing points and shall be provided as necessary for the proper completion of the work. Nailing shall be done in an approved manner, so as not to split the framing members.

6.3.4 Protection of Work

The Contractor shall protect all finished woodwork and millwork from injury after it has been set in place until completion and final acceptance.

6.3.5 Hardware

Items of hardware to be installed shall be as directed or as shown in the drawings and fitted carefully attached securely. Care shall be exercised not to mar or injure the work.

7.0 ROOFING AND MOISTURE & THERMAL PROTECTION

7.1 Scope of Work

This section includes the furnishing of all plant, tools, equipment, materials and other in the installation of waterproofing and roofing, including miscellaneous sheet metal works as required providing a waterproof installation.

7.2 DESCRIPTION

The work includes installation of pre-painted Rib-type Long Span roofing complete with hardware and accessories.

7.2.1 GENERAL

The work includes furnishing all materials and requirements performing all operations to provide a long span corrugated twin ribbed roofing and miscellaneous roofing work as required to provide an acceptable installation. Surfaces to which metal formed roofing sheets are to be applied shall be thoroughly cleaned and prepared, free from any defects that may affect the application. Metal formed roofing shall be locked and lapped and installed as applicable. Details shall be in accordance with manufacturer's recommended installation practice. Metal formed roofing and sheets and accessories shall be carefully handled at all times in strong and handling to prevent damage to the surfaces, edges and ends and shall be slightly elevated for drainage. Metal formed roofing and sheets and accessories shall be delivered to the site in the original sealed

container or packages bearing the manufacturer's name and brand designated where materials are covered by a reference specification number, type and class as applicable.

7.3 INSTALLATION

Lay and install the first sheet with turned down edge towards the outside of the area to be covered. Overlap the next sheets to the previous sheet in such a manner that the exposed edge is turned down and the covered edge is turned up. Side up fasteners should be done by rivets and washers spaced from 300mm to 450mm on centers. Care should be exercised in the proper anchorage of all roof frames. Ridge strips for ridge rolls and ridge flashings are attached to the roofing sheets by means of rivets. Other flashings are to be fabricated from plain sheets of the same materials as the roofing in accordance with the details and/or site requirements. These are also attached to roofing sheets by means of rivet.

7.3.1 TEMPORARY PROTECTION

Metal formed roofing sheets surfaces requiring protection from stains, discoloration, surface abrasion and other construction abuses shall be suitably protected in accordance with the manufacturer's recommendations.

7.3.2 FINAL CLEARING

Upon completion, the Contractor shall clean the metal formed roofing sheets surfaces and drain line of burrs, leaves, stones and other foreign matter that may impair the flow of water. Surface

shall be kept clean by periodic inspection.

7.4 RADIANT HEAT BARRIER

7.4.1 SCOPE OF WORK

The Contractor shall furnish and install all labor and material to complete the work.

7.4.2 MATERIAL

7.4.3 RADIANT BARRIER

Radiant Barrier shall be fire retardant aluminum foil for roof insulation. It shall have 6 layer fire retardant double-sided aluminum foil laminate with superior radiant heat barrier properties. It shall be tear proof, waterproof and possesses the following properties:

| | | |
|------------------------------------|---|---|
| Elongation | : | 150% ASTM D882 |
| Water Vapor Transmission | : | Greater than 5000 Mns/g ASTM E96-E |
| Water Vapor Permeance | : | Less than 0.20 ng/Ns Less than 0.004 (Perms) ASTM E96-E |
| Tensile Strength | : | M.D. 6.6 KN/m D.D.5.0 KN/m C.D. 4.7 KN/m ASTM 828 |
| Puncture Resistance T.APPA T800 | : | 1.0 Joules |
| Reflectivity | : | 86% ASTM E466-76 |

| | |
|--|-----------------------------|
| Emissivity | : 5% |
| Roll Size | : 1.25m x 60m = 75.00 sq.m. |
| Weight | : 200 g/m ² |
| Thickness | : 0.190mm |
| Total R-Value (M2K/W) | : 1.72 |
| Fire Retardant BS476 Part 7 Class 1 | : Part 6 Class 0 |

7.4.4 WORKMANSHIP

The product shall be delivered to the site in its original package or container bearing the manufacturer's name and brand designation. All material shall be installed by skilled and selected workmen familiar with the aforementioned product.

For further information, see manufacturer's specifications.

7.5 Basis of Payment

The accepted quantities measured as prescribed in the bill of quantities shall be paid for at the appropriate contract unit price for the pay item listed as shown in the bid schedule, which price and payment shall be full compensation for placing all materials, labor, equipment, tools and

incidentals to complete the work.

8.0 FINISHES

8.1 Scope of Work

This section covers all works required in connection with surface finished on wood, metal, masonry and concrete surfaces in accordance with this specification and as shown in the drawings.

8.2 Material Requirement

8.2.1 Plastering Works

(1) Portland Cement

Cement shall conform to ASTM standard C150, Type 1

(2) Sand

Fine aggregates for plastering shall be natural sand and shall be retained between No. 50 and No. 100 sieves.

(3) Lime

It shall be dehydrated lime where the free (un-dehydrated) calcium oxide and magnesium oxide in the hydrated product shall not exceed 8 percent by weight.

(4) Water

Water used in mixing, shall be reasonably clean and free of oil, salt, acids, alkali, grass or other substances injurious to the finished product.

8.2.2 Paints

This item shall consist of furnishing all paints, enamels, varnishes and other products to be used including labor, tools and equipment required as shown on the Plans and in accordance with this Specifications.

1. Material Requirements

- 1.1 All paint materials shall meet the requirements of the Standard Specifications of the Standardization Committee on supplies.
- 1.2 All paint materials shall be delivered on the job-site in their original containers with labels and seals unbroken.
- 1.3 Manufacture or brand of painting materials to be used shall be any of the leading brands or approved certified by the design Architect.
- 1.4 Tinting Color, tinting colors shall first be grade pigments ground in alkyd resin, which disperse and mix easily with paint to produce the colors desired.

2. Preparation of Surfaces

- 2.1 Inspect all surfaces in regard to their suitability to receive a finishing. In the event that imperfection due to materials or workmanship appear on any surfaces after the application of the paint the coat of any correction shall be borne by the contractor. Damage to any painted finished due to carelessness or negligence of other shall be corrected.
- 2.2 Neutralizer shall quality surface conditioner to be diluted with water neutralize lime activity in new exterior and interior concrete surfaces improving paint adhesion and durability.
- 2.3 Touch all knots, pitch streaks and sappy spots with shellac or other approved sealer. Putty nail holes cracks, etc., after the first coat with non-shrinking putty of a color to match that of the finish.
- 2.4 Prepare masonry works surfaces to be painted by removing all dirt, dust, oil and grease stain sand efflorescence. Masonry surfaces to be painted shall be free from alkali and thoroughly dry before paint is applied.

- 2.5 Before applying succeeding coats, primers and undercoats shall be completely integral and performing the function for which they are specified. Properly prepare and touch up all scratches, abrasions, or any other disfigurement and remove any foreign matter before proceeding with following coat.
- 2.6 Do not apply final coat on interior work until after other trades are finished with their work in any given area in normal sequence and all materials and debris removed and the premises left in satisfactory broom clean condition as approved.
- 2.7 Remove or protect hardware accessories plates, lighting, fixtures and similar items placed prior top paintings, reposition or remove protection upon completion of each space. Disconnect equipment adjacent to walls where necessary move to permit painting wall surfaces, and following completion of painting, replace and reconnect.
- 2.8 Except where otherwise noted or specified all paints shall be applied in three (3) coats (priming body and finish coats). Each coat shall be roller applied (except as otherwise noted) spread evenly and in full covering body.
3. Patching Compound, patching compound shall be fine powder material that can be mixed into putty consistency with oil base primers and paints to fill minor surface dents and imperfections.
4. Natural Wood Paste Filler, wood paste filler shall be quality filler ready mixed in can for filling and sealing open grains of interior wood. It shall produce a level finish for succeeding coats of paints, lacquer and other related products.

5. Application

- 5.1 Paints when applied by brush shall be non-fluid, thick enough to lay down an adequate film of wet paint. Brush marks shall be flawed out after the application of paint.
- 5.2 Paints prepared for application by roller must be similar to brushing paint. It must be non sticky when thinned to spraying viscosity to break up easily into droplets.
- 5.3 Paint is atomized by high pressure pumping rather than broken up by the large volume of air mixed with it. This procedure change the required properties of the paint.
- 5.4 Experienced and skilled craftsmen to assure finished work of first class quality, appearance and durability shall perform all works.
- 5.5 All paints and other coatings shall be mixed and applied strictly in accordance with the manufacturers printed instructions.

6. Paint Schedule

The type of paint specified are intended to illustrate the quality and are taken from paint catalogue equivalent materials from manufacturers listed herein, which the contractor desires to use other than those specified should accompany proposal with such request in writing for approval of the Architect or Engineer. After the award, no substitution of materials for those mentioned in the accepted proposal will be permitted.

6.1 Exterior walls

Cement plaster over concrete use:

1. Preparation of exterior and interior concrete walls Prepare masonry surface to be painted by removing all dirt, dust, oil and grease stains and efflorescence. Treat with masonry Neutralizers # 44 or approve equivalent. Mix one liter of Masonry neutralizer with 16 liters of water, then apply liberally by brush and let dry overnight before rinsing with water. Let dry.
2. Coat concrete primer and sealer
3. Coat textures paint
4. Coat semi-gloss latex paint

6.2 Exterior and interior Work

Frames steel windows and grating use:

1. Wash all metal surfaces with mineral sprints or detergents to remove any dirt or grease before applying materials. Where rust or scale is present, wire brush or sand paper clean before painting. Treat rusty portions with Metal Etching Solution # 71 or approve equivalent. Rinse and let dry.
2. Coat PRIMER paint
3. Coats QD Enamel

6.3 Interior Work

Plywood/gypsum/fiber cement boards Ceiling/walling use: (Roller Painted)

1. 1(one) priming coat flat washable paint
2. 2 (two)finish coat semi gloss paint.

6.4 Cabinets

Ducco or semi-ducco finish or as specified in the plans.

8.3 Construction Requirements

8.3.1 Cement Finish on Masonry Walls

(1) General

The work consists of furnishing all materials, labor and performing all operations in connection with plastering masonry wall surfaces, complete in every respect as shown in the drawings and as specified herein. Plastering work shall be protected properly from being damaged during plastering operations. Scaffolding shall be amply strong, well braced, tied securely and inspected regularly. Overloading of scaffolding shall not be permitted. The work consists of furnishing all materials, labor and performing all operations in connection with plastering masonry wall surfaces, complete in every respect as shown in the drawings and as specified herein. Plastering work shall be protected properly from being damaged during plastering operations. Scaffolding shall be amply strong, well

braced, tied securely and inspected regularly. Overloading of scaffolding shall not be permitted.

- (2) Mixing of Plaster Except where hand mixing of small patches is an approved mechanical mixer of an approved type shall be used for the mixing of plaster. Materials shall be accurately measured by a device that will maintain the specified proportions within a plus or minus tolerance not in excess of 5% by volume. Plaster materials shall be accurately measured in approved containers to insure the specified proportions. Caked and mixing each batch and kept free of plaster from previous mixes. Plaster materials shall be thoroughly mixed with the proper amount of water until a uniform color and consistency is attained. Tempering shall not be permitted and all plaster that has begun to stiffen shall be discarded.

- (3) Proportioning Plaster

Portland Cement plaster shall be a two-coat application, the base and the finish coat. Each coat shall be proportioned as follows: One part by volume of Portland, to three parts sand. Hydrated lime may be used as directed by the Consultant. Portland Cement plaster shall be a two-coat application, the base and finish coat. Each coat shall be proportioned as follows: One part by volume of Portland, to three parts sand. Hydrated lime may be used as directed by the Consultant. Portland Cement plaster shall be a two-coat application, the base and the finish coat. Each coat shall be proportioned as follows: One part by volume of Portland, to three parts sand. Hydrated lime may be used as directed by the Consultant. Portland Cement plaster shall be a two-coat application, the base and finish coat. Each coat shall be proportioned as follows: One part by volume of Portland, to three parts sand. Hydrated lime may be used as directed by the Consultant.

- (4) Application of Plaster

Surface to receive plaster must be free from structural defects and shall be thoroughly dampened prior to application of plaster. Plaster base coats shall be applied with sufficient pressure and the plaster shall be sufficiently plastic to provide good bond on masonry base. The base coat shall be compacted and straightened to a true surface without the application of water and the entire surface shall be floated to receive the finish coat. The finish coat shall be applied to a thickness approximately 3 mm before the scratch coat has set. Maximum finish free from blemishes or irregularities. Trawling shall be continued until the finish surface sets. Immediately after setting, surfaces shall be soured vigorously with clean burlap or cement bag paper or brush to remove the sheen finish produced by trawling. Plaster work shall be finished level, plumb, square and true, within a tolerance of 3mm in meters without waves, blisters, pits, crazing, discoloration, projections or other imperfections. Plaster work shall be formed carefully around angles and contours, and well up to screens. Special care shall be taken to prevent consequent dropping of applications. There must be no visible junction marks where one day's work adjoins another. Finished work shall be protected in an approved manner to prevent damage.

- (5) Portland Cement Plaster

Cement plaster shall have a total thickness of not less than 12 mm thick. The base coat shall be applied not less than 9 mm thick and allowed to dry slowly for 24 hours. Then the finish coat shall be applied to a thickness of not less than 3 mm and brushed with 4 applications of fog spray of clean water. The first spray shall be applied 12 hours after the finishing coat has been completed and three subsequent spraying shall be applied at sufficient intervals thereafter as approved by the consultants.

(6) Patching and Pointing

Upon completion of the work all loose, cracked, damaged or defective plastering shall be cut and re-plastered in a satisfactory manner. All pointing and patching of plastered surfaces and where plastering abuts or adjoins any other finished works shall be done in a neat and workmanship manner ready to receive pain or other finish.

(7) Curing and Protection

Damp curing shall begin as soon as the mortar has hardened sufficiently to prevent injury and water applied in a fog spray to keep the plaster damp throughout without soaking. The period for damp curing shall be specified for each coat. Protect the plaster from uneven and excessive evaporation during hot or drying weather conditions.

(8) Cleaning

After the completion of plastering work, all scaffolding surplus materials, debris and plaster daubs and stains in floors, windows and other surface shall be removed to the satisfaction and approval of the Project Manager.

8.3.2 Cement Finish on Concrete Floor Slabs

(1) General

This work includes plain cement finish with or without red cement, and plain cement finish as bed for tiles, including all labor, materials, equipment and other facility to complete the work in accordance with the plans and specifications.

(2) Finishing Requirements

Floors and slabs shall be sloped uniformly to the drains. In areas where tiles are to be laid, the concrete base slab shall be depressed to not less than 50 mm, when not indicated. Floor and slab finishes, where not indicated, shall receive a single steel trawling. Dry cement shall not be placed directly on the new concrete surface to absorb excess moisture.

(3) Finishing Procedures

Finishing procedures for floors and slabs, where not indicated on the drawings, shall be as follows:

| Finish | Description | Uses |
|----------|--|---|
| Screened | Rough, free from Ridges and holes | Slab and concrete surfaces under Earth fill |
| Floated | Medium rough with Texture finished | Light storage areas, base slabs And heavy machine pads |
| Trawled | Fine and texture To flossy glass Finish depending Upon the number Of passes of | All surfaces: 1) under floor- 1 pass 2) normal wearing surface – 2 passes 3) Dense wearing surfaces-3 Passes |

(4) Screened Finish

Concrete shall be placed, consolidated and immediately struck off to bring the top surface of the slab to proper grade. Floors shall be leveled with a tolerance of 3mm in 3.0 m, except where drain occurs, in which case the floors shall be pitched to the drains. Striking off and bull floating shall be completed before water appears on the surface of the freshly-placed concrete. If water is still visible by the time floating is to start, the excess water shall first be scrubbed off the surface by appropriate means.

(5) Floated Finish

Floating shall begin when the water sheen has disappeared and when the surface has stiffened sufficiently to support a man without indenting the surface. Floating shall be performed by hand with a wood float. During the floating, the surface shall be checked with a 3.0-m straight edge applied at different angles. The surface shall be floated to a true plane within 3 mm in 3.0 meters.

(6) Trowled Finish

Upon attaining proper set, the floor shall first be given a floated finish as specified herein above and then hand trowled. The first trowling should produce a smooth surface, free of defects. The finished surface shall be free of trowled marks, uniform in texture and true to a plane within 3mm in 3.0 meters.

(7) Broomed Finish

The floor shall first be given a floated finish and a steel trowled finish as specified herein above and then surface shall be broomed with flexible bristle broom. The topping mixture shall be spread evenly over the roughened base before the final set has taken place. At the time of brooding, the trowled surface shall have hardened sufficiently to retain the scoring on ridges. The brooding shall be in a direction transverse to that of traffic or at right angles to the slope of the floor.

(8) Mixing of Red Cement

Red cement shall be thoroughly dry, mixed with fresh Portland cement using dry and clean equipment. The proportion shall be three (3) parts red cement to one (1) part Portland cement. Cement top finish shall be one (1) part Portland cement – red cement mix and one (1) part sand, mix with minimum water content.

(9) Application of Cement Finishes

The concrete slab to receive cement top finish shall be roughened before the concrete has set. Before applying the cement top finish, the concrete surface shall be further roughened with a pick of a similar tool remove laitance, loose particles, plaster and anything that would prevent bond and then cleaned by an approved method or device. After cleaning, the slab shall be thoroughly wet before top finish is applied. The cement top finish shall have a minimum thickness of 19 mm and shall be poured continuously until the entire section is complete. Cement top finish shall be floated either manually or machine, struck off with straight edge, steel trowled to a hard smooth surface, and graded to drain where required. Where the floor is to be hardened, ½ of the pre-mixed floor hardener shall be spread over the freshly poured cement top finish after screening and removing any excess water from the mixture and the floor shall then be floated. The balance of pre-mixed floor hardener shall be evenly spread over the surface at the right angles to the first application. The floor shall then be floated and care shall be taken to embed the floor topping with hardener firmly in surface of the concrete floor. The treated cement top shall be allowed firmly

in surface of the concrete floor. The treated cement top shall be allowed to set sufficiently so that the surface maybe steel trowled to a hard-scaled surface.

8.3.3 Other Cement Finish

(1) Patching of Surface Defects

All surface defects shall be repaired with cement mortar of the same composition as used in the concrete. Part of the cement in the mortar may be white cement, for patching exposed areas to match the color of the surrounding concrete. Patching shall begin as soon as the forms are removed and areas to be patched are cleaned thoroughly. Minor defective areas shall be cut out of the solid concrete to a depth of not less than 25 mm. And edges of cuts shall be perpendicular to the surface of the concrete. Area to be patched and about 150 mm of the adjacent surrounding areas approximately one (1) hour before placing and remix occasionally during this period without adding water. An initial grout of cement and water mixed to the consistency of paint of the required color shall be applied into the surface to which the mortar is to be bonded.

(2) Repairing of Structural Defects

Concrete with excessive honey-comb, exposed reinforcing bars and other defects which affect the structural strength of the members shall be removed and repaired by the Contractor to the satisfaction of the Project Manager.

(3) Finishing of Formed Surfaces

Finishing of formed surfaces, where not indicated in the drawings, shall be as follows:

- (a) Surfaces exposed to public view shall be smooth form finished. No plastering work shall be done on exposed surfaces to correct imperfections. Form facing materials shall be used to produce a smooth, hard and uniform texture on the concrete. Tie holes and defects shall be patched and all fins shall be completely removed.
- (b) Surfaces not exposed to public view shall be rough form finished. Tie holes and defects shall be patched and fins exceeding 6 mm in height shall be chipped off or rubbed off.
- (c) Finishing of formed surfaces shall be accomplished after removal and repair of surface defects.

8.3.4 Painting

(1) General

The work covered by this section consists of furnishing all labor, equipment, tools and materials in performing all operations in connection with painting and finishing, including protective coating of metal surfaces, complete in accordance with the specifications and the applicable drawings.

(2) Color and Samples

The Project Manager shall in accordance with the color schemes shown in the drawings or as direct all colors. Sample panels of selected colors, as least (1) meter square in area shall be prepared for approval by the Project Manager prior to the application.

(3) Workmanship

Skilled workers shall do all work in a workmanlike manner. Paints shall be evenly applied and free from sags, runs, crawls and other defects. All coats shall be of proper consistency and well brushed out or rolled on so as to show a minimum brush or rolled marks. Brushes or rollers shall be clean and in good condition. All coats shall be thoroughly dry before the succeeding coat is applied. Allow at least twenty-four (24) hours or more between applications of coat. For exterior painting during rainy season, allow one (1) week drying time before the succeeding coat is applied. Painting coats as specified are intended to cover surfaces perfectly, if surfaces are not fully covered, further coats shall be applied to attain the desired evenness of the paint application. All finishes shall be uniform as to sheen, color and texture. Paint may be applied by spray method, except when, in the opinion of the spraying in any particular application would produce unsatisfactory results. The Contractor shall provide all drop cloths and other covering requisite to the protection of the floors and other work. Each surface shall be inspected carefully before applying any finish; and if surface is not in proper condition, they shall be notified to that effect in writing, otherwise the Contractor shall be held responsible for any defects in the finishes arising there from. Should a coat of paint be applied to a certain area and defects shall be knocked out and re-plastered by the Contractor and repainted to the satisfaction of the Project Manager.

(4) Inspection of Surfaces

The Contractor shall inspect all surfaces to be painted and all defects shall be remedied before starting the work before starting the work. No work shall be started unless the Contractor shall have made certain the dryness of the surfaces. Test shall be made, in the presence of the Project Manager, to verify the dryness of surfaces to be painted.

(5) Concrete Surfaces

(a) Surface Preparation

Before applying paint, concrete and cement surfaces shall be allowed to dry thoroughly. Clean surfaces of all dirt, alkali and grease before commencing work. Treat all surfaces with a solution of two (2) kilos of zinc sulfate to four (4) liters of water and sufficient phenolphthalein to act as color warning. Presence of alkali is indicated when phenolphthalein turns red and further treatment is required to neutralize it. Allow the surface to dry at least three (3) days and remove and loose crystals from the surface before finishing.

(b) Finishing:

For exterior and interior concrete surfaces and all other surface with cement plaster finish, use flat concrete paint with the specified brand approved by the Project Manager. First Coat- Apply flat concrete paint thinned with ½ liter water per 4 liters of paint; tint with latex tinting color to closely match color of topcoat or use premixed paint. Dry for 3 to 6 hours. Intermediate Coat- Repair all minor surface imperfection with paint putty made by mixing paint with patching compound powder. Let it dry for 24 hours, and then smoothen the surface with sand paper, before applying the intermediate coat. Final Coat- Apply semi-gloss or gloss paint tinted with latex

tinting color to the shade specified. Ducco or semi-ducco finish shall be applied using the appropriate paint sprayer by a well experienced painter.

(6) Wood Surfaces

(a) Surface Preparations

Plane the surface of wood with sandpaper to remove roughness, loose edges, splinters, slingers then clean to remove dust. All frames in contact with concrete or plaster shall be treated with an anti-termite solution or solution or equivalent before applying paints. Set the nail heads into the wood, fill holes, cracks and defects. Dry for three (3) hours and clean surface with sandpaper to smoothen the surface.

(b) Finishing

For all wood work, use gloss latex house paint with the specified brand approved by the Project Manager. First Coat- Apply paint thinned with ½ liter water per 4 liters of paint. Second Coat- Apply latex thinned with latex tinting colors to the shade specified for 4 to 6 hours.

8.4 Method of Measurement and Basis of Payment

The finished area to be paid for under each item shall be measured by the number of square meter painted surfaces accepted in accordance with the plans and specifications. The cost of tinting color, thinner, sand paper, putty including mixing, application, curing, false work and protection work shall be deemed to be included in the contract unit price for each pay item as shown in the bid schedule. The accepted quantities measured as stipulated above shall be paid for at the contract unit price for each of the particular pay item listed below, which price and payment shall be fill compensation for furnishing and placing all materials, labor, equipment, tools and incidentals necessary to completer each work item.

9.0 ELECTRICAL WORKS

9.1 WORK INCLUDED

- 1) To secure and pay for the electrical permits, certificates, and other related permits.
- 2) To secure and pay for the service charges and other fees required by the local electric utility company for the energization of the proposed transformer bank.
- 3) To secure and pay for the service charges and other fees required by the local telephone and CATV companies for the proposed CATV and telephone lines for the project.
- 4) To secure and pay for the insurance required for the project.
- 5) Roughing-in and wiring for lighting, power, telephone, CATV, fire alarm, nurse call, CCTV and paging system.
- 6) Supply, installation, testing, and commissioning of distribution transformer and construction of elevated transformer pad.
- 7) Supply, installation, testing and commissioning, of generator sets and grounding system.

- 8) Supply and install/cause to install primary metering.
- 9) Supply and install/cause to install wood pole and accessories at mid-span of the existing distribution line to be used as tapping point for the proposed transformers.
- 10) Supply, installation, and testing of automatic transfer switches, manual transfer switches, panel boards, and disconnect switches.
- 11) Supply and installation of underground feeder system included in the plan to powerhouse.
- 12) Construction of concrete pedestal and underground service entrance feeder for telephone and TV systems.
- 13) Supply and installation of boxes, pull boxes, auxilliary gutters, wire gutters, bus bar gutters, circuit breaker gutters and the like.
- 14) Supply and installation of lighting fixtures, switches, ceiling fans, and power outlets.
- 15) Supply and installation of complete telephone system including PABX control unit, telephone handsets, and other accessories.
- 16)As per regulations of the local telephone company, the electrical contractor shall secure and pay for the required fees for the installation of the service entrance wires and its subsequent connection.
16.a) Supply and installation of Cable TV system. TV sets and mounting brackets are not included.
- 17) As per regulation of the local CATV company, the electrical contractor shall secure and pay for the required fees for the installation of service entrance wire and splitters/connectors needed for the connection of the CATV system.
17.a) Supply, installation, termination, testing and commissioning of complete CCTV system, nurse call system, paging system, and fire alarm system.
- 18) Supply and installation of hangers and supports of conduits for power, feeder and subfeeder system and auxiliary system.
- 19) Painting of electrical works covering conduits, boxes, hangers, gutters, and the like.
- 20) Testing for electrical system:
 - Insulation resistance test
 - Ground resistance test
 - Continuity test
 - Operational test
 - Polarity check
 - Phase balancing check

9.1.2 Anything that has been omitted in any of work or materials usually furnished which are necessary for the completion of the works as outlined herein shall be undertaken or supplied by the contractor included in this division of work and must be included in the bid proposal.

9.2 CODE REGULATIONS

All materials and equipments to be used in the electrical installations and construction shall be in accordance with the provisions of the latest edition of the Philippine Electrical Code and the pertinent ordinances of the municipality wherein the project is located. All work shall comply with the rules and regulations of the local power utility company in so far as they are concerned in providing the respective permanent services to the building.

9.3 DRAWINGS AND SPECIFICATIONS

The electrical plans and these specifications are meant to be complementary to each other, and what is called for in one shall be as binding as if called for by both. Any permanent conflict between the electrical plans and these specification and any unclear points of controversial matter in either shall be referred to the owner's assigned representative for final decision. Upon final completion of the work herein described, the electrical contractor shall furnish the Owner two (2) copies of the "As-built" plans for future reference and maintenance purposes. The electrical plans indicate the general layout of the complete electrical system, arrangement of feeders, circuit outlets, switches, controls, panel boards, service equipment and other work. Field verification of the scale dimensions on the plane must be made, since actual locations, distances and levels will be governed by actual field conditions. The Electrical Contractor shall check architectural, structural and plumbing plans if necessary to resolve such conflicts. The Electrical Contractor shall notify the architect and secure approval and agreement on necessary adjustments before installation is started.

9.4 PERMITS AND INSPECTION

The Electrical Contractor shall obtain all necessary permits and certificates of electrical inspection from the proper government authorities concerned, required both for the performance of the work involved and the operation of the system upon completion of the work. The Electrical Contractor shall pay all the fees necessary to secure the above-mentioned permits and certificates. The Electrical Contractor shall at his own expense, reproduce the electrical plans to the necessary scale and size, complete them with all the necessary information and requirements as maybe required by the government authorities concerned with the approval of plans. The Electrical Contractor shall coordinate with the local power company regarding the power facilities and secure approval of the power requirements.

9.5 MATERIALS AND WORKMANSHIP

All materials to be used shall be brand new, with trade name, unused, and shall in every case be the best where such standards have been established for the particular type of materials used. Trade/brand name of materials indicated in the specifications are recommendatory in nature and are included for the purpose of uniformity in bids. If trade/brand names other than those indicated are to be used during construction, brochures and samples shall be submitted to the owner's representative for approval. Only skilled workmen using proper tools and equipment shall be employed during the entire course of the installation work. All workmanship shall be of the best quality and all works shall be done in accordance with the best engineering practice of the trade involved.

9.6 WIRING METHOD

Lighting and Power Branch Circuit – uPVC pipes concealed in ceilings and double walls and/or embedded in concrete walls/slabs. All uPVC pipes ran underground outside of buildings shall be buried not less than 40mm below nat. grd. line and enclosed in concrete

envelope. All concrete envelopes passing under roadways or areas accessible to vehicles shall be steel reinforced up to 1.0m from the edge of the roadway. Fire Alarm System Layout – rigid steel conduit concealed in ceiling and double walls and/or embedded in concrete walls/slabs. Low Voltage Service Entrance and All Feeders – rigid steel conduit, exposed/concealed in ceiling/double walls, embedded in concrete walls/slabs or ran underground encased in concrete. All Other Auxiliary Layout – uPVC pipes concealed in ceilings/double walls and/or embedded in concrete walls/slabs. Use flexible metal pipe for connection between junction boxes inside ceiling and lightings and other fixtures using approved fittings. All boxes, cabinets and other equipments shall be flush-mounted unless specified/approved otherwise. All boxes for lighting outlets, convenience outlets, tumbler switches and other devices shall be galvanized pre-painted and approved products of reputable manufacturers. Cut ends of conduits shall be reamed and cleaned to remove burr and sharp edges. Threads cut on conduits shall be the same thread dimensions as factory cut conduit threads. Conduits joints shall be made straight and true. Elbows and offsets and changes in direction and runs shall be uniform. Bends shall be made without kinking or destroying the cross-sectional contours of the conduits. Conduit terminals shall be provided at outlet boxes and cabinets with locknuts and bushing. Conduits shall be continuous from outlet and from outlet to pull boxes and cabinets in the manner that the conduit system shall be electrically continuous. Where conduit runs are exposed, they shall be supported at an interval of not more than 0.75 meters maximum with proper clamps and bolts or expansion shields or other means of support. All splices, taps, junction in wires larger than 8.0 sq.mm. shall be done with solderless connectors of suitable sizes and properly insulated with rubber tapes and protected by friction tapes, so that the insulation strength shall at least be equal to the insulation of the conductors they join. Unless otherwise specified, the type of wires to be used shall either be THW or THHN. Smallest size of wire to be used for lighting and power unless otherwise indicated shall be 3.5 sq.mm.

9.7 FEEDERS

Feeders shall be laid out in accordance with the riser diagram shown in the electrical plans. Unless otherwise specified type THW or THHN wires shall be used for feeder lines. The wires and conduits sizes shown in the electrical plans shall be the minimum sizes to be used.

9.8 WALLS SWITCHES AND RECEPTACLES

All wall switches shall be flush type and mounted 1.40 meters above finish floor line unless otherwise specified. Convenience outlets shall be grounding type, wall flushed, mounted 0.30 meter above finished floor line or finished counters unless otherwise specified in the plan. Ground fault circuit interrupter protected convenience outlets shall be used in bathrooms, lavatories, sinks, laundry areas and the like.

9.9 MAIN SWITCHES, TRANSFER SWITCHES, PANELBOARDS

The cabinets for the above shall be of standard sizes and shall be gauge #16. Circuit breakers shall be 250 Volts, AC, rated 75C, interrupting ratings specified in the plan shall be followed at all times.

9.10 LIGHTING FIXTURES

Install all lighting fixtures and lamps as specified and as shown on plans, Fluorescent lamps shall either be 48 inches/40 watts or 24 inches/20 watts, standard cool white or daylight with the minimum light output of 3,000 lumens. Use high power factor ballast. All fluorescent fixtures housing shall be of US Gauge 22 minimum.

Submit one sample of each type of fixtures to the Architect for approval prior to manufacturing and installation.

9.11 WATER PUMP

The Electrical Contractor shall install a complete wiring and conduit system including circuit breaker. The Electrical contractor shall; supply, install, test and commission the water pump and accessories such as motor, starter, ground fault protection, water level controller, etc.

9.12 AUXILIARY SYSTEMS

The Electrical Contractor shall supply, install, test, and commission a complete system for closed circuit TV, nurse call, paging, and fire alarm system as specified in the plan. The Electrical Contractor shall supply and install a complete system for Cable TV, and PABX/Telephone system, and at his expense shall coordinate with the local telephone and cable TV providers to ensure the complete operation and connection of the said systems. The Electrical Contractor shall, after completion, submit a complete schematic wiring diagram of the above to the owner's representative.

9.13 DISTRIBUTION TRANSFORMER \

The Electrical Contractor shall supply and install distribution transformers, pole line hardware for the receiving pole and pole at midspan, transformer pads and grounding system as indicated/specified in the plan. He shall also supply service metering instruments and accessories, and at his expense, shall submit these to the local electric utility company for connection. Materials for the works mentioned above shall be from manufacturers accredited/acknowledged by the local electric utility company.

GUARANTEE

All equipment, materials and workmanship shall be guaranteed for a period of one (1) year from date of acceptance at any time within the period of guarantee and upon notification, the contractor shall repair and rectify the deficiencies, including replacement of parts or entire units. Under such guarantee, the Contractor shall make good any defect due to faulty materials or workmanship caused by him without any additional cost to the Own

Prepared by:

ENGR. SAMUEL S. SALES

Civil Engineer – C.O.S.

Reviewed by:

ENGR. JUAN S. NARVATO

Resident Engineer

Section VII. Drawings

Drawings shall be attached on a separate folder and can be accessed at the school's website at brc.pshs.edu.ph.

Section VIII. Bill of Quantities



Republic of the Philippines
 Department of Science and Technology
 Philippine Science High School System
PHILIPPINE SCIENCE HIGH SCHOOL – BICOL REGION CAMPUS
GENERAL SERVICES MANAGEMENT-Engineering
 Tagongtong, Goa, Camarines Sur 4422
 Telefax: (054) 453-2048 *(pls. include local numbers, if applicable)*
<http://www.brc.pshs.edu.ph>



Pursuit of Truth



Passion for Excellence



Commitment to Service

SUMMARY FOR BILL OF QUANTITIES

Project Title : CONSTRUCTION OF MATERIAL RECOVERY FACILITY
 Location : Philippine Science High School-Bicol Region Campus
 Tagongtong, Goa, Camarines Sur 4422

Name of Bidder:

| ITEM NO. | DESCRIPTION | TOTAL COST |
|----------|--|------------|
| I. | GENERAL REQUIREMENTS | |
| II. | EARTHWORKS | |
| III. | REINFORCED CONCRETE AND MASONRY WORKS | |
| IV. | STEEL AND ROOFING WORKS | |
| V. | ELECTRICAL WORKS | |
| VI. | ARCHITECTURAL WORKS | |
| VII. | PAINTING WORKS | |
| | | |
| | | |
| | GRAND TOTAL COST | |

Amount in Words: _____

Submitted by:

Name of Contractor

Date

BILL OF QUANTITIES

Project Title : **CONSTRUCTION OF MATERIAL RECOVERY FACILITY**

Location : Philippine Science High School-Bicol Region Campus

Tagongtong, Goa, Camarines Sur 4422

Name of Bidder:

| ITEM NO. | DESCRIPTION | QTY | UNIT | UNIT COST | ADJUSTED TOTAL COST |
|---|--|--------|------|-----------|---------------------|
| I. GENERAL REQUIREMENTS | | | | | |
| | Mobilization and Demobilization | 1 | lot | | |
| | Permits/Licenses includes Fire, Water, Electrical | 1 | lot | | |
| | Safety and Health | 1 | lot | | |
| | Bonds Insurances | 1 | lot | | |
| | Temporary Facilities/Field Office | 1 | lot | | |
| | Construction Fence | 1 | lot | | |
| | COA Signage | 1 | lot | | |
| Sub-total for General Requirements | | | | | |
| II. EARTHWORKS | | | | | |
| | Structural Excavation (Common Soil) | 21.15 | cu.m | | |
| | Embankment from Structure Excavation | 11.16 | cu.m | | |
| | Gravel Fill | 15.00 | cu.m | | |
| Sub-total for EarthWorks | | | | | |
| III. REINFORCED CONCRETE AND MASONRY WORKS | | | | | |
| | Footings, Class A, 28 days | 3.89 | cu.m | | |
| | Portland Cement | 36.00 | bags | | |
| | Gravel | 4.00 | cu.m | | |
| | Sand | 2.00 | cu.m | | |
| | | | | | |
| | Footing Tie Beams and Slab on Fill, Class A, 28 days | 12.88 | cu.m | | |
| | Portland Cement | 118.00 | bags | | |
| | Gravel | 13.00 | cu.m | | |
| | Sand | 7.00 | cu.m | | |
| | | | | | |
| | Structural Concrete Columns, Class A, 28 days | 2.68 | cu.m | | |
| | Portland Cement | 25.00 | bags | | |
| | Gravel | 3.00 | cu.m | | |
| | Sand | 2.00 | cu.m | | |
| | | | | | |
| | Structural Concrete Beams, Class A, 28 days | 4.00 | cu.m | | |
| | Portland Cement | 37.00 | bags | | |
| | Gravel | 4.00 | cu.m | | |
| | Sand | 2.00 | cu.m | | |

| | | | | | |
|--|--|--------|-------|--|--|
| | | | | | |
| | Roofing Accesories and Plumbing | | | | |
| | Turnbuckle | 16.00 | e.a. | | |
| | Cross-Bracing | 75.00 | kgs | | |
| | Sagrod | 36.00 | kgs | | |
| | Flashing | 33.00 | m | | |
| | Pre Fabricated Gutter | 13.00 | m | | |
| | G.I. plain strap, 12" x 1", pre-painted | 45.00 | m | | |
| | Blind Rivets | 350.00 | pcs | | |
| | 3" PVC Downspout | 6.00 | pcs | | |
| | PVC Elbow 3" | 9.00 | pcs | | |
| | PVC Coupling | 3.00 | pcs | | |
| | Solvent Cement, 200 cc | 2.00 | cans | | |
| | Accessories and Consumables | 1.00 | lot | | |
| | | | | | |
| | Structural Steel Column 6" Dia. G.I. Pipe | 3.00 | pcs | | |
| | 6" Dia. G.I. Pipe, Sch. 40 | 3.00 | pcs | | |
| | Welding Rod | 10.00 | kgs | | |
| | Consumables | 1.00 | lot | | |
| | | | | | |
| | Structural Steel Column 4" Dia. G.I. Pipe | 4.00 | pcs | | |
| | 4" Dia. G.I. Pipe, Sch. 40, 3.60m thk | 4.00 | pcs | | |
| | Welding Rod | 10.00 | kgs | | |
| | Consumables | 1.00 | lot | | |
| | | | | | |
| | Sub-total for Steel and Roofing Works | | | | |
| | | | | | |
| | V. ELECTRICAL WORKS | | | | |
| | PB | 1.00 | set | | |
| | Main: 1-100AT, 2P, MCCB | | | | |
| | Branches: 3-15AT, 2P, MCCB | | | | |
| | 2-20AT, 2P, MCCB | | | | |
| | 3-20AT, 2P, MCCB | | | | |
| | 2-Spare | | | | |
| | In NEMA 12 enclosure/ grounding Bus Bar | | | | |
| | 30mm ² THHN wire | 100.00 | m | | |
| | 8.0mm ² THHN wire | 1.00 | box | | |
| | 5.5mm ² THHN wire | 3.00 | boxes | | |
| | 3.5mm ² THHN wire | 2.00 | boxes | | |
| | 2.0mm ² THHN wire | 3.00 | boxes | | |
| | uPVC pipe, 50mm dia. | 15.00 | pcs | | |
| | uPVC pipe, 25mm dia. | 35.00 | pcs | | |
| | uPVC pipe, 20mm dia. | 75.00 | pcs | | |
| | 50mm dia. MTA adapter with locknut | 8.00 | pcs | | |
| | 25mm dia. MTA adapter with locknut | 18.00 | pcs | | |
| | 20mm dia. MTA adapter with locknut | 36.00 | pcs | | |
| | Long Elbow 50mm dia. | 5.00 | pcs | | |

| | | | | | |
|--|--|--|------|--|--|
| | Long Elbow 25mm dia. | 5.00 | pcs | | |
| | Long Elbow 20mm dia. | 15.00 | pcs | | |
| | Fluorescent Light | 12.00 | pcs | | |
| | 1 gang switch | 3.00 | pcs | | |
| | 3 gang switch | 2.00 | pcs | | |
| | Convenience outlet 2 gang, 3 prong | 8.00 | pcs | | |
| | Convenience outlet 1 gang, 3 prong | 3.00 | pcs | | |
| | Utility Box | 16.00 | pcs | | |
| | Junction Box | 12.00 | pcs | | |
| | Rubber Tape | 1.00 | pcs | | |
| | Electrical Tape | 3.00 | pcs | | |
| | Ground Rod with Clamp, 5/8" x 10' | 1.00 | pcs | | |
| | Termination Assembly | 1.00 | pcs | | |
| | | Sub-total for Electrical Works | | | |
| | | | | | |
| | VI. ARCHITECTURAL WORKS | | | | |
| | TPI Planks Wall Cladding, Berry Brown 8x20x3000 | 12.00 | pcs | | |
| | Steel Gate complete with fabricated handle and hinges, lock and accessories | | | | |
| | 2 x 6 G.I. steel tubular 1.5mm thk | 2.00 | pcs | | |
| | 2 x 2 G.I. steel tubular 1.5mm thk | 35.00 | pcs | | |
| | Steel Matting Gauge 3/16 thk | 16.00 | pcs | | |
| | Accessories and Consumables | 1.00 | lot | | |
| | Stairs and Railings | | | | |
| | 2 x 2 x 4mm thk angle bar | 8.00 | pcs | | |
| | 1½ x 1½ x 4mm thk. angle bar | 6.00 | pcs | | |
| | MS checkered steel plate, 3mm thk | 136.00 | kg | | |
| | 1½ G.I. pipe, sch 40 | 16.00 | pcs | | |
| | 3" G.I. pipe, sched 40 | 1.00 | pcs | | |
| | 12mm anchor bolt with nut and washers | 4.00 | pcs | | |
| | Consumables | 1.00 | lot | | |
| | Signages | | | | |
| | Built-up Acrylic Letters, non-illuminated, 50mm thick | 1.00 | lot | | |
| | Labels (for cubicles) | 1.00 | lot | | |
| | | Sub-total for Architectural Works | | | |
| | | | | | |
| | VII. PAINTING WORKS | | | | |
| | Steel Truss, Checkered Plate, pipes and railings, etc | | | | |
| | Red Oxide Primer | 12.00 | gals | | |
| | Quick-Dry Enamel (Black) | 18.00 | gals | | |
| | Paint thinner | 8.00 | gals | | |
| | Walls | | | | |
| | Permacoat Latex Paint, finish | 12.00 | gals | | |
| | Spot Putty | 7.00 | gals | | |
| | Permacoat Flat Latex, White (Primer) | 7.00 | gals | | |
| | Consumables for Painting Works | 1.00 | lot | | |
| | | Sub-total for Painting Works | | | |
| | | TOTAL BID COST | | | |
| | Amount in Words: | | | | |
| | | | | | |
| | Submitted by: | | | | |
| | | | | | |
| | Name of Contractor | | | | |
| | 82 | | | | |
| | | | | | |
| | Date | | | | |
| | | | | | |

Section IX. Checklist of Technical and Financial Documents

Checklist of Technical and Financial Documents

I. TECHNICAL COMPONENT ENVELOPE

Class “A” Documents

Legal Documents

- (a) Valid PhilGEPS Registration Certificate (Platinum Membership) (all pages);
or
- (b) Registration certificate from Securities and Exchange Commission (SEC), Department of Trade and Industry (DTI) for sole proprietorship, or Cooperative Development Authority (CDA) for cooperatives or its equivalent document;
and
- (c) Mayor’s or Business permit issued by the city or municipality where the principal place of business of the prospective bidder is located, or the equivalent document for Exclusive Economic Zones or Areas;
and
- (e) Tax clearance per E.O. No. 398, s. 2005, as finally reviewed and approved by the Bureau of Internal Revenue (BIR).

Technical Documents

- (f) 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; **and**
- (g) Statement of the bidder’s Single Largest Completed Contract (SLCC) similar to the contract to be bid, except under conditions provided under the rules;
and
- (h) Philippine Contractors Accreditation Board (PCAB) License;
or
Special PCAB License in case of Joint Ventures;
and registration for the type and cost of the contract to be bid; **and**
- (i) 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; **and**
- (j) Project Requirements, which shall include the following:
 - a. Organizational chart for the contract to be bid;
 - b. List of contractor’s key personnel (*e.g.*, Project Manager, Project Engineers, Materials Engineers, and Foremen), to be assigned to the contract to be bid, with their complete qualification and experience data;
 - 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**

- (k) Original duly signed Omnibus Sworn Statement (OSS); **and** if applicable, Original Notarized Secretary's Certificate in case of a corporation, partnership, or cooperative; or Original Special Power of Attorney 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

- (l) The prospective bidder's audited financial statements, showing, among others, the prospective bidder's total and current assets and liabilities, stamped "received" by the BIR or its duly accredited and authorized institutions, for the preceding calendar year which should not be earlier than two (2) years from the date of bid submission; **and**
- (m) The prospective bidder's computation of Net Financial Contracting Capacity (NFCC).

Class "B" Documents

- (n) 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; **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

- (o) Original of duly signed and accomplished Financial Bid Form; **and**

Other documentary requirements under RA No. 9184

- (p) Original of duly signed Bid Prices in the Bill of Quantities; **and**
- (q) Duly accomplished Detailed Estimates Form, including a summary sheet indicating the unit prices of construction materials, labor rates, and equipment rentals used in coming up with the Bid; **and**
- (r) Cash Flow by Quarter.

Important:

For some of the above forms, templates are provided through this link:

<https://www.gppb.gov.ph/downloadables.php>

