Republic of the Philippines
PROVINCE OF LA UNION
City of San Fernando

Procurement of INFRASTRUCTURE PROJECT

Construction of a Permanent Triage/Waiting Area of Bacnotan District Hospital, Bacnotan, La Union

INFRA-23-15-DF-008

September 9, 2024

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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

Republic of the Philippines
PROVINCE OF LA UNION
City of San Fernando

Invitation to Bid for the *Construction of a Permanent Triage/Waiting Area of Bacnotan District Hospital, Bacnotan, La Union*

1. The ***Provincial Government of La Union***, through the ***Development Fund (DF)*** intends to apply the sum of ***₱5,000,000.00*** being the Approved Budget for the Contract (ABC) to payments under the contract for ***Construction of a Permanent Triage/Waiting Area of Bacnotan District Hospital, Bacnotan, La Union / INFRA-23-15-DF-008***. Bids received in excess of the ABC shall be automatically rejected at bid opening.

2. The ***Provincial Government of La Union*** now invites bids for the above Procurement Project. Completion of the Works is required ***150 calendar days***. Bidders should have completed a contract similar to the Project. The description of an eligible bidder is contained in the Bidding Documents, particularly, in Section II (Instructions to Bidders).

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 ***Provincial Government of La Union*** and inspect the Bidding Documents at the address given below from ***Monday to Friday at 8:00 AM to 5;00 PM***.

5. A complete set of Bidding Documents may be acquired by interested bidders on ***September 9 – October 1, 2024*** from given address and website/s below upon payment of the applicable fee for the Bidding Documents, pursuant to the latest Guidelines issued by the GPPB, in the amount of ***P5,000.00***. The Procuring Entity shall allow the bidder to present its proof of payment for the fees in person, by facsimile, or through electronic means.

6. The ***Provincial Government of La Union*** will hold a Pre-Bid Conference on ***September 17, 2024*** at the ***BAC Conference Room, Provincial Capitol, San Fernando City, La Union*** which shall be open to prospective bidders.

7. Bids must be duly received by the BAC Secretariat through manual submission at the office address as indicated below. Late bids shall not be accepted.

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

9. Bid opening shall be on ***October 1, 2024*** at the given address below ***BAC Conference Room, Provincial Capitol, San Fernando City, La Union.*** Bids will be opened in the presence of the bidders' representatives who choose to attend the activity.

10. The ***Provincial Government of La Union*** 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:

    PGLU-BAC Secretariat
    BAC Conference Room
    Provincial Capitol, Brgy. II
    City of San Fernando, Province of La Union
    Email Add: pglu_bacsu@launion.gov.ph
    Telefax No. (072) 242-5550 Loc. 249
    www.launion.gov.ph

12. You may visit the following websites:

    For downloading of Bidding Documents: *https://launion.gov.ph/infrastructure-3/*

September 9, 2024

SGD.

RESSIE A. ESTRELLA
Chairperson, Bids and Awards Committee (BAC)

Section II. Instructions to Bidders

1. Scope of Bid

The Procuring Entity, ***Provincial Government of La Union*** invites Bids for the **Construction of a Permanent Triage/Waiting Area of Bacnotan District Hospital, Bacnotan, La Union** with Project Identification Number ***INFRA-23-15-DF-008.***

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

2. Funding Information

2.1. The GOP through the source of funding as indicated below for ***Development Fund*** in the amount of ***₱5,000,000.00***.

2.2. The source of funding is LGUs, the Annual or Supplemental Budget, as approved by the Sanggunian.

3. Bidding Requirements

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

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

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

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

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

5. Eligible Bidders

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

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

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

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

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

6. Origin of Associated Goods

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

7. Subcontracts

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

The Procuring Entity has prescribed that:

a. Subcontracting is not allowed.

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 at the BAC Conference Room, Provincial Capitol, San Fernando City, La Union 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. In case of joint ventures, a special PCAB License, and registration for the type and cost of the contract for this Project, shall be required. 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 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 *January 29, 2025*. 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	
5.2	For this purpose, contracts similar to the Project refer to contracts which have the same major categories of work, which shall be: *Building Construction*
7.1	*n/a*
10.3	*n/a*
10.4	The key personnel must meet the required minimum years of experience set below: <u>Key Personnel</u> — <u>General Experience</u> — <u>Relevant Experience</u> 1. Project Engineer — 5 years — 3 years 2. Materials Engineer — 3 years — 3 years
10.5	The minimum major equipment requirements are the following: <u>Equipment</u> — <u>Capacity</u> — <u>Number of Units</u> Dump Truck — 1 Water Truck — 1 One Bagger Mixer — 1 Bar Cutter — 1 Bar Bender — 1 Minor Tools — 1
12	*n/a*
15.1	The bid security shall be in the form of a Bid Securing Declaration or any of the following forms and amounts: a. The amount of not less than ***₱100,000.00***, 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 ***₱250,000.00*** if bid security is in Surety Bond.
19.2	Partial bid is not allowed. The infrastructure project is packaged in a single lot and the lot shall not be divided into sub-lots for the purpose of bidding, evaluation, and contract award.
20	*None*
21	Additional contract documents relevant to the Project: 1. Construction Schedule and S-curve, 2. Manpower Schedule, 3. Construction Methods, 4. Equipment Utilization Schedule, and 5. Construction safety and health program approved by the DOLE

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	*n/a*
3.1	Within 10 calendar days after receipt of the Notice to Proceed (NTP)
6	The site investigation reports are: ***Certificate of Site Inspection***
7.2	*Fifteen (15) years*
10	No dayworks are applicable to the contract.
11.1	The Contractor shall submit the Program of Work to the Procuring Entity's Representative within 15 days of delivery of the Notice of Award.
11.2	The amount to be withheld for late submission of an updated Program of Work is P10,000.00.
13	The amount of the advance payment is 15% of the total contract price.
14	Materials and equipment delivered on the site but not completely put in place shall be included for payment.
15.1	The date by which operating and maintenance manuals are required is ***March 13, 2025*** The date by which "as built" drawings are required is ***March 28, 2025***.
15.2	The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals by the date required is ***P20,000.00***.

Section VI. Specifications

B.5 – PROJECT BILLBOARD /SIGNBOARD

Description

This Item shall consist of furnishing and installing project billboard in accordance with this Specification and details shown on the Plans, or as required by the Engineer.

The project billboard shall comply in all respects with the "COA Circular No. 2013-004" dated January 30, 2013. The information and publicity on projects of Government Agencies including Foreign Funded Projects are being guided by this Circular.

The project billboard will be erected as soon as the award has been made. It will be located at the beginning and at the end of the subproject throughout the project duration.

The size, materials and design to be used for the project signboard will specifically adhere to the General Guidelines No. 2.2.3 of the Circular while the content of the information shall conform to the General Guidelines No. 2.2.6 and the sample format shown in "Annex A" of the Circular.

Material Requirements

Tarpaulin

The design and format of the tarpaulin shall have the following specifications:

Color : White

Size : 8 ft. x 8 ft.

Resolution : 70 dpi

Font : Helvetica

Font Size of Main Information : 3 inches

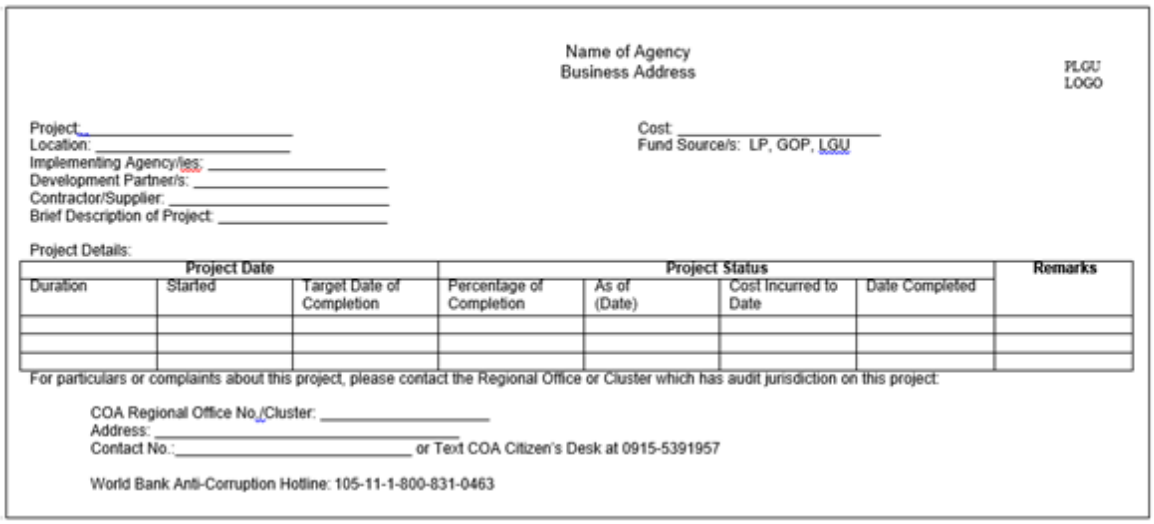
Font Size of Sub-Information : 1 inch

Font Color : Black

Suitable Frame: Rigid wood frame with post; and

Posting: Outside display at the project location after award has been made.

ANNEX 14
PROJECT BILLBOARD



Name of Agency
Business Address

PLGU
LOGO

Project: _____
Location: _____
Implementing Agency/ies: _____
Development Partner/s: _____
Contractor/Supplier: _____
Brief Description of Project: _____

Cost: _____
Fund Source/s: LP, GOP, LGU

Project Details:

Project Date			Project Status				Remarks
Duration	Started	Target Date of Completion	Percentage of Completion	As of (Date)	Cost Incurred to Date	Date Completed	

For particulars or complaints about this project, please contact the Regional Office or Cluster which has audit jurisdiction on this project:

COA Regional Office No./Cluster: _____
Address: _____
Contact No.: _____ or Text COA Citizen's Desk at 0915-5391957

World Bank Anti-Corruption Hotline: 105-11-1-800-831-0463

The information shall contain but not limited to i.) logo of the funding agencies, ii.) the name of implementing agencies, iii.) name of contractor, iv.) subproject's title, location, cost and description, v.) project details to include duration, date started, target date of completion and project status, and vi.) COA and WB Anti-corruption Hotline.

The display/and or affixture of the picture, image, motto, logo, color motif, initials or other symbol or graphic representation associated with the top leadership of the project proponent or implementing agency/unit/office, on project billboard, is considered unnecessary. (General Guidelines No. 2.2.6)

Post and Frame

Posts and frames/braces shall be made from good lumber with a 2X3 and 2x2 inches size respectively and shall be well-seasoned, straight and free of injurious defects. The frame will be covered with 2 pieces ¼ inch thick marine plywood where the tarpaulin will be attached.

Concrete Foundation Blocks

The concrete for the foundation blocks shall be Class A in accordance with Item 405, Structural Concrete and shall be of the size shown on the Plans.

Construction Requirements

Excavation and Backfilling

Holes shall be excavated to the required depth to the bottom of the concrete foundation as shown on the Plans.

The space around the post shall be backfilled to the ground line with approved material in layers not exceeding 100 mm and each layer shall be moistened and thoroughly compacted. Surplus excavated material shall be disposed of by the Contractor as directed by the Engineer.

Erection of Posts

The posts shall be erected vertically in position inside the formwork of the foundation block prior to the placing of the concrete and shall be adequately supported by bracing to prevent movement of the post during the placing and setting of concrete. The posts shall be located at the positions shown on the Plans.

Tarpaulin Installation

Tarpaulin shall be installed in accordance with the details shown on the Plans. The frame should be covered with the marine plywood before the tarpaulin is attached.

Method of Measurement

The quantities of project billboard shall be in pieces of such signs of the size specified, including the necessary posts and supports erected and accepted.

Basis of Payment

The quantities measured as determined in the Method of Measurement, shall be paid for at the contract unit price for the Pay Items shown in the Bid Schedule which price and payment shall be full compensation for furnishing and installing project billboard, for excavation, backfilling and construction of foundation blocks, and all labor, equipment, tools and incidentals necessary to complete the Item.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
B.5	Project Billboard	Each

B.7 - OCCUPATIONAL SAFETY AND HEALTH PROGRAM

B.7.1 Description

This Item covers the implementation of construction safety in all stages of project procurement (design, estimate, construction and maintenance), requirements, provisions, and instructions for the guidance of the Engineer.

B.7.2 Construction safety and Health Program (CSHP)

Every construction project shall have suitable and approved Construction Safety and Health Program (CSHP) as required in all projects regardless of amount, funding source and mode of implementation which shall comply with the minimum safety and health requirements as specified in the Occupational Safety and Health Standards.

The required CHSP shall include but not limited to the following:

1. Composition of the Safety and Health personnel responsible for the implementation of CSHP.
2. Specific safety policies which shall be undertaken in the construction site, including frequency of and persons responsible for conducting toolbox and gang meetings.
3. Penalties and sanction for violation of the CSHP.
4. Frequency, content and persons responsible for orienting, instructing and training all workers at the site with regard to the CHSP which they operate.
5. The manner of disposing waste arising from the construction

B.7.3 Construction Safety and Health Personnel

At the start of the project, the Contractor shall have an established construction safety and health committee composed of the following personnel:

1. Project Manager/Project Engineer

The Contractor must provide for a full time Project Manager/Project Engineer, who is tasked to observe, monitor and supervise if the enforcement of CSHP was being followed strictly and correctly.

2. Safety Engineer/Officer

The General Contractor must provide for a full time Officer, who shall be assigned as the General Construction Safety and Health Officer to oversee and enforce full time the overall management of the Construction Safety and Health Program (CSHP). Furthermore, deployment of part-time or full-time safety man depending on the number of workers shall be complied in accordance with Rule 1033 of the Occupational Safety and Health Standards (OSHS) and applicable provisions under Section 7.0, Safety Personnel of Department of Labor and Employment (DOLE) D.O. 13, Series of 1998.

3. Health Personnel

The Contractor's health personnel may be full time or part time certified first-aider, registered nurse, physician and dentist depending on the total number of workers conforms with Section 8.0, Emergency Occupational Health Personnel and Facilities or DOLE D.O. 13, Series of 1998.

4. Safety Practitioner

The Contractor must provide a full time or part time Safety Practitioner, who shall initiate and supervise safety and health training for employees.

B.7.4 Supervision, Control and Monitoring

Overall supervision, control and monitoring of the implementation of CSHP for projects undertaken by administration/contracts shall be under the implementing office.

B.7.5 Construction Safety and Health Training

The Construction Safety and Health seminar (COSH) shall be a 40 hrs. training course as prescribed by the DOLE-Bureau of Working Conditions (BWC). All safety personnel involved in a construction project shall be required to complete such basic training course.

The Contractor shall provide continuing construction safety and health training to all technical personnel under his organization. Continuing training shall be a minimum of 16 h per year for every full-time safety personnel.

B.7.6 Construction Safety and Health Reports

The Contractor shall be required to submit a monthly construction safety and health report to the Department of Labor and Employment (DOLE) Regional Office concerned. The report shall include a monthly summary of all safety and health committee meeting agreements, a summary of all accident investigations/reports and periodic hazards assessment with the corresponding remedial measures/action for each hazard.

In case of any dangerous occurrence or major accident resulting in death or permanent total disability, the concerned employer shall initially notify the DOLE Regional Office within 24 hours from occurrence. After the conduct of investigation by the concerned construction safety and health officer, the employer shall report all permanent total disabilities to DOLE Regional Office on or before the 20th of the month following the date of occurrence of accident using the DOLE Employer's Work Accident Illness Report.

B.7.7 Personnel Protective Equipment (PPE) and Devices

The Contractor shall furnish his workers with protective equipment for eyes, face, hands and feet, lifeline, safety belt/harness, protective shields and barriers whenever necessary by reason of the hazardous work process or environment, chemical or radiological or other

mechanical irritants of hazards capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical agent.

All PPE and Devices shall be in accordance with the requirements of the Occupation Safety and Health Standards (OSHS) and should pass the test conducted and/or standards set by the Occupational Safety and Health Center (OSHC).

For General Construction Work, the required basic PPEs for all workers shall be safety helmet, safety gloves and safety shoes. Specialty PPEs shall be provided to workers in addition to or in lieu of the corresponding basic PPE as the work or activity requires. Workers within the construction project site shall be required to wear the necessary PPE at all times. Moreover, all other persons who are either authorized or allowed to be at a construction site shall also wear appropriate PPEs.

Construction workers who are working from unguarded surfaces 6 m or more above water or ground, temporary or permanent floor platform, scaffold or where they are exposed to the possibility of falls hazardous to life or limb, must be provided with safety harnesses and life lines.

B.7.8 Signages and Barricades

Construction Safety Signages and Barricades shall be provided as a precaution and to advice the workers and the general public of the hazards existing in the worksite. Signages shall be posted in prominent positions at strategic location and as far as practicable, be in the language understandable to most of the workers employed. For road projects, it shall be in accordance with the DPWH Road Works Safety Manual.

B.7.9 Facilities

The Contractor shall provide the following welfare facilities in order to ensure humane working conditions:

1. Adequate supply of safe drinking water;

2. Adequate sanitary and washing facilities;

3. Suitable living accommodation of workers and as may be applicable for their families; and

4. Separate sanitary, washing and sleeping facilities for men and women workers.

The services of a full-time registered nurse, a full-time physician, a dentist and an infirmary or emergency hospital with one (1) bed capacity when the number of employees exceed three hundred (300). In addition, there should be one (1) bed capacity for every one hundred (100) employees in excess of three hundred (300).

B.7.10 Costing

The cost for the implementation of construction safety and health shall be integrated to the overall project cost under the prescribed pay item. In consideration of the cost involved of providing the necessary safety equipment and manpower for an effective implementation of safety in the workplace, the following shall be used as a guide:

1. Personal Protective Equipment (PPE)

The PPEs shall be provided by the Contractor, and its cost shall be duly quantified and made part of the overall cost of Item B.7, Occupational Safety and Health. The use of PPEs shall conform to Section B.7.7 Personal Protective Equipment and Devices.

2. Clinical Materials and Equipment

Clinical material and equipment such as medicines, beds and linens, other related accessories shall be to the account of the Contractors implementing the project and shall be in accordance with the Rule 1960, Occupational Health Services of OSHS.

3. Signages and Barricades

The quantities and cost of signages and barricades necessary for a specific item of work shall be quantified and made part of that particular pay item of work. For general signages and barricades not included in specific pay item of work but necessary for promoting safety in and around the construction site, the quantities and cost shall be a separate pay item and included in the overall cost of Item B.7, Occupational Safety and Health.

4. Facilities

Facilities such as portable toilets, waste disposal, sanitary and washing facilities, convenient dwelling and office, adequate lighting, and other facilities related to construction safety and health shall be in accordance with OSH Standards and previously approved guidelines of the Department and shall be quantified and the cost thereof be made a separate pay item under "Facilities for the Engineers" and "Other General Requirements" as required in the DPWH Standard Specifications.

5. Salaries

Labor cost for the medical and safety personnel actually assigned in the field shall be included in the overall cost of Item B.7, Occupational Safety and Health. Manpower cost shall be established based on the cost of labor in the area. Duration of employment shall be based on project duration of the particular project.

6. Safety and Health Training

Cost associated for the provision of basic and continuing construction safety and health training to all safety and technical personnel shall be made part of the indirect/overhead cost of the project.

B.7.11 Safety on Construction during Heavy Equipment Operation

In relation to heavy equipment operation in all construction sites, the following are required in the different phases of the project.

1. Pre-Construction

The Contractor must ensure that appropriate certification is obtained from DOLE duly accredited organizations for the following:

a. All heavy equipment operators assigned at the project site must be tested and certified in accordance with a standard trade test prescribed by Technical Education and Skills Development Authority (TESDA) in coordination with its accredited organization.

b. All heavy equipment must be tested and certified in accordance with the standards prepared by DOLE or its recognized organization prior to commissioning of said equipment.

2. During Construction

The Contractor must ensure that the following conditions are met or complied with:

a. For mobilization or transport of heavy equipment, load restrictions, height and width clearances as imposed by Department for all roads and bridges to be utilized during transport. Moreover, only duly certified operators are allowed to load and unload heavy equipment to low-bed trailer.

b. During erection and set-up of heavy equipment, existing hazards must be avoided. Standard checklist of steps and procedures must be observed. List of necessary equipment, tools and materials must be available and properly utilized.

c. In the interest of accident prevention, duly certified mechanics and operators shall conduct daily routine inspection of all heavy equipment deployed at the site in accordance with standards set by TESDA in coordination with the Association of Construction Equipment Lessors (ASCEL, Inc.). During routine inspection all equipment which do not comply with the minimum safety standards for equipment certification shall be immediately removed from the work site for restoration or repair until they meet said standards or requirements. The Contractor and the equipment owner shall maintain a separate logbook for data on maintenance, repair, tests and inspections for each heavy equipment. Such logbook shall be used as a necessary reference during the conduct of equipment inspection.

3. Post Operation and Post Construction

The procedures for dismantling and demobilization of heavy equipment shall follow the same requirements as listed under provisions of mobilization or transport of heavy equipment and erection and set-up of heavy equipment.

B.7.12 Violations and Penalties

The Contractor if found violating safety rules and regulations shall be meted sanctions depending on the gravity of offense. The amount corresponding to non-compliance shall be deducted from the contractor's billing.

***The following shall be the minimum requirements for the approval of a Construction Safety and Health Program (CSHP) under the* Department of Labor and Employment (DOLE) Department Order No. 13, Series 1998.**

1.1 Company Safety and Health Policy. The following shall apply:

A Company Safety Policy which shall serve as the general guiding principles in the implementation of safety and health on site duly signed by the highest company official or his duly authorized representative who has the over---all control of project execution and should include the contractor's general policy towards occupational safety, worker's welfare and health, and environment.

A Safety policy, which shall include the commitment that the contractor shall comply with DOLE minimum safety requirements, including reporting requirements of the Occupational Health and Safety Standards (OSHS), and other relevant DOLE issuances. These may include, but are not limited to the following:

a. Registration (Rule 1020 and DO 18---02)
b. Report of Safety Committee Organization (Rule 1040)
c. Notification of Accidents and Occupational Illnesses (Rule 1050)
d. Annual Work Accident/Illness Exposure Data Report (Rule 1050)
e. Application for installation of mechanical/electrical equipment for construction of structure for industrial use (Rule 1070 and 1160)
f. Annual Medical Report (Rule 1960)

1.2 Specific Construction Safety and Health Program shall contain the tendering agency's requirements in addition to the minimum requirements under the appropriate sections of D.O. No. 13 whenever deemed as applicable.

1.3 Composition of Construction Safety and Health Committee.

A structure and membership of the construction safety and health committee which shall be consistent with the minimum requirements of Section 11 of D.O. 13, series of 1998.

***1.4 Safety and Health Personnel*.** The following shall apply:

a. All appointed first---aiders shall be duly trained and certified by the Philippine National Red Cross and shall possess a Certificate of Basic First Aid Training Course (Standard) with a valid PNRC ID Card.
b. All appointed Safety Officers shall have completed the 40---hour BWC prescribed safety and health course as required by Rule 1030 of the OSHS, as amended by D.O. 16. All full---time safety personnel shall be accredited by the BWC pursuant to D.O. 16.

c. All physicians and nurses assigned at the project site shall have completed the Bureau prescribed course on occupational safety and health course, pursuant to Rule 1960 of the OSHS.

1.5 Specific duties and responsibilities of the Safety Officer. The following shall apply:

a. Specific duties and responsibilities shall comply with the outlined duties and responsibilities in Rule 1047 of the OSHS; and

b. Procedure on the required performance of the assigned duties and responsibilities of safety officers in the construction site.

1.6 Applicable In---plant Safety and Health Promotion and Continuing Information Dissemination. The following shall apply:

a. Detailed information dissemination or advisories to the new employees prior to on---site assignment, e.g. conduct of safety orientation, company's health and safety policies, hazards related to the job safety measures, safe work procedures.

b. Detailed programs on continuing education such as trainings and seminars, if any, that shall be given to employees, e.g. BOSH, refresher course, first aid training, refresher course toolbox meeting, construction safety training for site safety officers, 80---hour advance safety course prescribe.

c. Arrangements for conveying information on safety and health IEC materials e.g. Posters/komics/flyers, safety signages, handbooks/manuals, bulletin boards

d. Arrangements for setting up sub---committees on safety and health, where necessary.

e. Schedule of safety related activities, e.g. toolbox meeting, health and safety committee meeting

1.7 Accident and incident investigation, recording, and reporting. The following shall apply:

a. All accidents or incidences shall be investigated and recorded.

b. All work related accidents resulting to disabling injuries and dangerous occurrences as defined in OSH Standards (Rule 1050) shall be reported.

c. Responsible or duly authorized officer for accident or incident investigation recording and reporting who are either the employer/owner/project manager/safety officer

d. Accident Report shall contain the minimum information as required in DOLE/BWC/OHSD/IP---6.

e. Shall notify the appropriate DOLE Regional within 24 hours in case of fatal accidents. An accident investigation shall be conducted by the Regional Office within forty eight (48) hours after receipt of initial report of the employer.

1.8 Provisions for the protection of the general public within the vicinity of the company premises during construction and demolition. The following shall apply:

a. Measures in order to ensure the safety of the general public shall be pursuant to Rule 11 of the National Building Code---Implementing Rules and Regulations: Protection of Pedestrians During Construction or Demolition

b. Appropriate provisions and rules of OSHS

--- Rule 1412.09: Protection of the Public

--- Rule 1412.12: Protection against collapse of Structure

--- Rule 1412.16: Traffic Control

--- Rule 1413: Excavation

--- Rule 1417: Demolition

--- Rule 1060: Premises of Establishments

--- D.O. 13, Section 9: Construction Safety Signs

--- Other relevant provisions of OSHS.

***1.9 General safety within construction premises*.** The following shall apply:

The provisions for danger signs, barricades, and safety instructions for workers, employees, public, and visitors such as, housekeeping; walkway surfaces; means of access i.e. stairs, ramps, floor openings, elevated walkways, runways and platforms; and, light.

1.10 Environmental Control (Rule 1070 of the Standards). The following shall apply:

a. Monitoring and control of hazardous noise, vibration and air---borne contaminants such as gases, fumes, mists and vapors.

b. Provisions to comply with minimum requirements for lighting, ventilation and air movement.

1.11 Guarding of hazardous machinery (Rule 1200 of the Standards). The following shall apply:

a. Provisions for installation/design of built---in machine guards.

b. Provisions for built---in safety in case of machine failure.

c. Provisions for guarding of exposed walkways, access---ways, working platforms.

1.12 Provisions for and use of Personal Protective Equipment (PPE) --- (Rule 1080 of the Standards). The following shall apply:

a. Appropriate types and duly tested PPEs to be issued to workers after the required training on their use.

b. Provisions for maintenance, inspection and replacement of PPEs.

c. In all cases the basic PPE commonly required for all types of construction projects are hard hats, safety shoes and working gloves. Other PPEs shall be required depending on the type of work and hazards.

1.13 Handling of Hazardous Substances – (Rule 1090 of the Standards). The following shall apply:

Provision for identification, safe handling, storage, transport and disposal of hazardous substances and emergency procedure in accordance with Material Safety Data Sheet (MSDS) in cases of accidents.

1.14 General materials handling and storage procedures. – (Rule 1150 of the Standards). The following shall apply:

--- Safe use of mechanical materials handling equipment

--- Secured and safe storage facilities

--- Regular housekeeping as necessary so as not to constitute and/orresent hazards

--- Clearly marked clearance limits

--- Proper area guarding of storage facilities

1.15 Installation, use and dismantling of hoist and elevators.---Rule 1415.10 Testing and Examination of Lifting Appliance, Rule 1220 Elevators and Related Equipment. The following shall apply:

a. Provisions to ensure safe installation, use and dismantling of hoist and elevator;

b. Periodic inspection of hoists and elevators.

1.16 Testing and inspection of electrical and mechanical facilities and equipment. The following Rules of the Occupational Safety and Health Standards shall apply: **Rule Coverage**

a. Rule 1160 --- Boiler

b. Rule 1170 --- Unfired Pressure Vessels

c. Rule 1210 --- Electrical Safety

d. Rule 1220 --- Elevators and Related Equipment

e. Rule 1410 --- Construction Safety

f. Rule 1415.10 – Training and Examination of Lifting Appliance

1.17 Workers skills and certification. The following shall apply:

a. Provisions to ensure that workers are qualified to perform the work safely.

b. Provisions to ensure that only qualified operators are authorized to use and operate electrical and mechanical equipment.

1.18 Provisions for emergency transportation facilities for workers. The following shall apply:

Rule 1963.02 of the Occupational Safety and Health Standards – Emergency Medical and Dental Services

1.19 Fire Protection Facilities and Equipment. The following rule shall apply:

a. Fire protection facilities and equipment as required under Rule 1940 of the OSHS

b. Proposed structure and membership of fire brigade

c. Provision for training on emergency preparedness

1.20 First aid and health care medicines, equipment and facilities.

a. Identification of the proposed first aid and health care facilities that the employer shall provide satisfying the minimum requirements of OSHS.

b. Identification of the medical and health supplies, such as medicines and equipment to be provided.

c. In all cases, the provision of first aid medicines and emergency treatment shall be mandatory.

d. In the absence of the required on site health care facilities, the employer shall attach a copy of a written contract with a recognized emergency health provider as required under the OSHS.

1.21 Workers Welfare Facilities. The following shall apply:

a. Provisions for toilet and sanitary facilities

b. Proposed bathing, washing, facilities

c. Proposed facilities for supplying food and eating meals

d. Proposed facilities for supplying potable water for drinking and for washing

e. Proposed facilities for locker rooms, storing and changing of clothes for workers.

1.22 Proposed Hours of Work and Rest and Rest Breaks. The following shall apply:

a. Work schedules, working hours, shifting schedules

b. Frequency and length of meals and breaks

c. Schedule of rest periods

1.23 Waste Disposal. The following shall apply:

a. Proposed method of clearing and disposal of waste.

b. Provisions for permits and clearance where require in disposal of hazardous wastes.

1.24 Disaster and Emergency Preparedness Contingency

1.25 Safety Program . The Safety Programs shall contain the following:

a. Standard work procedures.

b. Job hazard analysis for the following activities as applicable to the project.

c. Other hazardous work, not outline herein but will be performed during project execution must also be included.

The activities may consist of any number of the following, depending on the nature of the project, vis---à---vis exposure to hazards:

a. Site Clearing

b. Excavations

c. Erection and dismantling of scaffolds and other temporary working platforms
d. Temporary electrical connections/installations
e. Use of scaffolds and other temporary working platforms
f. Working at unprotected elevated working platforms or surfaces
g. Work over water
h. Use of power tools and equipment
i. Gas and electric welding and cutting operations
j. Working in confined spaces
k. Use of internal combustion engines
l. Handling hazardous and/or toxic chemical substances
m. Use of hand tools
n. Working with pressurized equipment
o. Working in hot or cold environments
p. Handling, storage, usage and disposal of explosives
q. Use of mechanized lifting appliances for movement of materials
r. Use of construction heavy equipment
s. Demolition

The hazard analysis shall contain the following:

a. Identification of possible hazards for a particular activity.
b. Identification of any company permits or clearances needed prior to the performance of the activity together with the name of person/s who is authorized to issue such permit or clearance.
c. Identification of the proposed improvement in work standard procedures that shall be followed during implementation of a particular activity.
d. Company inspection procedures to ensure safety during the execution of a particular activity.
e. Identification of emergency procedures in case of accidents or any untoward incident while performing a particular activity.

1.26 **Company Penalties/Sanctions for Violation/s of the Provision/s of Safety and Health Program –** The appropriate penalties or sanctions for violation of company rules and regulations or those stipulated in the CHSP and the observance of due process.

2. Personal Protective Equipment by Type of Project

2.1 General Building Construction Project (GBC). The following classifications shall apply:

Classification: Air Navigation Facilities, Power Transmission & Distribution, Building and Housing, Communication facilities, Sewerage, water treatment plants and Site/Land development.

2.2 General Engineering Construction Project. The following classifications shall apply:

Classifications: Roads and Airports (Horizontal structure), bridges, irrigation system, flood control and drainages, dams, tunneling, ports and harbor, water supply

2.3 Specialty Construction Project. The following classifications shall apply:

Classifications: Electrical work, mechanical work, plumbing and sanitary work, air conditioning or refrigeration, water proofing work, painting work, communication facilities, foundation or piling work, structural steel work, concrete pre---cast, elevator or escalator, well drilling work, navigational equipment and instrument installation, electromechanical work, metal roofing and siding installation, structural demolition and landscaping.

3. Safety Personnel and Skilled Worker. The following shall apply: 3.1 **Minimum Required Safety Personnel.** The following shall apply:

a. The General Constructor shall provide for a full time officer, who shall be assigned as the general construction safety and health officer to oversee full time the overall management of the Construction Safety and Health Program.

b. The General Constructor shall provide for additional Construction Safety and Health Officer/s in accordance with the requirements for Safety Officer of D.O. 16, s. 2001, depending of the total number of personnel assigned to the construction project site.

c. The General Constructor shall provide for one (1) Construction Safety and Health Officer for every ten (10) units of heavy equipment assigned to the project site.

d. Each construction contractors/subcontractors shall provide for the required number of safety officers in accordance with the requirements of D.O. 16 series 2001.

3.2 Qualification and Training of Safety and Health Personnel and Skilled Workers. The following shall apply:

a. Training of OSH Personnel shall be pursuant to D.O. 16 series of 2001 and its Procedural Guidelines.

b. Worker Skills Certification for the critical operations/occupations shall be pursuant to D.O. 13 and D.O. 19 as well as the TESDA requirements on worker competency.

4. Construction Heavy Equipment. The following shall apply:

4.1 Accreditation of Organization for Testing of Construction Heavy Equipment shall be pursuant to D.O. No. 16 and its Implementing Guidelines and Procedural Guidelines on Accreditation and Performance Audit of Testing Organization for Construction Heavy Equipment.

4.2 Conduct of Inspection and Test of Construction Heavy Equipment shall be pursuant to Sec. 10 of D.O. No. 13 and its Procedural Guidelines. The following shall apply:

a. Procedural Guidelines on Accreditation and Performance Audit of Testing Organization for Construction Heavy Equipment

b. Standard Checklist for Testing and Inspection of Construction Heavy Equipment.

c. Inspection Procedures for DOLE Inspectors

4.3 TESDA Certification Requirements for Operators. Certification for Operators shall be in accordance with the requirements of TESDA on worker competency.

4.4 Monitoring and Evaluation of CHE Test/Inspection conducted shall be pursuant to the Procedural Guidelines on Accreditation and Performance Audit of Testing Organization for Construction Heavy Equipment.

5. Signages and Barricades. The following shall apply:

Construction Safety Signages shall be provided as a precaution and to advise the workers and the general public of the hazards existing in the worksite.

5.1 Signage Procedures: The signages shall be:

a. Posted in prominent positions and at strategic locations.

b. As far as practicable, be in the language understandable to most of the workers employed in the site.

c. For non---raised floor areas, the attached yellow CAUTION sign shall be used when using yellow CAUTION tape.

d. For non---raised floor areas , the attached red DANGER sign shall be used when using the red DANGER tape.

e. Placed in designated areas at four (4) feet from ground level, if there are no other more practicable height placement.

f. Regularly inspected and maintained in good condition to achieve its purpose. Signages that are damaged; illegible or that no longer apply as to purpose, site or language, shall be removed or be replaced by the safety officer when needed.

g. Removed after the hazard is completely eliminated. If upon work completion the hazard is still present, the signage shall remain in place.

h. Designed and constructed following the Overall Dimensions of Safety Signs Formula as required by the OSHS

i. Specific with the type of hazard and should indicate the name of the contaminant/ substance involved (for chemical hazards), and the type of PPE or respiratory equipment to be worn.

5.2 Posting of Signages shall include, but not limited to the following places:

a. Areas where there are risks of falling objects.

b. Areas where there are risks of falling, slipping, tripping among workers and the public

c. Prior to entry in project sites, locations and its perimeter.

d. Where there is mandatory requirement on the usage of PPEs.

e. Areas where explosives and flammable substances are used or stored

f. Approaches to working areas where danger from toxic or irritant airborne contaminants/ substances may exist,

g. All places where contact with or proximity to electrical facility/equipment can cause danger

h. All places where workers may come in contact with dangerous moving parts of machinery or equipment

i. Locations of fire alarms and fire---fighting equipment

j. Locations for instructions on the proper usage of specific construction equipment, tools.

5.3 Barricading Procedures: The following shall apply:

a. The contractor shall provide all necessary barricades, safety tapes, safety cones or safety lines as required in isolating or protecting an unsafe work area from other workers, pedestrians or vehicular traffic.

b. Barricades shall completely enclose the hazardous area and effectively limit unintentional or casual entry.

c. Barricades shall be three (3) feet vertical height from the ground, when no other more practical height specification is available.

d. Barricades shall be maintained in good condition to achieve its purpose.

e. Barricades that are damaged; faded or that no longer apply as to purpose, site or meaning, shall be removed or shall be replaced by the safety officer.

f. Barricade tape shall not be used on the floor as this presents a slipping hazard of its own.

g. In addition to using the proper warning tape, the contractor shall use the appropriate safety signage when barricading an area.

h. All barricades shall be removed after the hazard is completely eliminated.

i. Upon work completion, if the hazard is still present, the barricade shall remain in place.

5.4 Installation of barricades shall include, but not limited to the following worksites conditions:

a. hazardous areas

b. trip hazard

c. robotic movement

d. energized electrical works

e. overhead suspended load test

f. critical high pressure test

g. chemical introduction

h. fall exposure

i. Emergency Response Zone

j. Unsafe condition zone

k. Danger zone

l. Confined and enclosed space

6. Construction Safety and Health Committee. The following shall apply:

6.1 Composition

a. Project Manager or his representative as chairperson ex---officio

b. General Construction Safety and Health Officer

c. Construction Safety and Health Officers

d. Safety representatives (SAFETY OFFICER) from each subcontractor.

If DOLE's minimum requirements based on the number of workers of the contractor requires only a part time safety officer, the safety officer need not be an accredited safety practitioner or consultant.

e. Doctors, nurses and other health personnel pursuant to the requirements stated in Rule 1042 of the OSHS

f. Workers' representatives

If there are no contractor's sub---contractors or the constructor is a subcontractor, the safety and health committee shall be in accordance with the requirements of Rule 1040 of the Occupational Safety and Health Standards.

6.2 Duties and responsibilities

a. The Project Manager or his representative shall act as the Chairperson of the committee.

b. The committee shall conduct safety meetings at least once a month.

c. The persons constituting the Safety and Health Committee shall, as far as practicable, be at the construction site whenever construction work is being undertaken.

d. The committee shall continually plan and develop accident prevention programs.

e. The committee shall review reports of inspection, accident investigation and monitor implementation of the safety program.

f. The committee shall provide necessary assistance to government authorities authorized to conduct inspection in the proper conduct of their activities

g. The committee shall initiate and supervise safety trainings for its employees

h. The committee shall conduct safety inspection at least once a month, and shall conduct investigation of work accidents and shall submit a regular report to DOLE.

i. The committee shall initiate and supervise the conduct of daily brief safety meetings or toolbox meetings.

j. The committee shall prepare and submit to DOLE, reports on said committee meetings.

k. The committee shall develop a disaster contingency plan and organize such emergency service units as may be necessary to handle disaster situations.

7. Construction Safety and Health Reports. The following shall apply:

7. 1 The Construction Safety and Health Report shall include:

a. Monthly summary of all safety and health committee meetings

b. Summary of all accident investigations /reports

c. Corrective/Preventive measures/action for each hazard

d. Periodic hazards assessment with corresponding remedial measures for new hazards

e. Safety promotions and trainings conducted/attended

***7.2 Submission of Reports*.** The following shall apply:

a. All general constructors shall be required to submit a monthly construction safety and health report to the BWC copy furnished the DOLE Regional Office concerned.

b. In case of any dangerous occurrence or major accident resulting in death or permanent total disability, the concerned employer shall notify the appropriate DOLE Regional Office within twenty---four (24) hours from occurrence.

c. After the conduct of investigation by the concerned construction safety and health officer, the employer shall report all disabling injuries to the DOLE Regional Office on or before the 20th of the month following the date of occurrence of accident using the DOLE/BWC/HSD---IP---6 form.

8. Cost of Construction Safety and Health Program. The following shall apply:

8.1 The total cost of implementing a Construction Safety and Health Program shall be mandatory and shall be made an integral part of the project's construction cost as a separate pay item, duly quantified and reflected in the Project's Tender Documents and likewise reflected in the Project's Construction Contract Documents.

8.2 The cost of the following PPEs: helmet, eye goggles, safety shoes, working gloves, rain coats, dust mask, ear muffs, rubber boots, and other similar PPE's shall be indicated/enumerated per cost, per worker, foreman, leadman, jackhammer operator, carpenter, electrician, mason, steelman, painter, mechanic, welder, plumber, heavy equipment operator, physician/inspector, and other such personnel.

8.3 The PPEs shall be sufficient in number for all workers particularly where simultaneous construction activities/operations in different areas are being undertaken.

8.4 The cost of the minimum required inventory of medicines, supplies and equipment as indicated in "Attachment C" of the OHS Standards shall be included.

8.5 The safety personnel manpower cost salaries/wages, benefits shall be included.

8.6 Cost of safety promotions/activities, training conducted and salaries of safety and health personnel, medical personnel employed or engaged by constructor

9. Safety and Health Information. The following shall apply:

9.1 Workers shall be adequately and suitably:

a. Informed of potential safety and health hazards to which they may be exposed at their workplace.

b. Instructed and trained on the measures available for the prevention, control and protection against those hazards.

9.2 Every worker shall receive instruction and training regarding general safety and health common to construction sites which shall include, but not limited to the following:

a. The basic rights and duties of the workers at the construction site.

b. The means of access and egress, both during normal work and in emergency situations.

c. The measures for good housekeeping.

d. The location and proper use of welfare and first---aid facilities.

e. The proper care and use of the items or personal protective equipment and protective clothing provided the workers.

f. The general measures for personal hygiene and health protection.

g. The fire precautions to be taken.

h. The action to be taken in case of any emergency.

i. The requirements of relevant health and safety rules and regulations.

9.3 ***The instruction, training and information materials provided shall be given in a language or dialect understood by the worker.***

Written, oral, visual and participative approaches shall be used to ensure that the worker has understood and assimilated the information.

9.4 Each supervisor or any person e.g. foreman, lead man, gangboss, and other similar personnel shall conduct daily tool box or similar meetings prior to the start of the operations for the day to discuss with the workers and to anticipate safety and health problems related.

9.5 No person shall be deployed in a construction site unless he has undergone a safety and health awareness seminar conducted by safety professionals or accredited organizations or other institutions recognized by DOLE.

9.*6 Specialized instruction and training shall be provided to the following:*

a. Drivers and operators of lifting appliances, transport, earth---moving and materials---handling equipment and machinery; or any equipment of specialized or dangerous nature.

b. Workers engaged in the erection or dismantling of scaffolds.

c. Workers engaged in excavations at least one (1) meter deep or deep enough to cause danger, shafts, earthworks, underground works or tunnels.

d. Workers handling explosives or engaged in blasting operations.

e. Workers engaged in pile---driving.

f. Workers in compressed air cofferdams and caissons.

g. Workers engaged in the erection of prefabricated parts of steel structural frames and tall chimneys, and in concrete work, form work and other such type of work.

h. Workers handling hazardous substances and materials.

i. Workers as signalers and riggers.

j. Other types of workers as may be categorized by TESDA

10. Welfare Facilities. The following shall apply:

The employer shall provide the following welfare facilities in order to ensure humane working conditions:

10.1 Adequate supply of safe drinking water:

a. If the water is used in common drinking areas, it shall be stored in closed containers from which the water is dispensed through taps or cocks. Such containers shall be cleaned and disinfected at regular intervals but not exceeding fifteen (15) days.

b. Notices shall be posted conspicuously in locations where there is water supply that is not for drinking purposes

10.2 Adequate sanitary and washing facilities:

a. Adequate facilities for changing and for the storage and drying of work clothes.

b. Adequate accommodation facilities for taking meals and for shelter.

c. Adequate washing facilities regardless of sex for every 25 employees up to the first 100 and an additional of one (1) facility for every 40 additional workers.

d. Suitable living accommodation for workers and as may be applicable for their families, such as separate sanitary, washing and sleeping facilities for men and women workers.

10.3 Adequate and suitable toilet and bath facilities for both male and female workers at the following ratio:

a. Where the number of female workers exceeds 100, one (1) and bath facilities for every 20 female workers up to the first 100 and one (1) toilet and bath facilities for every 30 additional female workers.

b. Where the number of male workers exceeds 100 and sufficient urinals have been provided, one (1) toilet and bath facilities for every 25 sales up to the first 100 and one (1) more for every 40 additional male workers.

c. Every toilet shall be provided with enclosure, partitioned off so as to provide/ensure privacy. If feasible, shall have a proper door and fastenings, so doors shall be tight fitting and self---closing.

d. Urinals shall be placed or screened so as not to be visible from other parts of the site, or other workers.

e. Rest rooms shall be so arranged so as to be conveniently accessible to the workers and shall be kept clean and orderly at all times.

f. Adequate hand---washing facilities shall be so provided within or adjacent to the toilet facilities

g. In cases where persons of both sexes are employed, toilet and bath facilities for each sex shall be situated or partitioned so that the interior will not be visible even when the door of any facility is opened from any place where persons of the other sex have to work or pass.

h. If toilet and bath facilities for one sex adjoin those for the other sex, the approaches shall be separate, and toilet and bath facilities for each sex shall be properly indicated.

11. Compliance to the DPWH DO 30 Series 2021 Revised Construction Safety Guidelines for the Implementation of Infrastructure projects During the COVID-19 Public Health Crisis

12. Compliance to the provisions in the PRDP Supplemental Guidelines on Community and Occupational Safety and Health (COSH) during the Implementation of PRDP subprojects amidst the COVID-19 Public Health Crisis dated June 10, 2020.

I. Background

The coronavirus disease (COVID-19) is an infectious disease caused by a new strain of coronavirus and was unknown before the outbreak began in Wuhan, China, in December 2019. On January 30, 2020, the Department of Health (DOH) reported the first case of COVID-19 in the Philippines and on March 07, the first local transmission of COVID-19 was confirmed. Proclamation No. 922, s. 2020 declaring a "State of Public Health Emergency throughout the Philippines" was issued and signed on July 7, 2020.

The World Health Organization (WHO) declared COVID-19 a pandemic on March 11, 2020 since the virus had inflicted more than 150,000 people including 6,000 deaths all over the world. Following the declaration of COVID-19 as a pandemic, President Rodrigo Duterte announced on March 12, 2020 the "community quarantine" in Metro Manila but on March 16, 2020 President Duterte declared a Luzon-wide "enhanced community quarantine" (ECQ) through Presidential Proclamation No. 929, s. 2020 “Declaring a State of calamity throughout the Philippines due to Corona Virus Disease 2019”.

Pursuant to the above Presidential Declaration, the Inter-agency Task Force (IATF) for the Management of Emerging Infectious Diseases Omnibus Guidelines on the Implementation of the Community Quarantine in the Philippines, this Supplemental Guidelines on Community and Occupational Safety and Health (COSH) is issued in addition to the existing COSH standards employed in the implementation of the Project adhering to the Safeguards Policies of the World Bank as well as the new policy issuances, protocols and standards of the Philippine Government in ensuring public safety and health amidst COVID-19.

II. Objectives of the Guidelines

This guideline shall facilitate the implementation of PRDP into transitioning to the “new normal” amidst the COVID-19 Public health crisis, supplemental to the existing COSH guidelines under the PRDP Integrated Environmental and Social Safeguards Framework

(IESSF) of 25 October 2018 and the policy objectives of the RA 11058 An Act Strengthening Compliance with Occupational Safety and Health Standards and providing penalties for violations thereof of August 17, 2018. It strengthens the protection of the rights of workers to a safe and healthy working environment as well as the protection of the community especially the vulnerable population, ensuring non-discrimination and social inclusion during the time of the COVID-19 pandemic.

III. General Guidelines

The Supplemental COSH Guidelines shall primarily adopt and harmonize the following issuances of the Philippine Government in the implementation of PRDP covering the Infrastructures and Enterprises subprojects and all other PRDP activities.

1. Department of Public Works and Highways (DPWH) Revised Construction Safety Guidelines for the Implementation Infrastructure Projects during COVID-19 Public health crisis, repealing Department Order No. 35 Series of 2020 issued per Department Order No. 39 Series of 2020;

2. Joint Department of Trade and Industry (DTI) and Department of Labor and Employment (DOLE) Interim Guidelines on Workplace Prevention and Control of COVID-19 issued April 30, 2020;

3. Department of Health (DOH) Interim Guidelines on the Return-to-Work issued per Memorandum No. 2020-0220 dated May 11, 2020;

4. Department of Interior and Local Government (DILG) Amended Guide to Action Against the 2019 Novel Coronavirus Acute Respiratory Diseases issued per Memorandum Circular No. 2020-023 dated 06 February 2020;

5. Department of Agriculture (DA) Guidelines on Food Safety for the Philippine Agricultural and Fishery Sectors during COVID-19 Pandemic issued per Memorandum Circular No. 15 Series of 2020 dated May 13, 2020.

Under the "new normal", the Minimum Health Protocols and Standards set by the Department of Health (i.e. regular handwashing, observing cough etiquette, wearing of face masks, taking of body temperature, regular disinfecting, reducing contact and physical distancing) shall be applicable to all PRDP funded Infrastructure and Enterprise subprojects, and other relevant PRDP activities. Such activities are, but not limited to, consultations, trainings, technical coaching, meetings, technical reviews, procurement activities, validation s, appraisal reviews, monitoring, supervision, grievance investigation & resolution, and all other activities that involve interaction. PRDP shall adopt mixed or blended methodologies in the conduct of such activities that conform to health and safety policies, protocols and procedures stipulated in the above-mentioned issuances and guidelines.

As stakeholder engagement is important and critical in all project implementation phases, the Project has crafted a separate Consultation Guideline amidst the COVID-19 Public health crisis to ensure the continuous meaningful consultations despite the community quarantine

limitations. This will serve as reference into transitioning to the "new normal" for the implementation of PRDP subprojects (Annex A).

As measures in the prevention and control of COVID-19 incur costs, the PRDP recommends to adhere with DOLE Labor Guidelines on the cost of COVID-19 prevention and control measures issued per Labor Advisory No. 18 series of 2020.

As stipulated in Section 2 of the Labor Advisory, the costs associated to COVID-19 measures shall be charged to the employers and principals of the service contract and no direct or indirect costs shall be charged to the workers.

As these costs have not been part of the PRDP subprojects' feasibility study and business plan, the cost associated to the implementation of the required mitigation and control measures shall be shouldered by the: 1) Proponent LGU, as principal of the service contract for I-BUILD Infrastructure subprojects; and 2) Enterprise Proponent Groups, as business owner and employer of the workers in I-REAP Enterprise subprojects. However, due to funding limitations of the LGUs brought about by the pandemic and of the Proponent Groups, cost-sharing is advised. The LGUs may work out cost-sharing with the winning Contractors for the I-BUILD subprojects and with the Proponent Groups for the I-REAP subprojects to ensure that all subprojects are compliant to the health protocols and standards required for the resumption of operations of both the infrastructures and enterprise subprojects.

As we are continually learning from this unprecedented pandemic crisis, subproject proponents are reminded to regularly check recent issuances of the National government (DOH, DPWH, DOLE, DTI, DILG, etc.) and consult with/seek further advice from the concerned PRDP offices (RPCO, PSO and NPCO) for any further developments that may arise.

IV. Specific Guidelines for Construction of I–BUILD and I-REAP Infrastructure subprojects

In ensuring community, occupational safety and health during construction amidst the COVID-19 Public health crisis, supplemental guidelines on a) Prior deployment for construction; and b) During construction were harmonized in reference with the PRDP Integrated Environmental and Social Safeguards Framework (IESSF) based on the following international and local guidelines:

a. DPWH Department Order No. 39 Series of 2020 on Revised Construction Safety Guidelines for the Implementation Infrastructure Projects during COVID-19 Public health crisis, repealing Department Order No. 35 Series of 2020;

b. Joint DTI and DOLE Interim Guidelines on Workplace Prevention and Control of COVID-19 issued April 30, 2020;

c. DOH Memorandum No. 2020-0220 dated May 11, 2020 on Interim Guidelines on the Return-to-Work;

d. DILG Memorandum Circular No. 2020-023 dated 06 February 2020 on Amended Guide to Action Against the 2019 Novel Coronavirus Acute Respiratory Diseases;

e. International Labour Organization's (ILO) on Prevention and Mitigation of COVID-19 at Work: Action Checklist.

A. Prior deployment for construction

A.1. The LGU, and Contractor/Sub–Contractor/Suppliers shall:

. Establish regular communication and coordination among each other for any relevant COVID-19 information;

. b) Strengthen the Grievance Redress Mechanism to ensure that there is an open, active, and easily accessible communication platform for workers to channel their questions and concerns especially regarding COVID-19.

. c) Incorporate in the Environmental and Social Management Plan (ESMP) the management's commitment and responsibilities on the reduction and risk of exposure to the virus and transmission of COVID-19 at the workplace through prioritizing safety and health of workers and their surrounding communities;

. d) Assess and review occupational safety and health hazards of all construction works and develop strategic measures and possible changes in the construction methodologies on managing the potential risks and its impacts through incorporation of DOH minimum health protocols and standards, and other relevant guidelines.

A.2. The LGU shall:

. a) Screen and issue construction quarantine pass (QP) to the individual qualified personnel of the contractors clearly stating the identification, designation, nature of work, validity and destination, if necessary;

. b) Advise the Barangay Council of the start/resumption of construction works with adherence to DOH and IATF guidelines;

. c) Facilitate the inclusion of necessary information on the impacts and mitigation measures of the construction in the IEC campaigns through Barangay Council.

A.3. The Barangay Council through its Barangay Health Emergency Response Team (BHERT) shall:

a) Include in the IEC campaign for the community the necessary information on the impacts and mitigation measures relevant to the construction;

b) Inform the Contractor on the existing ordinances or plans of the Barangay on containment and control and prevention measures especially in terms of public health and sanitation through its waste management, cleaning and disinfection, isolation procedures, among others;

c) Inform the community on the start/resumption of the construction with special considerations on vulnerable groups such as women, children, elderly, Indigenous Peoples/Indigenous Cultural Communities (IP/ICCs), People with Disabilities (PWD), and immuno- compromised people through several mechanisms. Refer to Annex A - Consultation Guidelines amidst COVID-19 Public Health Crisis.

A.4. The Contractor/Sub – Contractor/Suppliers shall:

a) Not allow any person below twenty-one (21) years old, those who are sixty (60) years old and above, those with immune deficiencies, comorbidities, or other health risks, and pregnant women, including those who reside with the aforementioned, to be part of the workforce for construction projects except as may be allowed under the Revised Omnibus Guidelines issued by the IATF;

b) Undergo its employees fourteen (14) days quarantine prior to deployment, especially for the migrant workers coming from another barangay/municipality; or in the alternative, the employee may undergo any available Food and Drug Administration (FDA) - approved COVID-19 test, as may be prescribed by the DOH, and be retested as the need arises. In this regard, consultation with medical doctors (duly accredited by DOH, if possible) prior to the conduct of COVID-19 test shall be made. Further, COVID-19 test procedures and return-to-work policies of the contractors should comply with DOH Circular No. 2020- 0160 dated 31 March 2020, Department Memorandum No. 2020-0220 dated 11 June 6020, and other pertinent issuances of the DOH on the matter;

c) Ensure that the subproject is in compliance with DOLE DO. NO. 13 series of 1998, and the DTI and DOLE Interim Guidelines on Workplace Prevention and Control of COVID-19. Provide personnel and workers face mask and/or shield, soap, sanitizer, disinfectant, and continuous supply of vitamins particularly vitamin C, other over – the counter medicines, quarantine facilities, and oxygen tanks for emergency purposes;

d) Provide for the personnel/workers the necessary welfare facilities and amenities (i.e. employees' quarters board and lodging, adequate toilet and baths for both men and women, communal kitchens, etc.) while ensuring compliance to social distancing, proper hygiene, etc.;

e) Provide disinfection facilities in the respective project sites in compliance with pertinent DOH and IATF Guidelines, to be place at strategic locations to ensure the safety and welfare of all personnel;

f) Conduct proper information dissemination through the Safety Officer to increase awareness and knowledge of the workforce regarding COVID-19 construction protocols, guidelines, and management/mitigation measures on top of the existing construction safety practices through orientation, training, and installation of IEC materials and other notices for workers' safety;

g) Submit personal records of all personnel, especially for those migrant workers who would be coming from different barangay/municipalities, to proponent LGU and Barangay Council through its BHERT for necessary for contact tracing, assistance and monitoring. It shall be resubmitted and updated monthly, or as the need arises (Annex B – PRDP Worker's Log Format);

h) Prioritize engaging workers coming from the community or close proximity of the construction site. Should there be workers coming from another barangay/municipality, adhere with the proponent PLGU/MLGU and BHERT on the relevant guidelines for migrating workers;

i) Ensure non-discrimination of workers through developing and communicating a clear policy

of non-discrimination to reduce stigma so that employees feel safe reporting illness of themselves or within their families;

j) Maintain and disclose rights and workers benefits, such as the following:

Access to essential health care and other basic social services;

All workers shall be appropriately informed by the employer about all types of hazards in the workplace and be provided access to training, education, and orientation on chemical safety, electrical safety, mechanical safety, ergonomics and other hazards and risks (DOLE - DO. 198 series of 2018, Section 5);

iii. Worker has the right of refusal to work without threat or reprisal from the employer if, as determined by DOLE, an imminent danger situation exists. (DOLE - DO. 198 series of 2018, Section 6);

iv. No cost related or incidental to COVID-19 prevention and control measures shall be charged directly or indirectly to the workers (Labor Advisory No.18 series of 2020, Section 2);

v. Health hospital benefits, sickness benefits under the SSS and employee's compensation benefits under PD 626 (EC Law). In the event that the worker is not qualified to avail of the benefits under SSS or Phil Health due to the employer, the employer will shoulder all the medical expenses until full recovery (Labor Advisory No. 04 series of 2020);

k) Incorporate COVID-19 Health and Emergency Response Protocols and COVID-19 hotlines of designated hospitals and emergency medical centers in the existing Emergency response procedures or contingency plans established and Hotlines posted.

During Construction

B.1. The LGU shall:

a) Assist to the Barangay Council and Contractors in the management of COVID-19 concerns that may arise during construction and potentially impact the community;

b) Monitor the implementation of the supplemental guidelines through the Project's regular monitoring procedures and activities with the Resident Engineer as lead for the proponent LGU. The report on monitoring of compliance to these guidelines shall be submitted monthly to the PPMIU/MPMIU Head.

B.2. The Barangay Council through its Barangay Health Emergency Response Team (BHERT) shall:

a) Inform the Contractors on the status of the daily health monitoring in the community;

b) Remind the community and workers to reduce direct contact and adhere to physical distancing during construction;

c) Encourage other modes of uptake such as text messaging, call, e-mail, and social media in lodging community concerns and feedback through Grievance Redress Mechanism.

B.3. The Contractor/Sub – Contractor/Suppliers shall:

a) Conduct an inventory of works for the construction sequencing to be followed and undertake to uphold the required physical distancing. Barangay Council shall be informed of the revised construction sequencing or daily construction works;

b) Reduce direct personnel contact to adhere with physical distancing through clustered and staggered deployment of employees within the construction sites for easier contact tracing;

c) Make work breaks staggered; and during breaks, workers shall stay in the quarters or established welfare facilities rather than along the streets or nearby public space;

d) Prohibit smoking in public spaces especially while construction is on- going. It shall only be allowed only to designated smoking area and after construction work;

e) House all employees in their respective quarters for the entire duration of the project covered by the Community Quarantine. In case there is a need to leave the said quarters during the project duration, "Prior to Deployment" procedures shall be conducted at every instance of re-entry;

f) Ensure availability of adequate food, potable drinking water, disinfectants, and hand soaps to its in-house personnel;

g) Assist workers to manage any emerging psychosocial risks, new forms of work arrangements and in the promotion and maintenance of healthy lifestyles including diet, rest and sleep, exercise and social contacts with friends and family;

h) Designate workers in charge of the regular cleaning and disinfection of the premises and construction materials;

i) Regularly maintain good housekeeping which includes daily cleaning and disinfection of all construction facilities such as Field Office, employees' quarters, and other common area;

j) Promote culture of regular cleaning and disinfection among workers and within the premises of construction through reminders in tool box meeting and posting of relevant IEC materials;

k) Observe proper disposal of COVID-19 related PPE (e.g. face masks) by setting up a distinct bin labelled as special wastes and adhering to BHERT waste management collection protocols. Any face masks that could potentially be reused should be cut into pieces as a safety measure to avoid reuse;

l) Remind workers, during the conduct of regular tool box meetings, on the relevant construction protocols and prevention measures on the specific daily or weekly work tasks;

m) Conduct daily monitoring of the pre-and post-work health conditions of workers, including, but not limited to, temperature, health, and exposure monitoring, as preventive measures. Personnel with manifestation or symptoms relative to COVID-19 shall be immediately isolated and quarantined for fourteen (14) days and if necessary, brought to the nearest DOH COVID-19 treatment facility under strict confidentiality and privacy. Proper protocols in accordance with DTI and DOLE Interim Guidelines on Work Place Prevention and Control of COVID-19 shall likewise be strictly observed. Daily health monitoring report shall be endorsed to the proponent PLGU/MLGU and BHERT (Annex C - PRDP Daily COVID -19 Surveillance Fill-Up/Checklist Form);

n) Ensure that Project Engineers and Safety Officer assigned at the site shall strictly monitor work activities. Said Safety Officer shall conduct daily monitoring in strict compliance with DOLE D.vO. No. 13, Series of 1998 and the DTI and DOLE Interim Guidelines on Workplace Prevention and Control of COVID-19 with regard to the wearing of additional Personal Protective Equipment (PPE) required such as, but not limited to, face masks, safety glasses/goggles, face shields, and long sleeve T-shirts, and other measures to contain the spread of COVID-19 in the workplace, as provided in these guidelines.

o) Discourage sharing of construction and office equipment. However, if necessary, the shared equipment must be disinfected in between transfers amongst personnel;

p) Ensure that all materials and equipment delivery and disposal shall be conducted by a specific team of personnel on an isolated loading/unloading zone while limiting contact with the delivery/disposal personnel. All materials and/or equipment entering the construction site shall be duly disinfected, as possible;

q) Restrict the entrance/visit of non-essential personnel, visitors, and the general public in the construction site, employees' quarters, and field offices. Otherwise, all personnel entering the construction site premises on a temporary basis (e.g. delivery truck drivers, inspectors, etc.) shall be properly logged and checked for symptoms;

r) Strictly prohibit gatherings, liquors, and/or merry – making within the construction site premises;

s) Provide transport service for off-site employees' quarters. The transport service shall be disinfected before and after use, and social distancing shall likewise be observed therein at all times in accordance with DOTr guidelines;

t) Regularly clean and disinfect the vehicles and materials. During construction transport and delivery services, workers' shall reduce direct contact with clients. If contact with clients are necessary, drivers should ensure minimum safety protocols. All records on transport and delivery services (i.e. location of delivery, driver in charge, and client contact information) shall be submitted to the proponent PLGU/MLGU and BHERT as reference for contract tracing and other necessary assistance;

u) Keep errands to be conducted outside the construction site premises at a minimum. Number of personnel running errands shall be limited and shall properly be disinfected and closely monitored for symptoms within fourteen (14) days upon re-entry.

V. Specific Guidelines for I-REAP Enterprise and I-BUILD Other infrastructure Operations

This guideline primarily used as references the ***Joint DTI and DOLE interim guidelines on workplace prevention and control of COVID-19 issued April 30, 2020 and the Department of Health Memorandum No. 2020-0220 dated May 11, 2020 with subject Interim Guidelines on the Return-to-Work.*** These issuances were harmonized with PRDP's Integrated Environmental and Social Safeguards Framework (as of October 25, 2018) to come up with the COSH guidelines as follow:

A. Workplace Safety and Health

A.1. Increase physical and mental resilience

The Enterprise Management with the assistance from the proponent PLGU/MLGU shall assist workers in maintaining and increasing their physical and mental resilience such as:

1. Emphasize to workers everyday actions to stay healthy such as eating nutritious food and observing a healthy diet, drinking plenty of fluids, having adequate rest and at least eight (8) hours sleep, exercising regularly;

2. Provide free medicine and vitamins, if feasible;

3. Explore new forms of work arrangement beneficial to the health of the workers; and

4. Manage emerging psychosocial risks by providing referral for workers needing counseling or presenting with mental health concerns and facilitating continued social contacts with family and friends.

A.2.Reducing transmission of COVID-19

1. *The Enterprise Management shall assign a "Workplace Coordinator for COVID-19 concerns*".

1.1. He/She may also be the existing Safety Officer if applicable to the Enterprise.

1.2. The Workplace Coordinator for COVID-19 shall be in-charge of ensuring the guidelines stated herein are implemented accordingly together with the supervision of the Enterprise Management.

1.3. The proponent PLGU/MLGU shall provide assistance to ensure that the assigned Coordinator for COVID-19 receives the proper training.

2. *Prior Entrance in buildings and workplaces*

2.1. All employers and workers shall:

i. Wear face masks at all times and remove the same only when eating/drinking. Employers shall provide the appropriate face masks for workers. Should cloth masks be used, the washable type shall be worn but additional filter material such as tissue papers inside the masks may be added;

ii. Accomplish daily the health symptoms questionnaire and submit to the guard or designated safety officer prior to entry;

iii. Have their temperature checked and recorded in the health symptoms questionnaire. (Annex D – Health Checklist) For any personnel with temperature > 37.50 C, even after a 5-minute rest, or if their response in the questionnaire needs further evaluation by the Workplace Coordinator, the person shall be isolated in an area identified by the Enterprise and not allowed to enter the premises. The isolation area should be well ventilated and must be disinfected frequently. Workplace Coordinator assigned to assess the workers held in the isolation area shall be provided the appropriate medical grade PPE by the establishment which shall include but not limited to, face masks,

goggles/face shields, and/or gloves; and

iv. Spray alcohol/sanitizers to both hands; and provide disinfectant foot baths at the entrance if practicable.

2.2. Equipment or vehicle entering the hub operational area must go through a disinfection process; and

2.3. If there will be a long queue outside the office or store premises, roving officers should instill physical distancing of one meter.

3. Inside the workplace

3.1. All work areas and frequently handled objects such as door knobs and handles, shall be cleaned and disinfected regularly, at least once every two (2) hours;

3.2. All washrooms and toilets shall have sufficient clean water and soap, workers are encouraged to wash their hands frequently and avoid touching their eyes, nose and mouth;

3.3. Sanitizers shall be made available in corridors, conference areas, elevators, stairways and areas where workers pass;

3.4. Workers, whether in office workstations or in operations area, shall always practice physical distancing meaning at the minimum one (1) meter radius space (side, back and front) between workers;

3.5. Eating in communal areas is discouraged. It is best to eat in individual work area and all wastes shall be disposed properly. If eating in individual work areas is not possible, the employer shall ensure that physical distancing is maintained in dining areas with one worker per table and 1- meter distance per worker. It is discouraged that workers engage in conversation with masks off during meal times. Tables and chairs shall be cleaned or disinfected after every use of the area, and before as well as at the end of the work day; and

3.6. Canteens and kitchens should be cleaned and disinfected regularly.

A.3. Minimize contact rate

1. Alternative work arrangements, such as working-hour shifts, work from home (WFH), where feasible and on rotation basis;

2. Prolonged face-to-face interaction between workers and with clients are discouraged and masks shall be worn at all times and not removed. Meetings needing physical presence shall be kept to a minimum number of participants and with short duration. Videoconferencing shall be utilized for lengthy discussions among workers;

3. Office tables should be arranged in order to maintain proper physical distancing. Barriers may be provided between tables;

4. Workstation layout should be designed to allow for unidirectional movement in aisles, corridors or walkways;

5. To maintain physical distancing, number of people inside an enclosed space such as a room, store or hall shall be limited;

6. Use of stairs should be encouraged subject to physical distancing requirements. If more than 2 stairways are accessible, one stairway may be used exclusively for going up and another for going down;

7. Online system shall be highly encouraged to be utilized for clients needing assistance from offices including the use of videoconferencing; and

8. Roving officers (i.e. Manager, Supervisor, and Workplace Coordinator) shall always ensure physical distancing and observance of minimum health protocols.

A.4. On Reducing the risk of infection from COVID-19

1. In the event that a worker is suspected as having COVID-19:

1.1. The worker shall immediately proceed to the isolation area designated in the workplace and never remove his/her mask;

1.2. Workplace Coordinator attending to the workers should wear appropriate PPE and if needed should require the transport of the affected worker to the nearest hospital. Company protocols for transport for suspect COVID-19 cases and for PCR testing, should be in place including providing for ambulance conduction. For the micro and small enterprises, they may seek help from the Barangay or the Municipal Government. Hospitals will report to the DOH for COVID-19 suspect; and

1.3. Decontamination of workplace

i. Workplace shall be decontaminated with appropriate disinfectant (e.g. chlorine bleaching solution and 1:100 phenol-based disinfectant);

ii. After decontamination of the work area, work can resume after twenty-four (24) hours; and

iii. Workers present in the work area with the suspect COVID-19 worker shall go on fourteen (14) days home quarantine with specific instructions from the Workplace Coordinator on monitoring of symptoms and possible next steps. If suspect COVID-19 worker has negative result, co-workers may be allowed to report back to work.

2. In the event that a worker is sick or has fever but is not suspected to have COVID-19 (ex., urinary infection, wound infection or any diseases not related to lungs or respiratory tract) the employer must advise the worker to take prudent measures to limit the spread of communicable diseases, as follows:

2.1. Stay at home and keep away from work or crowds;

2.2. Take adequate rest and take plenty of fluids;

2.3. Practice personal hygiene to prevent spread of disease; and

2.4. Seek appropriate medical care if there is persistent fever, when difficulty of breathing has started, or when he/she becomes weak.

B. Duties of Employers and Workers B.1. Employer (Enterprise Management) shall:

1. Provide the necessary Enterprise policies/operating manuals to adapt to the "new normal" brought about by the COVID-19 pandemic in consultation with workers. Advocacy and IEC programs should be taken from DOH, WHO and reliable sources of information on COVID-19. Polices may be informed by the risk identification and mitigation process and can include the following (as adopted from COVID-19 Info-Sheet on Preventing and Managing related Environmental, Social, Health and Safety (ESHS) risks):

i. Prevention procedures covering basic hygiene, cleaning and

ii. Policies and procedures on how to determine and manage

iii. Updated working condition policies as appropriate;

iv. Stakeholder engagement procedures where operations or

2. Conduct training to guide workers for the transition to the "new normal" and provide proper visual reminders/IEC materials for safety policies posted strategically around the workplace to ensure workers are well informed and improve compliance;

3. Coordinate with concerned LGU and government agencies to provide the necessary capacity building activities relevant to COVID-19 health protocols, guidelines, and management/mitigation measures to prepare and equip farmers, fisherfolks, farmworkers and other units who will operate and maintain the facilities;

4. Ensure non-discrimination of workers: It is recommended to develop and communicate a clear policy of non-discrimination to reduce stigma so that employees feel safe reporting illness of themselves or within their families. All policies and procedures should be clearly communicated alongside contact information and access to a grievance mechanism should employees have questions or concerns;

5. Strengthen the Grievance Redress Mechanism to ensure that there is an open, active, and easily accessible communication platform for workers to channel their questions and concerns especially regarding COVID-19;

6. Establish clear and regular communication about preventive measures and precautions to workers and, where applicable, contractors, the supply chain, customers, and the wider community;

7. Adhere to the following provisions stated in RA 11058 Sections 5 & 6; Workers' Right to Know and Workers' Right to Refuse Unsafe Work:

i. All workers shall be appropriately informed by the employer about all types of hazards in the

workplace and be provided access to training, education, and orientation on chemical safety, electrical safety, mechanical safety, ergonomics and other hazards and risks;

ii. The worker has the right of refusal to work without threat or

8. Put in place policies and mechanisms in particular for the inclusion and protection of the vulnerable population such as women, older persons, those with underlying health conditions, persons with disabilities and Indigenous Peoples;

9. Provide resources and materials needed to keep the workers healthy and the workplace safe, e.g., masks, soap, sanitizer, disinfectant, PPE, including COVID-19 testing kits. For micro and small enterprises that proponent LGU shall provide assistance to the PG especially in accessing COVID-19 testing kits;

10. Observe proper disposal of COVID-19 related PPE (e.g. face masks, face shields, gloves, etc.) by setting up a distinct bin labelled as special wastes and adhering to BHERT waste management collection protocols. Any face masks that could potentially be reused should be cut into pieces as a safety measure to avoid reuse;

11.Enhance health insurance provision for workers, aside from the mandatory Philhealth, and establish appropriate sick leave policies to accommodate the COVID-19 situation;

12.Establish referral network for employees who will develop symptoms;

13.Where feasible, provide shuttle services and/or decent accommodation on near-site location to lessen travel and people movement;

14.Adhere to and regularly check recent issuances of the National government and consult with/seek further advice from the concerned PRDP offices (RPCO, PSO and NPCO) for any further developments that may arise. It is to be recognized that certain enterprises, depending on the nature of the enterprise (i.e. food processing, non-food processing, crop production, animal raising, aquaculture), may require other additional mitigation measures. For Food processing and production related enterprises, we may refer to:

i. COVID-19 and Food Safety: Guidance for food businesses: Food and Agriculture Organization (FAO) and World Health Organization (WHO) dated April 7, 2020; and

ii. Department of Agriculture (DA) Guidelines on Food Safety for the Philippine Agricultural and Fishery Sectors during COVID-19 Pandemic issued per Memorandum Circular No. 15 Series of 2020 dated May 13, 2020;

15.Provide the DOLE through its Regional Office and/or Barangay Council through its BERTH, copy furnished DOH, the LGU and PRDP, monthly reporting of illness, diseases and injuries utilizing the DOLE Work Accident/Illness Report Form (WAIR), attached as Annex E;

16. Incorporate COVID-19 Health and Emergency Response Protocols and COVID-19 hotlines of designated hospitals and emergency medical centers in the existing Emergency response procedures or contingency plans established and Hotlines posted;

17. Ensure that Enterprise Manager and Workplace Coordinator shall strictly monitor operation activities. Said Workplace Coordinator shall conduct daily monitoring in strict compliance with DOLE D.O. No. 13, Series of 1998 and the DTI and DOLE Interim Guidelines on Workplace Prevention and Control of COVID-19 and other supplemental measures, as provided in these guidelines.

B.2. LGU shall:

1. Extend technical and financial support to the enterprise operations in complying with the implementation of these guidelines;

2. Monitor the implementation of the supplemental guidelines through the Project's regular monitoring procedures and activities. The report on monitoring of compliance to these guidelines shall be submitted monthly to the PPMIU/MPMIU Head.

Mode of Measurement

Method of Measurement shall be paid for at the contract unit price for the Pay Items shown in the Bid Schedule which price and payment shall be full compensation for the provision of Personal Protective Equipment (PPE) and Devices, Medicines, Medical Supplies and other incidentals necessary to complete the item.

Basis of Payment

Payment shall be made on a proportional basis, calculated by multiplying the percentage rate of physical progress to the total lump sum amount every progress billing.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
B.7	**Occupational Health and Safety**	**Lump Sum**

ITEM 1003 - CARPENTRY AND JOINERY WORKS

1003.1 Description

The work under this Item shall consist of furnishing all required materials, fabricated woodwork, tools, equipment and labor and performing all operations necessary for the satisfactory completion of all carpentry and joinery works in accordance with the Plans and this Specification.

1003.2 Material Requirements

1003.2.1 Lumber

Lumber of the different species herein specified for the various parts of the structure shall be well-seasoned, sawn straight, sundried or kiln dried and free from defects such as loose unsound knots, pitch pockets, sapwood, cracks 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 2 months before use.

1003.2.1.1 Grades of Lumber and Usage

1. Stress grade is seasoned, close-grained and high-quality lumber of the specified specie free from defects and suitable for sustaining heavy loads. Stress grade lumber shall be used for wooden structural member subject to heavy loads, and for sub-floor framing embedded or in contact with concrete or masonry.

2. Select grade lumber of the specified specie is generally of high quality, of good appearance, without imperfections, and suitable for use without waste due to defects and suitable also for natural finish.

3. Select grade lumber shall be used for flooring, sidings, facia and base boards, trims, mouldings, millwork, railings, stairs, cabinet work, shelvings, doors windows and frames of openings.

4. Common grade lumber has minimum tight medium knot not larger than 25 mm in diameter, with minimal imperfections, without sapwood, without decay, insect holes, and suitable for use with some waste due to minor defects and suitable also for paint finish.

5. Common grade lumber shall be used for light framework for wall partitions, ceiling joist and nailer

1003.2.1.2 Lumber Species and Usage

Unless otherwise specified on the Plans, the following lumber species shall be used as indicated:

1. Yacal (stress grade) for structural member such as post, girders, girts, sleepers door and window frames set or in contact with concrete or masonry.

2. Guijo (select grade) for door and window frames set in wooden framework, for stairs, for roof framing supporting ceramic or cement tiles, for floor joists and other wooden structural parts.

3. Apitong (common grade) for roof framing supporting light roofing materials such as galvanized iron, aluminum, for wall framing, ceiling joists, hangers and nailers.

4. Tanguile (select grade) for door and windows, facia and base boards, trims, mouldings, millwork, railings, stairs, cabinet work, shelvings, flooring siding, celling joist, studs, roof framing and nailers.

5. Narra (select grade) for stair railings, flooring boards, wall panels base boards, trims, mouldings, cabinet work, millwork, doors and windows when indicated as such in the Plans.

6. Dao (selected grade) for stair railings, flooring boards, wall panels base boards, trims, mouldings, cabinet work, millwork, doors and windows when indicated as such on the Plans.

1003.2.1.3 Moisture Content

Except 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:

Rough Carpentry and Framing

a. Framing lumber 50.80 mm and less in thickness: 19%

b. Framing lumber over 50.80 mm thick: 25% Interior millwork, finish and trim: 17%

1003.2.1.4 Substitution in Lumber Species

Any lumber equally good for the purpose intended may be substituted for the specified kind subject to the prior approval of the Engineer, provided the substitution shall be of an equal or better specie acceptable to the Engineer. In case of substitution with a better specie, no additional cost therefore shall be allowed to the Contractor.

1003.2.2 Plyboard

Plyboard shall be good grade and made of laminated wood strips of uniform width and thickness bounded together with water resistant resin glue. The laminated core shall be finished both faces with select grade Tanguile or red Lauan veneers not less than 2 mm thick similarly bonded to the core. The plyboard of not less than 19 mm thick shall be free from defect such as split in veneer, buckling or warping.

1003.2.3 Plywood

Plywood shall conform to the requirements of PNS ISO 12465:2017 Plywood Specifications. Thickness of single layer laminae shall not be less than 2 mm. The laminae shall be superimposed in layers with grains crossing at right angles in successive layers to produce stiffness. The face veneers shall be rotary cut from selected grade timber. The laminae and face veneers shall be bonded with water resistant resin glue, hot pressed and pressure treated.

Two (2) types of plywood based on bonding quality:

1. Type I (Exterior/Marine Plywood)

This is intended for ceiling exposed to moisture such as at toilets and eaves partitions and doors (toilet and bath) and ceiling to be finished with acrytex.

2. Type II (Interior/Ordinary Plywood)

This is intended for interior ceiling, doors and partitions shall be of 6 mm thick tanguile plywood, grade "A", three (3)-ply with high water resistant.

Sample for testing shall comply with the applicable requirements of PNS ISO 12466-1:2016 Plywood - Bonding Quality - Part 1: Test Methods and PNS ISO 12466-2:2016 Plywood - Bonding Quality - Part 2: Requirements.

1003.2.4 Lawanit

Lawanit, when required per plans, shall be 6 mm thick, tempered or oil impregnated for moisture/water resistance. Texture of lawanit shall be subject to the approval of the Engineer.

1003.2.5 Materials Other than Lumber

1003.2.5.1 Plastic Sheet

When required for counter top, plastic sheet such as Formica shall not be less than 1.50 mm thick and shall have hard, durable and glossy surface resistant to stain, abrasion and heat. Color and design shall be as selected from the manufacturer's standard and approved by the Engineer.

1003.2.5.2 Glue

Glue shall be from water resistant resins which, upon hardening, shall not dissolve nor lose its bond or holding power even when soaked with water for extended period.

Glue in powder form be in sealed container and shall be without evidence of lumping or deterioration in quality.

1003.2.5.3 Fasteners

Nails, screw, bolts and straps shall be provided and used where suitable for fixing carpentry and joinery works. All fasteners shall be brand new and of adequate size to ensure rigidity of connections.

1. Nails of adequate size shall be steel wire, diamond-pointed, ribbed shank and bright finish.

2. Screws of adequate size shall be cadmium or brass plated steel with slotted head.

3. Lag screws of adequate size, for anchoring heavy timber framing in concrete or masonry, shall be galvanized steel.

4. Bolts and nuts shall be of steel having a yield point of not less than 245 MPa. Bolts shall have square heads and provided with standard flat steel washers and hexagonal nuts. Threads shall conform to American coarse thread series. The threaded portion shall be long enough such that the nut can be tightened against the bolted members without any need for blocking The bolt's threaded end shall be finished smooth for ease of engaging and turning of the nut.

5. Wrought iron straps or angles, when required in conjunction with bolts or lag screws to provide proper anchorage, shall be of the shape and size shown on the Plans.

1003.2.5.4 Fiber Cement Board

It shall comply with the applicable requirements of ASTM C1186, Standard Specification for Flat-Fiber Cement Sheets for exterior application and ASTM C1288, Standard Specification for Fiber-Cement Interior Substrate Sheets for interior application.

1003.2.5.5 Gypsum Board

It shall comply with the applicable requirements of Item 1041, Gypsum Board.

1003.2.5.6 Pre-painted Metal Panel

It shall comply with the applicable requirements of Item 1014, Prepainted Metal Sheets

1003.2.5.7 Aluminum Metal Cladding

Aluminum for metal cladding shall comply with the applicable requirements of Item 1039, Aluminum Cladding.

1003.2.5.8 Polyvinyl Chloride (PVC)

Polyvinyl Chloride (PVC) shall be made from 100% virgin PVC and Class A fire rating in accordance with ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

1003.2.5.9 Moulding

Mouldings may be made of steel, wood, PVC, concrete and precast concrete or as indicated on the Plans. It shall match the surface where it shall be built.

Sizes, dimensions, colors, finishes, locations and design details shall be specified on the approved Plans and in accordance with the manufacturer's recommendation.

1003.2.5.10 Modular Partition

Materials for modular partition shall be in accordance with the manufacturer's recommendation and approved by the Engineer.

Sizes, dimensions, color, finishes, descriptions, locations and framing details of modular partition shall be indicated on the approved Plans.

1003.3 Construction Requirements

1003.3.1 Quality Materials

All materials to be incorporated in the carpentry and joinery works shall be of the quality specified under Section 1003.2, Material Requirements. Before incorporation in work, all materials shall have been inspected/accepted by the Engineer or his authorized representative.

1003.3.2 Storage and Protection of Materials

Lumber and other materials shall be protected from dampness during and after delivery at the site. Materials shall be delivered well in advance of actual need and in adequate quantity to preclude delay in the work. Lumber shall be piled in orderly stack at least 150 mm above ground and sheltered place where it will be of least obstruction to the work.

1003.3.3 Shop Drawings

Shop drawings complete with essential dimensions and details of construction, as may be required by the Engineer in connection with carpentry and joinery work, shall be submitted for approval before proceeding with the work.

1003.3.4 Rough Carpentry

Rough carpentry covers timber structural framing for roof, flooring, siding partition and ceiling.

1. Framing shall be stress grade or common grade lumber of the specie specified under Subsection 1003.2.1.2, Lumber Species and Usage.

2. Rough carpentry shall be done true to lines, levels and dimensions. It shall be squared, aligned, plumbed and well fitted at joints.

3. Trusses and other roof framing shall be assembled, fitted and set to exact location and slope indicated on the Plans.

4. Fasteners, connectors and anchors of appropriate type and number shall be provided and fitted where necessary.

5. Structural members shall not be cut, bored or notched for the passage of conduits or pipes without prior approval of the Engineer. Members damaged by such cutting or boring shall be reinforced by means of specifically formed and approved steel plates or shapes, otherwise, damaged structural members shall be removed and replaced to the satisfaction of the Engineer.

6. Timber framing in contact with concrete masonry shall be treated with termite-proofing solution and after drying coated with bituminous paint.

1003.3.5 Finished Carpentry

Finished carpentry covers work on flooring, siding and ceiling boards, stairs. cabinets, fabricated woodwork, millwork and trims.

1. Framing lumber shall be select grade, free from defects and where exposed in finished work, shall be selected for color and grain.

2. Joints of framing shall be tenoned, mortised or doweled where suitable, dosely fitted and secured with water resistant resins and glue. Exterior joints shall be mitered and interior angles coped.

3. Panels shall be fitted to allow for contraction or expansion and insure that the panels remain in place without warping, splitting and opening of joints. 4. Plyboard shall be as specified under Subsection 1003.2.2 unless otherwise indicated on the Plans.

5. Plywood shall be specified under Subsection 1003.2.3.

6. Exposed edges of plywood or plywood for cabinets shall be provided with select grade hardwood strips, rabbeted as necessary, glued in place and secured with finishing nails. To prevent splitting, hardwood for trims shall be drilled before fastening with nails or screws.

7. Fabricated woodwork shall be done preferably at the shop. It shall be done true to details and profiles indicated on the Plans. Where set against concrete or masonry, woodwork shall be installed when curing is completed.

8. Exposed wood surfaces shall be free from disfiguring defects such as raised grains, stains, uneven planning, sanding, tool marks and scratches. Exposed surfaces shall be machine or hand sanded to an even smooth surface, ready to finish.

1003.3.6 Fiber Cement Board

Examine, clean, and repair as necessary any substrate conditions that would be detrimental to proper installation. Do not begin installation until unacceptable conditions have been corrected.

Prior to commencing installation, verify governing dimensions of building and condition of substrate. If substrate preparation is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.

Installation requirements shall be in accordance with the manufacturer's instructions and drawing details approved by the Engineer.

a. Use trim details indicated on drawings.

b. Touch up all field cut edges before installing.

c. Pre-drill nail holes if necessary to prevent breakage.

Over wood studs without sheathing. Install building paper over studs prior to installing siding.

Over wood and wood-composite sheathing. Fasten siding through sheathing into studs. For sheathing of 25 mm thickness or less, nail through sheathing into studs using correspondingly longer nails.

Over Masonry Walls. Install furring strips of adequate thickness to accept full length of nails and spaced at 406 mm on center.

Over steel studs. Minimum 20-gauge steel, 92 mm C-studs, size as indicated on drawings or as required by limiting span. Use 41 mm long, # 8-18 x 9.50 mm HD self-tapping, corrosion-resistant ribbed bugle head screws. Attach panel at each stud insuring that at least three (3) screw threads penetrate the studs.

After installation, seal all joints. Seal around all penetrations.

For finish painting, follow manufacturer's recommendation timeline for painting primed and unprimed products. Paint all exposed cut edges.

1003.3.7 Gypsum Board

Installation requirements shall conform to the applicable requirements of Item 1041, Gypsum Board.

1003.3.8 Aluminum Metal Cladding

Installation requirements shall conform to the applicable requirements of Item 1039, Aluminum Cladding.

1003.3.9 Prepainted Metal Panel

It shall comply with the applicable requirements of Item 1014, Prepainted Metal Sheets.

1003.3.10 Moulding

Moulding color finishes shall match the wall or the surface where it will be installed. Cutting details of molding and its installation shall be in accordance with the manufacturer's instructions and detailed drawings approved by the Engineer.

1003.3.11 Modular Partition

Installation requirements shall be in accordance with the manufacturer's instructions and detailed drawings approved by the Engineer.

1003.4 Method of Measurement

The quantity to be paid for will be measured as per individual item detailed in Section 1003.5, Basis of Payment for the complete Carpentry and Joinery as furnished on site and in accordance with these design standard, specifications and as accepted by the Engineer.

1003.5 Basis of Payment

The Items measured and determined as provided in Subsection 1003.4, Method of Measurement shall be paid for at the unit bid price which payment constitute full compensation of materials, labor, equipment, tools and incidentals necessary to complete the work.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
1003(1)e1	Ceiling, Metal Frame, Gypsum Board	Square Meter

ITEM 1008 – ALUMINUM GLASS WINDOWS

1008.1 Description

This Item shall consist of furnishing all aluminum glass window materials, labor, tools and equipment required in undertaking the proper installation as shown on the Plans and in accordance with this Specification.

1008.2 Material Requirements

1008.2.1 Frame and panel members shall be fabricated from extruded aluminum section true to details with clean, straight, sharply defined profiles and free from defects impairing strength or durability. Extruded aluminum section shall conform to the specification requirements defined in ASTM B 211.

1008.2.2 Screws, nuts, washers, bolts, rivets and other miscellaneous fastening devices shall be made of non-corrosive materials such as aluminum, stainless steel, etc.

1008.2.3 Hardware for fixing and locking device shall be closely matched to the extruded aluminum section and adaptable to the type and method of opening.

1008.2.4 Weather-strip shall be first class quality flexible vinyl forming an effective seal and without adverse deformation when installed.

1008.2.5 Glazing shall conform to the requirements specified in Item 1012.

1008.2.6 Pile weatherstrip shall be silicon treated and free from residual wetting agents made of soft fine hair as on wool, fur, etc.

1008.3 Construction Requirements

For all assembly and fabrication works the cut end shall be: true and accurate, free of burrs and rough edges. Cut-outs recesses, mortising and grinding operation for hardware shall be accurately made and properly reinforced.

1008.3.1 Installation Procedure

1008.3.1.1 Main frame shall consist of head, sill and jamb.

1008.3.1.2 Window sash

1008.3.1.3 Window panel shall be jointed at corners with miter and fixed rigidly to ensure weather tightness.

1008.3.1.4 Sliding windows shall be provided with nylon sheave. Sliding panels shall be suspended with concealed roller overhead tracks with bottom guide pitch outward and slotted for complete drainage. The sliding panels shall be provided with interior handles. The locking device shall be a spring loaded extruded latch that automatically engage~ special frame hips.

1008.3.1.5 Casement window type shall be provided with two hinges fabricated from extruded aluminum alloy. They shall open on stay arms having adjustable sliding friction shoes to

control window panel operations. Locking device shall be one arm action handle for manual operations complete with strike plate.

1008.3.1.6 All joints between metal surface and masonry shall be fully caulked.

1008.3.1.7 Aluminum parts in contact with steel members shall be properly insulated by a coat of zinc chromate, primer/bituminous paint applied to the steel surface.

1008.3.1.8 Weatherstrip shall be furnished on edges at the meeting stiles.

1008.3.2 Shop Finish

Exposed aluminum surfaces shall be electrotype hard coats such as anodize, satin, etc.

1008.3.3 Protection

All aluminum parts shall be protected adequately to ensure against damage during transit and construction phase.

1008.3.4 Cleaning

1008.3.4.1 The contractor does not only protect all entrance units during the construction phase but shall also be responsible for removal of protective materials and cleaning the aluminum surface including glazing before work is accepted by the Engineer.

1008.3.4.2 Aluminum shall be thoroughly cleaned with kerosene or gasoline diluted with water and then wipes surface using clean cloth rugs.

1008.3.4.3 No abrasive cleaning materials shall be permitted in cleaning surface.

1008.4 Method of Measurement

Aluminum glass window fully equipped with fixing accessories and locking devices shall be measured in square meters actually installed in place and accepted to the satisfaction of the Engineer.

1008.5 Basis of Payment

The area of aluminum glass windows in square meters ready for service as provided in the Bill of Quantities shall be the basis of payment based on the unit bid or contract unit price which price and payment constitute all materials, labor including incidentals.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
1008(1)	Aluminum Windows, Awning Type	m^2

ITEM 1010 - WOODEN DOORS AND WINDOWS

1010.1 Description

This Item shall consist of furnishing all materials, hardware, plant, tools, labor and services necessary for complete fabrication and installation of wooden doors and windows of the type and size in accordance with the Plans and this Specification and applicable Specifications of Item 1003, Carpentry and Joinery Works.

1010.2 Material Requirements

1010.2.1 Lumber

Lumber of doors, windows and jambs, and panels when required, shall be kiln dried with moisture content of not more than 14% and shall be of the species indicated on the Plans and/or specified under Item 1003, Carpentry and Joinery Works.

1010.2.2 Plywood

Plywood for veneer of solid core and hollow core flush doors shall be 3-ply, rotary cut, 6 mm thick ordinary plywood, Class B grade. Marine or waterproof plywood, rotary cut, 3-ply, 6 mm thick shall be used for flush doors at toilets and bathrooms or at places where these are exposed to moisture.

1010.2.3 Adhesive

Adhesive shall be water resistant resins and shall be non-staining.

1010.2.4 Glass

Glass for window panes shall be 3 mm thick and/or 6 mm thick, tinted, tempered, stained, clear, among others, unless otherwise shown on the Plans or indicated in the Schedule of Doors and Windows. The type of glass used shall conform to the applicable requirements of Item 1012, Glass and Glazing.

1010.2.5 Capiz Shells

Capiz shells, when required for window sashes, shall be of selected quality, free from dirt or blemishes and shall be large enough to obtain flat square piece.

1010.2.6 Hardware

Hardware shall be as specified under Item 1004, Hardware.

1010.3 Construction Requirements

1010.3.1 Fabrication

Wooden doors and windows, including frames, shall be fabricated in accordance with the designs and sizes shown on the Plans. The fabricated products shall be finished square, smoothly sanded and free from damage or warpage.

1. Flush Type Hollow Core Doors

Flush type hollow core doors shall be adequately framed with stiles and top and bottom rails having a minimum thickness of 44 mm and width of 75 mm. Two (2) intermediate rails at least 44 mm wide shall be provided for stiffness.

The stiles and the top and bottom rails shall be rabbeted at least 10 mm wide to receive the 6 mm thick plywood veneer. A lock block shall be provided at each stile, long enough to connect to the two (2) intermediate rails and at least 75 mm wide for mounting the lockset.

The plywood veneer shall be glued and nailed to the framing with 25 mm long finishing nails space at not more than 150 mm on centers.

2. Flush Type Solid Core Doors

Flush type solid core doors shall be fabricated in the same manner as the hollow core type except that spaces between stiles and rails shall be filled and fitted with wood blocks of the same species and of uniform thickness thinner by about the thickness of the plywood veneers. The filler blocks shall be secured to either stiles or rails by nails. Stiles and rails of flush type doors shall be joined by means of blind mortise and tenon joint, tightly fitted, glued and locked with bamboo pin 5 mm round.

3. Panel Doors

Rails with a minimum thickness of 44 mm and width of 140 mm. Rails shall be framed to stiles by mortise and tenon joints. Rabbets or grooves of stiles and rails to receive panels shall be 6.5 mm wide and 20 mm deep. Integral mouldings formed on both faces of stiles and rails framing the panels shall be true to shape and well defined. Intersections of mouldings shall be mitered and closely fitted.

Panels of the same species and having a minimum thickness of 20 mm shall be beveled around its edges up to a minimum width of 50 mm, both faces. The beveled edges shall closely fit into the grooves of stiles and rails, but free to move to prevent splitting when shrinkage occurs.

4. Window Sashes with Glass Panes or Wood Panels

Window sashes shall be fabricated in conformity with the design, size and type of installation shown on the Plans. Unless otherwise shown on the Plans, stiles and rails shall be Tanguile with minimum thickness of 30 mm and width of 70 mm. Jointing of stiles and rails shall be mortise and tenon secured with glue and bamboo pin. Stiles and rails shall be rabbeted at the exterior face for mounting glass panes or wood panels. Integral mouldings formed as frames for panes or panels shall be true to shape, sharply defined and mitered at joints. Separate mouldings of the same design shall be provided for fixing glass panes and wood panel from the outside.

5. Window Sashes with Capiz Shells

Stiles and rails shall be of the same sizes specified under Subsection 1010.3.1(4), Window Sashes with Glass Panes or Wood Panels, and assembled with mortise and tenon joint. Unless otherwise indicated on the Plans, lattices for framing Capiz shall be tanguile, 8 mm thick and 15 mm wide, spaced at not more than 60 mm on centers bothways. Grooves 2 mm wide and 5 mm shall be made at sides of lattices to receive the preformed Capiz shells.

The lattices shall be assembled with half lap joints at their intersections and the assembled lattices containing the Capiz shells shall be framed into the stiles and rails.

Selected Capiz shells shall be washed to remove dirt and blemishes and dried under the sun for bleaching effect. Capiz shells shall be cut square to required sizes with sharp bench cutter to produce non-serrated and non-peeling edges.

6. Sliding Type Window Sashes

Stiles of sliding type window sashes shall be framed to the top and bottom rails with mortise and tenon joints. Tenons shall be formed on the stiles. Joints shall be tightly fitted, glued and locked with bamboo pins. Top and bottom rails shall be 10 mm wider than the stiles. Top rails shall be rabbeted to form a tongue flush with the outer face, with width of 8 mm and height of 10 mm. The stiles and rails shall be rabbeted as specified under Subsection 1010.3.1(4), Window Sashes with Glass Panes or Wood Panels to receive glass panes or wood panels.

7. Awning Type Window Sashes

Tenons of rails shall be fitted into the mortises formed on the stiles and the joints glued and locked. The stiles and rails shall be rabbeted as specified under Subsection 1010.3.1(4), Window Sashes with Glass Panes or Wood Panels for mounting of glass panes. Series of sashes to be installed vertically shall have their meeting rails rabbeted for half lapping when in closed position.

8. Casement Type Window Sashes

Rails of casement type window sashes shall be fitted to stiles with mortise and tenon joint. Tenons shall be formed in the rails. Meeting rails shall be rabbeted to provide for half lapping when in closed position. The stiles and rails shall be rabbeted as specified under Subsection 1010.3.1(4), Window Sashes with Glass Panes or Wood Panels for mounting of glass panes of wood panels.

9. Door and Window Frames

Framing of the species specified under Item 1003, Carpentry and Joinery Works, shall be fabricated in conformity with the profile and sizes as shown on the Plans. Frames shall be assembled with tightly fitted tongue and groove joint mitered at both sides, and nailed. The assembled frames shall be finished square and flat on the same plane. Assembled frames shall be braced temporarily to prevent their distortion during delivery to the site and installation.

1010.3.2 Installation

1. Frames shall be set plumb and square in concrete/masonry work or framework of walls or partitions. Frames set in concrete or masonry shall be provided with two (2) rows of common wire nails 100 mm long for anchorage. The nails shall be staggered and spaced at 300 mm on center along each row. Frame set in concrete shall be installed in place prior to concrete work.

Frames set in masonry work may be installed after laying of hollow concrete blocks, bricks or adobe. Space between frames and masonry shall be fully filled with cement mortar proportioned 1:3.

2. Hinged Doors

Hinged doors, whether panel or flush type with standard height of 2,100 mm and width of not more than 900 mm shall be hung with four (4) loose-pin butt hinges, 100 mm x 100 mm. Swing out exterior doors shall be hung with four (4) fast-pin butt hinges. Two (2) hinges shall be fitted 150 mm from top and bottom edge of door. The other two (2) hinges shall be fitted at third points between top and bottom hinges. Care should be taken to ensure that the hinges are fitted such that their pins are aligned for ease of pin insertion and smoothness of operation. For added smoothness pins should be lightly greased. Hammering of hinges to attain proper alignment shall not be allowed.

For wider and heavier doors, such as Narra panel doors, an additional hinge shall be fitted 100 mm below the top hinge to counteract the door tilting action.

Mounting screws shall be screwed in place in their entire length, not forced into place by hammering. Hammering of screw into place shall not be permitted.

3. Sliding Doors

Overhead tracks, standard, locally manufactured as per Plans shall be installed level and mounting bracket secured in place with tag screws supplied with the set. Bracket shall be spaced 1,000 mm on centers. Hangers, two (2) each per door leaf, shall be perfitted and bolted to the door rail. For panel doors, the hangers shall be centered on the door stiles. For flush doors, the hangers shall be centered 100 mm from the edges of the door. If there is no adequate space for installing the door with its attached rollers, through either end of the track the perfitted hangers shall be disassembled for connection to the rollers.

After installation on the track, set the door plumb and in alignment by means of the adjustment mechanism integrated with the roller assembly.

4. Lock Installation

Locks of doors shall be fitted at the same height, centered 1000 mm above the finished floor level. Locks shall be installed in conformity with the templates and instructions supplied with locksets. Holes for mounting locks shall be properly formed to provide snug fit and rigid attachment of the locks to the doors. Strike plates shall be fitted on the door frame in true alignment with the lock latch. 5. Sliding Type Window Sashes

Sashes shall be trimmed to fit height of opening. A clearance of 2 mm shall be provided between the tongue's base at the top rail and the bottom of the window head. The same clearance shall be provided between the sash tongue and the groove at the window head. Paraffin wax shall be applied to contacts of sliding surfaces. The bottom rails shall be fitted with standard brass guided spaced 75 mm from both ends of the rail, mounted flush with the inner face and secured with three (3) brass screws each guide.

6. Casement Type Window Sashes

Sashes shall be trimmed to fit size of opening, with provision for half lapping of meeting stiles. Right side sash shall lap onto the left side sash. Sashes shall be fitted with two (2) brass-plated narrow hinges, 50 mm x 75 mm spaced 150 mm from top and bottom of stiles. In lieu of hinges, sashes maybe hung with cadmium-plated steel casement adjusters 200 mm long subject to prior approval of the Engineer. The top and bottom rails of casement type window sashes shall be milled to provide for the installation of adjusters.

7. Awning Type Window Sashes

Installation of awning type sashes shall be by means of casement adjusters specified under Subsection 1010.3.2 (6), Casement Type Window Sashes.

1010.4 Method of Measurement

Frames of doors and windows shall be measured on the basis of number of sets completely installed and accepted by the Engineer.

Doors and windows shall be measured based on the number of square meters or lump sum including its hardware involved in the completed and accepted installation.

Payment per square meter or in lumpsum shall include cost of required hardware and all incidental expenses, but exclusive of locks for doors. Locks shall be paid for per set completely installed.

1010.5 Basis of Payment

Payment for completely installed and accepted wooden doors and windows shall be based on actual measurement and the corresponding contract unit price thereof. Payment based on Contract Unit Price shall constitute full compensation.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
1010 (2)a	Doors, Flush, Hollow Core	Square Meter
1010 (2)b	Doors, Wood Panel	Square Meter

ITEM 1018 – CERAMIC AND GRANITE TILES

1018.1 Description

This Item shall consist of furnishing and installing ceramic and granite tiles materials including cementitious/adhesive materials, tools and equipment including labor required in the proper installation of floor, wall and countertop as shown on the Plans and in accordance with this Specification,

1018.2 Material Requirements

1018.2.1 Ceramic Tiles

Ceramic Tiles are thin slabs made from clays and/or other organic raw materials, generally used as coverings for floors and walls, usually shaped by extruding, pressing at room temperature but may be formed by other processes, then dried and subsequently fired at temperatures sufficient to develop the required properties. Ceramic tiles can be classified as glazed or unglazed.

All ceramic tiles shall be sound, durable, and free of spalls, cracks, open seams, pits, or other defects, which may impair its structural integrity or function. Table 1018.1 shows the required test methods for ceramic tiles. Texture, finish and color shall be within the range of samples approved by the Engineer.

Table 1018.1 Physical Tests for Ceramic Tiles

Physical Property	Test Method	Description
Abrasion Resistance - Glazed	ASTM C1027	Standard Test Method for Determining Visible Abrasion Resistance of Glazed Ceramic Tile
	ISO 10545-7	Determination of Resistance to Surface Abrasion of Glazed Tiles
Abrasion Resistance - through body	ISO 10545-6	Ceramic Tiles - Part 6: Determination of Resistance to Deep Abrasion for Unglazed Tiles

Water Absorption	ASTM C373	Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed
		Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products
	ISO 10545-3	Determination of Water Absorption, Apparent Porosity, Apparent Relative Density and Bulk Density
Chemical Resistance	ASTM C650	Standard Test Method for Resistance of Ceramic Tile to Chemical Substances
	ISO 10545-13	Determination of Chemical Resistance
Break Strength	ASTM C648	Standard Test Method for Breaking Strength of Ceramic Tile
	ISO 10545-4	Determination of Modulus Rupture and Breaking Strength
Stain Resistance	ASTM C1378	Standard Test Method for Determination of Resistance to Staining
	ISO 10545-14	Determination of resistance to stains

1018.2.1.1 Glazed Tiles and Trims

Glazed tiles and trims shall have an impervious face of ceramic materials fused onto the body of the tiles. The glazed surface may be clear white or colored depending on the color scheme approved by the Engineer. Standard glazes may be bright (glossy), semi-matte (less glossy), matte (dull) or crystalline (mottled and textured; good resistance to abrasion). Glazed tiles are

used principally for walls; crystalline glazed tiles may be used for floors provided however that these are used as light duty floors.

1018.2.1.2 Unglazed Tiles

Unglazed tiles shall be hard dense tile of homogeneous composition. Its color and characteristics are determined by the materials used in the body, the method of manufacture and the thermal treatment. It is used primarily for floors and walks.

1018.2.1.3 Trims

Trims are manufactured to match wall tile color, texture and to coordinate with it in dimension. These are shaped in various ceramic trim units such as caps, bases, coves, bullnoses, corners, angles and others that are necessary for edging or making a transition between intersecting planes.

1018.2.2 Granite Tiles

Granite tiles shall conform to the applicable requirements of ASTM C615M Standard Specification for Granite Dimension Stone, for material characteristics physical requirements, and sampling for selection of granite.

All granite shall be sound, durable, and free of spalls, cracks, open seams, pits, or other defects, which may impair its structural integrity or function, Color or other visual characteristics indigenous to the particular material and adequately demonstrated in the sampling or mock-up phases will be accepted provided they do not compromise the structural or durability capabilities of the material Texture and finish shall be within the range of samples approved by the Engineer. Table 1018.2 shows the required test methods for granite tiles.

Table 1018.2 Physical Tests for Granite Tiles

Physical Property	Test Method	Description
Absorption by weight	ASTM C97M	Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone
Density	ASTM C97M	Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension
Compressive Strength	ASTM C170M	Stone Standard Test Method for Compressive Strength of Dimension Stone

Modulus of Rupture	ASTM C99M	Standard Test Method for Modulus of Rupture of Dimension Stone Resistance of Stone Subjected to Foot traffic
Abrasion Resistance	ASTM C241M	Standard Test Method for Abrasion Resistance of Stone Subjected to Foot traffic
	ASTM C1353	Standard Test Method for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform Abraser
Flexural Strength	ASTM C880M	Standard Test Method for Flexural Strength of Dimension Stone

Finishes of Granite Tiles:

1. Polish - Highly reflective, mirror gloss finish; shows full color depth and crystal structure of the stone.

2. Hone Smooth, satin surface without reflection; shows full color of the stone.

3, Thermal - Slip-resistant, rough-textured surface. 4. Sandblast - Highly slip resistant; slightly rough textured surface.

1018.2.3 Synthetic Granite Tiles

Synthetic granite tiles are manufactured solid surface that are made of man made materials most often acrylic, polyester resins, marble dust and other pigment, all blended and heated together.

All synthetic granite tiles shall be sound, durable, and free of spalls, tracks, open seams, pits, or other defects, which may impair its structural integrity or function. Texture, finish and color shall be within the range of samples approved by the Engineer.

1018.2.4 Accessories

Tile accessories such as round edge ceramic tiles, cove tiles, step treads and nosing to stairs, landings, and thresholds, skirting, sills, copings, and bath vents, shall match the composition, color and finish of the surrounding tiles.

1018.2.5 Mortar Materials

1018.2.5.1 Portland Cement

Portland Cement shall comply with the applicable requirements of AASHTO M 85, Standard Specification for Portland Cement (ASTM C150M).

1018.2.5.2 Sand

Sand shall be well graded fine aggregate clean river sand, free from soluble salts and organic impurities.

1018.2.5.3 Lime

It shall be hydrated lime with free unhydrated oxide and magnesium oxide content not to exceed 8% by weight.

1018.2.6 Grouting Materials

1018.2.6.1 Sand-Portland Cement Grout

Sand-Portland cement grout is used with ceramic mosaic, quarry and paver tiles on floors and walls. Damp curing is necessary.

An on-the-job mixture of one (1) part Portland Cement to one (1) part of sand shall be used for joints up to 4.23 mm wide; one (1) part cement and two (2) parts sand for joints up to 12.70 mm wide; and one (1) part cement and three (3) parts sand for joints over 12.70 mm wide. Up to 1/5 part lime may be added.

1018.2.6.2 Standard Cement Grout

Standard Cement Grout shall be factory prepared mixture of cement, grade sand, and other ingredients to produce a water-resistant, dense, uniformly colored material, meant for joints of 3.18 mm width or greater.

1018.2.6.3 Standard Unsanded Cement Grout

It shall be a factory prepared mixture of cement and additive that provide water retentivity, meant for joints 3.18 mm wide or less.

1018.3 Construction Requirements

Tile work shall not be started until roughing-ins for plumbing, electrical a other trades have been completed and tested. The work of all other trad shall be protected from damage.

1018.3.1 Setting Materials

1. Wall Tiling. A mix of one (1) part of cement and four (4) parts of sand backing of 10 mm thick shall be laid as base for wall tiling. The surface of backing shall be scratched in an approved manner, when completely set to form ke. The surface of the backing shall be well wetted before the tiling is apply and same shall be cured for 5 days before tiling starts. Tiles shall be fixed using the appropriate adhesive.

2. Floor Tiling. The Contractor shall either bed the tiles using cement/sand mortar with ratio of 1:3 and 20 mm thick or lay the tiles on screed using the appropriate adhesive.

1018.3.2 Substrates Preparation

1. With the installer present, substrates and areas where tiles are to be installed shall be examined, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

a. Substrates for setting tile shall be firm, dry, clean and free from oil or waxy films and curing compounds.

b. Installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind the tile shall be completed before installation of tile.

2. Substrate Levels shall consider the following allowable variations:

a. For tiles with all edges shorter than 380 mm, the maximum allowable variation is no more than 6 mm in 3 m and no more than 1.6 mm in 0.3 m from the required plane, when measured from the high points in the surface.

b. For tiles with at least one (1) edge is 380 mm or longer, the maximum allowable variation is no more than 3 mm in 3 m and no more than 1.6 mm in 0.6 m from the required plane, when measured from the high points in the surface.

3. For thin set work, the variation can be no more than 1.6 mm in 1 m with no abrupt irregularities greater than 0.80 mm.

4. Concrete, masonry and plaster substrates shall be grinded or filled as required to comply with allowable variations. For fill and underlayment of concrete, masonry and plaster substrates, one (1) part Portland cement, three (3) parts sand and sufficient mortar admixture, if needed, shall be utilized to provide workable mortar mix.

5. Substrates and adjoining construction, and the conditions under which the work will be installed, shall be examined. Before proceeding with the work, all unsatisfactory condition detrimental to the proper completion of the work should be corrected.

1018.3.3 General Installation

1018.3.3.1 Floor

1. Installation of each material requirement shall be in accordance with the manufacturer's instructions.

2. Allowable Variations in Finished Work:

a. Floors: 3 mm in 2 m in any direction ± 3 mm at any location; 0.8 mm offset at any location.

b. Joints: 10.8 mm joint with variation at any locations; 1.6 mm in 1 m deviation from plumb and true.

3. Tile work shall be laid out in pattern using field tile and trim shapes as shown on the Plans. Tile fields shall be centered on both directions in each space or on each wall area, and shall be adjusted to minimize tile cutting. Uniform joint widths for ceramic tile and granite tile shall be used unless otherwise shown on the Plans or approved by the Engineer. Field tiles, not trim shapes, shall be cut unless otherwise shown on the Plans.

4. Tile work shall be extended into recesses and under equipment and fixtures in the spaces shown on the Plans or scheduled to receive tiles. A complete covering without interruptions shall be formed except for control and expansion joints as shown on the Plans and as required to comply with disruption of pattern or joint alignments.

5. Liquid Latex Mortar Thin-Set Installation: Liquid latex mortar for thin-set the work shall be used, unless otherwise shown on the Plans.

6. Work shall be neatly terminated at obstructions, edges, and corners without disrupting pattern or joint alignments.

7. Intersections and return shall be accurately formed. Cutting and drilling of tile shall be performed without damaging visible surfaces. Edges of tile abutting trim, finish or built-in items shall be carefully grind cut for straight aligned joints. Tiles shall be closely fit to electrical outlet, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.

8. Joining Pattern: Unless otherwise shown on the Plans, tiles shall be laid in grid pattern. Joints when adjoining tiles on floor, base, walls, and trim of the same size shall be aligned. Tile work shall be laid out and tile fields shall be centered in both directions in each space or on each wall area. Tile work shall be adjusted to minimize tile cutting. Uniform joint widths shall be provided unless otherwise shown on the Plans.

9. Tile lining shall be laid out to next full tile beyond dimensions indicated.

10. Control joints or expansion joints shall be provided where shown, or required on the Plans, or by job condition for proper workmanship. Removable divider strip of proper width and depth of the tile and setting bed shall be installed. Strips shall be removed after grouting tiles and properly curing the work. Joint fillers and sealants shall be installed in control joints and expansion joints, of type as recommended by the tiling manufacturer.

11. All floor tiling in water present areas such as bathrooms, washing area, kitchens, pantries and mechanical rooms shall be laid with a joint filling of approved polyurethane sealant.

12. For areas with ceramic tile flooring, a thick creamy slurry of neat white or tinted cement mixed with sufficient water shall be brushed over the floor until all joints are thoroughly filled. The surface of the floor shall be gently rubbed with a wood block to bring the surface to true planes. Excess slurry shall be removed, and the floor shall be rubbed with burlap to clean the tiles and finish of the joints to the satisfaction of the Engineer. Walking on tiles shall not be allowed for 5 days after laying and all completed tiled areas shall be protected to the satisfaction and approval of the Engineer.

1018.3.3.2 Wall

1. Cement and sand (1:4) mix backing 10 mm thick shall be laid as base for wall tiling. The surface of the backing shall be scratched in an approved manner when completely set to form key. The surface of the backing shall be well wetted before the tiling is applied and same shall be cured before tiling starts.

2. Allowable Variations in Finished Work:

a. Walls: 3 mm in 2 m in any direction; ± 3 mm at any location; 0.8 mm offset at any location.
b. Joints: ±0.8 mm joint with variation at any locations; 1.6 mm in 1 m deviation from plumb and true.

3. Wall tiles and fittings shall be set in cement and sand mortar (1:4) mix, 6 mm thick to a true vertical face with continuous horizontal and vertical joints. Joints shall be straight, level, perpendicular and of even width not exceeding 1.5 mm. The vertical joints shall be maintained plumb for the entire true level and plane by tamping under a straight edge or rubber faced block. Misfits as well as damaged or defective tiles shall be removed and replaced by and at the Contractor's expense.

4. Tile adhesive for wall tiles shall not be used without the approval of the Engineer.

5. The external and internal angles and side edges of glazed wall tiling shall be formed with angle beads. Whereas top edges of tiles shall be formed with rounded edges tiles. Joints shall match the general tiling and special fittings shall be used.

6. After edges of tiles have been thoroughly wet, joints in glazed wall tiles and fittings shall be grouted with a plastic mix of neat white or colored cement immediately after a suitable area of tile has been laid.

7. The joints shall be tooled slightly concave and the excess mortar shall be cut off and wiped off with a damp cloth from the face tile before it sets hard.

8. All special purpose wall tiles such as skirting tiles, single round edge, adjacent round edge, external round edge and the like, shall be used in wall cladding shall be submitted for approval prior to commencement to work.

9. All service points in wall tiling shall be drilled holes in the tiles if they are located in the center of tiles.

1018.3.3.3 Countertop

1. Solid surfacing components shall be installed plumb, level, and true according to approved shop drawings and manufacturer's published installation instructions. Woodworking and specialized fabrication tools that are acceptable to the Engineer shall be used.

2. Joint seams shall be formed with specified seam adhesive. Seams shall be in locations as shown on approved shop drawings and acceptable to the Engineer. Excess adhesive shall be promptly removed.

3. A minimum radius of 13 mm shall be provided for countertop inside corners.

4. Gaps shall be filled between countertop and terminating substrates with appropriate sealant.

5. Rout sink cut-outs shall be in accordance to manufacturer's template. Solid surface cast sink units shall be installed to countertops with appropriate adhesive.

6. Backsplashes and end splashes shall be installed where indicated on drawings. Install countertops with appropriate adhesive.

7. Vanities: Front panels shall be secured to solid substrate with appropriate adhesive. A 5 mm gap shall be maintained between fixed and removable panels.

1018.3.4 Grouting and Pointing

1. Tiles shall have laid in place for at least 24 h before grouting of the joints is started. Grouting mortar shall be white Portland cement or blended with pigments to acquire the color appropriate for the ceramic tile.

2. Grouting mortar shall be applied over the tile by float or squeegee stroked diagonally across the joints. Excess mortar shall be removed with a wet sponge stroked diagonally or in a circular-motion after 12 min to 15 min. A barely damp or dry sponge shall be used to remove remaining haze while smoothing all grouted joints.

1018.3.5 Cleaning

1. Tile surfaces shall be cleaned thoroughly as possible upon completion of grouting.

2. All grout haze shall be removed using the appropriate cleaner.

3. Tiles shall be thoroughly rinsed with clean water before and after using chemical cleaners.

4. Surface of tile shall be polished with soft cloth.

1018.3.6 Protection from Construction Dirt

1. A protective coat of neutral cleanser solution diluted with water in the proportion of 1:4 (1 L cleanser concentrate to 4 L of water) shall be applied.

2. In addition, tile flooring shall be covered with heavy-duty non-staining construction paper, taped in place. The protective paper shall not be torn or removed.

3. Just before final acceptance of the work, the protective paper shall be removed and the protective coat of neutral cleaner from tile surface shall be rinsed off.

1018.3.7 Quality Control

1. Each type and color of tile, mortar, adhesive and grout shall be obtained from a single source to minimize variations in appearance and quality.

2. Before installation of tiles, mock-ups shall be erected for each tile and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of material and execution. Mock-ups shall be built using materials indicated for final of work.

1018.3.8 Delivery, Storage and Handling

1. Packaged materials shall be delivered and stored in original containers with seals unbroken and labels intact until ready for installation.

2. Damage or contamination of materials by water, foreign matter and other causes that may affect its appearance and quality shall be prevented.

3. Tiles and setting materials shall be stored on elevated platforms, under cover and in a dry location and protect from contamination, dampness, or overheating.

1018.4 Method of Measurement

All works performed under this Item shall be measured in square meters or lump sum for areas actually laid with ceramic or granite tiles and accepted to the satisfaction of the Engineer.

1018.5 Basis of Payment

The quantities measured as prescribed in Section 1018.4, Method of Measurement shall be based on the Unit Bid or Contract Unit Price which price and payment constitutes full compensation for furnishing all materials, labor, tools, equipment and other incidentals necessary to complete this Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
1018	Ceramic Tiles	Square Meter

ITEM 1027- CEMENT PLASTER FINISH

1027.1 Description

This Item shall consist of furnishing all cement plaster materials, labor, tools and equipment required in undertaking cement plaster finish in accordance with the Plans and this Specification.

1027.2 Material Requirements

Manufactured materials shall be delivered in the manufacturer's original unbroken packages or container which are labeled plainly with the manufacturer's name and trademark.

1027.2.1 Cement

Portland cement shall conform to the requirements as defined in Subsection 900.2.1, Portland Cement of Item 900, Structural Concrete.

1027.2.2 Hydrated Lime

Hydrated lime shall conform to the requirements as defined in Subsection 900.2.5, Admixtures of Item 900, Structural Concrete.

1027.2.3 Fine Aggregates

Fine aggregates shall be clean, washed river sand and free from dirt, clay, organic matter or other deleterious substances. Sand derived from crushed gravel or stone may be used with the Engineer's approval but in no case shall such sand be derived from stone unsuitable for use as coarse aggregates.

Fine aggregates shall conform to ASTM C897, Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters, Grading.

Table 1027.1 Grading of Fine Aggregates for Portland Cement-Based Plasters

Sieve size No.	% Retaining by Weight
4.75 mm	0
2.36 mm	0
1.18 mm	40

600 um	65
300 um	90
150 um	100
75 um	100

1027.2.4 Water

It shall conform to the Specification requirements defined in Subsection 900.2.3, Water of Item 900, Structural Concrete.

1027.3 Construction Requirements

1027.3.1 Surface Preparation

All plaster bases and accessories shall be free of deleterious amounts of rust, oil, or other foreign matter, which could cause bond failure or unsightly discoloration.

1. After removal of formworks reinforced concrete surfaces shall be roughened to improve adhesion of cement plaster.

2. Surfaces to receive cement plaster shall be cleaned of all projections, dust, loose particles, grease and bond breakers. Before any application of brown coat is commenced all surfaces that are to be plastered shall be wetted thoroughly with clean water to produce a uniformly moist condition.

3. Metal bases and accessories used to receive plaster shall be installed in conformance with ASTM C1063, Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster, except as other specified. Non-metallic based used to receive plaster shall be installed in conformance with ASTM C1787, Standard Specification for Installation of Non-Metallic Plaster Bases Used with Portland Cement Based Plaster in Vertical Wall Application.

4. Surfaces of solid base to receive plaster, such as masonry, stone, cast in place or precast concrete shall be straight and true within 6 mm in 3 m and shall be free of form oil or other elements, which would interfere with bonding. Conditions where the surfaces are out of tolerance shall be corrected prior to the application of the plaster. Ferrous-containing form ties or other obstructions shall be removed or receded a minimum 3 mm below the surface of the

solid base and treated with a corrosion-resistant coating. Non-ferrous protuberances shall be permitted to be trimmed back even with the surface of the solid base.

1027.3.2 Plaster Proportions

All plaster shall be mixed and proportioned in accordance with the applicable requirements of ASTM C926, Standard Specification for Application of Portland Cement-Based Plaster.

The method of measuring materials for the finish shall be such that the specified proportions are controlled and accurately maintained. The weights per cubic meter of the materials are considered to be as follows:

Table 1027.2 Measurement of Materials

Material	Weight, kg/m^3
Portland Cement	1505
Blended Cement	Weight printed on Bag
Masonry or Plastic Cement	Weight printed on Bag
Hydrated Lime	640
Sand, Damp, and Loose	1280 of dry sand

For purposes of this specification, a weight of 1,280 kg of oven-dried sand shall be used. This is, in most cases, equivalent to 0.028 m^3 of loose, damp sand.

Plaster mix used shall be as designated and referenced to Table 1027.3. Base coat proportions shall be as shown in Table 1027.4 for the mix specified from Table 1027.3. Finish-coat proportions for job-mixed finish coats shall be as specified in Table 1027.5.

Table 1027.3 Plaster Bases - Permissible Mixes

Property Base	Mixes for Plaster Coats

	First (Scratch)	Second (Brown)
Low absorption, such as dense, smooth clay tile, brick, or concrete	C CM or MS P	C, CL, M or CM CM, MS, or M P
High Absorption, such as concrete masonry, absorptive brick, or tile	CL M CM or MS P	CL M CM, MS, or M P
Metal plaster base	C CL CM or MS M CP P	C, CL, M, CM, or MS CL CM, MS, or M CP or P M CP or P P

Where specified, natural or synthetic fibers shall be free of contaminants and used only in the base coat(s). The quantities per batch shall be in accordance with the published directions of the fiber manufacturer.

Table 1027.4 Base-Coat Proportions, [A] Parts by Volume [B]

	Cementitious Materials	

Plaster Mix Symbols	Portland Cement Blend	Plastic Cement	Masonry Cement		Lime	Volume of Aggregate per Sum of Separate Volumes of Cementitious Materials	
			N	M or S		1st coat	2nd coat
C	1	-	-	-	0 – ¾	2 ½ - 4	3 - 5
CL	1	-	-	-	¾ - 1 ½	2 ½ - 4	3 - 5
M	-	-	1	-	-	2 ½ - 4	3 - 5
CM	1	-	1	-	-	2 ½ - 4	3 - 5
MS	-	-	-	1	-	2 ½ - 4	3 - 5
P	-	1	-	-	-	2 ½ - 4	3 - 5
CP	1	1	-	-	-	2 ½ - 4	3 - 5

Note:

A The mix proportions for plaster scratch and brown coats to receive ceramic tile shall be in accordance with the applicable requirements of ANSI A108.1 series applicable to Specified method of setting time.

B Variations of lime, sand, and perlite contents are allowed due to variation in local sands and insulation and weight requirements. A higher lime content will generally support a higher aggregate content without loss of workability. The workability of the plaster mix will govern the amounts of lime, sand or perlite

C The same or greater sand proportion shall be used in the second coat than is used in the first coat.

Table 1027.5 Finish Coat Proportion Parts by Volume Cementitious Materials

Plaster Mix Symbols	Cementitious Materials					Volume of Aggregate per Sum of Separate Volumes of Cementitious Materials
	Portland Cement Blend	Plastic Cement	Masonry Cement		Lime	
			N	M or S		1 ½ - 3
F	1	-	-	-	0 – ¾	1 ½ - 3
FL	1	-	-	-	¾ - 1 ½	1 ½ - 3
FM	-	-	1	-	-	1 ½ - 3
FCM	1	-	1	-	-	1 ½ - 3
FMS	-	-	-	1	-	1 ½ - 3
FP	-	1	-	-	-	1 ½ - 3

Note:

A Additional Portland cement is not required when Type S or M Masonry cement is used.

B In areas not subject to impact, perlite aggregate shall be permitted to be used over bas-coat plaster containing perlite aggregate.

1027.3.2.1 Mixing

All plaster shall be prepared in a mechanical mixer, using sufficient water to produce a workable consistency and uniform color.

Base-coat plasters that have stiffened because of evaporation of water shall be permitted to be tempered one time only to restore the required consistency. Plaster not used within 90 min from start of initial mixing shall be discarded. Finish-coat plaster shall not be tempered.

1027.3.3 Mixture

1. Mortar mixture for brown coat shall be freshly prepared and uniformly mixed in the proportion by volume of one (1) part Portland cement, three (3) parts sand and one fourth (1/4) part hydrated lime.

2. Finish coat shall be pure Portland cement properly graded conforming to the requirements of Subsection 900.2.1, Portland Cement of Item 900, Structural Concrete and mixed with water to approved consistency and plasticity.

1027.3.4 Application

1. Brown coat mortar mix shall be applied with sufficient pressure starting from the lower portion of the surface to fill the groove and to prevent air pockets in the reinforced concrete/masonry work and avoid mortar mix drooping. The brown coat shall be lightly broomed/or scratched before surface had properly set and allowed to cure.

2. Finish coat shall not be applied until after the brown coat has seasoned for 7 days and corrective measures had been done by the Contractor on surface that are defective. Just before the application of the finish coat, the brown coat surface shall be evenly moistened with potable water. Finish coat shall be floated first to a true and even surface, then troweled in a manner that will force the mixture to penetrate into the brown coat. Surfaces applied with finish coat shall then be smooth with sandpaper in a circular motion to remove trowel marks, checks and blemishes. All cement plaster finish shall be 10 mm thick minimum on vertical concrete and/or masonry walls.

Wherever indicated on the Plans to be "Simulated Red Brick Finish," or "Decorative Stone" the Contractor shall render brick design or stone on plaster surface before brown coat had properly set and then allowed to dry. Cement plaster shall not be applied directly to:

1. Concrete or masonry surface that had been coated with bituminous compound and; 2. Surfaces that had been painted or previously plastered.

Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1027.3.5 Workmanship

Cement plaster finish shall be true to details and plumbed and do not deviate more than plus or minus 3 mm in 3 m from a true plane in finished plaster surfaces, as measured by a 3 m straight-edge placed at any location on surface. Finish surface shall have no visible junction marks where one (1) day's work adjoins the other. Vertical and horizontal groove joints shall be 25 mm wide and 10 mm deep or as shown on the Plans.

1027.4 Method of Measurement

All cement plaster finish shall be measured in square meters, lump sum or part thereof for work actually completed in the building.

1027.5 Basis of Payment

The work quantified and determined as provided in the Bill of Quantities shall be paid for at the Contract Unit Price which price constitutes full compensation including labor, materials, tools and equipment and incidentals necessary to complete this Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
1027 (1)	Cement Plaster Finish	Square Meter

ITEM 1032 - PAINTING, VARNISHING AND OTHER RELATED WORKS

1032.1 Description

This Item shall consist of furnishing all paint materials, varnish and other related products, labor, tools, equipment required and undertaking the proper application of painting, varnishing and related works in accordance with the Plans and this Specification.

1032.2 Material Requirements

1032.2.1 Paint Materials

Paint material shall conform to the requirements of the following Specifications:

Table 1032.1 Paint Material Specification Requirements

Material	PNS Code	Description	Application
Flat Latex Paint	PNS 139	Specification for Flat Latex Paint (white and light tints for exterior and interior use)	Properly prepared plaster, masonry and primed wood and other architectural surfaces
Semi-gloss Latex Paint	PNS 463	Specification for Semi- Gloss Latex Paint (white and light tints for exterior and interior use)	Properly prepared plaster, masonry and primed wood and other architectural surfaces
Semi-gloss Enamel Paint	PNS 225	Specification for Alkyd- based Semi-Gloss Enamel Paint (white and light tints for exterior and interior use)	Properly prepared plaster, masonry and primed wood and other architectural surfaces
Enamel Paint	PNS 226	Specification for Alkyd based Gloss Enamel Paint (white and coloured for exterior and interior use)	Wood, metal and other architectural surfaces

Alkyd-based Metal Primer	PNS 366	Specification for Alkyd based Metal Primer	Ferrous metal
Epoxy Metal Primer	PNS 2113	Specification of Epoxy Metal Primer	Ferrous metal
Flatwall Enamel Paint	PNS 227	Specification for Alkyd based Flat Enamel Paint (white and light tints for exterior and interior use)	Wood
Gloss Latex Paint	PNS 462	Specification for Gloss Latex Paint (white and light tints for exterior and interior use)	Masonry
Water Based Gloss Roof Paint	PNS 612	Specification for Water Based Gloss Roof Paint	Concrete, metal, wood and other paintable roofing materials
Elastomeric Wall Coating	PNS 2116	Specification for Elastomeric Wall Coating	Plaster, masonry, other architectural surfaces
Epoxy Enamel	PNS 2118	Specification for Epoxy Enamel, white and coloured	Concrete, wood, metal and other architectural surfaces
Roof paint (water based, flat)	PNS 464	Specification for Roof paint (water-based, flat)	Paintable roofing materials

Roof paint (Portland Cement)	PNS 465	Specification for Roof paint (Portland Cement)	Paintable roofing materials

1032.2.2 Tinting Colors

Tinting colors shall be first grade quality, pigment ground in alkyd resin that disperses and mixes easily with paint to produce the color desired. Same brand of paint and tinting color shall be used to effect good paint body.

1032.2.3 Acry-colors

It shall be high strength tinting colors for water-based coatings that are specially formulated from the finest blend of pigments combined with pure acrylic latex vehicle that is easy to disperse, fast drying, odorless, and gives maximum color retention.

1032.2.4 Concrete Neutralizer

Concrete neutralizer shall be first grade quality concentrate diluted with clean water and applied as surface conditioner of new interior and exterior walls thus improving paint adhesion and durability.

1032.2.5 Silicon Water Repellant

Silicon water repellant shall be transparent water shield especially formulated to repel rain and moisture on exterior masonry surfaces.

1032.2.6 Patching Compound

Patching compound shall be fine powder type material like calciumine that can be mixed into paint that will produce a putty consistency, with oil base primers and paints to fill minor surface dents and imperfections.

1032.2.7 Varnish

Varnish shall be a homogeneous solution of resin, drying oil, drier and solvent. It shall be extremely durable clear coating, highly resistant to wear and tear without cracking, peeling, whitening, spotting, etc. with minimum loss of gloss for a maximum period of time.

1032.2.8 Lacquer

Lacquer shall be any type of organic coating that dries rapidly and solely by evaporation of the solvent. Typical solvent are acetates, alcohols and ketones. Clear gloss lacquer shall be in accordance with the requirements of PNS 368, Specification for Clear Gloss Lacquer.

1032.2.9 Shellac

Shellac shall be a solution of refined lac resin in denatured alcohol. It dries up by evaporation of the alcohol. The resin is generally furnished in orange and bleached grades.

1032.2.10 Sanding Sealer

Sanding sealer shall be quick drying lacquer, formulated to provide quick dry, good holdout of succeeding coats, and containing sanding agents such as zirk stearate to allow dry sanding of sealer. It shall be in accordance with the requirements of PNS 367, Specification for Lacquer Sanding Sealer.

1032.2.11 Oil Wood Stain

Oil-based stain shall be a penetrating stain for interior doors, windows, trim and furniture. It rejuvenates and transforms interior timber. Oil-based stain penetrates deeply and adds color without raising the grain. Oil-based stain is best used to rejuvenate old or used timber.

1032.2.12 Glazing Putty

Glazing putty shall be alkyd-type product for filling minor surface unevenness.

1032.2.13 Natural Wood Paste Filler

Wood paste filler shall be quality filler for filling and sealing open grain of interior wood. It shall produce a level finish for following coats of paint varnish/lacquer and other related products.

1032.2.14 Schedule

Exterior

1. Plain cement plastered finish - Three (3) coats acrylic base masonry paint to be painted
2. Concrete exposed aggregate - One (1) coat water repellant and/or tool finish
3. Ferrous metal - One (1) coat primer and two (2) coats enamel paint
4. Galvanized metal - One (1) coat zinc chromate primer and two (2) coats Portland cement paint
5. Wood paint finish - Three (3) coats oil based paint
6. Wood varnished finish - Varnish water repellant

Interior

1. Plain cement plastered finish to - be painted - Two (2) coats acrylic base masonry paint

2. Concrete exposed aggregate - Clean surface

and/

or tool finish

3. Ferrous metal - One (1) coat primer and two (2) coats

enamel paint

4. Woodwork sea-mist - Three (3) coats of three (3) parts thinner

and one (1) part lacquer

5. Woodwork varnish - First coat of one (1) part sanding sealer

to one (1) part solvent

Second coat of two-third (2/3)

sanding sealer to one-third (1/3) solvent

6. Woodwork painted finish - Three (3) coats oil base paint

7. Ceiling boards textured finish - One (1) coat oil based paint, all to dry the patch surfaces unevenness and apply textured paint coat

1032.2.15 Containers and Markings

It shall be in accordance with the requirements of PNS 140, General Requirements for Packaging, Packing and Marking of Paints and Other Protective Coatings.

All paints, varnishes, and other related products shall be shipped in strong, substantial containers marked in prints distinctive color of the label or in letters clearly visible to the naked eye with the following information:

1. Type of Paint

2. Brand or Trademark

3. Name and address of manufacturer

4. Net Volume and/or mass in metric units

5. Directions for use

6. Safety precautions

7. Batch or lot number

Any package or container not so marked will not be accepted for use under this Specification.

1032.3 Construction Requirements

Prior to commencement of the painting, varnishing and related work, the surfaces to be applied shall be examined in order not to jeopardize the quality and appearances of the painting, varnishing and related works.

1032.3.1 Surface Preparation

All surfaces shall be in proper condition to receive the finish. Woodworks shall be hand-sanded smooth and dusted clean. All knot-holes pitch pockets or sappy portions shall be sealed with natural wood filler. Nail holes, cracks or defects shall be carefully puttied after the first coat, matching the color of paint.

Interior woodworks shall be sandpapered between coats. Cracks, holes of imperfections in plaster shall be filled with patching compound and smoothed off to match adjoining surfaces.

Concrete and masonry surfaces shall be coated with concrete neutralizer and allowed to dry before any painting primer coat is applied. When surface is dried, apply the first coating. Hairline cracks and unevenness shall be patched and sealed with approved putty or patching compound. After all defects are corrected apply the finish coats specified on the Plans (color scheme approved).

Metal shall be clean, dry and free from mill scale and rust. Remove all grease and oil from surfaces. Wash, unprimed galvanized metal with etching solution and allow it to dry. Where required to prime coat surface with Red Lead Primer same shall be approved by the Engineer.

In addition, the following shall be undertaken prior to painting, varnishing and ther related works:

I Voids, cracks, nick, and other wood imperfections will be repaired with proper patching material and finished flushed with surrounding surfaces.

2 Marred or damaged shop coats on metal shall be spot primed with appropriate metal primer.
3. Painting and varnishing works shall not be commenced when it is too hot or cold

4. Allow appropriate ventilation during application and drying period. 5. All hardware will be fitted and removed or protected prior to painting and varnishing works.

1032.3.2 Application

Paints when applied by brush shall become non-fluid, thick enough to lay down as adequate film of wet paint. Brush marks shall flawed out after application of paint.

Paints made for application by roller must be similar to brushing paint. It must be non-sticky when thinned to spraying viscosity so that it will break up easily into droplets.

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.

1032.3.3 Mixing and Thinning

At the time of application paint shall show no sign of deterioration. Paint shall be thoroughly stirred, strained and kept at a uniform consistency during application. Paints of different manufacture shall not be mixed together. When thinning is necessary, this may be done immediately prior to application in accordance with the manufacturer's directions, but not in excess of one (1) pint of suitable thinner per gallon of the paint.

1032.3.4 Storage

All materials to be used under this Item shall be stored in a single place to be designated by the Engineer and such place shall be kept neat and clean at a times. Necessary precaution to avoid fire must be observed by removing oily rags, waste, etc. at the end of daily work.

1032.3.5 Cleaning

All cloths and cotton waste which constitute fire hazards shall be placed in metal containers or destroyed at the end of daily works. Upon completion of the work all staging, scaffolding and paint containers shall be removed. Paint drips, o or stains on adjacent surfaces shall be removed. Paint drips, oil, or stains on adjacent surfaces shall be removed and the entire job left clean and acceptable to the Engineer.

1032.3.6 Workmanship in General

1. All paints shall be evenly applied. Coats shall be of proper consistency and well brushed out so as to show a minimum of brush marks.

2. All coats shall be thoroughly dry before the succeeding coat is applied.

3. Where surfaces are not fully covered or cannot be satisfactorily finished in the number of coats specified, such preparatory coats and subsequent coats as may be required shall be applied to attain the desired evenness of surface without extra cost to the Owner.

4. Where surface is not in proper condition to receive the coat the Engineer shall be notified immediately. Work on the questioned portion(s) shall not start until clearance be proceed is ordered by the Engineer.

5. Hardware, lighting fixture and other similar items shall be removed of protected during the painting varnishing and related work operations and re installed after completion of the work.

1032.3.7 Procedure for Sea-Mist Finish

1. Depress wood grain by steel brush and sand surface lightly.
2. Apply sanding sealer.
3. Apply two (2) coats of industrial lacquer paint.
4. Spray last coat of industrial lacquer paint mixed with sanding sealer.
5. Apply wood paste filler thinned with turpentine or paint thinner into the wood surface.
6. Wipe off wood paste filler immediately.
7. Spray flat or gloss lacquer whichever is specified.

1032.3.8 Procedure for Varnish Finish

1. Sand surface thoroughly.
2. Apply putty on all cracks and other wood imperfections with wood paste filler.

3. Apply oil stain.
4. Apply lacquer sanding sealer.
5. Sand surface along the grain.
6. Spray three (3) coats of clear dead flat lacquer.
7. Polish surface coated using cloth pad.
8. Spray gloss lacquer or flat lacquer whichever is desired or specified.

1032.3.9 Procedure for Ducco Finish

1. Sand surface thoroughly.
2. Apply primer surface white or gray by brush or spray.
3. Apply lacquer spot putty in thin coat. Allow each coat to become thoroughly dry before applying next coat.
4.Apply primer surfaces and then allow to dry in 2 h before applying the next coat.
5. Apply a coat of flat tone semi-gloss enamel as per color scheme submitted and approved by the Engineer.

1032.4 Method of Measurement

The areas of concrete, wood and metal surfaces applied with varnish, paint and other related coating materials shall be measured in square meters as desired and accepted to the satisfaction of the Engineer.

1032.5 Basis of Payment

The accepted work shall be paid at the unit bid price, which price and payment constitute full compensation for furnishing and proper application of all materials, labor, equipment, tools and other incidental necessary to complete this Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
1032(1)a	Painting Works, Masonry/Concrete	Square Meter
1032(1)c	Painting Works, Steel	Square Meter

ITEM 1046 - MASONRY WORKS

1046.1 Description

This Item shall consist of furnishing of all the necessary materials, tools, equipment and labor necessary to complete the execution of the masonry works as shown on the plans.

1046.2 Material Requirements

1046.2.1 Hydraulic Cement

Hydraulic Cement shall conform to the applicable requirements of Subsection 900.2.1, Portland Cement of Item 900, Structural Concrete.

1046.2.2 Aggregates

1046.2.2.1 Aggregates for Concrete Hollow Blocks and Louver Blocks

Aggregates shall conform to the applicable requirements of Subsection 900.2.1, Portland Cement of Item 900, Structural Concrete.

1046.2.2.2 Aggregates/Pozzolan for Autoclaved Aerated Concrete (AAC) Blocks

Aggregates and pozzolan shall conform to the applicable requirements of ASTM C332, Standard Specification for Lightweight Aggregates for Insulating Concrete and ASTM C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan in Concrete, respectively.

1046.2.3 Water

Water shall conform to the applicable requirements of Subsection 900.2.3, Water of Item 900, Structural Concrete

1046.2.4 Reinforcing Steel

1046.2.4.1 Reinforcing Steel for Concrete Hollow Blocks and Louver Blocks

Reinforcing steel shall conform to the applicable requirements of Item 902, Reinforcing Steel.

1046.2.4.2 Reinforcing Steel for Autoclaved Aerated Concrete (AAC) Blocks

Dowels and tie bars shall conform to the applicable requirements of AASHTO M322M or ASTM A996M, Standard Specification for Rail-Steel and Axle Steel Deformed Bars for Concrete Reinforcement.

1046.2.5 Mortar for Concrete Hollow Blocks and Louver Blocks

Mortar shall consist of sand, cement and water conforming to the requirements of Item 900, Structural Concrete, mixed in the proportion of one (1) part cement to three (3) parts sand by volume, and sufficient water to obtain the required consistency.

1046.2.6 Quicklime for Autoclaved Aerated Concrete (AAC) Bloc

Quicklime shall conform to the applicable requirements of ASTM C5, Standard Specification for Quicklime for Structural Purposes.

1046.2.7 Gypsum for Autoclaved Aerated Concrete (AAC) Blocks

Gypsum shall conform to the applicable requirements of ASTM C22M, Standard Specification for Gypsum.

1046.2.8 Aeration Agent for Autoclaved Aerated Concrete (AAC) Blocks

Aeration agent shall conform to manufacturer's specifications.

1046.2.9 Thin-bed Mortar for Autoclaved Aerated Concrete (AAC) Blocks

Thin-bed mortar shall conform to the applicable requirements of ASTM C1660, Standard Specification for Thin-bed Mortar for Autoclaved Aerated Concrete (AAC) Masonry.

1046.2.10 Backer Rod for Autoclaved Aerated Concrete (AAC) Blocks

Backer rod shall conform to the applicable requirements of ASTM D5249, Standard Specification for Backer Material Use with Cold- and Hot- Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints.

1046.2.11 Concrete Hollow Blocks and Louver Blocks

Width, height and length of concrete hollow blocks and louver blocks shall be +3.20 mm from the specified dimension as shown on the Plans.

1046.2.11.1 Load-Bearing Concrete Hollow Blocks

Load-bearing concrete hollow blocks shall conform to the physical requirements of the Tables 1046.1 and 1046.2 as prescribed on ASTM C90, Standard Specifications for Load-bearing Concrete Masonry Units.

Table 1046.1 Thickness of Face Shells and Webs

Nominal Width (W) of Units, mm	**Minimum Face Shell Thickness (t_{fs}), mm**	**Minimum Web Thickness (t_w)**	
		Webs, mm	**Equivalent Web Thickness, mm/linear m**
76.2 and 102	19	19	136

152	25	25	188
203	32	25	188
254 and greater	32	29	209

Table 1046.2 Strength, Absorption, and Density Classification Requirements

Density Classification	**Oven-Dry Density of Concrete, kg/m³**	**Maximum Water Absorption, kg/m³**		**Minimum Net Area Compressive Strength, MPa (Psi)**	
	Average of 3 Units	**Average of 3 Units**	**Individual Units**	**Average of 3 Units**	**Individual Units**
Lightweight	Less than 1680	288	320	13.1 (1900)	11.7 (1700)
Medium Weight	1680 to less than 2000	240	272	13.1 (1900)	11.7 (1700)
Normal Weight	2000 or more	208	240	13.1 (1900)	11.7 (1700)

1046.2.11.2 Non-load bearing Concrete Hollow Blocks and Louver Blocks

Non-load bearing concrete hollow blocks shall be clearly marked to prevent their use as load bearing units.

1. Type I, Moisture-Controlled Units - Units shall conform to the requirements of Tables 1046.3, 1046.4 and 1046.5.

2. Type II, Non-Moisture-Controlled Units - Units designated as Type II shall conform to the requirements of Table 1046.

Table 1046.3 Weight Classification

Weight Classification	**Oven-Dry Density of Concrete, kg/m³**
Lightweight	Less than 1680
Medium Weight	1680 to less than 2000
Normal Weight	2000 or more

Table 1046.4 Strength Requirements

	Compressive Strength (Average Net Area, Min.) MPa (Psi)
Average of 3 Units	4.14 (600)
Individual Unit	3.45 (500)

Table 1046.5 Moisture-Content Requirements for Type I Units

Total Linear Drying Shrinkage, %	**Moisture Content, max., % of Total Absorption (Average of 3 Units)**		
	Humidity Conditions at Job Site of Point of Use		
	Humid [A]	**Intermediate [B]**	**Arid [C]**

Less than 0.03	45	40	35
0.03 to less than 0.045	40	35	30
0.045 to 0.065, max	35	30	25

Note:

A Mean annual relative humidity above 75%

B Mean annual relative humidity 50 to 75%

C Mean annual relative humidity less than 50%

1046.2.12 Autoclaved Aerated Concrete Blocks

Overall unit dimension (width, height or length) of autoclaved aerated concrete blocks shall not exceed 3 mm from the specified dimension shown on the plans.

Non-load bearing Autoclaved Aerated Concrete Blocks shall conform to the physical requirements of the following tables as prescribed on ASTM C1693, Standard Specifications for Autoclaved Aerated Concrete (AAC).

Table 1046.6 Weight Classification

Strength Class	**Nominal Dry Bulk Density, kg/m3**	**Density Limits, kg/m3**	
		Lower Limit >	**Upper Limit <**
AAC-4	500 600	450 550	550 650

AAC-5	600 700	550 650	650 750
AAC-6	600 700	550 650	650 750

Table 1046.7 Strength Requirements

Strength Class	**Minimum Compressive Strength, MPa (Psi)**
AAC-4	4.0 (580)
AAC-5	5.0 (725)
AAC-6	6.0 (870)

Table 1046.8 Average Drying Shrinkage Requirement

Strength Class	**Average Drying Shrinkage**
AAC-4	≤0.02%
AAC-5	≤0.02%
AAC-6	≤0.02%

1046.2.13 Other Constituents for Concrete Hollow Blocks and Louver Blocks

Air-entraining agents, coloring pigments, integral water repellents, finely ground silica, and other constituents that are previously established as suitable for use in concrete masonry shall conform to applicable ASTM standards.

1046.2.14 Adobe Blocks

Adobe units shall have an average compressive strength of 2068 KPa when tested in accordance with ASTM C67, Standard Test Methods for Sampling and Testing Brick and Structural Clay. Five (5) samples shall be tested and individual units are not permitted to have a compressive strength of less than 1724 KPa.

1046.2.15 Mortar for Adobe Blocks

Mortar for adobe shall conform to ASTM C270, Standard Specification for Mortar for Unit Masonry.

1046.3 Construction Requirements

1046.3.1 Concrete Hollow Blocks and Louver Blocks

1046.3.1.1 Installation

1. All masonry work shall be laid true to line, level, plumb and neat in accordance with the Plans.

2. Units shall be cut accurately to fit all plumbing ducts, opening for electrical works, and all holes shall be neatly patched.

3. No construction support shall be attached to the wall except where specifically permitted by the Engineer.

4. Masonry unit shall be sound, dry, clean and free from cracks when placed in the structure.

5. Proper masonry units shall be used to provide for all window, doors, bond beams, lintels, plasters etc., with a minimum of unit cutting. 6. Where masonry units cutting is necessary, all cuts shall be neat and true to line.

7. Units shall be placed while the mortar is soft and plastic. Any unit disturbed to the extent that the initial bond is broken after initial positioning shall be removed and re-laid in fresh mortar.

8. Mortar shall not be spread too far ahead of units, as it will stiffen and loose plasticity, especially in hot weather. Mortar that has stiffened shall not be used. ASTM C270, Standard Specification for Mortar for Unit Masonry requires that mortar be used within 2½ hours of initial mixing.

1046.3.1.2 Reinforcement for Concrete Hollow Blocks

Reinforcement shall be done in accordance with the structural Plans as to size, spacing and other requirements of Section 902.3, Construction Requirements of Item 902, Reinforcing

Steel. Reinforcement shall be clean and free from loose, rust, scales and any coatings that will reduce bond.

1046.3.1.3 Sampling and Testing for Concrete Hollow Blocks and Louvers

Method of Sampling for Quality Test shall be as follows:

1. One (1) Quality Test for every 10,000 units or fraction thereof.

2. Six (6) specimens shall be submitted for one (1) quality test in which three (3) specimens for Compression Test and the remaining three (3) for Moisture Content and Water Absorption.

Units shall be tested in accordance with ASTM C140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units and ASTM C426, Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units.

1046.3.1.4 Storage and Handling of Masonry Works

The blocks shall be stockpiled on planks or other supports free from contact with ground and covered. The blocks shall be handled with care and damaged units shall be rejected.

1046.3.2 Autoclaved Aerated Concrete (AAC) Blocks

1046.3.2.1 Installation

1. Reference lines shall be established based on the given Plan.

2. Layout adjustments or opening rectifications (plumbing ducts or opening for electrical works) shall be made before laying masonry units.

3. Masonry unit shall be clean and free from dust or loose particles on it.

4. Floor and wall area shall be moistened prior to laying first layer of masonry unit. Mortar setting with 2:1 sand: cement ratio shall be provided as starter blocks if slab is unleveled beyond 2 cm

5. Adhesive shall be mixed using manufacturer's specified proportion of water using a power mixer and a non-absorptive pail or mixing container. Adhesive that has stiffened shall not be used. The pot life of the adhesive mix shall be referred to the manufacturer's instructions.

6. Thin bed adhesive shall be set and screed with notched trowel on the starter blocks to receive initial layer of masonry unit.

7. Laying of masonry unit shall be continued until the lateral layer is complete before moving on to the next layer. Adhesive shall be applied at 5 mm thick using a notched trowel on the required portions and maintaining 3 mm to 5 mm gap on the wall side surface to allow any wall movement. Alignment and levelness shall be regularly checked using rubber mallet and level bar.

8. Gaps and joints shall be filled with adhesive. Excess adhesive shall be spread on the surface or used to fill the gaps.

9. Rebar dowels, 10 mm in diameter, shall be installed spaced at 600 mm on the wall sides and along the affected beam and slab soffit. Dowels shall be embedded at least 50 mm into the side and top structures, exposing 100 mm to support lateral movement. No epoxy is needed.

10. Polyethylene backer rod, 20 mm in diameter, shall also be simultaneously installed at the slab or beam soffit.

11. When cutting of masonry unit is necessary, it shall be downsized first before applying the adhesive. Ice or wood saw can be used for this matter.

12. Corner interlocking setup is recommended.

1046.3.2.2 Finish and Appearance

1. All units shall be sound and free of cracks or other defects that interfere with the proper placement of the unit or significantly impair the strength or permanence of the construction. Minor cracks, incidental to the usual method of manufacture or minor chipping resulting from customary methods of handling in shipment and delivery, are not grounds for rejection.

2. Where units are to be used in wall construction, the face or faces that are to be exposed shall not show chips or cracks, not otherwise permitted, or other imperfections when viewed from a distance of not less than 6.1 m under diffused lighting. 5% of a shipment containing chips and cracks not longer than 1/3 of the dimension where it is found and not wider than 5 mm shall be permitted.

3. The color and texture of units shall be specified by the Engineer. The finished surfaces that will be exposed in place shall conform to an approved sample, consisting of not less than four (4) units, representing the range of texture and color permitted.

4. A shipment shall not contain more than 5% of units, including broken unit that do not meet requirements of the above provisions.

1046.3.2.3 Sampling and Testing of AAC Blocks

Method of Sampling for Quality Test shall be as follows:

1. Two (2) Quality Tests for every 10,000 units or a fraction thereof

2. Three (3) specimens shall be submitted for every one (1) quality test namely, Compression Test and Moisture Content & Bulk Density Determination.

Units shall be tested in accordance with ASTM C1693, Standard Specifications for Autoclaved Aerated Concrete (AAC).

1046.4 Method of Measurement

The work to be paid for under this Item shall be the number of square meters of masonry units that are satisfactorily completed and accepted.

1046.5 Basis of Payment

Measurement shall be paid for at the Contract Unit Price for Masonry Works The accepted quantity, measured as prescribed in Section 1046.4, Method of which price and payment shall include the cost of furnishing all labor, materials and equipment necessary to complete the work.

Payment shall be made under:

Pay Item Number	**Description**	**Unit of Measurement**
1046 (1)a1	CHB Non-Load Bearing (including Reinforcing Steel), 100 mm	Square Meter
1046 (1)a2	CHB Non-Load Bearing (including Reinforcing Steel), 150 mm	Square Meter

ITEM 1051 – RAILINGS

1051.1 Description

This Item shall consist of furnishing, fabricating and installing the railings for buildings and other similar structures of the material or combination of materials in accordance with this Specification and in conformity with the Plans.

Railings shall be classified as concrete, wooden, masonry, stone, metal, stainless steel and glass, in accordance with the predominating material contained in each.

Railing shall not be considered a part of the structural system of the building unless it is stated in the design.

1051.2 Material Requirements

1051.2.1 Concrete

It shall conform to the applicable requirements prescribed in Section 9002, Material Requirements of Item 900, Structural Concrete.

1051.2.2 Forms and Falseworks

It shall conform to the applicable requirements prescribed in Subsection 903.2, Material Requirements of Item 903, Formworks and Falseworks.

1051.2.3 Lumber, Plywood and Other Related Materials

It shall conform to the applicable requirements prescribed in Section 1003.2, Material Requirements of Item 1003, Carpentry and Joinery Works.

1051.2.4 Hardware

This shall conform to the applicable requirements of prescribed in Section 1004.2, Material Requirements of Item 1004, Hardware.

1051.2.5 Masonry

These shall conform to the requirements of Section 1046.2, Material Requirements of Item 1046, Masonry Works.

1051.2.6 Mortar

Mortar shall consist of sand, cement and water conforming to the requirement of Item 900, Structural Concrete, mixed 1n the proportion of one (1) part cement to three (3) parts sand by volume, and sufficient water to obtain the required consistency.

1051.2.7 Reinforcing Steel

It shall conform to the applicable requirements of Subsection 902.2.2, Material Requirements of Item 902, Reinforcing Steel.

1051.2.8 Stone

Stones shall be clean, hard, and durable and shall be subjected for the Engineer's approval. Adobe stones shall not be used unless otherwise specified.

1051.2.9 Metal

Steel base metal to be welded shall be open-hearth or electric furnace steel conforming to AASHTO M 183, Standard Specification for Structural Steel, unless otherwise shown on the Plans.

1051.2.10 Stainless Steel (Non-Ferrous Metal)

It shall conform to the requirements of ASTM A276M, Standard Specification for Stainless Steel Bars and Shapes or as called for in the Plans.

1051.2.11 Glass and Glazing

It shall conform to the applicable requirements prescribed in Section 1012.2 Material Requirements of Item 1012, Glass and Glazing.

Glass shall be laminated, heat strengthened, and tempered unless otherwise indicated in the Plans. If laminated glass were called for in the Plans it shall conform to ASTM C1048, Standard Specification for Heat-Treated Flat Glass

Kind HS, Kind FT Coated and Uncoated Glass and ASTM C1172, Standard specification for Laminated Architectural Flat Glass. The minimum thickness of glass shall be 6 mm unless otherwise indicated in the Plans.

If glass is intended for exterior railing in-fill panels, it shall comply with the following:

1. Test shall be in accordance with ASTM E2353, Standard Test Methods for performance of Glass in Permanent Glass Railing Systems, Guards and, Balustrades. The said standard evaluates static strength, impact resistance, and post-break retention.
2. Railing systems shall be in accordance to ASME E2358, Standard Specification for the Performance of Glass in Permanent Glass Railing Systems, Guards, and Balustrades. These systems include glazing in-fill, as well as structural glass railing types. The four (4) levels of performance are shown.

Table 1051.1 Levels of Performance

Performance Level	ASTM E935 (Structural[A]) (Minimum)	ANSI Z97.1 (Safety Impact[B]) (Minimum)
1	Concentrated load: 890 N Uniform Load : 290 N/m Infill Horizontal Load: 220N	Pass 230 J
2	Concentrated load: 890 N Uniform Load: 290 N/m Infill Horizontal Load: 220N	Pass 542 J
3	Concentrated load: 1330 N Uniform Load: 730 N/m Infill Horizontal Load: 220N	Pass 542 J
4	Concentrated load: 1620 N Uniform Load: 880 N/m Infill Horizontal Load: 220N	Pass 542 J

Note: [A] *Tests performed as outlined in ASTM E935, Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.*

[B] *Tests performed as described in ANSI Z97.1 2015, For safety glazing materials used in building safety performance specifications and method test.*

1051.2.12 Aluminum

It shall conform to the requirements of ASTM B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1051.2.13 Painting, Varnishing and Other related works

These shall conform to the applicable requirements prescribed in Section 1032.2, Material Requirements of Item 1032, Painting, Varnishing and Other Related Works.

1051.3 Construction Requirements

1051.3.1 General

Railings shall be constructed in accordance with the Plans and shall not reflect any unevenness in the structure/building. All railing posts shall be set plumb unless otherwise indicated on the Plans.

1051.3.2 Concrete Railing

Concrete railing shall be constructed in accordance with the requirements of Subsection 900.3 Construction Requirements of Item 900, Structural Concrete.

1051.3.2.1 Railing Cast-In-Place

Forms shall be secured to be smooth and tight fitting which can be rigidly held in line and grade and removed without damage to the casted concrete structure.

Forms shall either be of single width boards or shall be lined with suitable material to have a smooth surface which shall meet the approval of the Engineer or as shown in the Plans.

All moldings, panel work and bevel strips shall be constructed according to the detailed Plans with mitered joints. All corners in the finished work shall be true, sharp and clean cut, and shall be free from cracks, spalls, honeycombs and other defects.

1051.3.2.2 Precast Railings

Moist tamped mortar precast members shall be removed from the molds as soon as it is practicable and shall be kept damp for a period of at least ten (10) days. Any member that shows cracking of soft corners of surfaces shall be rejected.

1051.3.3 Wooden Railing

The construction requirements shall be in conformance whenever applicable, with Subsection 1003.3 Construction Requirements of Item 1003, Carpentry and Joinery Works.

1051.3.4 Masonry Railing

The construction requirements shall be in conformance, whenever applicable, with Subsection 1046.3 Construction Requirements of Item 1046, Masonry Works.

1051.3.5 Stone Railing

The maximum projection of stones beyond the pitch lines and shall not be more than 50 mm.

1051.3.6 Metal Railing

The metal railing shall be fabricated in accordance with the dimensions shown, on the approved Plans. In case of welded railings, all exposed joints shall be finished by grinding or filing after welding to give a neat appearance. Welding may be substituted for rivets or bolts with the approval of the Engineer.

1051.3.7 Stainless Steel Railing

The metal railing shall be fabricated in accordance with the dimensions shown on the Plans. During installation, stainless steel railing shall be free from rust and surface blemish. It shall be rust free until ten (10) years after completion.

1051.3.8 Glass Railing

The construction requirements shall be in conformance, whenever applicable with Section 1012.3 Construction Requirements of Item 1012, Glass and Glazing.

1051.4 Method of Measurement

The quantity to be paid for shall be the number of meters of specified railing materials and sizes or by lump sum for actually completed and accepted measured from center to center of end posts as shown on the Plans or as directed by the Engineer.

1051.5 Basis of Payment

The accepted quality, measured as prescribed in Section 1051.4, Method of Measurement shall be paid for at the Contract Unit-Price for Railing, which price and payment shall be full compensation for furnishing and placing all materials including all labor, equipment, tools and incidentals necessary to complete this Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measure
1051(l)a	Railings	Lump Sum

ITEM 1100-CONDUITS, BOXES AND FITTINGS

1100.1 Description

This Item shall consist of furnishing and installation of the complete conduit work consisting of electrical conduits; conduit boxes; conduit fittings and other electrical materials in accordance with the Plans and this Specification.

1100.2 Material Requirements

All materials shall be of the approved type in accordance with the requirements of the Philippine Electrical Code (PEC), Part I and bearing the Philippine Standard (PS) mark for locally manufactured and Import Commodity Clearance (ICC) certification marks duly issued by Bureau of Philippine Standards (BPS) for imported materials.

1100.2.1 Rigid Metal Conduit (RMC)

A threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

RMC shall be made of steel with protective coatings, aluminum, red brass or stainless steel.

Markings in each length of RMC shall be clearly and durably identified in every 3,000 mm as required in the Subsection 1.10.1.21 (A) of Article 1.10 Requirements for Electrical Installations of PEC, Part I. Nonferrous conduit of corrosion-resistant material shall have suitable markings.

The standard length of RMC shall be 3,000 mm, including an attached coupling and each end shall be threaded. Longer or shorter lengths with or without coupling and threaded or unthreaded shall be permitted.

RMC shall have a minimum size of metric designator 16 (trade size 1/2) and a maximum size of metric designator 155 (trade size 6).

1100.2.2 Intermediate Metal Conduit (IMC)

A steel threadable raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed with its integral or associated coupling and appropriate fittings.

IMC shall be made of either steel with protective coatings or stainless steel.

Markings in each length of IMC shall be clearly and durably marked at least every 1,500 mm with the letters IMC. Each length shall be marked as required in Subsection 1.10.1.21 of Article 1.10, Requirements for Electrical Installations of PEC, Part I.

The standard length of IMC shall be 3,000 mm, including an attached coupling, and each end shall be threaded. Longer or shorter lengths with or without coupling and threaded or unthreaded shall be permitted.

IMC shall have a minimum size of metric designator 16 (trade size ½) and a maximum size of metric designator 103 (trade size 4).

1100.2.3 Flexible Metal Conduit (FMC)

A raceway of circular cross section made of helically wound, formed, interlocked metal strip.

Sizes of FMC shall comply with the requirements of subsection 3.48.2.11, Size of Article 3.48, Flexible Metal Conduit: Type FMC of PEC, Part I.

1100.2.4 Electrical Metallic Tubing (EMT)

An unthreaded thin-wall raceway of circular cross section designed for the physical protection and routing of conductors and cables and for use as an equipment grounding conductor when installed utilizing appropriate fittings. EMT is generally made of steel (ferrous) with protective coatings or aluminum (nonferrous).

EMT shall be clearly and durably marked at least every 3,000 mm as required in the Subsection 1.10.1.21 (A) of Article 1.10, Requirements for Electrical Installations of PEC, Part 1.

EMT shall have a minimum size of metric designator 16 (trade size 1/2) and maximum size of metric designator 103 (trade size 4).

1100.2.5 Rigid Polyvinyl Chloride Conduit (PVC)

PVC Conduit shall be made of rigid (non plasticized) polyvinyl chloride (PVC) PVC conduit and fittings shall be composed of suitable nonmetallic material that is resistant to moisture and chemical atmospheres. For use above ground, it shall also be flame retardant, resistant to impact and crushing, resistant to distortion from heat under conditions likely to be encountered in service, and resistant to low temperature and sunlight effects. Where intended for di burial, without encasement in concrete, the material shall also be capabled withstanding continued loading that is likely to be encountered after installation.

Markings in each length of PVC conduit shall be clearly and durably marked at least every 3,000 mm as required in the Subsection 1.10.1.21 (A) of Article 1 Requirements for Electrical Installations of PEC, Part I. The type of material shall also be included in the marking unless it is visually identifiable. For conduit recognized for use aboveground, these markings shall be permanent. For conduit limited to underground use only, these markings shall be sufficiently durable to remain legible until the material is installed. Conduit shall be permitted to be surfaced marked to indicate special characteristics of the material.

The physical and mechanical properties of PVC conduit shall conform to the requirements of PNS 14:2005, Unplasticized Polyvinyl Chloride (UPVC) electric conduit - Specification.

PVC shall have a minimum size of metric designator 16 (trade size ½) and a maximum size of metric designator 155 (trade size 6).

1100.2.6 Liquidtight Flexible Nonmetallic Conduit (LFNC)

A raceway of circular cross section of various types as follows

1. A smooth seamless inner core and cover bonded together and having one d more reinforcement layers between the core and covers, designated as Tip LFNC-A.

2. A smooth inner surface with integral reinforcement within the conduit wall designated as Type LFNC-B.

3. A corrugated internal and external surface without integral reinforcement within the conduit wall, designated as LFNC-C.

LFNC-B as a prewired manufactured assembly shall be provided in continuous lengths capable of being shipped in a coil, reel, or carton without damage. LFNC shall be marked at least in every 600 mm in accordance with Subsection 1.10.1.21 (A) of Article 1.10, Requirements for Electrical Installations of PEC, Part I. The marking shall include a type designation and the trade size. Conduit that is intended for outdoor use or direct burial shall be marked.

The type, size and quantity of conductors used in prewired manufactured assemblies shall be identified by means of a printed tag or label attached to each end of the manufactured assembly and either the carton, coil or reel. The enclosed conductors shall be marked in accordance with Subsection 3.10.3.17, Markings of Article 3.10, Conductors for General Wiring of PEC, Part I.

Sizes of LFNC shall comply with the requirements of subsection 3.56.2.11, Size of Article 3.56, Liquidtight Flexible Nonmetallic Conduit: Type LFNC of PEC, Tot Part I.

1100.2.7 Weatherhead

Weatherhead is installed at the point of connection to service-drop connectors to protect the service raceways and service cables from exposure to weather or rain.

Weatherhead material shall be of the same material as conduit where it will be connected.

1100.2.8 Conduit Boxes, Fittings and Accessories

Conduit boxes, fittings and accessories shall comply with the applicable requirements of Article 3.14- Outlet, Device, Pull and Junction Boxes; Conduit Bodies; Fittings; and Handhole Enclosures of PEC, Part I

1100.3 Construction Requirements

All works throughout shall be executed satisfactorily by qualified electrician under the supervision of a duly Registered Electrical Engineer and shall be in accordance with the requirements of PEC, Part I.

1100.3.1 Rigid Metal Conduit (RMC)

1100.3.1.1 Uses Permitted

1. Atmospheric Conditions and Occupancies

a. **Galvanized Steel and Stainless Steel RMC**. Galvanized steel and stainless steel RMC shall be permitted under all atmospheric conditions and occupancies.

b. **Red Brass RMC.** Red brass RMC shall be permitted to be installed for direct embedment and swimming pool applications.

c. **Aluminum RMC.** Aluminum RMC shall be permitted to be installed where approved for the environment. Rigid aluminum conduit encased in concrete or in direct contact with the earth shall be provided with approved supplementary corrosion protection.

d. **Ferrous Raceways and Fittings**. Ferrous raceways and fittings protected from corrosion solely by enamel shall be permitted only indoors and in occupancies not subject to severe corrosive influences.

2. Corrosive Environments

a. **Galvanized Steel, Stainless Steel and Red Brass RMC, Elbows Couplings and Fittings.** Galvanized steel, stainless steel and red brass RMC, elbows, couplings and fittings shall be permitted to be installed in concrete, in direct contact with the earth, or in areas subject to server corrosive influences where protected by corrosion protection approved for the condition.

b. **Supplementary Protection of Aluminum RMC.** Aluminum RMC shal be provided with approved supplementary corrosion protection where encased in concrete or in direct contact with the earth.

3. Cinder Fill

Galvanized steel, stainless steel and red brass RMC shall be permitted to be installed in or under cinder fill where subject to permanent moisture where protected on all sides by a layer of noncinder concrete not less than 50 mm thick; where the conduit is not less than 450 mm under the fill; or where protected by corrosion protection and judged suitable for the condition.

4. Wet Location

All supports, bolts, straps, screws, and so forth, shall be of corrosion-resistant materials or protected by corrosion-resistant materials exposed to moisture.

1100.3.1.2 Dissimilar Metals

Where practicable, dissimilar metals in contact anywhere in the system shall be avoided to eliminate the possibility of galvanic action. Aluminum fittings and enclosures shall be permitted to be used with galvanized steel RMC, and galvanized steel fittings and enclosures shall be permitted to be used with aluminum RMC where not subject to severe corrosive influences. Stainless steel RMC shall only be used with stainless steel fittings and approved accessories, outlet boxes, and enclosures.

1100.3.1.3 Number of Conductor

The number of conductors in a conduit and tubing shall not exceed the permitted percentage fill specified in table below.

Table 1100.1. Percent of Cross Section of Conduit and Tubing for Conductors

Number of Conductors and/or Cables	Cross-sectional Area (%)
1	53
2	31
Over 2	40

Notes:

1. Table 1100.1 is based on common conditions of proper cabling and alignment of conductors where the length of the pull and the number of bends are within reasonable limits. It should be recognized that, for certain conditions, a larger size conduit or lesser conduit fill should be considered.

2. When pulling three (3) conductors or cables into a raceway, if the ratio of the inside diameter (raceway) to the outside diameter (conductor or cable) is between 2.8 and 3.2, jamming can occur. While jamming can occur when pulling four (4) or more conductors into a raceway, the Probability is very low.

3. Table 1100.1 applies only to complete conduit or tubing systems and is not intended to ap probability is very low. to sections of conduit or tubing used to protect exposed wiring from physical damage.

Cables shall be permitted to be installed where such use is not prohibited by the respective cable articles of PEC, Part I. The number of cables shall no exceed the allowable percentage fill specified in Table 1100.1.

1100.3.1.4 Bends

Bends of RMC shall be so made that the conduit will not be damaged and s that the internal diameter of the conduit will not be effectively reduced. The radius of the curve of any field bend to the centerline of the conduit shall be less than indicated in Table 1100.2.

Table 1100.2. Radius of Conduit and Tubing Bends

Conduit or Tubing Size	One Shot and Full Shoe Benders	Other Bends
Raceway Size (mm)	**(mm)**	**(mm)**

15	100	100
20	115	125
25	145	150
32	180	200
40	210	250
50	240	300
65	265	375
80	325	450
90	375	525
100	400	600
125	600	750
150	750	900

There shall not be more than the equivalent of four (4) quarter bends (38 degrees total) between pull points, for example, conduit bodies and boxes

1100.3.1.5 Reaming and Threading

All cut ends shall be reamed or otherwise finished to remove rough edges Where conduit is threaded in the field, a standard cutting die with a one (1) 16 taper (62.5 mm per meter) shall be used.

1100.3.1.6 Securing and Supporting

RMC shall be installed as a complete system in accordance with Subsection 30.1.18, Raceway Installations of Article 3.0, General Requirements for Wiring Methods and Materials of PEC, Part I and shall be securely fastened in place and supported in accordance with the following:

1. Securely Fastened. RMC shall be secured in accordance with the following:

a. RMC shall be securely fastened within 0.90 m of each outlet box, junction box, device box, cabinet, conduit body, or other conduit termination.

b. Fastening shall be permitted to be increased to a distance of 1.50 m where structural members do not readily permit fastening within 0.90 m.

c. Where approved, conduit shall not be required to be securely fastened within 0.90 m of the service head for above-the-roof termination of a mast

2. Supports. RMC shall be supported in accordance with one of the following:

a. Conduit shall be supported at intervals not exceeding 3.0 m.

b. The distance between supports for straight runs of conduit shall be permitted in accordance with Table 1100.3, provided the conduit is made up with threaded couplings, and such supports prevent transmission of stresses to termination where conduit is deflected between supports.

Table 1100.3 Supports for Rigid Metal Conduit

Conduit Size		**Maximum Distance Between Rigid Metal Conduit Supports**
Metric Designator	**Trade Size**	**(m)**
16 – 21	½ - ¾	3.0
27	1	3.6
35 – 41	1 ¼ - 1 ¼	4.2
53 – 63	2 – 2 ½	4.8

73 and larger	3 and larger	6.0

c. Exposed vertical risers from industrial machinery or fixed equipment shall be conduit is made up with threaded couplings, the conduit is supported and securely fastened at the top and bottom of the riser and no other means of intermediate support are readily available.

d. Horizontal runs of RMC supported by openings through framing members at intervals not exceeding 3.0 m and securely fastened within 0.90 m of termination points shall be permitted.

1100.3.1.7 Couplings and Connectors

Threadless couplings and connectors used with conduit shall be made tight Where embedded in masonry or concrete, they shall be the concrete tight type where installed in wet locations, they shall comply with Subsection 3.14.21, Damp or Wet Locations of Article 3.14, Outlet, Device, Pull Junction Boxes Conduit Bodies; Fittings; and Handholes Enclosures of PEC, Part I. Threadless couplings and connectors shall not be used on threaded conduit ends unless listed for the purpose.

Running threads shall not be used on conduit for connection at couplings.

1100.3.1.8 Locknut and Bushings

Where a conduit enters a box, fitting, or other enclosure, a locknut and bushing shall be provided to protect the wire from abrasion unless the design of the box, fitting, or enclosure is such as to afford equivalent protection.

1100.3.2 Intermediate Metal Conduit (IMC)

1100.3.2.1 Uses Permitted

1. All Atmospheric Conditions and Occupancies

Use of IMC shall be permitted under all atmospheric conditions and occupancies

2. Corrosion Environments

IMC, elbows, couplings and fittings shall be permitted to be installed in concrete in direct contact with the earth, or in areas subject to severe corrosive influences where protected by corrosion protection approved for the condition

3. Cinder fill

IMC shall be permitted to be installed in or under cinder fill where subject to permanent moisture where protected on all sides by a layer of noncinder concrete not less than 50 mm thick; where the conduit is less than 450 mm under the fill; or where protected by corrosion protection approved for the condition.

4. Wet locations

All supports, bolts, straps, screws, and so forth, shall be of corrosion-resistant materials or protected against corrosion by corrosion-resistant materials.

1100.3.2.2 Dissimilar Metals

Where practicable, dissimilar metals in contact anywhere in the system shall be avoided to eliminate the possibility of galvanic action.

Aluminum fittings and enclosures shall be permitted to be used with galvanized steel IMC where not subject to severe corrosive influences. Stainless steel IMC shall only be used with stainless steel fittings and approved accessories, outlet boxes, and enclosures.

1100.3.2.3 Number of Conductors

It shall comply with the requirements of Subsection 1100.3.1.3, Number of Conductors.

1100.3.2.4 Bends

It shall comply with the requirements of Subsection 1100.3.1.4, Bends.

1100.3.2.5 Reaming and Threading

It shall comply with the requirements of Subsection 1100.3.1.5, Reaming and Threading.

1100.3.2.6 Securing and Supporting

It shall comply with the requirements of Subsection 1100.3.1.6, Securing and Supporting.

1100.3.2.7 Couplings and Connectors

It shall comply with the requirements of Subsection 1100.3.1.7, Couplings and Connectors.

1100.3.2.8 Bushings

It shall comply with the requirements of Subsection 1100.3.1.8, Locknut and Bushings.

1100.3.3 Flexible Metal Conduit

1100.3.3.1 Uses Permitted

FMC shall be permitted to be used in exposed and concealed locations.

1100.3.3.2 Uses Not Permitted

FMC shall not be used in the following:

1. In wet locations.

2. In hoistways, other than as permitted in Subsection 6.20.3.1(A) (1), Hoistways and Pits of Article 6.20, Elevators, Dumbwaiters, Escalators, Moving Walks, Platforms Lifts of PEC, Part I.

3. In storage battery rooms.

4. In any hazardous (classified) location except as permitted by other articles in the PEC, Part I.

5. Where exposed to materials having a deteriorating effect on the installed conductors, such as oil or gasoline.

6. Underground or embedded in poured concrete aggregate.

7. Where subject to severely physical damage.

1100.3.3.3 Number of Conductors

The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1100.1 or as permitted in Table 3.48.2.13, Maximum Number of Insulated Conductors in Metric Designator 12 (Trade Size) Flexible Metal Conduit of Article 3.48, Flexible Metal Conduit: Type FMC of PEC, Part I or for metric designator 12 (trade size 3/8)

Cable shall be permitted to be installed where such use is not prohibited by the respective cable articles of PEC, Part I. The numbers of cables shall not exceed the allowable percentage fill specified in Table 1100.1.

1100.3.3.4 Bends

Bends in conduit shall be made so that the conduit is not damaged and the internal diameter of the conduit is not effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment. The radius of the curve to the centerline of any bend shall not be less than as shown in Table 1100.2 using the column "Other Bends".

There shall not be more than the equivalent of four (4) quarter bends (360) degrees total) between pull points, for example, conduit bodies and boxes.

1100.3.3.5 Trimming

All cut ends shall be trimmed and smoothened.

1100.3.3.6 Securing and Supporting

FMC shall be secured and supported in accordance with the requirements of Subsection 3.48.2.21, Securing and Supporting of Article 3.48, Flexible Metal Conduit: Type FMC of PEC, Part I.

1100.3.3.7 Couplings and Connectors

Angle connectors shall not be used for concealed raceway installations.

1100.3.4 Electrical Metallic Tubing (EMT)

1100.3.4.1 Uses Permitted

1. Exposed and Concealed. The use of EMT shall be permitted for both exp and concealed work for the following:

a. In concrete, in direct contact with the earth or in areas subject to see corrosive influences where installed in accordance with Subsection 1100.3.4.1 (b).

b. In dry, damp and wet locations.

c. In any hazardous (classified) location as permitted by other articles in be PEC, Part 1.

2. Corrosive Environments

a. Galvanized Steel and Stainless Steel EMT, Elbows and Fittings. Galvanized steel and stainless steel EMT, elbows and fittings shall be permitted to be installed in concrete, in direct contact with the earth, or in areas subject to severe corrosive influences where protected by corrosion protection and approved as suitable for the condition.

b. Supplementary Protection of Aluminum EMT. Aluminum EMT shall be provided with approved supplementary corrosion protection when encased in concrete or in direct contact with the earth.

3. Cinder Fil

Galvanized steel and stainless steel EMT shall be permitted to be installed in cinder concrete or cinder fill where subject to permanent moisture whe protected on all sides by a layer of noncinder concrete not less than 50 m thick or when the tubing is installed at 450 mm under the fill.

4. Wet Locations

It shall comply with the requirements of Subsection 1100.3.1.1 (4), We Locations.

1100.3.4.2 Uses Not Permitted

EMT shall not be used under the following conditions:

1. Where subject to severe physical damage.

2. Where protected from corrosion solely by enamel.

1100.3.4.3 Number of Conductors.

It shall comply with the requirements of Subsection 1100.3.1.3, Number of Conductors.

1100.3.4.4 Bends

It shall comply the requirements of Subsection 1100.3.1.4, Bends.

1100.3.4.5 Reaming and Threading

All cut ends of EMT shall be reamed or otherwise finished to remove rough edges.

EMT shall not be threaded.

1100.3.4.6 Securing and Supporting

EMT shall be securely fastened in place at least every 3.0 m. In addition, each EMT run between termination points shall be securely fastened within 0.90 m of each outlet box, junction box, device box, cabinet, conduit body, or other tubing termination except to the following conditions:

1. Fastening of unbroken lengths shall be permitted to be increased to a distance of 1.5 m where structural members do not readily permit fastening within 0.90 m.

2. For concealed work in finished buildings or prefinished wall panels where such securing is impracticable, unbroken lengths (without coupling) of EMT shall be permitted to be fished.

3.Horizontal runs of EMT supported by openings through framing members at intervals not greater than 3.0 m and securely fastened within 0.90 m of termination points shall be permitted.

1100.3.4.7 Couplings and Connectors

Couplings and connectors used with EMT shall be made up tight when embedded in masonry or concrete. Where installed in wet locations, they shall comply with Subsection 3.14.2.1, Damp or Wet Locations of Article 3.14, Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; Fittings; and Handhole Enclosures of PEC, Part I.

1100.3.5 Rigid Polyvinyl Chloride Conduit

1100.3.5.1 Uses Permitted

The use of PVC conduit shall be permitted in accordance with the following:

1. Concealed. PVC conduit shall be permitted in walls, floors and ceilings.

2. Corrosive Influences. PVC conduit shall be permitted in location subject to severe corrosive influences as covered in Subsection 3.0.1.6, Protection against Corrosion and Deterioration of Article 3.0, General Requirements for Wiring Methods and Materials of PEC Part I.

3. Cinders. PVC conduit shall be permitted in cinder fill.

4. Wet Locations. PVC conduit shall be permitted in portions of dairies, laundries, canneries, or other wet locations, and in locations where walls are frequently washed, the entire conduit system, including boxes and fittings used therewith, shall be installed and equipped so as to prevent water from entering the conduit. All supports, bolts, straps, screws, and so forth, shall be of corrosion-resistant materials or be protected against corrosion by approved corrosion-resistant materials.

5. Exposed. PVC conduit shall be permitted for exposed work. PVC conduit used exposed in areas of physical damage shall be identified for the use.

6. Underground Installations. For underground installations, PVC shall be permitted for direct embedment and underground encased in concrete in accordance with Subsections 3.0.1.5 and 3.0.2.20, Underground Installations of Article 3.0, General Requirements for Wiring Methods and Materials of PEC, Part I.

7. Support of Conduit Bodies. PVC conduit shall be permitted to support nonmetallic conduit bodies not larger than largest trade size of an entering raceway. These conduit bodies shall not

support devices other than splicing devices as permitted by Subsection 1.10.1.14 (B), Mounting and Cooling of Equipment of Article 1.10, Requirements for Electrical Installations and Subsection 3.14.2.2(C)(2), Conduit Bodies of Article 3.14, Outlet, Device, Pull, and Junction boxes; Conduit Bodies; Fittings; and Handhole Enclosures of PEC, Part I.

8. Insulations Temperature Limitations. Conductors or cables rated at a temperature higher than the listed temperature rating of PVC conduit shall be permitted to be installed in PVC conduit, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the PVC conduit.

1100.3.5.2 Uses Not Permitted

PVC conduit shall not be used under the conditions specified in the following: 1. Hazardous (Classified) Locations. In any hazardous (classified) location, except as permitted by other articles of the PEC, Part I.

2. Support of Luminaires. For the support of luminaires or other equipment not described in Subsection 1100.3.5.1 (7) Support of Conduit Bodies.

3. Physical Damage. Where subject to physical damage unless identified for such use.

4. Ambient Temperatures. Where subject to ambient temperatures in excess of 50°C unless listed otherwise.

5. Theaters and Similar Locations. In theaters and similar locations, except as provided in Subsection 5.18.1.4, Wiring Methods of Article 5.18, Assembly Occupancies and Subsection 5.20.1.5, Wiring Methods of Article 5.20, Theaters, Audience Areas of Motion Picture and Television Studios, Performance Areas, and Similar Locations of PEC, Part I.

1100.3.5.3 Number of Conductors

It shall comply with the requirements of Subsection 1100.3.1.3, Number of Conductors.

1100.3.5.4 Bends

It shall comply with the requirements of Subsection 1100.3.1.4, Bends.

1100.3.5.5 Trimming

All cut ends shall be trimmed & smoothen.

1100.3.6.6 Securing and Supporting

PVC Conduit shall be installed as a complete system as provided in Subsection 3.0.1.18 Raceway Installation of Article 3.0, General Requirements for Wiring Methods and Materials of PEP, Part I and shall be fastened so that the movement from thermal expansion or contraction is permitted. PVC conduit shall be securely fastened ans supported in accordance with the following:

1. Securely Fastened. PVC conduit shall be securely fastened within 900mm of each outlet box, junction box, device box, conduit body, or other conduit termination. Conduit

listed for securing at the other than 900mm shall be permitted to be installed in accordance with the listing.

2. Supports. PVC conduit shall be supported as required in table 1100.4 listed for support at spacings other than as shown in table 1100.4 shall be permitted to be installed in accordance with the listing. Horizontal runs of PVC conduit supported by openings through framing members at intervals not exceeding those in table 1100.4 and securely fastened within 900 mm of termination points shall be permitted.

Table 1100.4 Supports for Rigid Polyvinyl Chloride Conduit (PVC)

Conduit Size		**Maximum Spacing Between Supports**
Metric Designator	**Trade Size**	**(m)**
16 - 27	½ - 1	0.90
35 - 53	1 ¼ - 2	1.5
63 - 78	22 ½ - 3	1.8
91 - 129	3 ½ - 5	2.1
155	6	2.4

1100.3.5.7 Expansion Fittings.

Expansion fittings for PVC conduit shall be provided to compensate for thermal expansion and contraction where the length change, in accordance with Table 3.52.2.35, Expansion Characteristics of PVC Rigid Nonmetallic Conduit Coefficient of Thermal Expansion = 6.084 x 10^{-5}mm/mm/^{o} C, of PEP, Part 1 is expected to be 6 mm or greater in a straight run between securely mounted items such as boxes, cabinets, elbows, or other conduit terminations.

1100.3.5.8 Locknut and Bushings

Where a conduit enters a box. fittings, or other enclosures, a bushing or PVC adapter shall be provided to protect the wire from abrasion unless the box, fitting or enclosures designs provides equivalent protection

1100.3.5.9 Joints

All joints between lengths of conduit, and between conduit and couplings, fittings, and boxes, shall be provided with PVC solvent and made by an approved method

1100.3.6 Liquidtight Flexible Nonmetallic Conduit (LFNC)

1100.3.6.1 Uses Permitted

LFNC shall be permitted to be used in exposed or concealed locations for the following purposes:

1. Where flexibility is required for installation, operation and maintenance.
2. Where the protection of contained conductors is required for vapors, liquids or solids
3. For outdoor locations listed and marked as suitable for the purpose.
4. For direct embedment where listed and marked for the purpose.
5. Type LFNC-B shall be permitted to be installed in lengths longer than1.8 m where secured in accordance with Subsection 1100.3.6.7, Securing and Supporting.
6. Type LFNC-B as a listed manufactured prewired assembly, metric designator 16 through 27 (trade size 1/2 through 1) conduit.
7. For encasement in concrete where listed for direct embedment and install accordance with Subsection 1100.3.6.8, Couplings and Connectors.

1100.3.6.2 Uses Not Permitted

LFNC shall not be used as follows:

1. Where subject to severe physical damage.

2. Where any combination of ambient and conductor temperatures is in excess of that for which the LFNC is approved.

3. In lengths longer than 1.8 m, except as permitted by Subsection 1100.351(5) or where a longer length is approved as essential for a required degree of flexibility.

4. In any hazardous (classified) location, except as permitted by other articles in PEC, Part I.

1100.3.6.3 Number of Conductors

It shall comply with the requirements of Subsection 1100.3.1.3, Number of Conductors.

1100.3.6.4 Bends

It shall comply with the requirements of Subsection 1100.3.3.4, Bends.

1100.3.6.5 Trimming

All cut ends of conduit shall be permitted inside and outside to remove rough

edges.

1100.3.6.6 Securing and Supporting

LFNC shall be securely fastened and supported in accordance with Subsector 3.56.2.21, Securing and Supporting of Article 3.56, Liquidtight Flee Nonmetallic Conduit: Type LFNC of PEC, Part I.

1100.3.6.7 Couplings and Connector

Only fittings listed for use with LFNC shall be used. Angle connectors shall not be used for concealed raceway installations. Straight LFNC fittings are permitted for direct burial or encasement in concrete.

1100.3.7 Weatherhead

Weatherhead shall be installed in accordance with the PEC, Part I.

1100.3.8 Test and Guarantee

Upon completion of the electrical construction work, the Contractor shall provide all test equipment, materials and personnel for conducting the test and shall submit written copies of all test results to the Engineer.

The Contractor shall guarantee that the electrical installations are done in accordance with the approved Plans and Specifications.

The Contractor shall furnish a guaranty or warranty covering all labor and materials for period of 1 year from the date of the final acceptance of works and shall agree to repair all defects and any part of the work not satisfactory to the Engineer which may develop during the defects liability period arising from defective workmanship or materials at his own expenses.

1100.4 Method of Measurement

The work under this Item shall be measured either by lengths, pieces, and lump sum actually placed and installed as shown on the approved Plans.

1100.5 Basis of Payment

All works performed and measured in Section 1100.4, Method of Measurement and as provided for in the Bill of Quantities shall be paid for at the Unit Bid or Contract Unit Price which payment shall constitute full compensation including labor, materials, tools and incidentals necessary to complete this Item.

Payment shall be made under.

Pay Item Number	Description	Unit of Measurement
1100(10)	Conduits, Boxes & Fittings (Conduit Works/Conduit Rough-In)	Lump Sum

ITEM 1101 - WIRES, CABLES AND WIRING DEVICES

1101.1 Description

This Item shall consist of furnishing and installation of all wires and wiring devices consisting of electric wires and cables, wall switches, convenience receptacles, heavy duty receptacles and other devices in accordance with the approved Plans and this Specification.

1101.2 Material Requirements

1101.2.1 Wires and Cables

1101.2.1.1 Wires

All wires shall meet the requirements specified in the Philippine Electrical Code (PEC), Part 1 and PNS 35-1, Electric wires and cables-Thermoplastic-insulated copper wires and cables rated 600 volts - Part 1: General Specifications, and shall bear the Philippine Standard (PS) mark unless specified or indicated otherwise and shall be marked to indicate the following information:

1. The maximum rated voltage

2. The proper type letter or letters for the type of wire or cable as specified in the PEC Part 1

3. The manufacturer's name, trademark, or other distinctive marking by which the organization responsible for the product can be readily identified

4.The size in square millimeter or millimeter diameter

5.Cable assemblies where the neutral wire is smaller

The letters such as TW, THHN, THWN and THW represent the main insulation types of individual wires. These letters depict the following requirements: 1.

1. T-Thermoplastic Insulation

2. H-Heat Resistance

3. HH-High Heat Resistance

4. W-Suitable for Wet locations

5. N-Thermoplastic Polyester, Tough and

6. X-Flame-Resistant Synthetic Polymer

7. Z-Modified ethylene tetrafluoroethylene

Conductors shall be insulated for 600 V and shall be aluminum, copper-clad aluminum, or copper unless otherwise specified. The minimum diameter size of conductors shall be 1.6 mm (2.0 mm2) for copper and 2.0 mm (3.5 mm) for aluminum or copper-clad aluminum conductors. Solid aluminum conductors of diameters 3.2 mm, 2.6 mm, and 2.0 mm shall be made of an AA-8000 series electrical grade aluminum alloy conductor material. Stranded

aluminum conductors 8.0 mm² through 500 mm² marked as Type RHH, RHW, XHHW THW, THHW, THWN, THHN, service-entrance Type SE Style U and SE Style R shall be made of an AA-8000 series electrical grade aluminum alloy conductor material.

Ampacities for conductors shall be as specified in the PEC Part 1. Where bare or covered conductors are used with insulated conductors, their allowable ampacities shall be limited to those permitted for the adjacent insulated conductors.

1101.2.1.2 Cables

1. Armored Cables (Type AC)

Type AC shall have ready identification of the manufacturer by distinctive external markings on the cable sheath throughout its entire length.

Type AC cable shall have an armor of flexible metal tape and shall have an internal bonding strip of copper or aluminum in intimate contact with the armor for its entire length. Insulated conductors of type AC shall be of type listed in the PEC Part 1. In addition, the conductors shall have an overall moisture resistant fibrous covering and fire-retardant fibrous covering. For Type ACT, a moisture-resistant fibrous covering shall be required only on the individual conductors.

2. Flat Cable Assemblies (Type FC)

Flat cable assemblies shall consist of two, three, four, or five conductors. The conductors shall be 5.5 mm² (2.6 mm dia.) special stranded copper wires Type FC cable shall have the temperature rating durably marked on the surface at intervals not exceeding 600 mm.

3. Flat Conductor Cable (Type FCC)

Type FCC cable shall be clearly and durably marked on both sides at intervals of not more than 600 mm with the information required by the PEC Part 1. It shall consist of three (3), four (4), or five (5) flat copper conductors, one of which shall be an equipment grounding conductor. The insulating material of the cable shall be moisture resistant and flame retardant.

4. Integrated Gas Spacer Cable (Type IGS)

The conductors shall be solid aluminum rods, consisting of one to nineteen 13 mm diameter rods. The minimum conductor size shall be 125 mm², and the maximum size shall be 2375 mm². The insulation shall be dry kraft paper tapes and a pressurized sulfur hexafluoride gas (SF6), both approved for electrical use. The nominal gas pressure shall be 138 kPa gauge.

5. Medium Voltage Cable (Type MV)

Type MV cables shall have copper, aluminum, or copper-clad aluminum conductors and shall be marked as required by the PEC Part 1.

6. Metal-Clad Cable (Type MC)

The conductors for type MC shall be of copper, aluminum, or copper-clad aluminum, solid or stranded. The minimum conductor size shall be 0.75 mm² (1.0 mm dia.) copper and 3.5 mm² (2.0 mm dia.) aluminum or copper-clad aluminum. Metallic covering shall be one of the

following types: smooth metallic sheath, corrugated metal sheath, interlocking metal tape armor. The metallic sheath or armor shall be used on single conductor type MC. Supplemental protection of an outer covering of corrosion-resistant material shall be permitted and shall be required where such protection is needed. The sheath shall not be used as current-carrying conductor.

7. Mineral-Insulated, Metal-Sheathed Cable (Type MI)

Type MI cable conductors shall be of solid copper, nickel, or nickel-coated copper with a resistance corresponding to standard mm² and mm dia. sizes. The conductor insulation in Type MI cable shall be a highly compressed refractory mineral that provides proper spacing for all conductors.

8. Non-metallic - Sheathed Cable (Types NM, NMC, and NMS)

The 600 volt insulated conductors shall be sizes 2.0 mm² (1.6 mm dia.) through 30 mm² copper conductors or sizes 3.5 mm² (2.0 mm dia.) through 2.0 mm aluminum or copper-clad aluminum conductors. The signaling and communication conductors shall comply with the PEC Part 1. The insulated power conductors shall be one of the types listed in the PEC Part I that are suitable for branch circuit wiring or one that is identified for use in these cables Conductor insulation shall be rated at 90°C.

The outer sheath of non-metallic-sheathed cable shall comply with the following:

a. Type NM The overall covering shall be flame retardant and moisture resistant.

b. Type NMC - The overall covering shall be flame retardant, moisture resistant, fungus resistant, and corrosion resistant.

c. Type NMS - The overall covering shall be flame retardant and moisture resistant. The sheath shall be applied so as to separate the power conductors from the communications and signaling conductors. The signaling conductors shall be permitted to be shielded. An optional outer jacket shall be permitted.

9. Power and Control Tray Cable (Type TC)

A metallic sheath or armor shall not be permitted either under or over the nonmetallic jacket. Metallic shield(s) shall be permitted over groups of conductors, under the outer jacket, or both. The insulated conductors of Type TC tray cable shall be in sizes 0.75 mm² (1.0 mm dia.) through 500 m aluminum or copper-clad aluminum. Insulated conductors of sizes 2.0 mm (1.6 mm dia.) and larger copper and sizes 3.5 mm² (2.0 mm dia.) and larger aluminum or copper-clad aluminum shall be one of the types listed in the PEC Part 1 that is suitable for branch circuit and feeder circuits or one that is defined for such use.

The outer jacket for Type TC shall be a flame-retardant, nonmetallic material. There shall be no voltage marking on a Type TC cable employing thermocouple extension wire.

10. Service-Entrance Cable (Type SE and USE)

Cabled, single-conductor, Type USE constructions recognized for underground use shall be permitted to have a bare copper conductor cable with the assembly. Type USE single, parallel, or cabled conductor assemblies recognized for underground use shall be permitted to have a

bare copper concentric conductor applied. These constructions shall not an outer overall covering. Type SE or USE cable containing two or more conductors shall be permitted to have one conductor uninsulated.

11. Underground Feeder and Branch-Circuit Cable (Type UF)

The conductors shall be sizes 2.0 mm (1.6 mm dia.) copper or 3.5 mm² 2 (2.0 mm dia.) aluminum or copper-clad aluminum through 100 mm². The conductors of Type UF shall be moisture-resistant type that is suitable for branch-circuit wiring or one that is identified for such use. Where installed as a substitute wiring method for NM cable, the conductor insulation shall be rated 90°C. The overall covering shall be flame retardant; moisture, fungus, and corrosion resistant; and suitable for direct burial in the earth.

1101.2.2 Switches

All switches shall conform to the requirements of the PEC Part 1. Switches shall be marked with the current voltage, and, if horsepower rated, the maximum rating for which they are designed. They shall be of the externally type mounted in an enclosure listed for the intended use.

Metal faceplates for switches shall be of ferrous metal not less than 0.75 mm in thickness or of non-ferrous metal not less than 1.00 mm in thickness. Faceplates of insulating material shall be non-combustible and not less than 0.25 mm in thickness, but they shall not be permitted to be less than 0.25 mm in thickness if formed or reinforced to provide adequate mechanical strength.

1101.2.3 Receptacles

All receptacles shall conform to the requirements of the PEC Part 1. Receptacles shall be listed and marked with the manufacturer's name or identification and voltage and ampere ratings. The rating for receptacles shall not be less the 15 A, 125 V, or 15 A, 250 V. Table 1101.1 shows the receptacle ratings various size circuits.

Table 1101.1 Receptacle Rating for Various Size Circuits

Circuit Rating (Amperes, A)	Receptacle Rating (Amperes, A)
15	15 Not over
20	15 - 20
30	30

40	40 or 50
50	50

Metal faceplates for receptacles shall be of ferrous metal not less than 0.75mm in thickness or of non-ferrous metal not less than 1.00 mm in thickness Faceplates of insulating material shall be non-combustible and not less the 0.25 mm in thickness if formed or reinforced to provide adequate mechanic strength.

1101.3 Construction Requirement

Installation of electric wiring and wiring devices shall comply with the governing laws and applicable codes and standards such as the PEC Part 1 and Safety Standards.

1101.3.1 Installation

1101.3.1.1 Conductors

1. Conductors of the Same Circuit

All conductors of the same circuit and, where used, the grounded conductor and all equipment grounding conductors and bonding conductors shall be contained within the same raceway, auxiliary gutter, cable tray, cable bus assembly, trench, cable, or cord, unless otherwise permitted in accordance with the PEC 1.

a. Paralleled Installations

Conductors shall be permitted to be run in parallel in accordance with the provisions of the PEC Part 1. The requirement to ru2021/9/9 09:18 circuit conductors with the same raceway, auxiliary gutter, cable tray, trench, cable, or cord shall apply separately to each portion of the paralleled installation, and the equipment grounding conductors shall comply with the provisions of the PEC Part 1. Parallel runs in cable tray shall comply with the provisions of the PEC Part 1.

b. Grounding and Bonding Conductors

Equipment grounding conductors grounding conductors shall be permitted to be installed outside a raceway or cable assembly in accordance with the provisions of the PEC Part 1.

c. Non-ferrous Wiring Methods

Conductors in wiring methods with a nonmetallic or other nonmagnetic sheath, where run in different raceways, auxiliary gutters, cable trays, trenches, cables, or cords shall comply with the provisions of the PEC Part 1.

2. Conductors of Different Systems

Conductors of circuits rated 600 V, nominal or less, ac circuits, and dc circuits shall be permitted to occupy the same equipment wiring enclosure, cable, or e raceway. All conductors shall have an insulation rating equal to at least the maximum circuit voltage applied to any conductor within the enclosure, cable, or raceway.

Conductors of circuits over 600 V, nominal, shall not occupy the same equipment wiring enclosure, cable, or raceway with conductors of circuits rated 600 V, nominal, or less unless otherwise permitted in the PEC Part 1.

1101.3.1.2 Switches

Installation of switches shall conform to the requirements of the PEC Part 1. All switches and circuit breakers used as switches shall be located in an accessible place to facilitate operation. They shall be installed such that the center of the position, is not more than 1980 mm above the floor or working platform. Sip of the operating handle of the switch or circuit breaker, when in its highest position, is not more than 1980 mm above the floor or working platform.

Faceplates provided for snap switches mounted in boxes and other enclosures shall be installed so as to completely cover the opening and, where the switch is flush mounted, seat against the finished surface.

Metal enclosures for switches shall be grounded. Where nonmetallic endosures are used with metal raceways or metal-armored cables, provision shall be made for grounding continuity. Snap switches, including dimmer and similar cont switches, shall be effectively grounded and shall provide a means to ground metal faceplates, whether or not a metal faceplate is installed. Snap switches shall be considered effectively grounded if either of the following conditions met:

1. The switch is mounted with metal screws to a metal box or to a nonmetal box with integral means for grounding devices.

2. An equipment grounding conductor or equipment bonding jumper connected to an equipment grounding termination of the snap switch.

1101.3.1.3 Receptacles

General installation requirements for receptacles shall be in accordance with the PEC Part 1. Receptacle outlets shall be located in branch circuits in accordance with the PEC Part 1.

Receptacles shall be mounted in boxes or assemblies designed for the purpose and such boxes or assemblies shall be securely fastened in place unless otherwise permitted in the PEC Part 1.

Receptacles installed on 15- and 20-A branch circuits shall be of the grounding type, Grounding-type receptacles shall be installed only on circuits of the voltage class and current for which they are rated, except as provided in the PEC Par

Receptacles and cord connectors that have grounding contacts shall have these contacts effectively grounded. They shall be grounded by connection to the equipment grounding conductor of the circuit supplying the receptacle or co connector. The branch circuit wiring method shall include or provide equipment-grounding conductor to which the grounding contacts of the receptacle or cord connector are connected.

1101.3.2 Personnel Qualification

The installation of electrical wiring and devices shall be done by a certified installer under the supervision of an Electrical Engineer based on the guidelines of Republic Act No. 7920, New Electrical Engineering Law

1101.3.3 Locations

1101.3.3.1 Dry Locations

Insulated conductors and cables, receptacles, switches and other devices used in dry locations shall be any of the types identified in the PEC Part 1.

1101.3.3.2 Dry and Damp Locations

Insulated conductors and cables used in dry and damp locations shall be Types FER, FEPB, MTW, PFA, RHH, RHW-2, SA, THHN, THW, THW-2, THHW, THHW 2, THWN, THWN-2, TW, XHH, XHHW, XHHW-2, Z, or ZW.

Receptacles installed outdoors in a location protected from the weather or in other damp locations shall have an enclosure for the receptacle that is weatherproof when the receptacle is covered (attachment plug cap not inserted and receptacle covers closed).

1101.3.3.3 Wet Locations

Insulated conductors and cables used in wet locations shall be Moisture impervious metal-sheathed, Types MTW, RHW, RHW-2, TW, THW, THW-2, THHW, THHW-2, THWN, THWN-2, Z, or ZW and Type for use in wet locations. Receptacles installed in wet locations shall have an enclosure that is weatherproof. Switches in a wet location or outside of a building shall be enclosed in a weatherproof enclosure or cabinet.

1101.3.3.4 Locations Exposed to Direct Sunlight

Insulated conductors or cables used where exposed to direct rays of the sun shall comply with one of the following:

1.Cables listed, or listed and marked, as being sunlight resistant.

2.Conductors listed, or listed and marked, as being sunlight resistant.

3.Covered with insulating material, such as tape or sleeving.

1101.4 Method of Measurement

The work under this Item shall be measured either by meters, rolls, set and Jump sum actually placed and installed as shown on the Plans.

1101.5 Basis of Payment

The quantity as determined in Section 1101.4, Method of Measurement shall be paid for at unit price stipulated in the Contract's Bill of Quantities. The payment shall constitute the full compensation for furnishing all the necessary materials, providing necessary equipment and

tools in installing the wires and wire devices labor cost and all the incidental expenses necessary to complete the work.

Payment shall be made under:

Pay Item Number	**Description**	**Unit of Measurement**
1101 (33)	Wires and Wiring Devices	Lumpsum

ITEM 1102 – POWER LOAD CENTER, SWITCHGEAR AND PANELBOARDS, AND OTHER OVERCURRENT PROTECTION DEVICES

1102.1 Description

This Item shall consist of furnishing and installation of the power load center unit substation or low voltage switchgear and distribution panelboards at the location shown on the approved Plans complete with transformer, circuit breakers, cabinets, and all accessories, completely wired and ready for service.

1102.2 Material Requirements

All materials shall be brand new and shall be of the approved type. It shat conform to the applicable requirements of the Philippine Electrical Code Part and the products locally manufactured shall bear a Philippine Standard (PS) mark, while imported products shall bear Import Commodity Clearance (ICO certification marks duly issued by the Bureau of Philippine Standards (BPS).

1102.2.1 Power Load Center Unit Substation

The Contractor shall furnish and install an indoor-type Power Load Center Unit Substation at the location shown on the approved Plans. It shall be metal-enclosed, dead front and shall consist of the following parts:

1102.2.1.1 High Voltage Primary Section:

High voltage primary incoming line section consisting of the following parts and related accessories:

1. One (1) air-filled interrupter Switch, Two (2)-position (open-close) installed in a suitable air-filled metal enclosure and shall have sufficient interrupting capacity to carry the electrical load. It shall be provided with key interlock with the cubicle for the power fuses to prevent access to the fuses unless the switch is open.

2. Three (3)-power fuses mounted in separate compartments within the switch housing and accessible by a hinged door.

3. One (1) set of high voltage potheads or three (3)-conductor cables or three (3) single conductor cables.

4 Lightning arresters shall be installed at the high voltage cubicle with the proper neutral and grounding system.

Items (1) and (2) above could be substituted with a power circuit breaker with the correct rating and interrupting capacity.

1102.2.2 Transformer Section

The transformer section shall consist of a power transformer with ratings and capacities as shown on the plans. It shall be oil liquid-filled non-flammable or dry type and designed in accordance with the latest applicable standards.

The transformer shall be provided with four (4) approximately 2.5% rated KVA ups on the primary winding in most cases one (1) above and three (3) below rated primary voltage and shall be changed by means of externally gang-operated manual tap changer only when the transformer is de-energized. Tap changing under load is allowed, if necessary.

The following accessories shall be provided with the transformer, namely: drain valve, sampling device, filling connection, oil liquid level gauge, ground pad, top filter press connection, lifting lugs, diagrammatic nameplate, relief valve, thermometer and other necessary related accessories.

The high-voltage and low-voltage bushings and transition flange shall be properly coordinated for field connection to the incoming line section and low voltage switchboard section, respectively.

1102.2.2.1 Current Transformers

Current transformers shall be of the straight-through type with suitable ratio, output and class of accuracy for their function and shall comply with IEC 600-44, Instrument transformers. Measuring current transformers shall have accuracy of Class 1 and protective transformers shall have an accuracy of SP10.

Groups of current transformers used on three (3) phase systems shall have their secondary connections starred and earthed. When measuring line current value using a common meter with a selector switch, they shall be connected so that the current transformers shall be shorted out when not being used for indication. This shall be carried out in the selector switch by "make before break" contacts.

1102.2.2.2 Potential Transformers

Potential transformers shall conform to IEEE C57.13, IEEE Standard Requirements for Instrument Transformers for installation in metal-clad switchgear. Standard 120-volt secondary transformers shall be used. The transformer shall provide with burden, frequency, and accuracy as required. Indoor dry type two-winding construction for disconnecting potential transformers with integral fuse mountings and current-limiting fuses with primary and secondary voltage ratings as required.

1102.2.2.3 Distribution Transformer

A distribution transformer is a static device constructed with two or more windings used to transfer alternating current electric power by electromagnetic induction from one circuit to another at the same frequency but with different values of voltage and current. It is equipped with a lightning arrester, a weak link or protective-link expulsion-type fuse (installed under oil in the transformer tank), a secondary circuit breaker, and a warning light. The transformer primary bushing conductor is connected to one phase of the three-phase primary circuit through a partial-range current-limiting fuse. The transformer tank is grounded and connected to the primary and secondary common-neutral ground wire. The self-protected transformer contains

core and coils, a primary fuse mounted on the bottom of the primary bushing, a secondary terminal block, and a low voltage circuit breaker.

Pad-mounted transformers are used with underground systems. Three-phase pad-mounted transformers are used for commercial installations, and single-phase pad-mounted transformers are used for underground residential installations. Vault-type distribution transformers are installed for commercial customers where adequate space is not available for pad-mounted transformers. The vault-type transformer may be installed in a vault under a sidewalk or in a building. They are often used in underground electric network areas. Submersible single-phase distribution transformers are used in some underground systems installed in residential areas.

1102.2.3 Low-Voltage Switchboard Section

The low-voltage switchboard shall be standard modular units, metal-built, dead front, safety type construction and shall consist of the following:

1. Switchboard Housing

The housing shall be fully type tested switchgear as duly certified by the Original Electrical Manufacturer.

2. Secondary Metering Section

The secondary metering section shall be digital type consisting of one (1) ammeter, AC, indicating type; one (1) voltmeter, AC, indicating type; one (1) ammeter transfer switch for 3-phase; one (1) voltmeter transfer switch for 3-phase; and current transformers of suitable rating and capacity.

The above-mentioned instruments shall be installed in one compartment above the main breaker and shall be complete with all necessary accessories completely wired, ready for use.

3. Main Circuit Breaker

The main circuit breaker shall be draw-out type, manually or electrically operated as required with ratings and capacity as shown on the approved Plans.

The main breaker shall include insulated control switch if electrically operated, manual trip button, magnetic tripping devices, adjustable time overcurrent protection and instantaneous short circuit trip and all necessary accessories to ensure safe and efficient operation.

4. Feeder Circuit Breaker

There shall be as many feeder breakers as shown on the single line diagram, or schematic riser diagram or schedule of loads. The circuit breakers shall be Air Circuit Breaker (ACB) draw-out or fixed type, Molded Case Circuit Breaker (MCCB). The circuit breakers shall each have sufficient interrupting capacity and shall be manually operated complete with trip devices and all necessary accessories to ensure safe and efficient operation. The number, ratings, capacities of the feeder branch circuit breakers shall be as shown on the approved Plans with short circuit and arc flash analysis.

Circuit breakers shall each be of the indicating type, with "ON" - "OFF" and "TRIP" positions of the operating handles and shall each be provided with nameplate for branch circuit

designation. The circuit breaker shall be so designed that an overload or short on one pole automatically causes all poles to open.

5. Automatic Transfer Switch

Automatic transfer switches shall be open transition switches, four-pole, draw out construction, electrically operated, mechanically held open contact without integral overcurrent protection. Automatic transfer switches utilizing automatic or non-automatic molded case circuit breakers, insulated case circuit breakers, or power circuit breakers as switching mechanisms are not acceptable.

Automatic transfer switches shall be completely factory-assembled and wired such that only external circuit connections are required in the field.

Each automatic transfer switch shall be equipped with an integral bypass/isolation switch.

Automatic transfer switches Markings shall be in accordance with UL 1008, Transfer Switch Equipment.

Automatic transfer switches shall be tested in accordance with UL 1008. The contacts of the transfer switch shall not weld during the performance of withstanding and closing tests when used with the upstream overcurrent device and available fault current specified.

Enclose automatic transfer switches in wall or floor-mounted steel cabinets, with metal gauge not less than No. 14, in accordance with UL 508, Standard for Industrial Control Equipment, or in a switchboard assembly in accordance with UL 891, Switchboards, as shown on the Plans.

The enclosure shall be constructed so that personnel is protected from energized bypass-isolation components during automatic transfer switch maintenance.

Automatic transfer switch components shall be removable without disconnecting external source or load power conductors.

Cabinets shall be given a phosphate treatment, painted with rust-inhibiting primer, and finish-painted with the manufacturer's standard enamel or lacquer finish.

Actuated by an electrical operator.

Electrically and mechanically interlocked so that the main contact cannot be closed simultaneously in either normal or emergency position.

Normal and emergency main contacts shall be mechanically locked in position by the operating linkage upon completion of the transfer. Release of the locking mechanism shall be possible only by normal operating action.

Contact transfer time shall not exceed six cycles. Operating mechanism components and mechanical interlocks shall be insulated or grounded.

1102.2.4 Low-Voltage Switchgear

The Contractor shall furnish and install a low-voltage fully type tested switchgear as duly certified by the Original Electrical Manufacturer at the location shown on the Plans.

The low-voltage switchgear shall consist of the switchgear housing, secondary metering, main breaker and feeder branch circuit breakers and all necessary accessories, completely wired, ready for service.

The equipment mounted in the Low voltage switchgear and controlgear assembly shall be fitted and wired in accordance with corresponding Manufacturer's instructions and recommendations. Minimizing the Low voltage switchgear and controlgear assembly size shall be taken into account. The equipment and circuits in the Low voltage switchgear and controlgear assembly shall be so arranged as to facilitate their operation and maintenance and at the same time to ensure the necessary degree of safety.

The equipment mounted within the assembly shall have a clearance of 100 mm minimum around the perimeter of the enclosure and 50 mm from the door.

All electrical equipment, bus bars, terminal blocks and covers of connections of Switching devices, mounted inside the assembly, shall be IP 20 or NEMA Type 1 (general use) protected at least.

1102.2.5 Grounding Systems

It shall conform to the applicable requirements of Item 1109, Grounding Systems.

1102.2.6 Panelboards and Cabinets

Panelboards shall be fully type tested panels as duly certified by the Original Electrical Manufacturer.

Main and branch circuit breakers for panelboards shall have the rating, capacity and number of poles as shown on the approved Plans. Breakers shall be thermal magnetic type. Multiple breaker shall be of the common trip type having a single operating handle. For 50-ampere breaker or less, it may consist of single-pole breaker permanently assembled at the factory into a multi-pole unit

1102.2.7 Busbars

Four pole air insulated busbars of the uniform cross-sectional area throughout their length with a continuous rating or dimensions not less than that indicated in the drawings shall be arranged neatly.

The busbars and busbar connections between the busbar and various items of the switchgear shall be manufactured from copper.

All busbars shall be tinned, and continuous lengths without connections shall be insulated with heat shrink sleeves.

Busbars shall be mounted on non-hygroscopic, anti-tracking insulators strong enough to endure, without damage, forces set up by any thermal expansion within the bars under normal operating conditions and forces created by prospective fault currents.

Busbars shall be housed in separate compartments and these compartments shall not contain any wiring or apparatus other than that required for coupling to the busbars.

Access to busbars and busbar connections shall be gained only by the removal of a cover secured by bolts. Behind the covers, an insulating sheet with warning labels bearing the word "DANGER" in bold letters and the lighting symbol shall be provided so that final access can be gained only through removing this sheet secured by round head screws.

1102.2.8 Diesel-Generator Set Stationary 100-2500 Kw, With Auxiliaries

1. Provide and install each engine-generator set complete and very functional, with all necessary ancillary equipment to include: air filtration; starting system; generator controls, protection, and isolation; instrumentation; lubrication; fuel system; cooling system; and engine exhaust system. Each engine-generator set shall satisfy the requirements specified in the Engine Generator Parameter Schedule.

2. Each set shall consist of one engine, one generator, and one exciter mounted, assembled, and aligned on one base; and other necessary ancillary equipment which may be mounted separately. Sets having a capacity of 750 kW or smaller shall be assembled and attached to the base prior to shipping. Sets over 750 kW capacity may be shipped in sections. Each set component shall be environmentally suitable for the location shown and shall be the manufacturer's standard product offered in catalogs for commercial or industrial use. Any nonstandard products or components and the reason for their use shall be specifically identified. Each engine-generator-set shall provide power equal to the sum of Service Load plus the machine's efficiency loss and associated ancillary equipment loads. Rated output capacity shall also consider engine and/or generator oversizing required to meet requirements in paragraph Engine-Generator Parameter Schedule.

3. Transient Response

The engine-generator set governor and voltage regulator shall cause the engine-generator set to respond to the maximum step load changes such that output voltage and frequency recover to and stabilize within the operational bandwidth within the transient recovery time. The engine generator set shall respond to maximum step load changes such that the maximum voltage and frequency deviations from bandwidth are not exceeded.

4. Each engine-generator set specified for parallel operation shall be configured for automatic or manual parallel operation.

5. Each set shall be capable of parallel operation with a commercial power source on an infinite bus and with one or more sets on an isolated bus

6. Each engine-generator set specified for parallel operation shall be configure to manually load share or automatically load share with other sets by proportional loading. Proportional loading shall load each set to within 5% of its fair share. A set's fair share is its nameplate-rated capacity times the total load, divided by the sum of all nameplate-rated capacities of on-line sets. Load sharing shall incorporate both the real and reactive components of the load.

7. The engine-generator set enclosure shall be corrosion resistant and fully weather resistant. The enclosure shall contain all set components provide ventilation to permit operation at Service Load under secured conditions. Doors shall be provided for access to controls and equipment requiring periodic maintenance or adjustment. Removable panels shall be provided for access to components requiring periodic replacement. The enclosure shall be capable of

being removed without disassembly of the engine-generator set or removal of components other than the exhaust system.

1102.2.9 Station Battery System

A station battery system shall be provided to include the battery, battery rack spacers, automatic battery charger and distribution panelboards with overcurrent protection, metering and relaying. Components shall be sized to withstand the seismic acceleration forces specified.

1102.2.9.1 Battery

The battery shall be lead-acid or nickel-cadmium, sized in accordance with IEEE 485, Lead Acid Batteries for Stationary Applications, and conform to the requirements of IEEE 484, IEEE Recommended Practice for Installation Design and Installation of Vented Lead-Acid Batteries for Stationary Applications, Valve regulated lead-acid batteries are not acceptable

1102.2.10 Motor Control

Motor Controllers shall conform to NEMA ICS 3, Industrial Control and Systems: Medium Voltage Controllers Rated 2001 to 7200 V AC and UL 508, Standard for Industrial Control Equipment. Controllers shall have thermal overload protection in each phase.

1102.2.10.1 Manual Motor Controllers

Full-voltage, manually operated manual motor controllers shall be provided for the control and protection of single-phase 60-hertz ac small wattage rating fractional-horsepower squirrel-cage induction motors.

Single-throw, single or double-pole, three-position controllers rated at not more than 750 W, rated 1 hp at 115 V and 230 V single phase shall be provided. Include a supporting base or body of electrical insulating material with enclosed switching mechanism, yoke, thermal overload relay, and terminal connectors. Controllers shall clearly indicate operating condition: on, off, or tripped.

Toggle or key-operated type manual motor controllers shall be provided as indicated and arrange so that they are lockable with a padlock in the "OFF" position.

Recessed manual motor controllers shall be provided for single-speed, small wattage rating fractional-horsepower squirrel-cage induction motors that include a single controller and indicating light in a 100-millimeter square wall outlet box for flush-wiring devices with matching corrosion-resistant steel flush cover plate. Surface-mounted manual motor controllers shall be provided for single-speed, small wattage rating fractional-horsepower squirrel cage induction motors that include a single controller and indicating light in a NEMA 250, Type 1 General-purpose enclosure.

Recessed and surface-mounted manual motor controllers shall be provided for two-speed, small wattage rating fractional-horsepower squirrel-cage induction motors that include two controllers, two indicating lights, and a selector switch in a multiple-gang wall outlet box for flush-wiring devices with matching corrosion-resistant steel flush-cover plate. Surface-mounted manual motor controllers shall be provided for two-speed small wattage rating fractional horsepower squirrel-cage induction motors that include two controllers, two Indicating lights, and a selector switch in a NEMA 250, Type 1 General-purpose enclosure.

1102.2.10.2 Magnetic Motor Controllers

1. Full-Voltage Controllers

Magnetic motor controllers shall be provided for the control and protection of single and three-phase, 60-hertz, squirrel-cage induction motors with fa voltage, full magnetic devices in accordance with NEMA ICS 1, Industrial Control and Systems General Requirements, NEMA ICS 2, Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts, and Ut 508, Industrial Control Equipment.

Overcurrent protection includes three manual reset thermal overload devices, one in each pole of the controller. Thermal overload relays of the melting-alloy or bimetallic nonadjustable type with continuous current ratings and service limit current ratings and with a plus or minus 15% adjustment to compensate for ambient operating conditions.

An externally operable manual-reset button shall be provided to re-establish control power to the holding coil of the electromagnet. The Contractor sha ensure that after the controller has tripped from overload, resetting the motor overload device will not restart the motor.

2. High-Voltage Motor Controllers

High-voltage motor controllers shall be provided for the control and protection of squirrel-cage induction motors, wound-rotor induction motors, and synchronous machines rated 2.4 through 7.2 kilovolts, three-phase, that are NEMA ICS 2, Class E2, type as required.

Unless enclosed within a switchgear or unit-substation cubide, house high-voltage motor controllers in floor-mounted structures of the NEMA type indicated, approximately 2.3 m high, 750 mm wide, and 750 mm deep, with suitable draw-out compartments. Include structural provisions for padlocking the doors.

The structure shall be subdivided into low-voltage control compartment with separate door, high-voltage control compartment with separate door, ac bus compartment, and cable-entrance compartment.

Isolate controller by externally operated draw-out stabs with shutter mechanism which also opens the secondary of the control-power transformer. Interlocks shall be provided to prevent inadvertent operation of the isolating mechanism under load, opening the medium-voltage compartment door without isolating the starter, and closing the line contactor with the door open. Include an isolating switch assembly.

For overload protection, include ambient-compensated thermal overload relays and hand reset in all three phases. Utilizing solid-state multifunction overload protection is acceptable when approved.

Fused type controllers shall be provided employing current-limiting power fuses of the interrupting rating indicated. Single-phase anti-trip protection shall be provided. Magnetic air-break line contactors rated not less than 5 kilovolts shall be provided on starters. Control circuit shall be provided with provisions for external testing of a 120-volt control circuit and a minimum of one (1) set of normally open and normally closed auxiliary contacts.

1102.2.11 Fuses

All switches and switchgear shall be provided with a complete set of fuses. Fuses shall be provided voltage rating of not less than the circuit voltage.

For ratings 30 A, 125 V or less, nonrenewable cartridge type fuses shall be provided. Renewable cartridge type fuses shall be provided for ratings above 30 A, 600 V or less with time-delay dual elements, except where otherwise indicated. It shall conform to NEMA FU

1, Low Voltage Cartridge Fuses, for fuses.

Special fuses shall be installed such as extra-high interrupting-capacity fuses, fuses for welding machines, and capacitor fuses where required. Plug fuses are not permitted.

Power fuses shall be provided on ac systems above 600 volts in accordance with NEMA SG 2, High Voltage Fuses.

Fuses shall be labeled showing UL class, interrupting rating, and time-delay characteristics, when applicable. Clearly, list fuse information on equipment drawings.

Porcelain fuse holders shall be provided when field-mounted in a cabinet or box. Do not use fuse holders made of such materials such as ebony asbestos, bakelite, or pressed fiber for field installation.

1102.2.12 Protective Relays

1102.2.12.1 Overcurrent Relays

Overcurrent relays shall conform to IEEE C37.90, IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus. For protection against phase and ground faults provide a single-phase non-directional removable induction type overcurrent relays with built-in testing facilities designed for operation on the de or ac control circuit indicated.

Ground-fault overcurrent relays with short-time inverse time characteristics and with adjustable current tap range shall be provided as required.

Phase-fault overcurrent relays with varied inverse-time characteristics with adjustable current tap range shall be provided as required. Indicate instantaneous-trip attachments with an adjustable current range as required.

Trip unit shall employ a combination of discreet components and integrated circuits to provide the time-current protection functions required in a modem distribution system.

Complete system selective coordination by utilizing a combination of the following time-current curve-shaping adjustments: ampere setting; long-time delay; short-time pickup; short-time delay; instantaneous pickup; and ground fault.

Switchable or easily defeatable instantaneous and ground fault trips shall be provided.

Make all adjustments using non-removable, discrete step, highly reliable switching plugs for precise settings. Provide a sealable, transparent cover over the adjustments to prevent tampering.

Trip devices shall be furnished with three visual indicators to denote the automatic tripping mode of the breaker including overload; short circuit; and ground fault.

Make available for use a series of optional automatic trip relays for use with the trip unit to provide remote alarm and lockout circuits.

All trip units shall be with test jacks for in-service functional testing of the long time instantaneous and ground fault circuits using a small hand-held test kit.

1102.2.12.2 Directional Overcurrent Relays

Directional overcurrent relays shall conform to IEEE C37.90.

Single-phase induction type relays shall with adjustable time delay and instantaneous trip attachments for directional overcurrent and protection against reverse-power faults. Provide removable type relays with inverse-time directional and overcurrent units with built-in testing facilities.

1102.2.13 Apitong or Approved Equal Creosoted Wood Pole

It shall conform to the applicable requirements of ANSI 05.1, Wood Poles - Specifications and Dimensions.

1102.3 Construction Requirements

The Contractor shall install the Power Load Center Substation and Low-Voltage fully type tested Switchgear and Panelboards at the locations shown on the Plans.

The switchboards shall be of enclosed assembly design, suitable for indoor use in the form of free standing or wall mounting, self-contained, flush fronted cubicles sectionalized as necessary to facilitate easy transportation and erection. The assembly shall be Type Tested in accordance with IEC 61439. The main incoming unit, functional units of metered and unmetered supply, the metered and unmetered busbar sections shall be separately housed in their own cubicles.

Wall mounted switchboards shall be suitable for front access only and the maximum height shall be 2.0 m.

Floor mounted switchboards shall be suitable for front and back access.

The cubicle sections shall be constructed of electro-galvanized sheet steel frames of a minimum thickness of 2.0 mm and the panels shall be constructed from electro-galvanized sheet steel of a minimum thickness of 1.6 mm. It shall be able to withstand a fault level of 36 KA for one (1) second unless otherwise specified in the single-line-diagrams. The enclosures for the switchboards shall provide a degree of protection of IP 4X.

Each cubicle unit shall be incorporated with a removable cover with hidden hinges. The front cover shall have apertures for the protrusion of operating handles of circuit breakers.

The various units comprising a complete switchboard shall be grouped in a multi-tier arrangement including cabling and wiring chamber of ample dimensions to accommodate terminal boards, cable boxes and gland plates.

All external panels of the switchboard shall be treated with a coat of finishing paint, giving a total paint thickness of not less than 50 microns. All coats of paint shall be oven-baked and dried.

Installation of panelboards and enclosures shall be coordinated with cable a e and raceway installation work.

Enclosures shall be anchored firmly to walls and structural surfaces to ensure that they are permanently and mechanically secure.

Panelboard's circuit directory shall be filled out upon completion of installation work and it shall be typewritten or printed.

Bus bar shall be of high conductivity tinned copper, fully insulated, and installed in a segregated compartment completely shielded and isolated from other circuits with sheet metal. Barriers are to be provided between adjacent panels Bus bar shall be supported on non-hygroscopic material, braced and rated to withstand the short-circuit currents. They are to be drilled for future extensions at each end of the switchgear and insulated boots shall be fitted at the ends of the bus bars. Heaters suitable for operating at 230V, 60Hz, AC shall be provided to prevent moisture condensation on bus bars, current transformers, feeder/bus bar spouts and inside the switchgear enclosure.

The switchgear shall be provided with all small wiring, terminal boards, fuses links, labels, cable sockets, foundation bolts test, and earth connections

The Contractor shall follow the manufacturer's instructions for receiving handling, storage, and installation of a unit substation.

1102.3.1 Inspection and Tests

The Contractor shall submit a proposal of preliminary Test and Inspection Plan. Each Low voltage switchgear and controlgear assembly shall be tested in accordance with IEC Standard 60439-1, Low-voltage switchgear and controlgear assemblies Part 1: Type-tested and partially type-tested assemblies.

1102.4 Method of Measurement

The work under this Item shall be measured either by set, pieces or lump sum actually placed and installed as shown on the Plans.

1102.5 Basis of Payment

All works performed and measured and as provided for in this Bill of Quantities shall be paid for at the Unit Bid or contract Unit Price which payment shall constitute full compensation including labor, materials, tools and incidentals necessary to complete this Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
1102 (1)	Panelboard with Main & Branch Breakers	Lump Sum

ITEM 1103 - LIGHTING FIXTURES

1103.1 Description

This Item shall consist of furnishing all lighting fixtures, accessories and fixings necessary for installation as shown on the Plans and in accordance with this Specification.

A light fixture or luminaire is an electrical device to create artificial light that serves as a tool to direct light using reflective and shielding materials.

1103.2 Material Requirements

1103.2.1 General

All fixtures shall be suitable for 220 V single phase 60 Hz power supply system. They shall be complete with accessories and fixings necessary for installation. Fixture housing, frame or canopy shall have a suitable cover for the fixture outlet box or fixture opening.

Fixtures shall be installed at mounting heights as shown on the Plans. The weight of the fixtures shall be adequately supported by hangers. The design of hangers and method of fastening other than shown on the Plans or herein specified shall be submitted to the Engineer for approval.

Wiring within the fixture and for connection to the branch circuit wiring shall not be less than 1.5 mm² or equivalent for 250 V application. Insulation shall be silicon rubber for the lower temperature (fluorescent fixtures) and impregnated asbestos for the higher temperatures (incandescent fixtures).

All materials to be used for lighting fixtures shall be in accordance with the Plans and Specifications. The fixtures shall be completely free from burrs and tool marks, and solder shall not be used as a mechanical fastening device on any part of the fixture.

The color rendering index (CRI) scale shall be used to compare the effect of a light source on the color appearance of its surroundings. A scale of 0 to 100 defines the CRI. CRI shall not be less than 65. Under higher CRI sources, surface colors appear brighter, improving the aesthetics of the space.

Table 1103.1 Efficacy Ranges of Various Lamps

Lamp Type	Rated Power Ranges (watts)	Efficacy Range (lumens/watts)
Linear/Tubular Fluorescent Lamp		
Halophosphate	10 - 40	55 – 70

Triphosphor	14 - 65	60 – 83
Compact Fluorescent Lamp (CFL)	3 - 125	41 – 65
Light Emitting Diode (LED)	3 - 100	80 – 95
Incandescent Lamp	10 - 100	10 – 25
Mercury Vapor Lamp	50 - 2000	40 – 63
Metal Halide Lamp	Up to 1000	75 – 95
Low Pressure Sodium Lamp	20 - 200	100 – 180
High Pressure Sodium Lamp	50 - 250	80 – 130

Source: Guidelines on Energy Conserving Designs of Buildings

1103.2.1.1 Interior Lighting Fixtures

1. Linear Fluorescent Fixtures

a. It shall be suitable for single or twin approximately 1.20 m of 40 watts alternatively 36 watts fluorescent tube as specified. It shall be complete with low loss heavy duty ballast(s), starter(s) and power improvement capacitor.

b. It shall be decorative, commercial or industrial type as specified. In case of industrial type, stove/vitreous enameled reflector shall be provided wherever specified. In case of decorative luminaire, Opal Acrylic diffuser/square polystyrene/vertical metal louvers shall be provided as specified.

c. The fixture shall be surface or recessed mounted as indicated on the Plans. In some cases, single/twin tube fixtures for Offices/Commercial areas shall be decorative recessed mounting type with specially designed aluminum bright anodized reflectors. It shall have a bat wing wide spread distribution light and high optical efficiency. The reflector shall have Matt anodized cross louvers to minimize glare.

d. Only single and/or two lamp ballast shall be used in any one fixture. Ballast shall be completely enclosed inside sheet steel casing, and shall have a corrosion resistant finish. Ballast shall contain a thermosetting type compound not subject to softening or liquefying under any operating conditions or upon ballast failure. Under no condition shall the thermal device permit the enclosure temperature of the ballast to exceed 90ºC Make sure that the compound shall not support combustion.

e. All fluorescent fixtures shall be provided with white lamp holders while industrial type shall have turret type lamp holders.

f. Surface mounted fixtures longer than 600 mm shall have one (1) additional point of support besides the outlet box fixture stud when installed individually. Pendant individually mounted fixtures 1.2 m long and small-sized shall be provided with twin stem hangers. It shall have ball aligners or any similar device and having a provision of 25 mm (minimum) vertical adjustment.

g. Items with appropriate length to suspend fixtures are required mounting height as specified on the approved Plans.

h. Lamps shall be rapid or trigger start, bi-pin base and a minimum approximate rated life of 20,000 hours.

2. Compact Fluorescent Fixtures

There are two (2) units specified under this type of fixture:

a. Integral units - These consist of a compact fluorescent lamp and ballast in self-contained units. Some integral units also include a reflector and/or glass enclosure.

b. Modular units - The modular type of retrofit compact fluorescent lamp is similar to the integral units, except that the lamp is replaceable.

Considerations before the installation include:

a. Reflectors shall be clear, with integral white trim ring, unless noted otherwise. Open reflectors shall have a minimum 18 mm diameter.

b. Fixtures installed outdoors and over food handling areas shall be lensed.

c. Fixtures installed in shower locations shall be provided with flush type plastic reflector with opal lens.

Special Application and Function

a. Teleconferencing areas shall have fixtures which match and are compatible with existing facility installations, including lamp type, lamp color, fixture and lens type, controls, and minimum lighting levels for the vertical and horizontal planes.

b. Low voltage fixtures utilizing MR16 lamps shall be lensed.

c "Clean-room" type fixtures for high purity areas and special laboratory functions shall be triple gasketed, with sealed cam latches.

d. Warning signs (In Use, Beam On, X-Ray In Use, etc.) shall be light emitting diode (LED) illuminated with housing and face color as specified.

e. Task lights shall be equipped with an integral rocker switch. Where two or more task lights are located in a room, a wall switch shall be installed at the entry door for control.

1103.2.1.2 Environmental Rooms and Exterior Lighting Fixtures

Enclosures shall be complete with gaskets to form weatherproof seal where no water can enter or accumulate in wiring compartments, lampholders, or other electrical parts. It shall be provided with low temperature ballasts starting at 0 °C.

Garden and driveway lighting fixtures requirements:

1. It shall be suitable for mounting on GI poles of 2 m to 3 m height. The fittings shall be waterproof, robust and shall have components which are not easily corroded.

2. The connectors shall be easily accessible and suitable for a minimum 2 x 4 mm² PVC aluminum conductor cables. 3.

3. The appearance with the reflector/shade shall be pleasing and aesthetic.

4. The fittings shall be suitable for mounting GLS lamps/ MLL blended lamps/80W/125W/ High Power Micro Wave (HPMW) /70W High Pressure Sodium Vapor (HPSV).

1103.2.1.3 Return Air Troffer

1. The return air troffer where indicated on the Plans, shall have white enamel finish, 4 mm clear prismatic acrylic lens, and shall be recessed in inverted "T" bar ceiling.

2. It shall have the capacity to handle 200 CFM of return air through the side slots of the nominal 1.2 m long fixture (without return air attachment) with a total pressure drop from the rooms to the return air ceiling plenum not to exceed 1.27 mm.

1103.2.2 Emergency Exit Signs

1. Provide exit signs with red Light-Emitting Diode (LED) illumination.

2. Exit signs shall have covers that are composed of a black face and body, smooth red diffusion material, with 152 mm high red letters on black background, directional arrows as indicated. Individual LED's shall not be visible through the diffusion material.

3. Fixtures installed in these areas shall have minimum five (5) year warranty.

4. Exit signs shall be rated for auto-volt (100-240) with back-up power supply.

1103.2.3 Lamps

1. Pin-based compact fluorescent lamps shall be quad or triple tube, 13, 18, 26 or 32 watt similar to NEMA lamp type CFQ13W/G24Q/835 CFTR26W/GX240/835. Compact fluorescent lamps in nominal 39 and 40 watt sizes shall be acceptable. Compact fluorescent

lamps shall be 3,500K color temperature. Original equipment manufacturer lamps that are only available from a single manufacturer shall not be acceptable.

2. Linear fluorescent rapid or instant-start lamps shall be medium bi-pin with minimum CRI of 85. If different lamp manufacturers are submitted, no noticeable difference in color temperature shall be allowed and performance shall be equal to or better than the base lamp. T-8 fluorescent lamps shall have a color temperature of 4,100 K and be specified in 610 mm, 915 mm and 1,220 mm lengths only. Linear 1.2 m lamps used in open fixtures in environments below 21°C, or in operation rooms, shall be full wattage type.

3. Metal halide High Intensity Discharge (HID) lamps shall be ceramic metal halide type, clear, unless noted otherwise, with mogul or medium bases. Acceptable medium base lamp sizes are 50, 100 and 150 watts. Double ended lamps are not acceptable. Any base type other than medium or mogul shall be submitted for Engineer's review and approval in advance. Metal halide fixtures shall be lensed or utilize a lamp (PAR type) which does not require special arc tube protection.

4. Cold cathode, neon, T-5 and T-2 systems shall not be approved for use.

5. The use of LED, induction and fiber optic lighting systems for special applications shall be approved by the Engineer.

6. Lamps, including linear fluorescent, compact fluorescent and high intensity discharge, shall be low-mercury and shall pass all federal Toxicity Characteristic Leaching Procedure (TCLP) test requirements at the time of manufacture.

1103.2.4 Ballasts

1103.2.4.1 Ballasts for Fluorescent

1. High frequency (20 kHz or greater) electronic type.

2. Total Harmonic Distortion (THD) shall be less than 10%.

3. Power factor shall be greater than or equal to 95%.

4. Ballast shall operate with 265 MA Lamps.

5. Unless noted otherwise (such a dual switching, etc.), provide one ballast per fixture.

6. All ballast shall be auto-volt rated.

7. Ballasts shall be Class P Minimum thermally protected.

1103.2.4.2 Ballasts for Compact Fluorescent Lamp

1. All ballasts shall be of high-power factor and capable of independent switching, if two (2) ballasts are provided with a fixture.

2. Dimming ballasts shall be electronic and compatible for line voltage or control wire dimming systems as specified on the Plans.

3. Ballasts shall be magnetic for 2-pin lamp application. Electronic ballasts for other applications shall be submitted for Engineer's approval in advance.

1103.2.4.3 Ballasts for High Intensity Discharge (HID) Lamp

1. HID ballast shall be of the lead-peak auto-transformer type for metal halide lamps. The ballast shall start and operate the lamp at ambient temperatures ranging from minus 7°C to 41°C. All ballasts shall have automatic thema protection, and high power factor, minimum of 90%. Ballasts for interior applications shall be encased and potted, or be of the electronic type.

2. HID ballasts for M90, M110, M130, M139 and M140 rated lamps shall be electronic-type.

1103.3 Construction Requirements

1103.3.1 Locations

1. Wet and Damp Locations - It shall be installed in areas where no water can enter or accumulate in wiring compartments, lampholders, or other electrical parts and shall be marked with "Suitable for Wet Locations" based on the Philippine Electrical Code (PEC) Part 1.

2. Corrosive Locations Ferrous metal shall be bonded and given a corrosion resistant phosphate treatment or other approved rust inhibiting prime cost before application of finish.

3. Fixtures in Indoor Sports, Mixed-Use, and All-Purpose Facilities Fixtures subject to physical damage, using mercury vapour or metal halide lamp installed in playing and spectator seating areas of indoor sports, mixed-use or all-purpose facilities shall be of the type that protects the lamp with a glass or plastic lens. Such fixtures shall be permitted to have additional guard.

4. Fixtures Near Combustible Material - Fixtures shall be installed, or equipped with shades or guards so that combustible material is not subjected to temperatures in excess of 90 °C in compliance with the hazardous area of the PEC, Part 1.

5. Fixtures Over Combustible Material Lampholders installed over highly combustible material shall be of the unswitched type. Unless an individual switch is provided for each luminaire (fixture), lampholders shall be located at least 2,400 mm above the floor or shall be located or guarded so that the lamps cannot be readily removed or damaged.

6. Fixtures in Show Windows - Chain-supported fixtures used in a show window shall be permitted to be externally wired. No other externally wired fixtures shall be allowed.

7. Fixtures in Clothes Closets fixtures in clothes closets shall be permitted to be installed as follows:

a. Surface-mounted fluorescent or LED fixtures installed on the wall above. the door or on the ceiling, provided there is a minimum clearance of 300 mm between the fixture and the nearest point of a storage space.

b. Surface-mounted fluorescent or LED fixtures installed on the wall above the door or on the ceiling, provided there is a minimum clearance of 150 mm between the fixture and the nearest point of a storage space.

c. Recessed fluorescent or LED fixtures with a completely enclosed lamp installed in the wall or the ceiling, provided there is a minimum clearance of 150 mm between the fixture and the nearest point of a storage space.

d. Recessed fluorescent or LED fixtures installed in the wall or the ceiling, provided there is a minimum clearance of 150 mm between the luminaire (fixture) and the nearest point of a storage space

1103.3.2 Installation

1. Installation shall conform to the specifications of the PEC Part 1 and in accordance with the manufacturer's written instructions.

2. Building electrical system requirements shall be checked. Regardless of the catalog number prefixes and suffixes shown, fixtures shall be furnished with the proper trim, frames, supports, hangers, ballasts, voltage rating, and other miscellaneous appurtenances to properly coordinate with Project conditions.

3. The type of ceilings to be installed shall be checked in each room and verify that the recessed lighting fixtures are proper for the type of ceiling to be installed before ordering fixtures. A frame compatible with the type of celling shall be provided in which the recessed lighting fixture is installed. The specified ceiling type shall be referred to the Architectural Room Finish Schedule.

4. Fixtures shall be securely attached to the ceiling-framing members by mechanical means. Clips identified for use with the type of ceiling framing member(s) and fixture(s) shall also be permitted. Lighting fixtures shall be fastened in areas where there is no ceiling securely installed to the structure

5. Immediately before final observation, all fixtures shall be cleaned, inside and out, including plastics and glassware, and all trim shall be adjusted to properly fit adjacent surface, broken or damaged parts and lamps shall be replaced, and all fixtures for electrical as well as mechanical operation shall be tested.

6. Installed fixtures shall be protected from damage during the remainder of the construction period.

7. When replacing an existing fixture, the old fixture shall be disconnected and removed.

8. Pendant fixtures within the same room shall be installed plumb and at a uniform height from the finished floor. Adjustment of height shall be made during installation as per Architect's instructions.

9. Flush mounted recessed fixtures shall be installed so as to completely eliminate light leakage within the fixture and between the fixture and adjacent finished surface. It shall be rigidly secured to a fixture stud in the outlet box. Extension pieces shall be installed where required to facilitate proper installation. Recessed fixtures shall be constructed so that all components are replaceable without removing housing from the ceiling.

10. Fixture shall be completely wired and constructed to comply with the regulations and standards of PEC, Part 1 for electric lighting fixtures, unless otherwise specified.

1103.3.3 Wiring

Wiring of fixtures shall comply with the existing standards of the PEC Part 1.

1. Lighting fixtures shall be connected to a typical metal conduit, junction box, and wire lighting grid system. MC (Metal-Clad Cable) and FMC (Flexible Metal Conduit), when permitted to be used, shall be properly concealed to prevent physical damage. Exposed MC and FMC installations shall not be acceptable.

2. Modular cabling, flexible whip assemblies, feed through wiring, 'daisy-chain' feeds, tandem wiring and other similar wiring methods shall not be acceptable for the lighting circuit distribution and wiring system.

1103.3.4 Testing

Upon completion of installation of interior lighting fixtures, and after circuitry has been energized, electrical energy shall be applied to demonstrate capability and compliance with requirements. When possible, malfunctioned units at the Project Site shall be rectified, then retested to demonstrate compliance; otherwise, defective items shall be removed and replaced with new units, and another test shall be conducted.

1103.3.5 Outlet Boxes, Canopies, and Pans

It shall be in accordance with the requirements of Item 1100, Conduits, Boxes and Fittings.

1103.3.6 Grounding and Bonding

Bonding and grounding shall be provided where necessary to ensure electrical continuity as well as the capacity to conduct safe installation. It shall be in accordance with the PEC Part 1.

1103.4. Method of Measurement

The work under this Item shall be measured in lump sum placed and installed as shown on the Plans.

1103.5. Basis of Payment

The accepted quantity, measured as prescribed in Section 1103.4, Method of Measurement shall be paid for at the contract unit price which payment shall constitute full compensation including labor, materials, tools and incidentals necessary to complete this Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
1103 (1)	Lighting Fixtures and Lamps	Lump Sum

ITEM 1200-AIR CONDITIONING AND VENTILATING SYSTEM

1200.1 Description

This Item shall consist of furnishing and installation of air conditioning, refrigeration and ventilation systems, inclusive of necessary electrical connections, ductworks, grilles, pipes and condensate drains and all other necessary accessories, ready for service in accordance with the Plans and this Specification.

1200.2 Material Requirements

The types, sizes, capacities, quantities and electrical requirements of the compressor, evaporator, condenser chilled water pump and condenser water pump shall be as shown on the Plans.

1200.2.1 Refrigerants

Refrigerants shall comply with the Implementing Rules of Philippine Clean Air Act, 1999. The use of chlorofluorocarbons as refrigerant shall not be permitted.

1200.2.2 Refrigerant Pipes

Refrigerant pipes shall be copper tubing, type L or K or black steel pipe, Schedule 40 for size of 100 mm diameter and smaller. Pipes over 100 mm shall be black steel pipe Schedule 40.

Black steel pipe shall be standard seamless, lap-welded, or electric resistant welded for size 50 mm diameter and larger, screw type for size 38 mm diameter and smaller, fittings for copper tubing shall be cast bronze fitting designed expressly for brazing.

1200.2.3 Pipes for Cooling Water

Chilled and condenser cooling water pipes shall be black steel pipe, Schedule 40.

Pipes and fittings for size 50 mm diameter and smaller shall be screwed type. Pipes and fittings for size 62 mm diameter and larger shall be welded or flanged type.

1200.2.4 Pipe Insulations

Insulations shall be preformed fiber glass or its equivalent.

The insulating materials shall be covered with 100 mm x 0.13 mm thick polyethylene film which shall be overlapped by not less than 50 mm. Pipe insulations shall be adequately protected at point of support by means of suitable metal shield to avoid damage from compression. Insulated pipes, valves and fittings located outdoors shall be provided with protection from weather.

1200.2.5 Ductworks

Ducts shall be galvanized metal sheet of not less than the following thickness:

1. No. 26 (0.55 mm) for 300 mm wide and smaller

2. No. 24 (0.70 mm) for 350 mm to 750 mm wide

3. No. 22 (0.85 mm) for 775 mm to 1,500 mm wide

4. No. 20 (1.01 mm) for 1,525 mm to 2,250 mm wide

5. No. 18 (1.31 mm) for 2,275 mm to 2,500 mm or larger

6. For aluminum sheets use one (1) gauge higher

Joints and stiffeners of ducts using slip joints shall be as follows:

1. 300 mm wide and smaller, without bracing

2. 325 mm to 750 mm wide, brace with 25 mm x 25 mm x 3 mm steel angles

3. 775 mm to 1,500 mm, brace with 31 mm x 31 mm x 3 mm steel angles

4. 1,525 mm up, brace with 38 mm x 38 mm x 3 mm steel angles

Stiffeners shall be located not more than 1,200 mm from each joint.

1200.2.6 Ductwork Insulation

The application insulation materials shall be rigid board made of closed-cell extruded polystyrene foam (XPS) or equivalent 25 mm thick for ground and top floor, 13 mm thick for intermediate floor.

Galvanized metal bands for ducts shall be secured and spaced 300 mm minimum center to center and corners shall be protected with galvanized metal angles.

1200.2.7 Diffusers

The type, shape, capacity, size and location shall be as shown on the Plans.

Diffusers shall be complete with frame and gasket, equalizing deflector and volume control as indicated or specified and shall have a factory-applied prime coat of paint.

1200.2.8 Dampers

Dampers shall be of same materials as duct, at least one (1) gauge heavier and shall have accessible location, complete with locking device for adjusting and locking damper in position.

Where necessary, splitters, butterflies and louvers damper deflecting vanes for control of air volume and direction and for balancing the system shall be provided whether or not they are shown on the Plans.

1200.2.9 Fire Damper

Main duct shall be provided with proper fire dampers of the fusible link actuated type.

Access door shall be provided in ductwork for renewal of fusible link and to reset damper.

1200.2.10 Foundation for the Equipment

Foundation shall be provided and shall conform to the recommendation of the manufacturer of the equipment. Equipment shall be leveled on foundation by means of jacks or steel wedges. All spaces between equipment bases and concrete foundation shall be filled with cement mortar. Cement mortar shall conform to the requirements of Subsection 1710.2.3, Cement Mortar.

1200.2.11 Electrical Works

The Contractor shall provide power supply at the pull box installed inside the machine room and shall furnish and install the main circuit breaker and starter with suitable ratings and capacities, conduits, wirings, fittings, devices and all other equipment and electrical connections needed to complete the electrical installation of the system. All electrical works shall comply with the latest edition of the Philippine Electrical Code (PEC), Part 1, the ordinance of the local government and all the rules and requirements of the local power company.

1200.3 Construction Requirements

The air conditioning system shall be entirely automatic in operation and shall not require the presence of an attendant except for periodic inspection for lubrication. All equipment and materials shall be inspected upon delivery and shall be tested after installation. Pipings shall not be buried, concealed, or insulated until it has been inspected, tested and approved. Walls, floors and other parts of the building and equipment damaged by the Contractor in the prosecution of the work shall be restored as shown on the Plans.

1200.3.1 Operating Tests

Air conditioning equipment shall be tested for 8 h per day for three (3) consecutive days or longer when so directed, under the supervisions of manufacturers qualified and authorized representative, who will make necessary adjustments and instruct designated plant operating personnel for each operation and maintenance of refrigerating equipment and controls. Tests of air flow, temperature and humidity shall be made to demonstrate that each complies with the requirements as indicated in the manufacturer's specifications.

1200.3.2 Miscellaneous

The Engineer shall be provided with three (3) bound copies of "AS BUILT" diagrams, shop drawings, part lists, serial number and inventory of equipment including manufacturers operating and maintenance manuals.

All standard tools and equipment shall be furnished for proper and regular maintenance of installed unit.

1200.4 Method of Measurement

The quantity to be paid for shall be measured either by set, kilograms, square meter or by lump sum completed and accepted by the Engineer in accordance with the Plans and this Specification.

1200.5 Basis of Payment

The accepted quantities, measured as prescribed in Section 1200.4, Method of Measurement shall be paid for at the Contract Unit Price for each of Pay Item isted below that is included in the Bill of Quantities of Air Conditioning and Refrigeration completed in place and incidentals necessary to complete the Item.

Payment shall be made under:

Pay Item Number	**Description**	**Unit of Measurement**
1200 (13)a	Air Conditioning System, Package/Split type	Lump Sum

Section VII. Drawings

Section VIII. Bill of Quantities

Bill of Quantities

Construction of a Permanent Triage/Waiting Area of Bacnotan District Hospital, Bacnotan, La Union

Item No.	Description	Unit	Quantity	Unit Price	Amount (Pesos)
B.5	Project Billboards / Signboard *(Amount in Words)*	ea	1		
B.7(2)	Occupational Safety and Health Program *(Amount in Words)*	L.S.	1		
1003 (1)e1	Ceiling (Gypsum Board on Metal Frame) *(Amount in Words)*	sq.m.	807.08		
1007(2)	Aluminum Glass Door *(Amount in Words)*	sq.m.	8.76		
1008(2)	Aluminum Glass Window *(Amount in Words)*	sq.m.	10.56		
1010(2)b	Wooden Panel Door *(Amount in Words)*	sq.m	4.26		
1018 (1)	Glazed Tiles and Trims *(Amount in Words)*	sq.m	39.6		
1018 (2)	Unglazed Tiles *(Amount in Words)*	sq.m	12.5		
1018 (3)	Granite Tiles *(Amount in Words)*	sq.m	794.58		
1027(1)	Cement Plaster Finish (Plain) *(Amount in Words)*	sq.m	794.19		
1032(1)a	Painting Works (Masonry Painting) *(Amount in Words)*	sq.m	794.19		
1032(1)b	Painting Works (Wood Painting) *(Amount in Words)*	sq.m	807.08		
1046(2)a1	CHB Non Load Bearing (including RSB, 100mm) *(Amount in Words)*	sq.m	110.39		

PROVINCIAL GOVERNMENT OF LA UNION

REFERENCE NUMBER: _____

Construction of a Permanent Triage/Waiting Area of Bacnotan District Hospital, Bacnotan, La Union

Standard Form Number: SF-INFR-55
Revised on: August 11, 2004

Bill of Quantities

Construction of a Permanent Triage/Waiting Area of Bacnotan District Hospital, Bacnotan, La Union

Item No.	Description	Unit	Quantity	Unit Price	Amount (Pesos)
1051(5)	Metal Railings *(Amount in Words)*	li.m.	94.7		
1100	Junction / Utility / Pull / Sqaure Box *(Amount in Words)*	L.S.	1		
1100 (10)	Conduit, Boxes, and Fittings *(Amount in Words)*	L.S.	1		
1101 (33)	Wires and Wiring Devices *(Amount in Words)*	L.S.	1		
1102 (1)	Panelboard with Main and Branch Breakers *(Amount in Words)*	L.S.	1		
1103 (1)	Lighting Fixtures and Lamps *(Amount in Words)*	L.S.	1		
1200 (1)	Ventilating Equipment *(Amount in Words)*	L.S.	1		
1200(4)a1	Package Type Air Conditioning Unit (PACU) *(Amount in Words)*	L.S.	1		
SPL1	Granite Countertop *(Amount in Words)*	L.S.	1		
				Total Bid Amount	

Submitted by:

_____

_____

_____

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) in accordance with Section 8.5.2 of the IRR;

Technical Documents

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

☐ (c) Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid, except under conditions provided under the rules; **and**

☐ (d) Special PCAB License in case of Joint Ventures;
and registration for the type and cost of the contract to be bid; **and**

☐ (e) Original copy of Bid Security. If in the form of a Surety Bond, submit also a certification issued by the Insurance Commission;
or
Original copy of Notarized Bid Securing Declaration; **and**

(f) 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**

☐ (g) 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

☐ (h) The prospective bidder's computation of Net Financial Contracting Capacity (NFCC).

Class "B" Documents

☐ (i) If applicable, duly signed joint venture agreement (JVA) in accordance with RA No. 4566 and its IRR in case the joint venture is already in existence;
or

duly notarized statements from all the potential joint venture partners stating that they will enter into and abide by the provisions of the JVA in the instance that the bid is successful.

II. FINANCIAL COMPONENT ENVELOPE

☐ (j) Original of duly signed and accomplished Financial Bid Form; **and**

Other documentary requirements under RA No. 9184

☐ (k) Original of duly signed Bid Prices in the Bill of Quantities; **and**

☐ (l) Duly accomplished Detailed Estimates Form, including a summary shee indicating the unit prices of construction materials, labor rates, and equipmen rentals used in coming up with the Bid; **and**

☐ (m) Cash Flow by Quarter.

SEALING AND MARKING OF BID ENVELOPES